

# **BENBOW BEST PRACTICE DESIGN GUIDELINES:**

## **NURSING HOME**

### **COMPLEX CARE and DEMENTIA, (BPDG)**

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The BPDG is a model based on Australian, American, European and Canadian evidence-based design principles and practices. Utilization of the following twelve principles of this guideline is suggested as a methodology for developing Functional Programs and for analyzing the design of long term care facilities with an emphasis on efficiency and effectiveness.

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# 1: PRIVACY/RESIDENT ROOM: NURSING HOME DESIGN

**All resident rooms in new Complex Care facilities should be private rooms: i.e. accommodate one resident. Renovation of existing facilities should attempt to eliminate double rooms.**

Experience and research has shown that complex care residents, particularly those with a dementia, do better in private accommodation.

The American Institute of Architects (AIA) and the Facility Guidelines Institute (FGI) have adopted single-bed private rooms as a minimum standard for new hospital construction. Although this pertains to acute care, it is instructive and will set the direction for complex care as well **(AIA, 2006)**.

This standard is the result of a study conducted by Simon Fraser University in Vancouver, British Columbia which shows that private rooms are the trend in hospital planning and design. The advantages of single occupancy rooms are cited as improvements in patient care, enhanced infection control, and greater flexibility in operation. Built in flexibility is so essential because technology is so quickly obsolete and resident populations are constantly changing. Construction costs were reviewed and show that single rooms cost approximately 14% more than doubles. However the authors concluded that initial capital costs, which are often the rationale for double rooms, are quickly overshadowed by ongoing operating costs. Initial capital costs should not be the driving and determining factor. Medication errors were reduced in single occupancy rooms, and consultation with health care professionals was more thorough and more productive. Studies and surveys of residents' preferences for room design indicate that the majority of residents prefer single rooms because of greater privacy, reduced noise, reduced embarrassment, improved quality of sleep, avoidance of upsetting other residents, and opportunity for family members to stay. Crowding was found to increase higher blood pressure. It also impacted socialization. The elderly living in long term care facilities need enough space to have their needs for privacy and territoriality met. The use of private rooms and social lounges minimizes the residents' sense of crowding. When dementia residents were moved from a ward style high-density special care unit to a new, low-density special care unit with private rooms disruptive behaviours decreased **(Chaudhury et al, 2003)**.

The US Institute of Medicine notes the following:

"Quality of life is also affected by the physical surroundings, which can be pleasing or depressing and can promote independence or dependence. In particular, most residents, prospective residents, and families consider private room and bath important to independence, dignity, and social interaction."**(Gooloo et al, 2001)**.

Wherever possible residents should have private rooms. **(Fraser Health Unit, 2004)**.



## 2: ACCESSIBILITY: NURSING HOME DESIGN

### Complex Care facilities must enhance full wheelchair accessibility

The BPDG follows the same principle of universal design as reiterated in the US Department of Veterans Affairs Community Living Centers Design Guide (VA: CLCDG, 2011): “The rooms are designed universally to accommodate all residents regardless of needs “(p.3.5) This means full wheelchair accessibility.

<http://www.cfm.va.gov/til/dGuide/dgCLC.pdf>

Wheelchair maneuverability is primarily a function of room size, door widths, corridor widths and level access. The US Department of Veterans Affairs points out that the standard Federal accessibility code used a younger, more fit population to determine their parameters. Frail, disabled patients are less able to manoeuvre wheelchairs, often need someone to assist them, and have a more limited reach than independent, more physically sound wheelchair users. Enhanced space allowance makes nursing simpler, puts less strain on staff, gives patients more independence, and requires less patient supervision by a limited staff (US Department of Veteran Affairs, 2004). Similar problems are faced in applying the Canadian National Building Code accessibility guidelines to seniors (BC Ministry of Municipal Affairs, 1999).

**The article by this author “*Are Nursing Homes Falling Short In Full Wheelchair Accessibility?*” published in Canadian Nursing Home, Vol.24, No.4, December 2013 (available wabenbow.com) provides a checklist and details for senior oriented accessibility features in nursing homes. Support documentation for scoring the checklist is also available from wabenbow.com.**

#### **i. Front Entrance: Level Walkway to Main Entrance:**

One would hope that a site chosen for a facility would be relatively level with easy access to outdoors, parking, sidewalks, and surrounding amenities. Minimally it is expected that from the main entrance drop off point there will be an ‘accessible path of travel’ for visitors, staff and residents. The walkway leading to the front door must be contiguous: i.e. a level plane surface. It should be of a minimum 1524 mm (5’) wide and of a permanent firm slip resistant material. If it is sloped it should be inclined at a maximum 1 in 20 gradient. It should have a curb of a minimum 75 mm (3”) if there is a drop off of more than 75 mm. (BC Building Access Handbook, 2007)

#### **ii. Front Entrance Door: Power Operated:**

Building Codes require a power operated front entrance door for care facilities. This can be initiated by an easily reached manual push pad or by automatically controlled sensors. Sliding doors are preferable and less cumbersome for wheelchair users. They should have a programmable closure delay set at 4 – 6 seconds. (BC Building Access Handbook, 2007)

### iii. Front Door Width and Clearances:

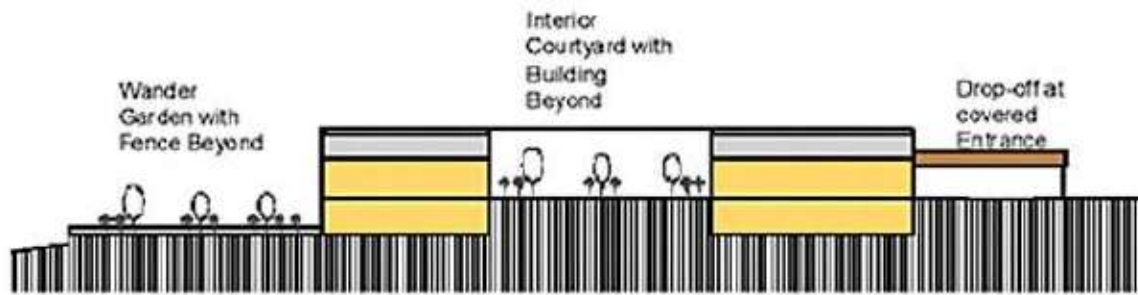
Front Entrance doors should have a minimum opening of 914 mm (36"). Building Codes and ADA guidelines generally require a minimum 800 mm – 815 mm (32") for accessible door openings, however Long Term Care Guidelines recommend 914 mm as a minimum width for wheelchair accessible doors intended for use by frail seniors.

Equally important for accessibility is a level clear area before each side of the door. These clearances apply to all accessible doors and are there basically to allow the wheelchair to manoeuvre out to the way of the door swing. So, if the door is a swing type, then on the side where the door swings towards the wheelchair user there must be an area of a minimum length of 1100 mm (43") plus the width of the door swing. If in a vestibule then the minimum length is 1220 mm (48") plus the width of the door. If the door swings away from the user or if the door is a slider, the area must be a minimum 1100 mm long.

A feature often missed is the requirement for width clearance on the latch side of doors: i.e. 600mm (24") on the side of the swing towards the user; and 300 mm (12") on the side of the swing away from the user. This means that the width of the clear and level area must be a minimum of the width of the door plus the latch side clearance. **(BC Building Access Handbook, 2007)** As noted above these are minimum clearances, so a more functional clear and level area before the door would be 1524 mm wide by 1524 mm long plus the width of the door for swings towards the user.

### iv. Outside Access:

It is ideal if a care facility is limited to a one or two story building with grade access on both levels for easy accessibility. Under 'Lessons Learned' Nova Scotia points out that "The site should be large enough and of such profile to support the entire facility as a one or two storey structure with at grade access to each level. This approach improves access to the outdoors and provides more possibilities for enjoying natural stimuli, provides a greater sense of security in terms of evacuation, and promotes less reliance on elevators in maneuvering to events in public areas of the facility." **(NS, 2007, p.7)** Such easy access to shared amenities and programs is time efficient for staff and residents. However, this is not always economically feasible, particularly in urban locations. In multi-story configurations it is expected that there will be access from each level to patios, decks, balconies or sunrooms. It is preferable that there be direct access from every House; and that doors to the outside area be powered with a pad. Generally, a larger at grade garden is also shared with all levels. And of course all outdoor areas should be level with a maximum doorway threshold of 13 mm (1/2"). Although BC has traditionally required 1.5 square metres per resident of outdoor space, the recent Alberta Guidelines call for 2 square metres per resident of outside space, which is more accessible. **(Alberta, 2012)**



#### v. Contiguous floor levels:

Floor levels must be contiguous and a continuous level surface. Generally changes in flooring level are not permitted, particularly where wheelchair manoeuvrability is critical such as in turning circles and required clear areas in front of doors and fixtures. However in some areas such as walkways small tolerances are acceptable. Where this occurs, flooring joints should have a maximum vertical height differential of 6mm (1/4") and preferably no more than 2 mm (1/25"). Thresholds should be a maximum 13 mm (1/2") in height and bevelled at 45 degrees or less. **(ADA, 2010)**

#### vi. Turning Circle of 1676 mm (5'6"):

We recommend that where possible the basis for area requirements be a minimum turning circle of 1676 mm (5'6"), rather than the Building Code minimum of 1524 mm (5'). This is particularly useful for residents requiring an assistant to help them manoeuvre and for those who utilize motorized wheelchairs. The BC Multilevel Care (MLC) Design Guidelines show that even for an ordinary wheelchair, the turning diameter with one wheel stationary is 1855 mm. With opposing rotation of each wheel it is 1650 mm. **(MLC, 1992, Fig.16)**. Vancouver Coastal Health Authority called for a turning circle allowance of 1800 mm (6'). **(VCH, 2007)**. Turning circle allowance has a critical impact on the size of resident rooms in terms of clearances and room to manoeuvre on both sides of resident beds and in ensuites. We consider 1676 mm (5'6") a good compromise that is sensitive to cost issues which result from increased area requirements. This is in line with the US Veterans Community Living Centers. **(CLC, 2011)** Pressalit Care has a comprehensive table of turning areas by type of wheelchair with and without assistance in their 'Design Guide Bathroom'. **(Pressalit, 2007)**

#### vii. Corridor width of 1830 mm (6 feet):

The **2010 Canada National Building Code (CNBC)** has created a new classification for care facilities that permits a minimum corridor width of 1650 mm (5'5"). Guidelines for Long Term Care facilities generally require a minimum corridor width of 1820 - 1830 mm (6 feet) to comfortably accommodate two passing wheelchairs. **(Ontario, 2009)** Corridor width often must accommodate service carts, lifts, motorized wheelchairs, as well as unsteady pedestrians. A minimum for safe passage in the corridor is 1830mm. Lay-bys or alcoves are useful for temporary parking of lifts and carts. Some Guidelines

require 2400 mm (8 feet) but that requirement was derived from the erroneous assumption that patients are moved in their beds in emergencies. **(VCH, 2007)** Articulation of the corridor walls particularly at doorways and with alcoves makes the corridor more interesting and functional. So, a minimum of 1830 mm with articulation is a good compromise.

#### **viii. Minimize length of corridors:**

Layout of Care Houses should be designed with a view to minimize length of corridors in order to functionally reduce distances travelled for staff and residents. Pinet has shown that proximity increases usage of amenities: a space 20 feet away would be used five times as often as a space 100 feet away. (Pinet, 1999) Nursing Home design guidelines generally support this principle. Nova Scotia is particularly helpful in providing measurable guidelines: “the travel distance between resident bedroom entry doors and the entry to the dining room must be 50 feet (15.3 m) for 50% of the residents and less than 75 feet (23.0 m) for the remainder.” (NS, 2007, p.9) Clearly, the accessibility of amenities is a function of their proximity to resident bedrooms: hence short corridors are mandated.

#### **ix. Resident Room Useable Space (excluding ensuite and vestibule):**

Resident Rooms come in two basic configurations: a Panhandle design which has a vestibule entrance; and a Paired Ensuite design which has no vestibule and places two ensuites between rooms. This makes Resident Room areas difficult to compare unless the area is reduced to useable space: i.e. excluding the ensuite and vestibule. A vestibule is approximately 2 – 3 square meters and an ensuite generally between 5 and 6 square metres. As a result the Panhandle design needs to have a larger area. The overall area of a private resident room including ensuite should be a minimum of 22–25 sq. m (237 - 265 sq. f) with panhandle designs at the upper end of the range because of the vestibule.

Some years ago British Columbia recommended a room size of 21 sq. metres overall and this has been found to be very tight for complex care equipment, particularly with the Panhandle Design. **(MLC, 1994)** Some recent Complex Care facilities have designed resident rooms in the mid to high twenties in terms of square metres. This size allows for the larger turning circle of 1676 mm (5'6") and so better accommodates electric wheelchairs and lifts.

Some examples are instructive: New Brunswick shows a compact paired ensuite design based on a 1524 mm (5') turning circle with 15.79 sq. m. of clear area excluding the ensuite. **(NB, 2010, p.25 – 27)** With a larger turning circle and a Panhandle Design, Vancouver suggests 23 sq. m. including the ensuite: i.e. 17 sq. m. of useable space. **(VCH, 2007, p.33)** Veterans Affairs with a Panhandle Design and larger turning circle calls for 20.9 sq. m. for the resident room plus 6 sq. m. for the ensuite for a total of 26.9 sq. m. **(CLC, 2011 p.4-8, 4-13)** Nova Scotia calls for 17.7 sq. m. excluding the 7 sq. m. ensuite. **(NS, 2007, p.23)**

For a bare minimum with a 1524 mm (5') turning circle 16 square metres of useable space is acceptable; however, for frail seniors it is preferable if possible to have 17 sq. m (183 sq. f) of useable space which allows for a 1676 mm (5'6") turning circle. And for a bariatric room New Brunswick has a good graphic showing a paired ensuite design of 21.5 sq. m. of useable space. **(NB, 2010, p.31)**

## **x. Resident Room Minimum Dimensions (Clearances):**

### **Clearances:**

Although Useable Space is the simplest way to determine a guideline for accessibility, it is also critical to determine minimum dimensions of a resident room. This is to ensure adequate clearances: i.e. passage of wheelchair and walkers past the end of the bed and adequate space for turning circles and access on both sides of the. Vancouver requires a minimum 1200 mm (47") wide passage for movement past the end of the bed. **(VCH, 2007)** Nova Scotia requires that there must be a minimum of 5 feet (1524 mm) clear on either side of the bed and 4 feet (1200 mm) clear at the end of the bed. **(NS 2007)** Like Nova Scotia, Alberta requires access on three sides of the bed and unobstructed turning radius for a wheelchair on at least two sides. **(Alberta, 2012, p.15)**

### **Width:**

Given that a reasonable allowance for a bed is 2235 (7' 4") and adding a passing allowance of 1200 mm (47"), an overall width minimum of 3455 (11' 4") is tight but acceptable for a paired ensuite design. The width needs to be increased to 4000mm (13' 1") in the panhandle design in order to accommodate the minimum ensuite size of approximately 2200 mm (7' 3") plus partition and width of the vestibule which needs to be a minimum 1676 mm (5' 6") to allow for the entrance door installation and latch side clearance.

### **Length:**

In terms of length a panhandle entrance and adjacent ensuite consumes approximately 2133 mm (7') of the length of the room. In the remaining length 1066 mm (42") of bed width needs to be accommodated, with night tables and perhaps an armoire or chair and bed access clearances. This results in a minimum length of 6550 mm (21' 6") for the panhandle design and 4548 mm (14' 11") for the paired ensuite layout.

For a Panhandle Design with a turning circle of 1524mm (5') a minimum of 4000 mm (13' 1") by 6550 mm (21' 6") is required. A Paired Ensuite layout needs a room 3455mm (11' 4") by 4548mm (14' 11"). **(NB, 2010, p. 27)** Resident rooms based on a 1676 mm (5' 6") turning circle will need to be slightly larger, as will rooms designed for bariatric residents. Veterans Affairs has examples of standard and bariatric rooms based on a panhandle design and a 1676 mm (5' 6") turning circle. **CLC, 2011, p.4-13 and 4-19)** New Brunswick has examples of Paired Ensuite Bariatric rooms with a larger turning circle. **(NB, 2010, p.29 and 31)**

## **xi. Resident Room Ensuite Size:**

The size of ensuites needs to accommodate wheelchairs and should be a minimum 5.3 sq. m (57 sq. feet). This is a minimum size and is designed to allow a 1524 mm (5') turning circle and to include a European style shower where the toilet can be used as a shower seat. Without a shower 4.5 sq. m. is an acceptable minimum. New Brunswick guidelines have an ensuite of 5.6 sq. m. (60 sq. f.) **(NB 2010, p.63)** A more preferable size is 6 sq. m (65 sq. feet) which can better accommodate trash receptacles and glove and sanitizer dispensers which McGuinness has referenced as a growing concern. **(McGuinness, 2013)** This also allows for a 1676 mm (5'6") turning circle, a shower chair and adequate space for staff assistance on two sides of the toilet. **(CLC, 2011 p.3-8, 4-8, 4-13)** For its Residential Care Facilities Nova Scotia requires 7 sq. m (75 sq. f) when a wheelchair accessible shower is included. **(NS, 2007, p. 44)**. Another way to measure the accessibility adequacy of the resident room ensuite is to require a minimum dimension of 2400 mm (7'10") x 2200 mm (7' 3"). This yields the minimum 5.3 sq. m. and ensures the minimum 1524 mm (5') turning circle. A square room of 2438 mm (8') sides will provide 6 sq. m. For 7 sq. m. a room would need a minimum dimension of 2600 mm (8'6") by 2700 mm (8'10").

## **xii. Resident Room and Ensuite Door Openings:**

Usable door openings for resident rooms should be between 1050 mm (41 inches) and 1220 mm ((48")) while ensuites should be a minimum of 914mm (36 inches). Ontario requires 1120 mm (44 inches) for Resident Room doors and 914 mm for ensuites. **(Ontario, 2009)** Nova Scotia asks for 1050 mm (41") for the entrance doorway; and 914 mm for the ensuite. **(NS, 2007)** New Brunswick and Vancouver call for 1220 mm (48") for the entrance door. Vancouver also requires 1220 mm for the ensuite door. **(NB, 2010; VCH, 2007)** Most will allow two leaves for the entrance door so that the one leaf has a minimum 900 mm clearance.

Swing doors can be awkward for residents in wheelchairs, and consume a great deal of space, so alternatives for ensuite doorways could be considered such as pocket doors, sliding track doors (barn style), accordion style and saloon style. Some facilities receive permission from the relevant authorities to remove the ensuite doors entirely in dementia units. Washroom doors should not open inwards, unless extra allowance is made to ensure that fallen residents cannot be trapped behind the door. Two way or double acting safety hinges can mitigate the size of room required.

Clear area requirements in front of doors are the same as for Front Entrances. Particular attention needs to be paid to latch side clearances: i.e. 600 mm (2') for door swing towards the user and 300 mm (1') for swing away from the user.

### **xiii. Ensuite Toilet Access - height and clearances:**

Barrier free toilets vary from 406 mm (16") to 460 mm (18"). Elderly women tend to be shorter and prefer a medium height of approximately 431 mm (17").

Clearances are critical for toilet access and assistance. Alberta shows 800 mm (31.5") by 1500 mm (5') clear area for side access to the toilet on one or two sides. **(Alberta, 2012)** Vancouver required access from three sides, with clearances of 600 mm to 800 mm on each side. **(VCH, 2007)** Ontario is more conservative requiring access from the front and at least one side. **(Ontario, 2009)** Some facilities install toilets with one side access alternating from room to room on left or right sides to allow for room assignment by need.

### **xiv. Ensuite Fixtures:**

A barrier free sink requires at least 700 mm (28") on at least one side of the sink for an assistant, and 1100 mm long by 800 mm wide in front of the sink. The sink should have a maximum height of 865 mm (34") with under sink clearances of 735 mm (29") at the front edge, tapering to not less than 660 mm at a point 250 mm back from the front face. **(Building Access Handbook, 2007)**

Some care models are including ensuite showers in the resident bathroom to provide privacy and assist with incontinence issues and infection control. **(VCH, 2007; CLC, 2011)** This is becoming a standard in most new care facilities in British Columbia, is common in Europe and is now a US Veterans Affairs requirement. European style showers use the entire washroom by providing impervious wall and floor finishes and a floor drain. Modular showers should be 1500 mm by 900 mm (5' by 3'), have a maximum bevelled threshold of 13 mm (1/2") and a clear entrance area of 1500 mm by 900 mm. **(Building Access Handbook, 2007)**

Ensuites should include tilting mirrors for wheelchair users, and sufficient grab bars for safety near all fixtures, as well as glove and sanitizer dispensers and trash receptacle. Consider a nurses cupboard for special supplies.

### **xv. Assisted Bathing Suite:**

Assisted bathing tubs are standard in Care facilities, usually with accessible showers although bathing suite showers can be eliminated if they are provided in resident ensuites. Alberta requires a 1200 mm (48") entrance door. **(Alberta, 2012)** The Assisted tubs come in a variety of formats including recumbent. Sufficient area needs to be allocated to allow manoeuvrability of stretchers and lifts. Nova Scotia requires 1200 mm (4') access on three sides. **(NS, 2007)** Ceiling lifts are usually part of the room specifications although some tubs are designed with their own lifts. An area of 20 to 24 sq. m. (215 – 258 sq. f.) is recommended to accommodate fixtures, clearances and storage. This allowance includes an adjacent toilet and sink. New Brunswick allocates 15.8 sq. m. for a Bathtub Room, 8.4 sq. m. for the Shower Room, plus 5.6 sq. m. for Bathing Suite Storage. **(NB, 2010)**



## **xvi. Door Handles and Closures:**

The National Building Code requires that door handles be operable by devices which do not require tight grasping, or twisting of the wrist. Push-pull mechanisms which do not require grasping are acceptable. Doors need to operate with a force not more than 38 N for exterior doors and 22 N (5 pounds) for interior doors. **(Building Access Handbook, 2007)** It is preferred that doors not have closures, but if they do, there should be a minimum 5 seconds delay. **(ADA, 2010)** Lever or blade handles are preferred on both doors and fixtures. Alberta requires blade handles on faucets to be 10.2 cm. **(Alberta, 2012)** Ontario prefers C or D type handles on sliding doors. It is a good idea to use contrasting colours for handles. **(VCH, 2007)**

## **xvii. Resident Room Ceiling Lift System:**

Ceiling track lifts should be considered for Complex Care resident rooms and in assisted bathing rooms. An overhead lift system can reduce staff injuries and is economical in terms of space. Mobile floor lifts are certainly acceptable but do require considerable area for manoeuvrability. Nova Scotia requires ceiling tracks in every resident bedroom and sufficient lifts to accommodate 1 in 6 residents. **(NS, 2007)** New Brunswick requires ceiling lifts that run from the resident's bedroom into the ensuite. The tracks are to be recessed and coloured to match the ceiling. **(NB, 2010)** Vancouver requires an X-Y gantry ceiling lift system that provides better room coverage than a single track. Vancouver makes it optional to run the track into the ensuite. **(VCH, 2007)** The more recent Alberta guideline leaves it up to the facility to determine whether to use mobile floor lifts or ceiling lifts and points out the serious design complications of extending the ceiling track from a resident's bedroom into the ensuite: i.e. raising the ensuite ceiling and overcoming challenges in mechanical ducts and pipes. **(Alberta, 2012)** Some residents have reported that it is uncomfortable to be transferred by a ceiling lift into the ensuite rather than in a commode or wheelchair.

## **xviii. In House Amenity Area (Dining plus Lounge plus Activity)**

Minimum allocation for amenity space for resident use should total 6 sq. m. (64.5 sq. f) per resident in each House unit.: 3 sq. m. (32 sq. f) for dining and 3 sq. m. (32 sq. f) for lounge/activity. Complex care is seeing a rapidly increasing use of wheelchairs, geriatric chairs, and walkers so a total of 7 sq. m. (75 sq. f) would be preferable. BC determined that a minimum of 3 sq. m (32 sq. f) per resident is required for dining in order to accommodate wheelchairs. **(MLC, 1994)** Subsequent experience indicates that Lounge and Activity allowances need to be right sized as well to a minimum allocation of 3 sq. m. (32 sq. f) per resident. More recently Veterans Affairs determined that activities requiring tables such as dining and social areas need a minimum 3.35 sq. m. (36 sq. f) This is based on 1220 mm (48") square tables arranged at diagonals and provides circulation of 1220 mm (48") which includes turning space to avoid conflicting with other occupants while conserving necessary square footage. **(CLC, 2011. p.3-21)** In line with this Nova Scotia requires 3.34 sq. m. (36 sq. f) for dining and 3.34 sq. m. (36 sq. f) for living area per resident in each House for a total of 6.7 sq. m. (72 sq. f). **(NS, 2007, p.27 and 28)** New Brunswick calls for 3.5 sq. m. (37.5 sq. f) for dining and 2.5 (27 sq. f) for lounge for a total of 6 sq. m. (64.5 sq. f) plus an additional allowance for activity area. **(NB, 2010)** With the movement towards a



smaller number of residents in each House it has become difficult to provide a variety of living areas with the traditional per resident amenity area allowance, particularly if there is a desire for shared neighbourhood multipurpose activity space. Six to seven square metres per resident of in-House amenity area is reasonable.

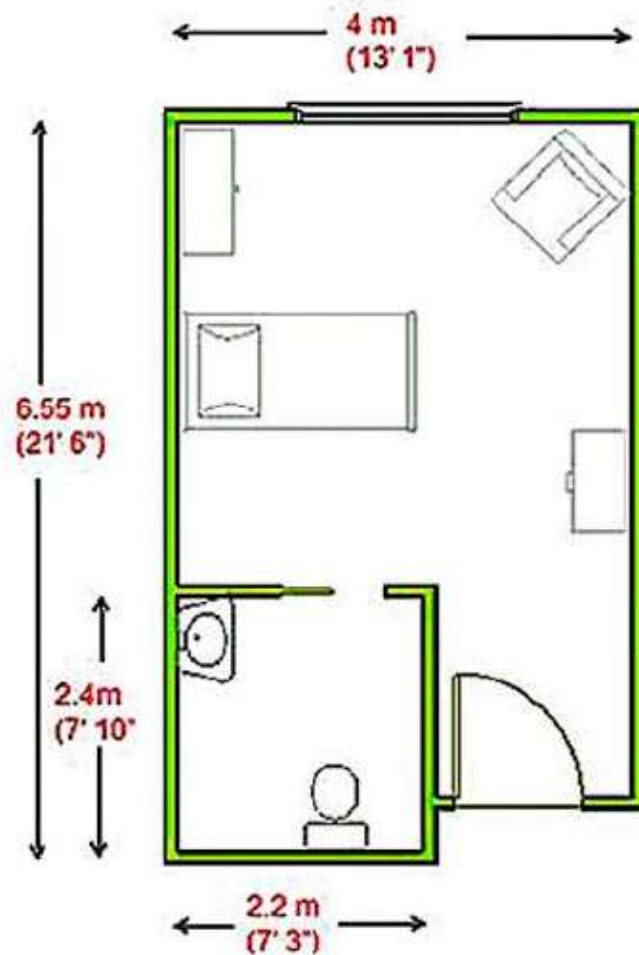
**xix. Resident area controls - height from finished floor:**

Switches and other resident activated controls should be within the reach threshold of frail residents: i.e. located between 900 mm (35.5") and 1200 mm (47") from the floor. **(Building Access Handbook, 2007)** In addition there should be a clear floor area adjacent to the controls with a minimum of 1220 mm x 1220 mm (48" square). **(ADA, 2010)** Consider motion sensor activated controls: e.g. for light switches in ensuites.

**xx. Resident area windows – viewing height from floor:**

Alberta requires that each resident bedroom have one operable window located a maximum of 610 mm (24") from the floor in order to provide direct views of the outside from both a sitting and lying in bed position. The window should provide good levels of natural lighting and not open more than 152 mm (6") for safety. **(Alberta, 2012)** Nova Scotia and New Brunswick have similar requirements with a sill height of 630 mm (25"). **(NS, 2007, NB, 2010)** Ontario follows suit with a requirement for a sill height maximum of 600 mm and an overall window size of at least 10 percent of the floor area of the bedroom to ensure that there is sufficient natural light. **(Ontario, 2009)**

**Good layouts for BPDG resident rooms: ensuite includes European shower:**



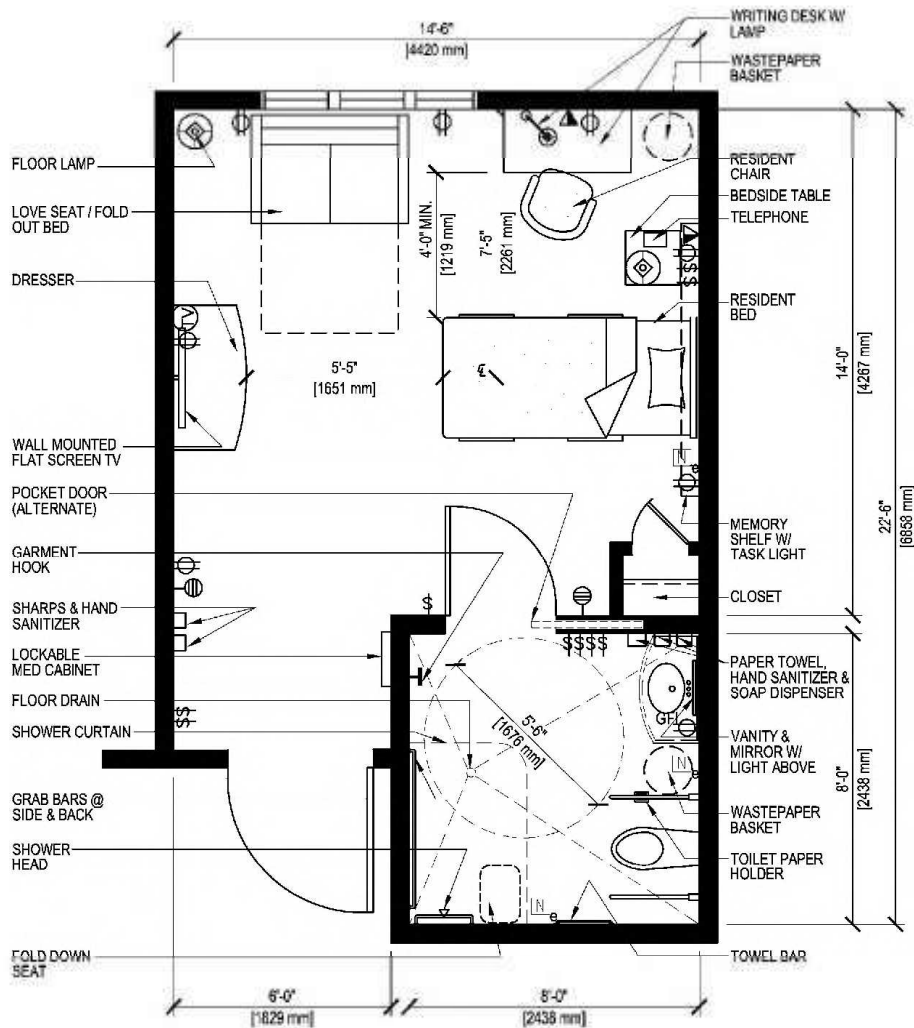
### CRD MODEL

24.6 sq. m (265 sq.f)

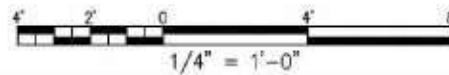
16.3 sq. m. usable space (175 sq.f)

CRD Model Resident Room, Panhandle design, by Kevin Brewster, Victoria, 2002

## H1.0 Resident Bedroom (BRNP1); and Bathroom (TLTS2) Floor Plan



Resident Bedroom (BRNP1): 225 NSF [20.9 m<sup>2</sup>]  
Resident Bathroom (TLTS2): 65 NSF [6.0 m<sup>2</sup>]



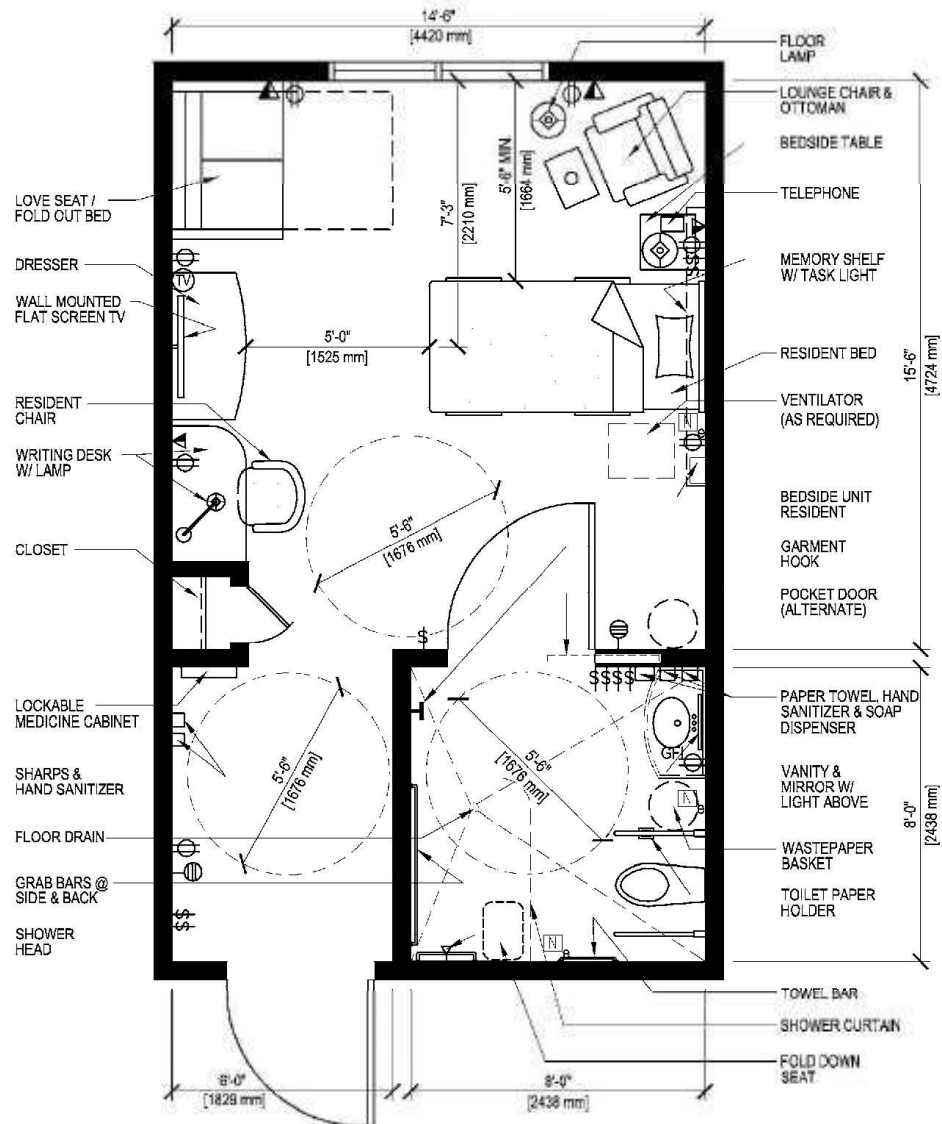
Department of  
Veterans Affairs

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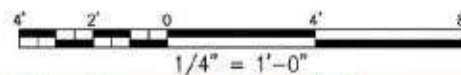
Office of Construction & Facilities Management

Veterans Affairs Community Living Centers Design Guide layouts (VA: CLCDG, 2011) :

## H2.0 Special Care Resident Bedroom (BRNP2); and Bathroom (TLTS2) Floor Plan



Special Care Resident Bedroom (BRNP2): 280 NSF [26.0 m<sup>2</sup>]  
Special Care Resident Bathroom (TLTS2): 65 NSF [6.0 m<sup>2</sup>]



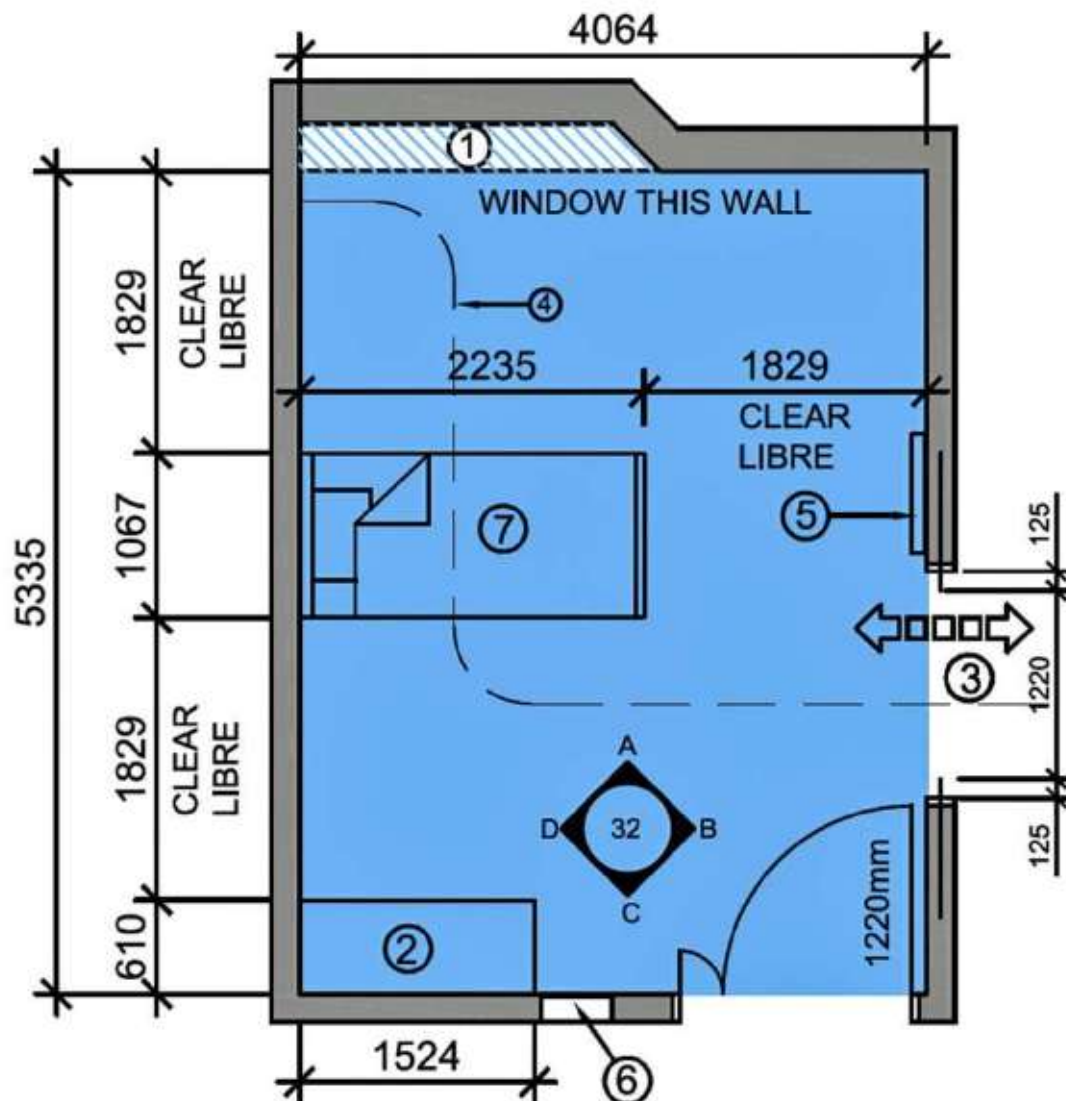
Department of  
Veterans Affairs

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Office of Construction & Facilities Management

Veterans Affairs Community Living Centers Design Guide layouts (VA: CLCDG, 2011) :





Bariatric Resident Room: New Brunswick DSD Design Standards for Nursing Homes, p.31, 2010.

### 3: SMALL SELF CONTAINED HOUSE UNITS: NURSING HOME DESIGN

#### Complex Care facilities should be divided into small self contained house units of 12 to 25 beds, preferably sub-divided into Social Wings.

As early as 1991, Health and Welfare Canada recommended that 4 to 8 is the ideal group size for dementia residents, though 8 to 12 may be more realistic for economic considerations. It noted that several sources suggest that a unit contain a maximum of 10 to 20 residents. (Health and Welfare Canada, 1991) This principal that care units should be small has been generally accepted in the design of complex care facilities in British Columbia since the release of the 1994 Multilevel Care Design Guideline Review. In BC units of 14 to 25 are now standard. These units should be self contained: i.e. have their own dining, lounge, bathing and care staff.

A good summary of the rational for the 'Small House Unit' principal is available in a New South Wales publication: which notes that groups of eight have been found to be sufficiently small for the care of the mobile, confused and disturbed, but groups of 14 people with moderate dementia have been shown to work well and offer a more practical option. ( **Fleming et al, 2003**)

A review of seven English facilities for dementia residents concluded that there is broad agreement that it is desirable for dementia care homes to be small scale. The homes that they studied ranged from house units of 8 to 24. They recommended an upper limit of 15 but recognized that financial considerations are a factor (**Cantley, 2002**).

In an article entitled "Ten new and emerging trends in residential group living environments," it was pointed out that one of the most significant North American developments was the movement from large scale nursing homes to small scale clusters of about ten residents each. It was noted that these individual clusters are often com-bined into group clusters of between 5 and 7 units and connected to a larger system of service provision. Nursing homes in Northern Europe have had this model for years based on clusters of 6 to 8 residents (**Regnier and Denton, 2009**).

Gaius Nelson, a U.S. architect describes the evolution of nursing homes from the "institutional to the small house model," (**Nelson, 2009**). Nelson, a pioneer in the movement toward the Small House model, was instrumental in the development of the Creekview Household model in Oshkosh, Wisconsin. He based the size of his Household on the observation that "in any group we tend to see one-third of residents who participate in all offered activities, one-third who almost never participate, and one-third who may or may not join in." He concluded that a Household of between 8 and 12 would provide the optimum formation for a social group of between three and eight residents.

Dr. Margaret Calkins, Ph.D., looked at the ten most significant changes in senior living design over the past decade and concluded that the Small-House and Household model was one of the major highlights (**Calkins, 2011**). She found that virtually every study that examined resident/staff outcomes pertaining to the size of resident groupings concluded that the outcomes were more positive with smaller groupings.

Outcomes included:

- less disruptive behaviours,
- greater socialization,
- less use of psychoactive medications,
- greater resident, family and staff satisfaction.



It has been found that by reducing the size of care houses it is possible to group and manage residents according to their common needs. Small, physically separate units are most appropriate for meeting the special needs of residents with severe mental health and behaviour management problems. Some units can be utilized for the various stages of dementia residents, while others can be dedicated to the frail elderly and those with various complex medical needs, and others for younger disabled adults, or those with mental illness.

Experience has shown that through creative designing, it is possible to share some amenities in Neighbourhoods, and so create even smaller units economically. Highview Residences of London Ontario is a good example of this, with two groupings of six beds each sharing amenities in two back to back 12 bed homes that share a kitchen and support areas.

With Houses in the 20 to 25 resident range, it is preferable to sub-divide the Home into Social Wings of approximately 12 residents with their own activity and lounge areas. This is a more manageable size especially for dementia residents and is easily attainable with L, T, U, H or Chevron shaped layouts.

**The Article by this author "*Advantages of 'Small House' designs in dementia care*" published in Canadian Nursing Home, Vol.23, No.1, March 2012, has additional details and examples. (available [wabenbow.com](http://wabenbow.com)).**

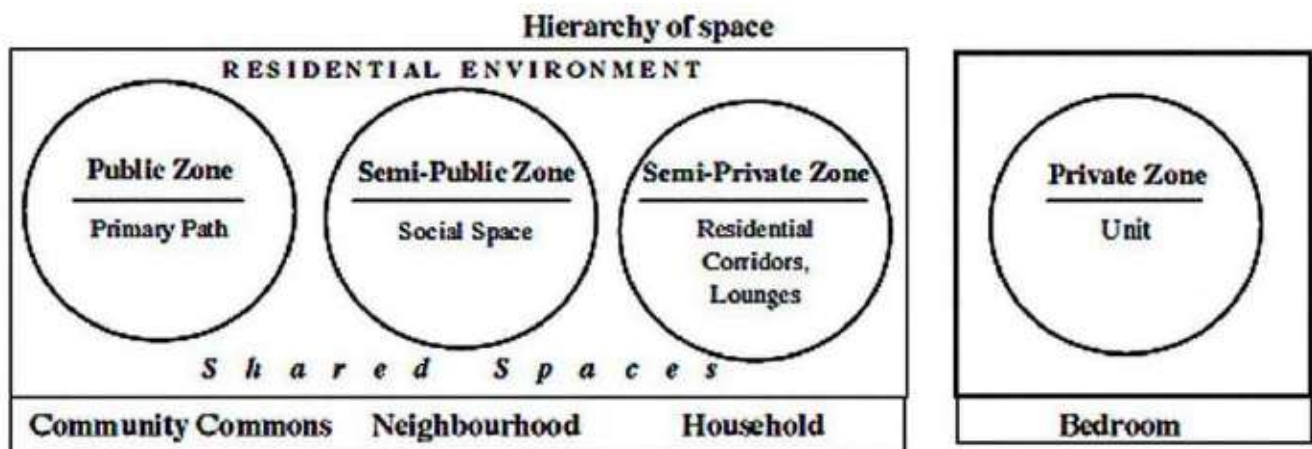


## 4: LAYOUT: NURSING HOME DESIGN

**Nursing Home households should follow a layout design based on minimizing corridors, centrally grouping core services and amenities, and where possible locating more private functions in a separate zone for bathing and bedrooms.**

The functionality and co-location of components is critical in reducing distances travelled. A rectangle of rooms around a large courtyard is probably the least successful in achieving this. Layouts that work best utilize designs with subdivision into Social Wings such as A, Y, V, U, T, X or L shapes with short corridors and amenities grouped centrally. A courtyard can work if shared by two homes so that travel distances are minimized. To function well the Homes need to be laid out in a way that organizes day time amenity areas in an efficient way for staff and residents, provides a privacy zone for bedrooms and bathing, and keeps corridors short for the frail elderly, for wayfinding and for staff.

### i. Hierarchy of Space:



Nelson (2009) discusses a “hierarchy of Space” where movement is from a public zone, to a semi-public, to a semi-private, to a private zone. The idea is to achieve short corridors with functional grouping of spaces such as a main lobby/entrance (public zone) a multipurpose or activity area (semi-public zone), an in-house centralized lounge and dining area (semi-private zone), a residential bedroom area (private zone). In particular, it is important in Larger Houses to achieve some physical sub-grouping within the House so that 7 to 12 residents can meet in more intimate social spaces.

### ii. Shorter corridors:

Pinet (1999) studied the behaviours of 960 residents in five nursing homes and concluded that there was a significant negative relationship between distance and the probability that a resident would use a social space. A space 6 metres [20 feet] away would be used five times as often as a space 30 metres [100 feet] away. A double-loaded corridor with 15 resident rooms can easily be over 40 metres in length (130 feet). Pinet concludes by suggesting that it would be advantageous for spaces used for informal socializing be located closer to the residents' bedrooms.

### iii. Corridor width:

A case can be made for more home-like, narrower corridors, i.e., 1830 mm (6 feet), rather than the traditional 2400 mm (8 feet) of nursing homes. The Ontario Long Term Care Home Design Manual (Ontario Ministry of Health, 2009) calls for a minimum corridor width of 1820 mm (6 feet). Building Codes have traditionally required that corridors be 2400 mm (8 feet) as it may be necessary to move a resident in a bed in emergencies. However, the new National Building Code of Canada (NBC, 2010) contains a new occupancy classification for care facilities, and requirements that are commensurate with the anticipated use conditions of a variety of facilities that provide care, but do not perform invasive medical treatment. One of the results of a changed classification for some care facilities is that “corridors shall be at least 1650 mm wide” (5.4 feet). In addition, dead-ends up to 6 metres (20 feet) long are permitted by the 2010, National Building Code. The Multilevel Design Guidelines, British Columbia 1994, point out that a 1830 mm corridor width [6 feet] with rest areas or lay-bys at the resident room doors is adequate to move beds in and out of the resident rooms and is also adequate for two wheelchairs and for people with moderate to severe cognitive dysfunctions to pass each other. The main advantage to the wider 2440 mm corridor [8 feet] is the accommodation of cleaning and storage carts which frequently clutter corridors. This could better be met with built-in alcoves, or adequate equipment and supply storage, or both.

### iv. Increase in-house centralized amenity space:

One impact of smaller, self-contained wings or Households is the need for a larger allocation of amenity space. Houses need to be self-contained in terms of amenity space, i.e., lounge, activity, and dining areas. Allocation per resident for these areas averages around 2.5 square metres [27 sq. ft.] for lounge/activity, and 3 square metres [32 sq. ft.] for dining. In addition, there is usually an allocation for multipurpose space. Recent post-occupancy reviews indicate that, with the increasing complexity of residents in care, it is becoming especially difficult for residents to actively participate in more traditional programs such as a Country Kitchen or entertainment activities and larger gatherings outside the residents’ House. As attractive as it is to provide programming outside the residents’ House, it is becoming less practical, and extremely staff intensive. Portering complex care residents to out-of-house amenities not only takes a lot of staff time, but stretches staff resources left to manage residents remaining in the Houses. In order to sub-divide the Large House population of 25 to 30 into more manageable Social Wings or Smaller Households, it really requires an increase in the in-house allocation of social space. Something in the range of 3 to 4 square metres [32 to 43 sq. ft.] per resident will allow sub-groups to have their own lounge and activity areas. This can be achieved by transferring some multi-purpose space to within the House. This would still leave some multi-purpose space for those residents who can participate in out-of-house activities. This additional in-house amenity space can be offset with a reduction in corridor area, both in width and length. There is some movement towards corridor-free designs, though this has licensing/regulatory barriers.

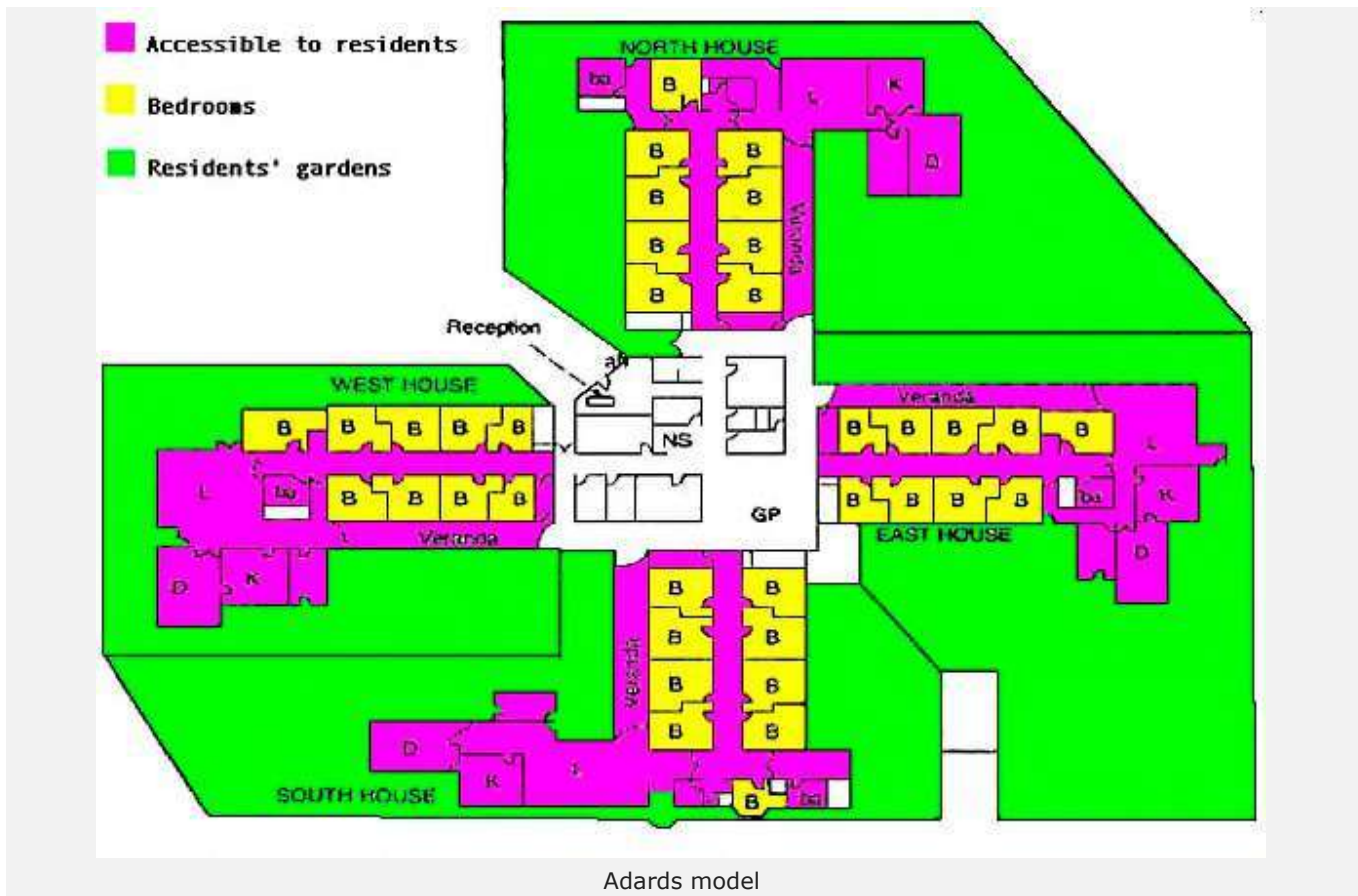
### v. Handrails

One factor to consider in reducing the area requirements for corridors is to reduce the use of handrails which effect the usable width of corridors. In British Columbia they have been building some complex care facilities without handrails. The thinking is that residents who use mobility aids do not need hand rails. Indeed, much damage is done to walls when residents in wheelchairs use handrails inappropriately to propel themselves along. The elimination of handrails could be a considerable cost saving. Nelson, in his article (2009), states that “within a Household, the need for and desirability of handrails is significantly reduced, if not eliminated.”

## vi. Small House Examples:

### a. Adards

A leading influence on British Columbia's facility design was our early exposure to Australian design principals such as those of Dr. Tooth and the ADARDS HOMES: <<http://www.adardsnursinghome.com.au/>> . This design featured four wings or houses of eight or nine resident rooms formed around a central administrative core. Each house was self-contained during the day time with its own lounge, dining, and kitchen areas. At night, staffing could be drastically reduced by opening the units up to the administrative core, and closing off the daytime amenities. This graphic shows Daytime access.



A good Canadian example is Heritage Woods in Victoria, BC. by Jensen Group Architects.

### b. Creekview

The Nelson article shows an L shaped house composed of two 11 bed wings or households: two of these 22 bed L shaped Houses are combined into a 44 bed neighbourhood. In this case these 11 bed wings actually function quite independently with their own dining. This facility is Creekview and is part of the Evergreen Retirement Community of Oshkosh, Wisconsin where Nelson pioneered these smaller Households.



One 11 bed wing of 22 bed L shaped House: Creekview

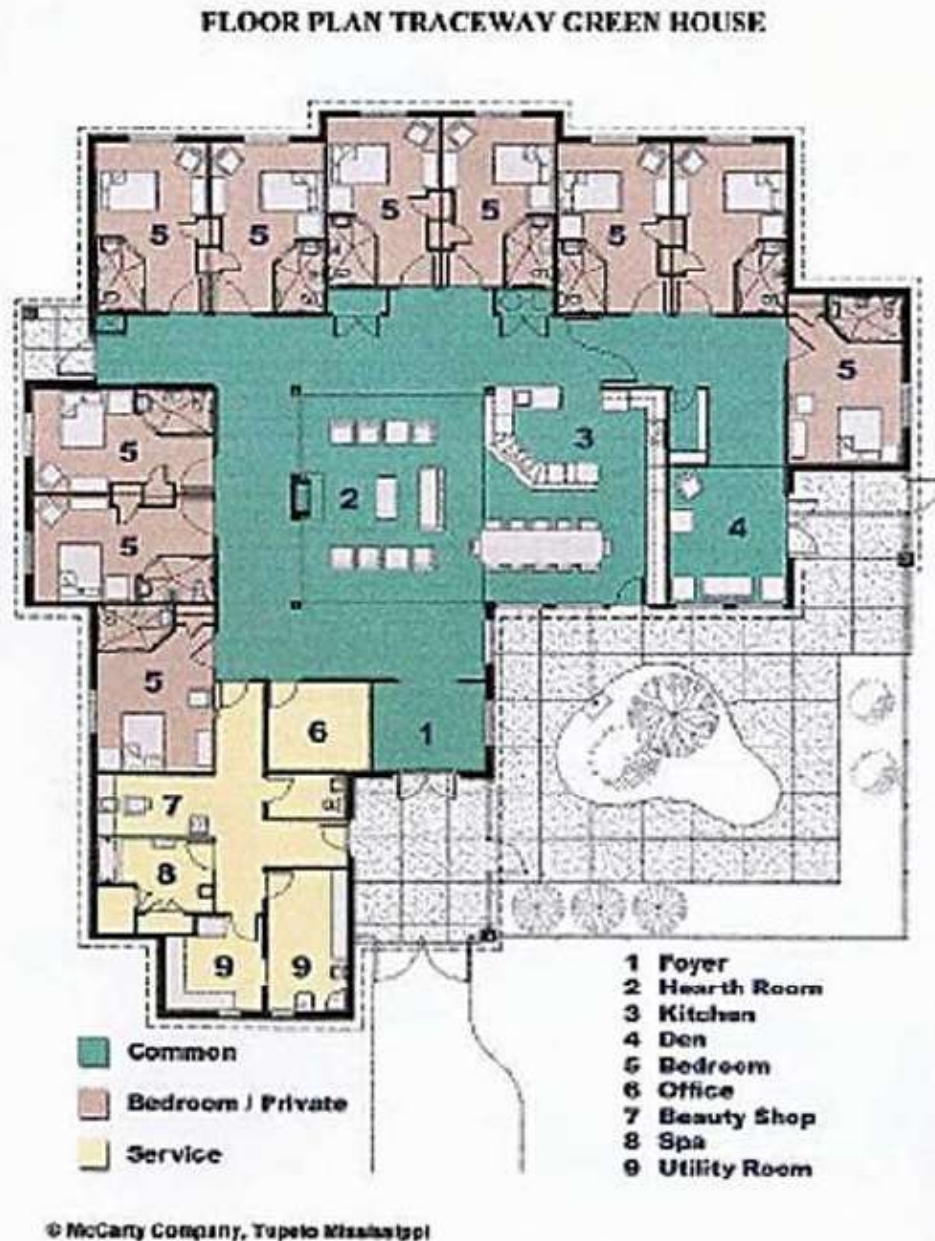


Creekview Neighbourhood: two 22 bed Houses combined



### c. Green House:

Lois Cutler and Rosalie Kane in Transforming Nursing Homes, discuss a trade-marked model of a small house nursing home conceived by William Thomas. The key to the design are the small size (10 beds) and the private spaces surrounding the central shared spaces. As mentioned, these small houses can be combined into “neighbourhoods” for more efficient staffing.



Floor Plan Traceway Green House, Tupelo, Mississippi

Canadian examples of this style of Nursing Home are the Linhaven Home in St. Catherines, Ontario; and the Windsor Elms Village in Falmouth, Nova Scotia.

**Additional Small House Unit floor plan layouts and a model for an H shaped facility composed of two 22 bed Houses are available on [www.wabenbow.com](http://www.wabenbow.com).** Each House is made up of two 11 bed “social” wings which each have their own lounge and activity space. The wings can be combined for dining and staffing. The two Houses form a 44 bed Neighbourhood.

The main functional principles to achieve efficiency and effectiveness in the layout of each House unit can be summed up as 1. central grouping of core services such as day amenity and care station, 2. convenient location of bathing rooms to both care station and resident bedrooms, 3. short corridors, and 4. privacy zones for resident bedrooms and bathing.

## **5: ENSUITE AND BATHING: NURSING HOME DESIGN**

**All Resident Rooms should have ensuite showers.**

**This is in line with the (VA: CLCDG, 2011) “Each resident bedroom shall have a private full toilet room including a functionally accessible shower adjacent to and accessed from a resident bedroom”. ( p 3-8) The VA Design Guide provides excellent detail on the requirements for Resident ensuites. (p.3-8 to 3-13)**

“Private showers are included to:

- ☐ Reinforce privacy
- ☐ Integrate personal care
- ☐ Reduce the fears and discomforts

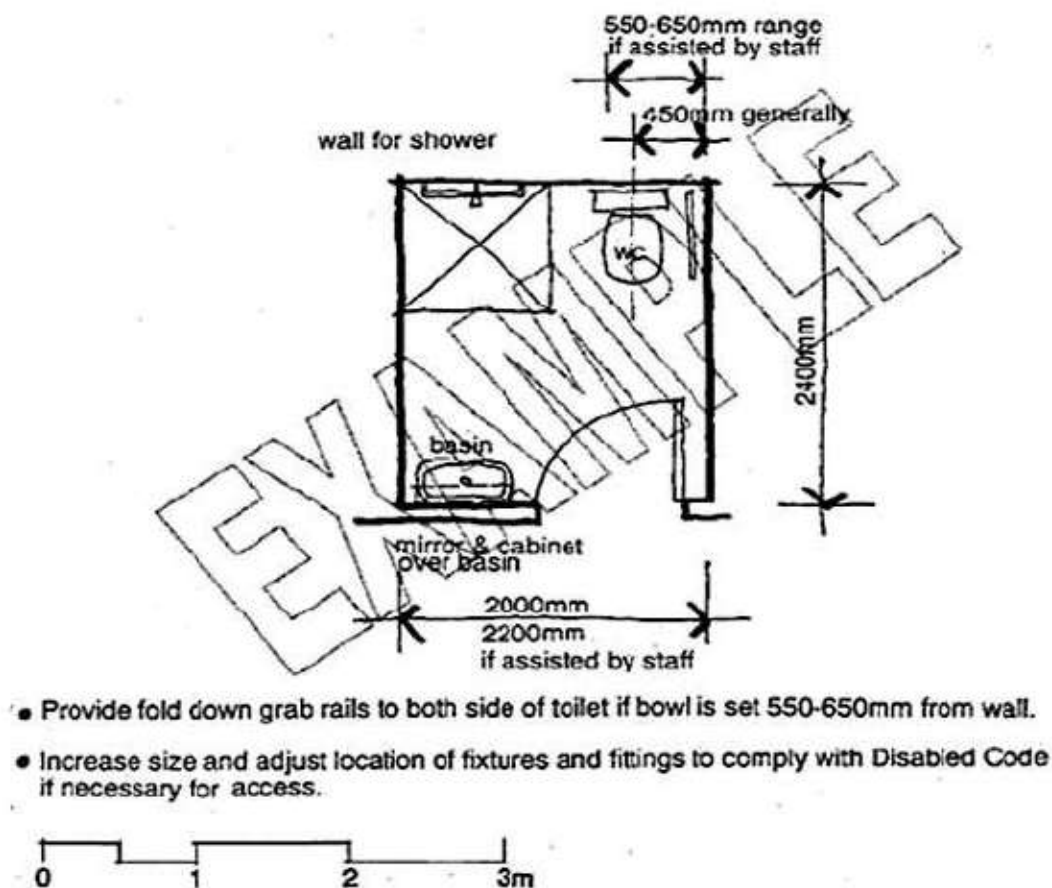
associated with communal bathing

- ☐ Reduce infection transference” (VA: CLCDG, 2011) (p.3-11)

A major problem for complex care is the near universal practice of diapering the vast majority of residents. This combined with daily suppositories makes for a lot of mess to clean up. This is usually done on the resident’s bed, and can result in a fair bit of contamination of bedding and carpets in the resident’s room from soiled diapers. Infection control is problematic to say the least.

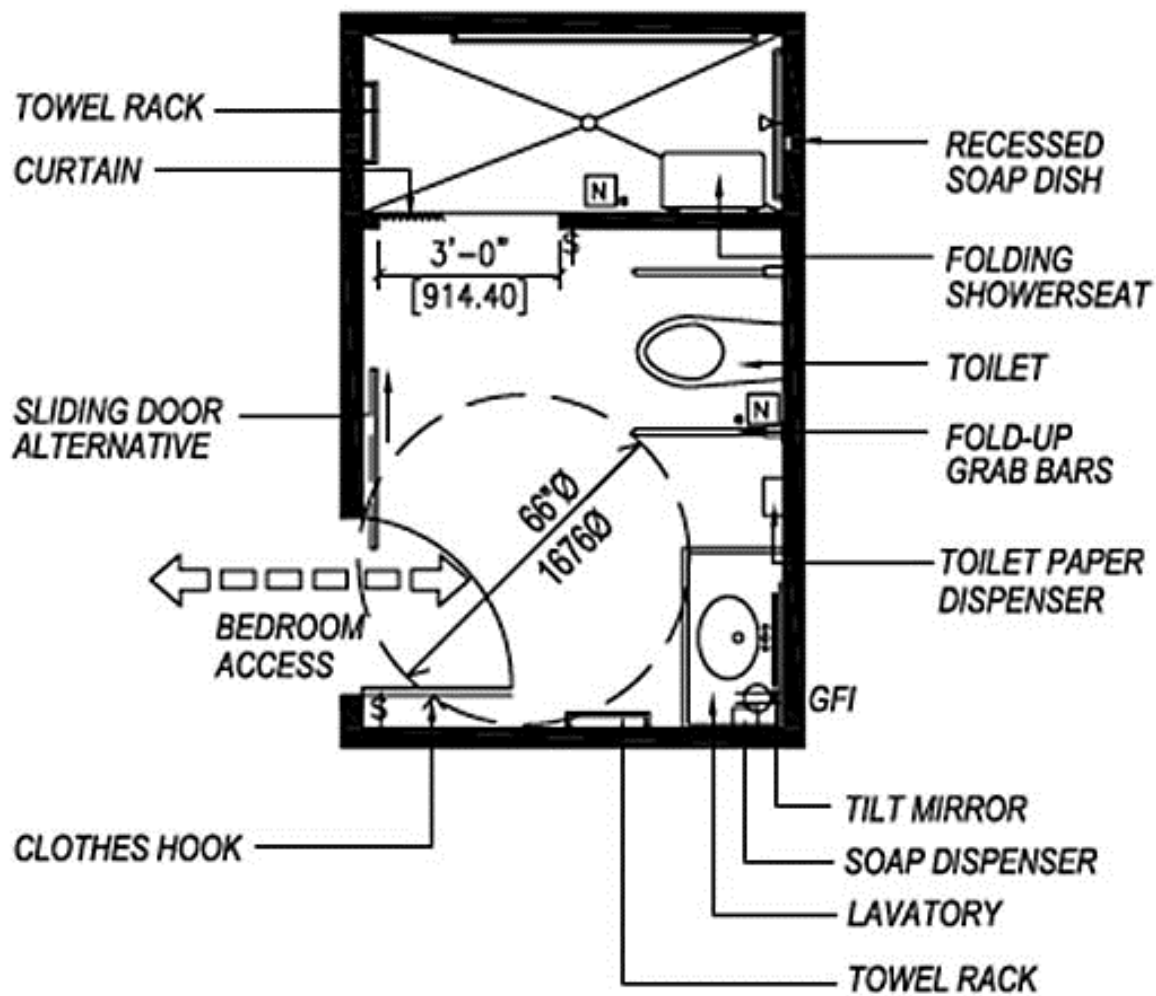
In the early 90s, in BC, a few facilities began experimenting with the installation of showers in the ensuites of residents’ rooms. St. Joseph’s Extended Care Unit in Comox, BC commissioned a study to determine the usefulness of such installations. The author concluded that there was a movement in the practice of bathing residents toward the practice of showering residents rather than tub bathing and that this should have an impact on designing facilities (Archibald, 1994).

The *Design Guidelines for Queensland Residential Aged Care Facilities* include a diagram for an ensuite with shower. The size is 5.3 sq.m. (2.2m x 2.4m). (Queensland Health Authority, QHA 1999) In this case there is access to the toilet from only one side. To accommodate access from both sides of the toilet the US Veterans Affairs recommends 6 sq.m. (VA: CLCDG, 2011) (p 3-8)



Australian ensuite shower

Alternatively, a larger ensuite can accommodate a prefabricated or built in shower as in the VA NHDG figure below. The use of shower chairs in lieu of a fold-up bench is recommended in order to allow repositioning and to increase the safety of both the resident and the assistant. Also, a handheld or telephone style shower head is suggested so that assistants are able to safely shower a resident without dousing themselves in the process.



VA shower ensuite

More recently researchers studied bathing practices in care facilities in Oregon and North Carolina, particularly showering and towel bathing in bed. They report that now the vast majority of nursing homes residents are showered (**Rader, 2006**). An English study of several facilities concluded that although only one of the facilities had showers in every ensuite, the consensus was that in future all resident room ensuites should be outfitted with a shower (**Cantley, 2002**).

Ensuite showers are critical for incontinence and infection control, as well as for resident privacy and comfort. By using a European style shower, the whole ensuite can be utilized as the shower area, and little increase in area is required.

Ensuite amenities should include a lockable drawer for resident use and a lockable storage cupboard for nursing supplies. The sink should be accessible, with knee room underneath and a reasonable reach of no more than 18 inches to the blade type controls. Individual hot and cold controls are preferred. Hot



water should have a governor permitting maximum hot temperature of 110 degrees Fahrenheit. The mirror should be viewable sitting or standing.

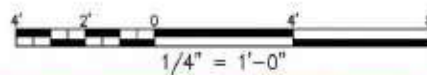
**BATHING SUITE: Each House Unit or Neighbourhood should have access to a Bathing Suite with Assisted Tub.**

The main issue is the size of the Bathing Suite: The VA recommends 22 sq.m. including the ensuite. A slightly larger size would accommodate some storage. Households can share a Bathing Suite if every resident room has private ensuite showers. In that case there is no need for a separate barrier free shower in the Bathing Suite. (VA: CLCDG, 2011) p.3-11 to 3-16).

This detailed floor plan shows the layout of a rest room with the following dimensions and labels:

- Overall Dimensions:** 14'-6" [4420 mm] wide by 12'-1" [3683 mm] deep.
- Top Section:** Includes a SEATED SCALE, GARMENT HOOK, CONSOLE TABLE FOR PERSONAL ITEMS, WASTEPAPER BASKET, and TRANSFER CHAIR.
- Left Wall:** Features a WARDROBE, FULL LENGTH MIRROR, WALL CABINET, VANITY & TILT MIRROR W/ LIGHT ABOVE, and SHARPS, PAPER TOWEL SOAP & GLOVE DISPENSER.
- Right Wall:** Includes a TOWEL BAR, SPA BATHER TUB (82" X 34", with a dotted line showing 104" X 34"), FLOOR DRAIN, HOSE BIB, and CHANGING BENCH.
- Central Area:** Contains a TOWEL BAR, WASTEPAPER BASKET, and FOLD-UP GRAB BARS.
- Bottom Section:** Includes a TOILET PAPER HOLDER, VANITY & MIRROR W/ LIGHT ABOVE, and SOAP DISPENSER & HAND SANITIZER.
- Other Features:** A PAPER TOWEL DISPENSER, PRIVACY CURTAIN, and GARMENT HOOK are also shown.

Bathing Suite (TLTS2): 175 NSF [16.3 m<sup>2</sup>]  
Toilet (TLTU1): 65 NSF [6.0 m<sup>2</sup>]



## 6: WAYFINDING: NURSING HOME DESIGN

### Wayfinding should be a major principle in the design of Nursing Homes.

Wayfinding is basically how people find their way around an environment. Persons with dementia have difficulty planning and visualizing their route. They are more dependent upon help with decision points along the way as they occur. They are lost without assistance to pick out relevant information at these decision points.

The research and analysis of Gesine Marquardt is particularly relevant. Her 2009 study of 30 German nursing homes is ground breaking in the analysis of dementia unit floor plan layouts. (Marquardt, 2009) This study clearly identified the features of nursing homes' floor plans that best provide good orientation for dementia residents. The significant factors included a small number of residents per living area, the straight layout of the circulation system minimal changes in direction, and the provision of only one living/dining room. The number of residents and the size of the living area constitute the most significant factor on a resident's orientation. Her 2011 overview of literature on architectural wayfinding design for people with dementia provides an excellent summary of recent research. (Marquardt, 2011)

**The article by this author “*Evidence-based checklist for wayfinding design in dementia care facilities*” published in Canadian Nursing Home, March/April 2013, Vol.24, No.1, (available [wabenbow.com](http://wabenbow.com)) provides a checklist and details for these evidence based findings which are listed in two sections: Building Structure and Interior Design elements.**

**Checklist and Supporting documentation is available for Wayfinding ([wabenbow.com](http://wabenbow.com)).**

**A. Building Structure:** These items are built into the architectural design to promote wayfinding.

**i. Small Scale:**

Ann Netten studied 13 UK homes in 1987 and found that group homes provide a more favourable design than larger communal homes in terms of wayfinding especially for physically frail demented elderly people. She found that a key element in unhelpful design was a lot of 'meaningless' decisions. In larger homes this might occur when there were few identifiable 'zones' and lots of doors. An ideal size of House unit is thought to be around 10 to 12 residents, although Houses up to 25 can be designed to function well with simple layouts and subgroupings.

## **ii. Corridor Length:**

Netten found that Residents who had longer routes had more difficulty finding their way around. Celine Pinet studied 960 residents in five nursing homes and found that social spaces closest to residents' bedrooms were used significantly more often by residents than spaces that were farther away. In those homes a space 20 feet away would be used five times as often as a space 100 feet away. Pinet concluded that with the right features designers could encourage walking and the use of social spaces. Corridors need to be minimized and simplified to lead to areas most used by residents. Thirty metres or less is the ideal (100 feet).

## **iii. Direct Visual Access:**

Passini et al conducted two controlled studies in Quebec and concluded that residents with dementia were incapable of forming an overall plan for a wayfinding task, but rather made their decisions based on explicit architectural information: they had to see where they were going in order to make a decision. And their destinations had to be recognizable: i.e. well articulated and identifiable. Passini recommended that settings should not be large and should be a simple configuration so that residents could move from one decision point to the next as they walk along without having to plan ahead: i.e. the setting should offer direct visual access to its major spaces and functions. Dementia residents need to be able to see core amenities such as dining, lounge, and activity areas from their bedroom doorway. In addition they should be able to see an access point to outdoors from the core amenity area.

## **iv. Layout:**

Solve Elmstahl studied 105 residents in 18 dementia units in Sweden and found that the floor plan layout had a definite effect on symptoms and behaviour. He compared a straight corridor design with L shaped, H shaped and square shaped layouts. Residents living in the L shaped design had less disorientation than the others. Marquardt and Schmieg followed up with a similar study of 450 residents in Germany and found that the key element was the number of shifts in direction. In straight layouts residents were able to find their way better than in designs that required turning corners, such as L and courtyard designs. The preferred layout for a dementia unit is one with no changes in direction: i.e. a straight route from bedroom to core amenities. This could be an open plan such as a Green House model or one with a short direct corridor. A layout with only one change in direction such as an L, V or T is nearly as good, particularly if the major decision point is clearly landmarked.

## **v. Reference Points:**

Netten found that 'meaningful decision points' were a critical aid to a resident finding her way around: i.e. built in landmarks and places that are actually used by residents. These spatial anchors can be particularly helpful if positioned on junctions and at important decision points. Passini notes that the elements of the circulation system such as stairs, elevators and significant places can serve as reference points. Marquardt suggests that core amenities used as an "intermediate element" can serve as reference points to break up a long corridor. Zeisel, drawing upon neuroscience, maintains that humans are universally preset to use physical landmarks that stand out from the rest of our landscape. Dementia residents depend upon meaningful clues at decision points such as architectural features like well delineated entrances to rooms and corridors perhaps with distinguishing canopies, colours, landmarks, and signage.

## **vi. Minimal Repetitive Elements:**

Passini also found that monotony in architectural composition, such as repetitive environments, render wayfinding more difficult: like long corridors with similar doors and indistinguishable wings. Residents particularly found it difficult to find their own rooms because they could not distinguish between the doors. Stirling University has an excellent example of distinctive doors on its website:

<https://dementia.stir.ac.uk/files/Bed%20Door%2010.swf>. It is helpful to stagger opposing bedroom doors along corridors to reduce confusion. Marquardt emphasizes that spatial situations and places should not be repeated; in particular the dining area should be a unique and recognizable feature so as to function as a spatial anchor point.

## **vii. Legible Rooms:**

Marquardt adds that all places within the home need to be architecturally legible – their function should be evident through their size, proportion, materiality and furnishing. Distinct and familiar places help enhance the resident's orientation. Libraries, hair salons, treatment rooms, dining rooms, lounges, should all have distinct décor, furnishings and fittings. Signage with pictograms and words can reinforce this. Netten found that residents had difficulty when there were few identifiable 'zones' and long corridors with lots of doors. Passini pointed out that interior zones and destinations need to be identifiable with their own entrances and meaning and distinctiveness. He called this environmental or architectural communication. In dementia units corridors need to lead to meaningful and easily identifiable destinations.

### **viii. Spatial Proximity Of Amenities:**

Elmstahl observed that disorientation was less pronounced in units in which the kitchen, dining room, and activity room were located together. Similarly Marquardt found that the central dining area had a great importance for residents as a spatial anchor point, particularly if there was only one such area. This is particularly helpful at the junction of wings or as an intermediate element in a straight corridor. In addition, such collocation facilitates staff and resident interaction.

## **B. Interior Design: These items can be added to enhance and provide cues to wayfinding.**

### **i. Name and Photo:**

In two studies Beth Nolan found that a portrait type photograph of the resident as a young adult outside their bedroom increased room finding by 45 – 50%. In one of the studies a name plate was used as well. It is most helpful if this signage is on the resident's door rather than beside it.

### **ii. Pictograms:**

Kevan Namazi and Beth Johnson compared the effectiveness of nomenclatures and pictograms for finding toilets in two dementia units. Although a pictogram of a toilet increased usage, it was the combination of the nomenclature 'toilet' with arrows on the floor that produced the best results. Passini pointed out that Arrows need to be in close spatial proximity with the name of the destination in order to make the connection.

### **iii. Lettering: Enlarged and Contrasting:**

Namazi and Johnson used six-inch high letters with good success in their toilet wayfinding study. Elizabeth Brawley recommended a minimum of  $\frac{3}{4}$  inch high letters, and noted that contrast was far more important than colour. There needs to be contrast between sign and mounting background, as well as between lettering/pictogram and sign background.

**iv. Low Placement:**

Passini noted that the elderly and Alzheimer's patients in particular, tend to look at the ground and seldom are aware of signs or other objects placed on doors or walls. In their 1991 study, Namazi and Johnson found much better results when they lowered signage initially to eye level, and even better when placed on the floor. Caution is needed however as patterns on the floor can disturb dementia residents. Signage needs to be in the normal visual field of residents which for dementia is generally low.

**v. Landmarks:**

Marquardt emphasises the importance of placing landmarks and cues at the spot where direction changes. In addition, dementia residents have better recall for landmarks that have long-term meaning to themselves. Familiarity is critical, given dementia residents capacity for long-term memory. Passini noted residents were particularly relieved once they found their own rooms and recognized familiar personal items such as their bed spread.

**vi. Colour Contrast:**

Brawley pointed out that changes in the eye's lens affect colour perception: the environment slowly takes on a yellowish-brown cast. This change causes difficulty in distinguishing both dark shades from each other and light tones from each other. Older people have difficulty distinguishing their room colour as different from their neighbours and find colour coded corridors of little help. She recommends colour contrasts: light entry ways, dark door jambs; light floor, dark furniture. Contrast is more important than colour. In their Virtual Suite Stirling University measures contrast as a Light Reflectance Value (LRV) on a scale of 0 to 100. Acceptable contrast needed for seniors to distinguish between surfaces is an LRV greater than 30.

<http://dementia.stir.ac.uk/virtualhome>

**vii. Personal Memorabilia:**

Namazi et al studied whether prominently displayed personal memorabilia of long term significance would serve as orientation cues to help identify bedrooms. Two display conditions were used to show this helpful cuing orientation. Namazi found that object selection was crucial: that the further back in time the reference point, the greater the likelihood of eliciting recall. Those linked to the resident's own childhood years were best. The residents room needs to be personalized so as to be recognizable to the resident. Personalized memorabilia can be helpful as well in providing background for staff and visitors.

### **viii. Lighting – Glare and Lux:**

Netten concluded her 1987 study with the statement that “the most important aids to people finding their way around would appear to be the level of lighting and ‘meaningful decisions’”. She found deficient lighting to be a critical issue. Brawley echoes this in her concern for consistent light sources to eliminate shadows, attention to eliminating glare and focused task lighting. She indicates that light requirements for very old people may be as much as five times greater than for younger people. Corridors need to be bright and evenly lit at least at double normal levels: a minimum of 500 lux is preferable.

### **ix. Minimal Information Clutter:**

Passini recommends that competing information displays should be reduced to minimize confusion for residents seeking cues. Floor plans in particular are of little use. He indicates that non-discriminatory reading of information is among the most confusing interferences in the wayfinding process. He recommends that graphic information along circulation routes should be minimized. Public notices should be placed elsewhere. Graphic wayfinding information should be provided in a consistent design and location, so that the user knows what to look for and where. Information overload is confusing and makes wayfinding more difficult.

### **x. Reduced Floor Patterns and Lines:**

Brawley points out that impaired depth perception can cause a sharp contrast in the colour or pattern of the floor covering to be seen as a step, hole or pit. This can impede wayfinding by preventing access to a desired route. Perritt et al confirm that large, bold patterns immobilize residents and interfere with wayfinding, spatial exploration and social interaction. Appropriate patterns for persons with Alzheimer’s include mottled and mini-print patterns that are very small in size. Larger patterns may be used if there is not a strong contrast between the subject matter and background. It is best to eliminate strong patterns and contrast particularly at thresholds from one space to another. Where flooring material changes, the difference in LRV should be below 30 in order to avoid trip hazards and confusion.



**xi. Visibly Accessible Toilet:**

Namazi and Johnson report that wandering and disorientation may be a result of attempts to find a bathroom. They suggest that toilets that are out of sight may be out of mind. In their 1991 study they found that the frequency of toilet use increased when toilets were visually accessible to residents, primarily through an open or removed door. (p.16, Namazi and Johnson, 1991) Though this may be a challenge, washroom doors ideally should be left open so that the toilet is visible, with a contrast between the toilet seat/bowl and floor. The washroom needs to be well located and visible with good signage. The toilet in the resident's ensuite needs to be visible from the bedhead.

**xii. Multiple Cueing:**

Marquardt recommends a combination of multiple cues as does Nolan who found that the combination of cues such as a photo of the resident, the residents name, and personal memorabilia was most effective in resident room identification. Zeisel points out that verbal agitation and psychotic symptoms are reduced in settings where people are provided with multiple sensory cues. The environment should be designed so what people see, hear, touch, and smell all provide consistent information about the environment.

## 7: LIGHTING: NURSING HOME DESIGN

### Lighting design needs to accommodate aging eyes.

Two US studies looked at 81 nursing homes and found that ambient light was 50% to 60% lower and task light was only 20% to 40% of recommended levels. **(Brawley and Noell-Waggoner, 2008)**. A Belgian study of eight nursing homes came to a similar conclusion that the amount of light in nursing homes was seldom sufficient to meet the visual needs of older people. **(Lepeleire, 2007)**. Due to the thickening of the lens of the eye and the reduced size of the pupil, the light requirements for seniors can be as high as five times greater than for younger people. **(Brawley, 2001)** Low lighting and poor visual acuity doubles the risk of falling. (Torrington, 2007) For persons with dementia shadows and glare increase the difficulty of interpreting the environment and may lead to fear and agitation. Day-time bright lighting of approximately 1000 lux has been shown to improve symptoms of dementia in a Netherlands study of 12 group care homes. **(Riemersma-van der Lek, 2008)**

The article by this author “*Lighting and noise design in dementia care facilities*” with checklist published in Canadian Nursing Home, Vol.24, No.3, October/November 2013, (available [wabenbow.com](http://wabenbow.com)) provides a good guideline for addressing Lighting design issues and includes the following items.

Supporting documentation is available for scoring the Light and Noise Checklist. ([wabenbow.com](http://wabenbow.com))

#### i. Ambient Lighting:

Lighting can be measured with a simple light meter. General lighting should be between 30 and 70 foot candles (320 to 750 lux) for indoor illumination in most areas of a care facility including living rooms, resident rooms, and activity areas with the latter including dining at the higher level. Full spectrum lighting that mimics natural daylight is preferred.

#### ii. Task Lighting:

Increased lighting needs to be directed towards visual tasks and should be 50 to 100 foot candles (550 lux to a 1100 lux) for fine tasks.

### iii. **Colour Rendering Index (CRI), Colour Temperature:**

The color rendering index (CRI) is a measure of the ability of a light source to reveal the colours of objects relative to a natural light source; the closer the rating is to 100, the truer or more accurate the colours. Because of the yellowing of the lens of the eye in seniors, it is important to use a light source with a high CRI. Aim for greater than 70 CRI. Fluorescent lighting tends to have a lower CRI while LED lighting is 80 plus.

Colour temperature is measured in degrees Kelvin (K) and range from warm to cool, with lower numbers for warmer light, and higher numbers for cooler. A candle flame is 2000 K while daylight is 7,500 K. Cooler light is preferred as it has a greater effect on the circadian cycle with sky blue the most effective. Manufacturers usually indicate CRI (Colour accuracy) and Colour Temperature on packaging. Aim for greater than 4000K.

### iv. **Contrast:**

Contrast is measured as Colour Value. Seniors frequently develop diminished sensitivity to contrast. This, combined with problems with depth perception, make it difficult to identify objects set against a background of similar colour. Increased Contrast Value is helpful for seniors to distinguish elements such as where flooring meets walls and around doors, through the use of contrasting trim, molding, skirting, and on level changes such as nosing on stairs and curbs. Handrails and handles should contrast with walls and doors; seating material on chairs should contrast with flooring; furniture with walls, toilet seats with the toilet and floor, grab bars with shower walls, table edges, place mats, cups, plates and utensils with backgrounds. White plates make food easier to see. However, value contrast should be avoided at thresholds and in patterns on flooring as this can appear as barriers and irregular levels. A gray scale chart is a valuable tool for evaluating colour contrast and is available at art supply stores.

### v. **Natural Light**

Daylight can be as high as 10,000 footcandles (FC). Typical interior lighting rarely exceeds 100 FC. Natural light has been shown to enhance well-being and improve the natural rhythms of the body such as the circadian cycle which effects sleep. Bright daylight is essential for Vitamin D in order to maintain healthy bones. Vitamin D deficiency has been linked to an increased risk of falls among seniors. A Japanese study reported that 15 minutes per day of sunlight exposure reduced hip fractures by 84%. However, studies have shown that natural light exposure diminishes greatly once individuals move to a nursing home (**Brawley and Noell-Waggoner, 2008**). Available daylight can be increased with skylights, clerestories and sunrooms.

**vi. Natural Views:**

A natural external view is therapeutic. Several studies demonstrate the benefits of natural views such as a lower incidence in post-operative depression in rooms with windows, and more social interactions in care homes where residents congregate around view windows (**Torrington and Tregenza, 2007**). Window sill heights need to accommodate residents' positions while sitting, in wheel chairs, or lying in bed: i.e. approximately 630mm (25 inches) sill from floor in both common areas and resident rooms.

**vii. Transitions:**

Older eyes adjust much more slowly to changes in light levels, especially from bright to dim light. The Illuminating Engineering Society of North America recommends that the brightest light in an area be no greater than three times brighter than the lowest light in the same area. This is especially important in transitioning from outdoors. Awnings/Porticos can ease the transition, with brighter interior lighting in entrance ways during daylight.

**viii. Day and Night Adjustments:**

Bright corridor lighting at night can cause confusion for persons with dementia and sleep disturbance. Dimmable lighting provides cues for evening and night time routines. Daylight and views connect people living in care homes to the daily cycle of light and dark when combined with a period of darkness. All light fixtures should be able to be dimmed to uniformly lower the ambient lighting at night. Night lights and motion detectors can resolve safety issues.

**ix. Even Distribution of Lighting:**

Lighting should be uniform on walls and floors; pools of light should be avoided. Sheer draperies can diffuse bright daylight. Indirect lighting conceals the bright source of light and directs it to the ceiling and walls using pendant or surface fixtures, cove lights and wall-mounted valences that direct light to the ceiling. This requires surfaces with a high light reflectance value (LRV). Ceilings should have a LRV of >80, walls >60, and floors of 30 to 40. Paint manufacturers usually list LRV on their products.

**x. Glare:**

Seniors often experience increased sensitivity to glare. Glare can be from a direct light source, such as unshielded bulbs or daylight, or reflected such as when it bounces off a high light value surface. Its intensity can range from discomfort to disability; i.e., temporary blindness. Chandeliers with exposed lights and other high mounted down lights produce mostly glare. Indirect lighting is the best solution, and works better with 9 foot or 10 foot ceilings. Flooring in particular needs to be of a low to medium LRV to alleviate glare. Surfaces, such as concrete in outdoor areas, should be stained to a medium colour value.

**xi. Individual Preferences:**

Desk lamps and dimmers can provide flexibility to accommodate individual needs. Ambient light could be 550 lux with dimming to 320; task light could be 1100 lux with dimming to 550. Light switches should be accessible on fixtures and on walls; i.e. they should be below the reach threshold of frail residents; i.e., 1200 mm (47 inches) from the floor. Controls for task lights should be within easy reach. Windows should have adjustable coverings.

**xii. Maintenance Standards:**

Staff should be sensitive and skilled in adjusting lighting throughout the day to meet residents' needs. It's important to develop a maintenance schedule to audit lighting and regularly clean lamp tubes and bulbs and replace them when they dim or flicker. Dirty fixtures will absorb light and reduce the amount reflected into the room.

Equally important is the condition, fit and accuracy of resident eye glasses. Residents should have access to regular optometrist services, and staff should daily check glasses for cleanliness, scratches etc.

## 8: NOISE: NURSING HOME DESIGN

### Noise mitigation needs to be designed into nursing homes.

A 2012 study found that those with lower cognitive strength may be less able to adapt to environmental stressors such as noise. Obtrusive sound was definitely found to contribute to agitation. And there was a cumulative effect that may well be connected to sundowning. **(Joosse, 2012)** Of all stimuli noise has the most damaging effect on people with dementia. (Dewing, 2009) Noise generally exceeds recommended levels in nursing homes. The World Health Organization (WHO) recommends background noise in hospitals below 35 dB at daytime and below 30 dB at night. **(Berglund, 1999)** A US study found noise levels in a nursing home were in the range of 55-70 dB which is comparable with busy road traffic. **(Bharathan, 2007)** It is worth noting that loudness levels measured as dB are based on a logarithmic scale so that to the human ear a 10 dB increase is perceived as a doubling of loudness. **(Joseph, 2007)** People with dementia can lose the ability to interpret what they hear accurately. Excess noise can result in confusion, overstimulation, and difficulty communicating. (Bakker, 2003) Fagan has discussed the issue of Hearing Loss as a risk factor for Alzheimer's disease and possibly an early marker of cognitive decline. Even mild cognitive impairment affects hearing function, and in particular may exacerbate PWD ability to process speech in environments that have high ambient noise such as dining rooms. **(Fagan, 2011)**

**The article by this author “*Lighting and noise design in dementia care facilities*” published in Canadian Nursing Home, Vol.24, No.3, October/November 2013, (available wabenbow.com) provides a good guideline for addressing Noise design issues and includes the following items.**

**The Checklist and Supporting documentation is available for Light and Noise elements (wabenbow.com).**

#### **i. Ambient Noise Level – Bedrooms:**

Invest in a noise meter to accurately measure noise levels. Use knowledgeable staff such as OT, Health and Safety, as well as Maintenance/Housekeeping to regularly monitor noise throughout resident areas to uncover and address issues. Note volume, frequency and duration. Objectively quantifying noise is a major step in addressing noise issues. The WHO guideline for background noise in resident bedrooms is 35 dB in the day, and 30 dB at night, with night time peaks not to exceed 40 dB.

## **ii. Ambient Noise Level – Common Areas**

The WHO suggests background noise level should not exceed 35 dB in most rooms in which patients are being treated or observed. The Environmental Protection Agency in the U.S. recommends noise levels below 45 dB for

## **iii. Layout**

The size and layout of rooms can impact noise reverberation. Layout should separate noisy areas from quiet activities; e.g., resident rooms should not flank noisier areas such as utility, laundry, kitchen, dining, activity, TV and administration areas. Resident rooms should be in a zone of their own with the exception of Bathing which should have soundproofing. Amenities should include a “Quiet” lounge or sitting area.

## **iv. Noise Mitigating Design Features**

Use acoustical ceiling and wall products to soften hard surfaces and reduce echoes. Osborne recommends small rooms for group activities, partitions between activity areas and double glazed windows. Resident room walls need to be sound proofed with a Sound Transmission Class rating of 45. Walls should extend to the structural deck in order to reduce sound travel in the space over lowered ceilings. Ventilation and heating systems should be designed and installed with sound attenuation measures so as not to exceed Noise Criterion (NC) of 25 in bedrooms and 35 in amenity areas.

## **v. Noise Reducing Adaptations**

Some useful interventions for noise reduction are lined drapes , wall hung quilts, place mats on dining tables, upholstered furniture, and carpeting. If the kitchen or servery is adjacent to the dining room, there are a number of ways to reduce noise; adapt chair legs with rubber tips or sliders to dampen movement noise. Other noise-reducing interventions include padding in chart holders, and distancing noisy equipment, such as pill crushers, grinders, etc. from resident areas. A U.S. study found that closing doors was the most effective measure for reducing noise (average reduction of up to 10.4 dB). This reduction improved to 13.5 dB when combined with sound-absorbing panels hung on hallway walls, and to 14 dB with bedside TV speakers. (Connell, 2004)



## **vi. Scheduling of Intrusive Noise**

Limit use of electronic equipment, such as radios and TV and cleaning equipment such as floor cleaners, vacuuming and dish washers - especially during meal times. Consider using non-powered carpet sweepers. Crush pills outside of amenity areas and away from residents. Limit what is done in the serving area; e.g., return dishes to kitchen for washing. Consider scheduling Quiet Times in the daytime and evening.

## **vii. Mitigate Disruptive Night-time Environment**

In three studies that reviewed 18 nursing homes at night, hall lights were dimmed at only two of the 18 facilities; there were no significant reductions in noise levels at any of the homes until 0100h; nursing care routines were always accompanied by overhead lights and increased noise levels (to above 70 dB). Decreasing noise levels at night helps improve sleep and lessens agitation in residents (**Alessi and Schnelle, 2000**). Consider resident room doors with built in window blinds, or motion sensor monitoring.

## **viii. Fire Alarms and Paging Systems**

Fire Alarms and Paging systems: Alarms and overhead paging systems in dementia units should only be used for emergencies (Bakker, 2003). Discuss with appropriate authorities a reduced use of alarms; decreased loudness, less frequent drills and even silent drills. Fire alarm levels should not exceed 65 dB in resident rooms and hallways. Set staff and visitors pagers and cell phones, as well as system alerts for wandering, to vibrate.

## **ix. Staff Training**

Loud voices have been perceived as the most bothersome by residents and staff, followed by carts, foot traffic, pagers and alarms. Reductions in noise levels can be attained through staff education; i.e., lower speaking voices, more quiet footwear; alarms, ringers and pagers turned down; closing residents' doors, and generally being sensitized to noise in the resident. Nursing staff need to increase their awareness of how the sounds they create can lead to agitation. Group discussions should be conducted in enclosed rooms, and equipment, including TVs, should be turned off when not in use.

**x. Signage**

Post 'quiet' signs as reminders, such as "Please keep voices soft," "Please speak softly, slowly, and clearly," "Please turn off cell phones." This kind of signage has led to significantly reduced noise in hospitals (Overman-Dube, 2008).

**xi. Surveys**

Regularly conducted resident, family and staff surveys can help identify bothersome noises, raise awareness and stimulate suggestions for noise control interventions.

**xii. Maintenance.**

Schedule regular maintenance and replacement of noisy equipment. Purchase low-noise equipment. Wheeled equipment can be designed, modified and maintained for more quiet operation. Paper towel dispensers can be quieter. Persistent intermittent noise can be addressed such as leaky toilets and faucets, squeaky doors, etc.

## 9: SUSTAINABILITY: NURSING HOME DESIGN

### Best Practice Nursing Home design should be economically sustainable.

The Queensland Guidelines sums up the importance of sustainable functionality thus:

“Economic sustainability of capital works and recurrent funding for residential aged care facilities place the onus on designers to provide efficiency in circulation and economy of functional areas. A fine balance between efficient design, longevity and low maintenance buildings, optimum bed numbers, optimum staffing and effective personal and support services management will provide a “best model” facility.” p.142 (QHA, 1999)

Good facility design results in greater staff efficiency, provides flexibility – possibly for alternative use, results in cost-effective use of space, and minimizes maintenance costs. (Cantley, 2002).

We have developed a sustainable cost effective model based on a target of 55 building gross square metres (bgsm) per resident for the residential care portion of the facility: i.e. excluding service and support areas which are generally external to the actual residential units: e.g. Commercial Kitchen, Laundry, Bulk Storage, Housekeeping, Mechanical, Electrical and Maintenance areas.

This Sustainable Model is based on these assumptions:

#### i. BC 1994 Multilevel Care Guideline:

We recommend following the 1992 and 1994 MLC Design Guidelines with modest modification to account for wheelchair accessibility issues and the use of ceiling lifts and ensuite showers.

#### ii. Small House design:

Small house sizes are preferable with a maximum house size of 25. Houses at the larger end of this range could be divided into wings or Households within each House to minimize corridor length. Amenities within each House are best collocated and centralized at the conjunction of Wings or Households. Consider 6 foot corridors if permitted: i.e. B3 designation in new 2012 BC Building Code.

### **iii. Self-sufficient Houses:**

Each House should be self-sufficient in dining, lounge/activity, and possibly bathing Spa depending on the size of the House and intended type of residents. Each House should include clean utility, dirty utility, housekeeping closet, amenity washroom, equipment storage and hand wash sinks if desired.

### **iv. Private Resident rooms:**

Private Resident Rooms are preferable. We support a slight increase in size of private resident room areas over the 1994 MLC guideline of 21 sq. m. We suggest 17 sq. m. for the bedroom with an ensuite of 5.5 sq.m. to accommodate a European style shower for a total of 22.5 square metres.

### **v. Amenity Areas**

Dining – 3 sq.m. per resident as per 1994 MLC. Lounge/Activity: increase from minimum licensing 2.5 sq. m. per resident to 3 sq. m. per resident to accommodate wheelchairs and better fit for Small House design. Capture this increase by reducing Multipurpose area outside of Houses.

### **vi. Neighbourhood Model:**

Share some services between 2 or 3 grouped Houses or Households: i.e. Care Station, Served, and possibly personal laundry facilities. Bathing Spa could be shared depending on size of House and intended residents.

### **vii. Shared Program Services:**

Some program services to be shared facility wide: e.g. Hairdressing, PT/OT, Exam/Treatment.

### **viii. Multipurpose Area:**

We recommend reducing multipurpose space outside of the House to limit portering issues and to move some additional area into the Houses for lounge/activity wheelchair accessibility. We suggest moving .5 sq. m. per resident into the House to increase the in-House amenity area to a total of 3 sq. m. per resident. We recommend providing approximately 40 sq. m. of multipurpose area on each floor, again, to reduce portering issues.

**ix. Non-funded amenity spaces:**

Amenity areas over the above Multipurpose allocation could be provided through fundraising: e.g. for chapel, additional meeting rooms etc.

**x. Admin and Support Services:**

Administration is minimized to Reception/Foyer if needed, Staffing Clerk Office, Activity Office, Site Manager/RN office, Staff Lounge and Lockers, Receiving/Loading, some Bulk Storage, Central Housekeeping and Central Soiled Utility.

**xi. Corridors:**

Short length of corridors should be a consideration in design. Width of corridors could be reduced to 6 feet if lay-bys are provided for carts and doors are inset. Handrails should be optional with licensing approval.

TABLE:

DRAFT PROGRAM AREA			SUSTAINABLE MODEL NURSING HOME			
Two floors of three houses each, possibly Y configuration				m2		
House Unit	No	per res		Area	Notes	
Single bedrooms	17	Rooms @	17.0	m2 ea	289.0	
ensuites			5.50		93.5	European Showers
Clean Utility	1		6.40		6.4	
Housekeeping	1		3.70		3.7	
Lounge/Activity		3 sq.m			51.0	Right sized to accommodate wheelchairs
Dining		3 sq.m			51.0	As per MLC
Amenity washroom	1		4.50		4.5	
Equipment storage	1		10.00		10.0	
Hand wash sinks	4		0.50		2.0	
dirty utility	1		6.40		6.4	Sterilizer in Central Soiled Utility
<b>Subtotal</b>					517.5	
<b>Subtotal Six Houses</b>	6				3,105.0	
<b>Shared per floor (3 houses)</b>						
Care Station					25.0	include small conference area
Med prep					9.3	
Assisted bathing					20.0	no shower necessary
Central Soiled Utility					15.0	With sterilizer, hopper, floor sink
Personal Laundry					9.3	
Servery					14.5	
Washroom					4.5	
Multipurpose/Meeting Room		.78 sq.m.			40.0	Consider distributing into Houses
<b>Subtotal</b>					137.6	
<b>Subtotal 2 groups of 3 Houses</b>					275.2	
<b>Shared with all Houses</b>						
Hairdressing					15.1	
Exam/Treatment/OT/PT					21.8	
Washroom					4.5	
<b>Subtotal Shared with all Houses</b>					41.4	
<b>Admin &amp; Support</b>						
Washroom					4.5	
Reception					7.4	
Site Manager					11.2	
Office Recreation					16.8	
Office staffing clerk					7.4	
Staff Lounge					24.0	
Lockers and Washrooms					34.4	
Receiving/Loading					34.3	
Bulk Storage					20.0	Total Storage 80: 20 plus in house 60
Central Housekeeping					14.0	
<b>Subtotal Admin &amp; Support</b>					174.0	
<b>Total net area</b>						
					3,595.6	
Component Gross sq.m. at 1.3					4,674.3	
Building Gross sq.m. at 1.2					5,609.1	
Total Residents			102			
<b>Gross metres per resident</b>					55.0	
Note: three houses per floor maximizes efficiency of construction, lining up walls, and shared spaces.						

## 10: OUTDOOR GARDEN: NURSING HOME DESIGN

**Outdoor Gardens in Complex Care facilities need to design in motivation for staff and residents.**

Charlotte Grant concluded that management policies and staff attitudes and training affect the use of outdoor space as much as garden design. She developed a particularly helpful “Garden-Use Model for increasing the use of Outdoor Space. In this model each of five factors must be realized: i.e.

Organizational Policy, Staff attitudes, Visual Access, Physical Access, and Garden Design (layout and amenities). (Grant 2003, Grant and Wineman, 2007)

Mary Jane Lovering, a Canadian Landscape Architect and Physiotherapist, has developed eight dementia garden design principles to optimize use: Motivating elements, comfort features, barrier free design, safety qualities, ease of supervision, calm environment, private and social opportunities and maintenance. (Lovering, 2002)

**The Article by this author “*Maximizing the use of outdoor gardens in dementia care facilities*” published in Canadian Nursing Home, Vol. 25, No. 1, March/April 2014, (available [wabenbow.com](http://wabenbow.com)) provides a good guideline for addressing Outdoor Garden design issues and includes the following Support and Design Elements.**

**Checklist and Supporting documentation is available for Outdoor Garden ([wabenbow.com](http://wabenbow.com)).**

### **A. Support Elements:**

#### **i. Management Support (Policies)**

Organizational policy is determined by the facility mission statement, available literature and brochures, the Director’s own attitude, the education and training of staff, and programming philosophy. To encourage use of outdoor space at a facility these elements should promote residents’ independence and maintaining their optimal abilities; encompass a positive belief in the value of the outdoors for residents; and through programming reflect an active effort to promote outdoor use by residents. (Grant)

#### **ii. Staff Attitude, Training and Involvement:**

Staff Attitudes involve the overall staff mindset regarding the importance and benefits of outdoor space for residents. Staff attitudes are an important element in encouraging and assisting residents to go outside and allowing them a degree of independence and risk taking. (Grant)



### iii. **Meaningful Engagement (Activities)**

Motivation is Lovering's first design principle. She reports in her 1983 survey of Canadian Nursing Homes, that even with favourable weather conditions, resident and staff motivation were the most important factors in determining the usage of outdoor spaces, and that the greatest motivating factors were the opportunities to observe activity. She argues that Outdoor spaces need to be designed as a milieu for numerous casual and organized activities. **(Lovering, 1990, 2002)**

### iv. **Maintenance: (Plants and structures)**

One of Lovering's design principles for special gardens is to facilitate maintenance by the staff. In her three year follow up study of a garden that she had designed she found serious deterioration, settling and an uneven surface on the paths due to poor maintenance. Staff reported the issue of poor maintenance as a major barrier to the use of the garden. "The garden should be viewed as a tool that needs to be appropriately maintained just like any other piece of equipment." **(Lovering 2002)**

## **B. DESIGN ELEMENTS:**

### i. **Location:**

Location determines the indoor-outdoor connection and is critical to a number of factors influencing use particularly independent wayfinding. To encourage use, outdoor areas need to be visible and easily accessible from each care unit. **(MLC 1994)** There is general agreement among researchers that Outdoor Gardens should be located immediately adjacent to each Household unit's common areas (dining, lounge, activity). This facilitates "self-initiated" or independent use and gives both residents and staff a sense of security. **(Bengtsson and Carlsson)** Outdoor areas are preferably at grade, but for multistory buildings can be accomplished with a balcony, deck or sunroom.

### ii. **Entryway:**

Physical Access is one of Grant's five factors critical to Garden use. A single access point helps dementia residents to easily locate the outdoor area and reduce confusion. Grant recommends that the garden entry be legible: i.e. easily recognizable and a highly visible landmark from both indoors and outdoors. Attention should be paid to easing the transition for elderly eyes by providing extra light indoors and sun shading outdoors. An unlocked door is preferable and a propped open door increased "self-initiated" use twofold. **(Grant)**

### iii. **Safety:**

Residents will not use Gardens if they do not feel safe. Another of Lovering's design principles is a safe environment that accommodates the physical changes of aging and dementia, including diminished vision, physical mobility, and strength and endurance as well as cognitive deficits. She reported that fear of falling was rated by staff and residents as the greatest deterrent to the use of outdoor spaces.

**Walkways:** Walkways need to be smooth, level, non-slip, free of sharp turns and kept litter free. They should be tinted so as to be non-glare and have well defined edges and hand rails.

**Lighting:** Lighting needs to be enhanced particularly in the evening, with overhead lighting, bollard type lights for the walkways and perimeter lighting.

**Plants:** Plants must be non-poisonous, non-allergic and without thorns.

### iv. **Visibility:**

Visual Access for both staff and residents is included in Grant's five factors and Lovering's Design Principles. It encompasses views of the legible garden entry and to the garden from the interior of the Household. The door itself should have good contrast with the frame or wall. Residents should be able to preview the outdoors from the entryway area: i.e. through glass in the door and large adjacent windows. Once outdoors, residents should be able to see the complete garden layout, and also back into the common areas of the Household. Members of staff are more comfortable in allowing residents to use the outdoor area independently if they can easily monitor them from indoors. For large gardens outdoor call boxes and video monitoring could be considered.

### v. **Security:**

To prevent elopement and reassure staff outdoor areas must be adequately enclosed either as a courtyard or with fencing which should be 1800 – 2400 mm (6 to 8 feet) in height and difficult to climb. Studies have shown that a walled enclosure can be comforting if confinement is minimized so some camouflaging is in order, both for the fencing and for any exit gate or maintenance access.

## **vi. Accessibility (Door):**

Also in Lovering's design principles is a barrier-free environment that allows participants to be as independent and comfortable as possible. The greatest barrier to going outdoors for many is the process of going through the door. Disability guidelines based on the National Building Code call for an exterior door to have a maximum opening pressure of 8.5 pounds. The door should be a minimum 36 inches wide with a lever handset. For wheel chair users both sides of the door should have a level landing with a minimum 18 to 24 inch space at the latch side of the door. The threshold should ideally be no more than ¼ inch though a maximum bevelled ½ inch is acceptable. **(BC Building Access Handbook, City of Toronto Accessibility Guide)**

## **vii. Accessibility (Walkway):**

Accessible walkways need to allow for two persons using mobility devices to pass: i.e. a minimum of 1830mm (6 feet) wide and should be level, slip-resistant and glare-free. Paths need to have gentle curves with clearly marked edges, curbs, and hand rails. There should be good contrast between the paths, edges, and surroundings.

## **viii. Accessibility (Furniture and Fixtures):**

Outdoor furniture should accommodate wheelchairs: tables should have a minimum height under the top of 685mm (27") to allow wheelchairs to partially slide under; and a manoeuvring space of 915 mm (36 inches) surrounding the useable portion of the table. If drinking fountains are provided there should be a minimum clear knee space below of 700 mm (27 inches) and the spout should be a maximum 915 mm (36 inches) and easily operable with one hand. Raised garden beds or containers at a height of 460 – 600 mm (18 – 24") are suitable for wheelchair users. Ideally they should be able to put their knees underneath. For standing use the beds should be approximately 1m high and about 50cm wide with 230mm (9 inch) high toe allowance. **(Toronto p.25, 30, 44)**

## **ix. Comfort (Shelter):**

In Grant's study staff named a lack of shelter from harsher weather conditions as the highest reason for residents not using Gardens. Shade and shelter are essential to maximize Garden use. Some facilities mitigate weather issues with enclosed perimeter paths and solariums. Lovering found support in her follow up study for a variety of microclimates within the garden to allow for shade in summer as well as warm sunny spots to extend the use of the garden in the spring and fall.

**x. Comfort (Shade):**

The entryway patio should be covered and sheltered to protect from wind, rain, sun and provide visual adjustment from outdoor glare. It should be large enough to accommodate wheelchairs, seating and tables. Outdoor gas heaters could extend its usage. For those able to venture deeper into the garden destination shelters such as Gazebos and shady nooks should be provided. According to Grant the entrance patio area is the heaviest used with shady chairs the next most. **(Grant)**

**xi. Layout:**

In successful Garden layouts the main orienting element is the path which connects the other elements. Residents are more likely to use Outdoor spaces if they can see where they are going at a glance. This requires a simple layout such as a looped walkway with destinations and landmarks visible going and returning. If space is limited an outdoor/indoor loop could be utilized using a two door layout. For this to work doorways need to be easily recognized landmarks from inside and out. Frequent rest stops are essential. **(Lovering 1990)**

**xii. Amenities**

Consider convenience features such as easy access to a washroom, a drinking fountain and a coffee and snack cart. A Garden Shed is handy for tools and supplies. Lovering found that the lack of convenient proximity to washrooms was a major deterrent to use of the garden. **(Lovering, 2002)**

**xiii. Seating**

Seniors need a variety of seating options to enjoy both sun and shade, to provide opportunities for privacy and social interaction, and for rest stops along the walkway. **(Lovering, 2002)** Benches or seats should be located to one side of walkways, mounted on a firm and level base, with suitable back supports and arms to allow for easy transfers, with a seat height between 405 – 460 mm (16 – 19”) **(Toronto, p.30, York).**

#### **xiv. Plants**

Natural features are the magnets that increase the interest of residents in going outdoors, particularly greenery, fresh air, flowers, and birds. In a Swedish study of three nursing homes staff described the significance of contact between residents and natural elements in terms of smelling, tasting and feeling fruits and flowers. They also remarked that plants and outdoor elements can be part of an inspiring design which stimulates the mind and helps residents recall their own gardens, connect with seasonal changes, and socialize. **(Bengtsson and Carlsson)**

#### **xv. Supportive Features:**

Other features can enhance interest such as including birds and small animals, bird houses and bird feeders, garden ornaments, weather vanes, and flag poles. A water feature can provide interesting sounds and attract birds. However, ponds can be unsafe for people with dementia: low depth trickling or bubbling and self-contained fountains are safer. Structures such as pergolas, arches, gazebos and arbours add height and interest to the garden and can be used as a frame for climbing plants as well as offering a place to sit sheltered from the glare and intensity of the sun. However, caution must be used to avoid shaded stripes on the walkway which can be misinterpreted by persons with dementia.

#### **xvi. Views:**

A stimulating view with activity such as scenery, people, vehicles, buildings, daily life is desirable both to entice residents outdoors and to keep them interested while there. However, some authors express concern with views to areas beyond the garden because they may stimulate exit behaviours.

## 11: DÉCOR: NURSING HOME INTERIOR DESIGN

**In addition to providing a welcoming, comfortable and safe environment Interior Design of Complex Care Facilities needs to support the individual's remaining abilities, compensate for lost abilities, and optimize participation in daily life.**

Interior Design deals particularly with **Fixtures, Fittings, Furniture and Finishes**. Fixtures are reasonably permanent well attached items while fittings and furnishings are free standing or lightly hung articles.

The Center for Health Design recommends that surfaces should be:

- Easy to maintain, repair and clean
- Not support microbial growth
- Nonporous and smooth
- Seamless. (Malone)

Generally, Fixtures, Fittings and Furnishings should:

- Look familiar
- Belong in a domestic setting
- Be comfortable to use
- Be safe
- Be colour-contrasted against background surfaces
- Suit people with reduced manual agility (C shaped handles are easier to use than doorknobs). (Interior Design, Victoria, Australia)

Light and colour, especially colour contrast are important overarching aspects of successful Interior Design in Complex Care facilities. Seniors need three times more light than younger adults due to yellowing and thickening of the lens, cataracts and pupil constriction . (Dupuy) In addition seniors' eyes are more sensitive to glare, have diminished depth perception and decreased contrast sensitivity (Brush, 2003) Dutch, Belgian and American studies found that the amount of light in nursing homes was seldom sufficient to meet the visual needs of older people and so placed them at greater risk of falls. They recommend increasing illuminance levels, controlling glare, and using clear and contrasting colours. (Lepeleire, Sinoo et al) Two studies in residential units explored increasing ambient light to around 2500 lux and found improvements in sleep and reduction of disruptive behaviours. (Calkins) The variety, selection and placements of lighting fixtures are critical to ensure adequate and uniform lighting levels.

**The article by this author “*Interior Design for Dementia Care Residences*” published in Canadian Nursing Home, October 2014, vol.25, NO. 3, provides details for evidence based findings pertinent to Interior Design.**

**A Checklist and Supporting documentation are available for Interior Design of Complex Care residences ([wabenbow.com](http://wabenbow.com)).**

## **LIGHT FIXTURES**

Lighting fixtures are of three basic types: ceiling mounted, wall mounted, and free standing portable floor or table lamps. It is important that Lighting Fixture bulbs have a high Colour Rendering Index (CRI) so that colours appear natural (CRI 70 - 100). The temperature of the light emitted as measured on the Kelvin scale is important with lower values (<3000) providing a warmer appearing light often preferred for lounges, and higher values (>3000) closer to daylight delivering cooler but truer colours and health and behaviour benefits related to sleep patterns.

LED lighting is quickly becoming the fixture of choice in terms of cost effectiveness. Savings in long term care facilities are estimated at 50% of the operating cost of fluorescent or CFL bulbs. In addition the long life span virtually eliminates maintenance. LED light fixtures can be designed with adjustable Kelvin values with higher cooler values for daytime use and lower warmer values for evenings. Research is underway to evaluate the efficacy of an automated LED lighting system which mimics the Kelvin value changes of daylight throughout the day to help ameliorate the residents' symptoms of dementia. (Ellis)

A word of caution: the first wave of new and innovative products can be problematic as there is a rush of new manufacturers to capitalize on the growing market. There have been concerns expressed regarding some LED fixtures in terms of quality and durability: i.e. light is not as bright as claimed and life expectancy is overestimated. As yet there is no standard way to rate the lifetime and reliability of LED lighting products. The colour delivered by some LED s shifts over time and becomes less accurate. Some LEDs flicker noticeably and some LEDs can cause glare, particularly at high lighting output levels. Be sure products selected meet North American standards and negotiate reasonable warranties which cover the complete fixture: LEDs, Driver and Housing. (Brodrick)

To avoid glare lighting should be indirect: consider illuminating vertical as well as horizontal surfaces: i.e. use up-lighting fixtures such as wall sconces, cove lighting as well as shaded ceiling fixtures. Placement and shading of overhead lights is important to avoid glare and light and dark “puddles” particularly in corridors where fixtures are often too far apart. (Hyde, Calkins). Recessed ceiling lights can result in dark ceilings which may not be helpful. Corridor lighting should be dimmable and include ceiling and wall up-lighters on different switched circuits.



In bedrooms, lighting should be double-switched from the bed near the door, should be dimmable, and switches should be pressure-plate type. (Van Hoof) A minimum of two ceiling fixtures is recommended for single bedrooms with supplementary task lighting for reading. A night light or motion sensor is good for trips to the ensuite.

A 2005 study in a skilled nursing facility found that LED lights under the bed frame and in the ensuite could improve sleep quality and help to reduce falls. Researchers replaced the overhead light with LED lights under the bed frame, around the ensuite door, under the grab bar and mirror. The LED lights were operated by photo sensor and motion sensor controls. They came on only at night when a resident got out of bed or when staff checked on a resident. Staff and residents reported positively on the changes. Previously residents were disturbed with staff turned on the overhead light to check on them. (Figueiro)

Research has shown that increased lighting in dining rooms can improve nutritional intake (Brush et al, 2002). Persons sitting by the window or wall benefit from increased natural and reflected light. Those sitting in the middle of the room may have inadequate light unless there are sufficient overhead fixtures to boost the light intensity to the recommended 550 - 1100 lux.

Floor and table lamps make good task lighting fixtures: they should be easily controlled by users. Floor lamps should have a good stable base. Table lamps need to be impact resistant, stable and easy to clean.

Light switch plates should be in good contrast with the wall, and positioned low enough for wheelchair use (< 1200 mm or 47 inches). Double-switching fixtures are recommended. (Calkins)

A 2007 British study reviewed lighting in seniors housing and made several recommendations for improvements:

- more individual lighting switches to enhance flexibility, including dimmable lights,
- a better match between number of fittings and room size
- additional spaced ceiling, wall-mounted up lights and free standing uplighters for even lighting,
- improved lighting in circulation spaces such as corridors, landings and stairs,
- correct sized and fitted shades to reduce glare,
- lights in cupboards and wardrobes,
- under-unit lighting in kitchens,
- more portable and adjustable task lights especially in activity and lounge areas. (Percival)

## USE OF COLOUR

A Canadian study has established that the ability to discriminate colour decreases with age, and is particularly evident after age 60. There is a reduction in the perceived saturation or vividness of colours. They appear washed out, grayed. In particular, aging effects the reception of short wave lengths (blue) and more gradually the rest of the spectrum (Cooper et al). Colour discrimination is better in the yellow and red areas. However, the effect of colours upon seniors' behaviour and mood is still poorly researched. The use of colour coding is controversial and should be limited to saturated primary colours such as blue, yellow, red and secondary colours such as green, orange and purple rather than lighter shades and pastels which may all appear gray to older eyes (Dalke, H. et al).

Research has also found that persons with dementia experience increased difficulty with colour discrimination, depth perception and contrast sensitivity. (Cronin-Golomb, Pache, Rizzo, Wijk). Contrast or colour value is the lightness (tint) or darkness (shade) of a colour. This is the critical colour element that is supported by research for designing environments for seniors. A British study recommends a contrast differential value of 30 percent on a gray scale to enable persons with visual impairments to distinguish an object from its background or field. Twenty percent may be adequate in some well illuminated situations while 70 percent is needed for signage. (Bright and Egger)

### *Suggestions for colour selection*

- Colour contrast and good lighting help people's navigation, orientation, mobility, independence and involvement.
- Too many colours together can be distracting:
- Colours that are too well coordinated often lack sufficient contrast.
- Older people are best able to discriminate strong colours at the warm end of the spectrum.
- Colours with a high degree of brightness, such as yellow and yellow-green are highly visible.
- Colours such as peach, coral and soft apricot tones flatter skin tones and add warmth to any setting.
- Pastel blues and lavenders are hard for older people to see and often look grey.
- People with colour vision issues are less sensitive to colours on either end of the colour spectrum. Reds and blues will look darker.
- Combine light colours, such as yellow or green, with dark colours, such as red or blue, to produce the most effective contrasts.
- Avoid dark green against bright red, yellow against white, blue against green, and lavender against pink.

- Colour combinations for effective colour contrasts are light colours against black, dark colours against white, light yellow against dark blue, light green against dark red. (Interior Design, Victoria)

## **ENSUITE FIXTURES:**

It is recommended that ensuite fixtures be easily visible from the resident's bed, particularly the toilet. Ensuited need grab bars in showers, beside toilets and near sinks for safety: these ought to contrast with walls for easy visibility.

Faucet's should be traditional in appearance with separate lever or cross handled taps and clear indication of hot and cold: i.e. marked with a clear indication large enough to be easily seen and understood such as red and blue dots or 'H' and 'C', or 'Hot' and 'Cold'.

The vanity unit ought to contrast with the sink and provide wheelchair accessibility.

Mirrors need to be adjustable and either removable or easily covered since some dementia residents reach a stage where they do not recognize themselves in a mirror and become agitated.

Toilet seats should contrast with the commode bowl and reservoir which need to contrast with flooring and walls. Toilet roll holders can contrast with walls to add visibility. Toilets are easier to transfer to and get on and off of if higher than regular domestic height: i.e. 400 – 460 mm. (16 – 18 inches) A good compromise is 430 mm (17") for seniors.

Showers should have a low lip, preferably no more than 13 mm. (1/2 inch) to be accessible. Shower curtains should not have large patterns or life like objects depicted. It is prudent to ensure there is a floor drain in washrooms with showers.

## **FITTINGS :**

Vertical blinds provide flexibility to minimize glare and the amount of daylight entering a room and are easy to clean. Fabric curtains create a cosy atmosphere and help reduce noise. Curtains should be plain, light coloured with a high LRV and contrast with walls. They should be closed at night to reduce reflective glare. Blackout curtains are good for bedrooms.

Bedding should be plain and contrast with the flooring. Different coloured sheets can be helpful. Personalized quilts or bedspreads can help the resident identify their room. Cushions and throws can create a home-like feel in bedrooms and living rooms.

Memory boxes are helpful adjacent to the resident door for personal memorabilia to help resident identify their own room. LED lit memory boxes will make them more visible and draw attention to their contents.

For dining, placemats or table cloth that have a good contrast to plates and utensils help residents to see food: research has shown that this kind of good contrast increases consumption. Brightly coloured plates have also been shown to stimulate intake. Plates can have a contrasting border to better define their edges. (Brush, 2002).

Pictures and art work should have low reflective glass to reduce glare.

Graphics or signage are best seen at or below door handle height as visually impaired persons and people with dementia tend to look down. Text on signs should be in good contrast with background, minimum font size of 60 pt. (2.1 cm) with serifs, using upper and lower case. Common toilet rooms should be well marked with signage including text and graphics. (Benbow, Wayfinding)

Door fittings including name plates and pictures of the residents can personalize resident room entrances so that they can more easily identify their own rooms. Good examples of decal applications that create individualized door finishes are available at: [www.memorymaid.ca](http://www.memorymaid.ca) and [www.bkrcarteffects.com](http://www.bkrcarteffects.com) . This site also has a good selection of wayfinding decals to identify and lead to toilet rooms, dining rooms etc.

The site also has examples of custom murals designed to camouflage doorways to restricted areas such as exit doors, housekeeping closets, elevators, etc.

## **FURNITURE:**

Generally, seniors' residence furniture should be familiar, home-like, safe, comfortable, sturdy, accessible, and help identify each room's purpose. Stability is important as chairs and tables are often used for support and leverage in 'sit to stand' and walking movements.

The ability to rise safely from a sitting position is critical to independence. Seating height is best at approximately 120% of a resident's lower leg length (LLL) – the distance from the heel to the joint line of the knee with shoes on. Appropriate chair height requires less knee extension, less work by the quadriceps, and less leaning forward. Seat height higher than this or lower than 80% of LLL can impede safe transfer and result in falls. This applies to chairs, toilets and beds. (Capezuti, Kuo) Earlier studies reported that as chair height increased from 17 to 22 inches, successful chair rise doubled and nursing home and community subjects reported less difficulty. Research also found that increased seat compressibility and associated seat height adjustment interfered with chair egress, but cautioned that seating comfort must be balanced with egress ease. (Malone) Arm rests and foot positioning are also major factors in the sit to stand movement. (Janssen) To accommodate a variety of leg lengths, beds need to be adjustable to lower heights to enable easy rising and chairs need to be provided in a variety of seating heights and have arm rests.

## **Chairs:**

Care needs to be taken to avoid designs with 'pinch zones' where fingers and hands can get stuck.

Consider Lounge seating that addresses incontinence issues: i.e. water repellent, stain resistant, and easily cleaned fabric, and removable pop out cushions. It is preferable to have flow through designs (no fabric deck below the cushions) for ease of cleaning and so fluids do not pool within the frame of the seat. Also useful is a clean out area on chairs so that items are not caught between the seat and back frame.

Sofas, Love Seats and Arm Chairs should be designed for good support for proper body alignment with orthopedic back support for the small of the back and with arm rests. Chair upholstery should avoid piping in the lower section which could restrict blood flow in resident's legs. Seating needs to be high enough (51 – 56 cm; 20 - 22 inches), with not too deep a seat (51 – 56 cm). Medium to high density foam is suggested to provide sufficient firmness to for the sit to stand movement. Too severe a seat posterior tilt angle and seat back recline can impede resident egress. It is also easier to rise from chairs designed to allow feet to move to a more posterior position.

Select dining chairs that are easy to move, stable with arm rests that are easy to grasp and push from when getting up. Also important is good lower lumbar support, medium to high density foam seat padding with fire retardant, anti-microbial and water resistant fabric like crypton or vinyl fabrics, and leg cross supports. Consider height and weight of users, and provide a variety of choice including some suitable for bariatric residents. (Hughes) Upholstery should be a good contrast with walls and floor. Joints and fasteners need to be durable and of high quality. Restricted in line castors on two of the chair's legs combined with friction glides on the other two can facilitate sliding the chairs in and out particularly for heavy residents.

([http://www.comfortekseating.com/products/Health\\_Care\\_Bariatrics/royal-ez-rez.htm](http://www.comfortekseating.com/products/Health_Care_Bariatrics/royal-ez-rez.htm))

## **Tables:**

Tables need to have sturdy support which can be pedestal bases or well braced legs. The latter has the advantage of increased stability which is an important consideration since residents often use table edges for support in rising from their chair. The top should have rounded corners and contrasting curved edges. A height of 790 mm (31 inches) is suggested with 735 mm (29 inch) clearance underneath for wheelchair access. Square tables are preferred for dining as they provide a clearly defined eating area for each person.

## **Wardrobes and dressers:**

Wardrobes are preferred over fixed closets for ease of repairs and replacement, and flexibility of room arrangement. Recommend an open section for daily clothing, with latched closed section for storage and contrasting handles on both wardrobes and dressers. Alternatively wardrobe could have two sections with one smaller section colour contrasted for daily use and the other side coloured the same as the wall to deter rummaging. Tops of night-tables and dressers should have no sharp corners.

Be aware of durability issues: vinyl wrap/melamine, low-pressure laminate (LPL) on tops, doors, and drawers are not as damage resistant as high pressure laminate(HPL). A combination of HPL and LPL is acceptable if LPL is restricted to vertical or low-impact surfaces. And particle board construction is not as durable as wood, plywood or medium density fiberboard (MDF) as the substrate.

## **Appliances:**

Microwave ovens are often supplied in Assisted Living and Supportive Housing residences: however, there are safety concerns especially for persons with vision and/or cognitive impairments. It is recommended that any microwaves supplied to seniors' residences have easy-to-use controls. Although difficult to find features to look for are:

- One touch operation with sensors that stop cooking automatically and prevent over-heating so that users do not have to estimate time for cooking.
- An automatic defrost function.
- Well-spaced buttons and large text and numbers.
- A handle is preferred over a push button opener.
- Sound prompts are helpful
- A clear glass window with a bright interior light to see the food while it is cooking.
- Large text manuals and training should be available in the use of the ovens.
- Microwave ovens should be secured for the cognitively impaired to prevent fires. (Tomoko)

A Residents' Kitchen is often included in dementia residences. Safety is a critical issue. Electric ranges and stove tops need to be secured if accessible to dementia residents, with staff operated shut off switches. Residents will need to be supervised to use a Residents' Kitchen as their attention span and ability to pursue complex sequenced activities is frequently limited.

## FLOORING:

Flooring needs to be comfortable to walk on, long lasting, durable, easily and economically maintained and cleaned. Glare is a serious concern especially near or adjacent to exterior windows. A particular issue is the unnecessary waxing and buffing of resilient flooring which increases glare, slips and falls. The Center for Health Design recommends a set of criteria for flooring selection based on a fairly exhaustive literature review:

1. Reduce slips, trips and falls
2. Reduce resident and staff injuries associated with falls
3. Reduce noise levels
4. Reduce staff fatigue
5. Reduce surface contamination and potential risk of Healthcare-Associated Infections (HAI)
6. Improve Indoor Air Quality (IAQ)
7. Improve resident and family satisfaction
8. Represent the best return on investment. (Nanda)

The main choice in flooring for facilities is between carpeting and resilient flooring (vinyl, linoleum). Research has shown that large bold patterns on floors can confuse , immobilize dementia residents, and contribute to falls. (Perritt). Large high contrast patterns can appear as holes or barriers: it is preferable to use low-contrast smaller patterns, solid colours or natural appearing material such as wood (real or imitation). Flooring needs to be stable, firm and slip resistant, yet cushioned for falls. Cushioning properties should be balanced with roller mobility in areas such as corridors. Research has shown that low-pile carpet does not adversely affect balance in older healthy seniors. However, some difficulty was evident if visual input was limited. (Dickinson) This does suggests care should be taken in using carpet in facilities designed for middle to late stage dementia residents where balance, gait and vision are serious issues.

High performance carpeting has the advantage of noise absorption, while resilient flooring is easier to clean. It should have a matt non-glare finish. Where spillage is likely (bathrooms, sinks) flooring should be impermeable, easily cleaned and textured. Both carpet and resilient flooring comes as tiles or strips for easy replacement. Such tiles are not impermeable unless edges are sealed. Carpeting should be low pile and water, mildew and stain resistant. Higher quality carpet will prove more durable. Nylon carpets tend to be stain resistant, durable and cost effective. Long term maintenance issues should be an important factor in selection.

Transitions from one flooring material to another should be smooth with little if any change in level to prevent tripping. Where necessary, thresholds should be a maximum 13mm height and bevelled. To encourage movement where different flooring materials meet, it is best if there is little if any colour



contrast change, and certainly no visible stripe or block of contrast such as a floor mat. If building entry and floor mats are used they should have beveled edges and be firmly anchored. All flooring should contrast with walls and base boards. First-time costs need to be balanced with life-cycle costs.

Highly contrasting flooring can be used to discourage people from moving into a designated area: a dark coloured floor stripe is read as a chasm and so avoided by those with dementia. DYS Architecture has used a black 6 inch wide door threshold to deter dementia-challenged residents from wandering into housekeeping rooms and kitchens.

## **FINISHES:**

Surfaces need to be familiar, easily cleaned and durable. Patterns with life like objects or specks on upholstery, walls and floors can precipitate falls when residents bend to pick up a “leaf” or a particle. Wavy-line patterns on carpets can create nausea . Patterned wallpaper can be disorienting.

Pastel colours appear gray so do require contrasting adjacencies, edges or borders for separation of object and field. Warm tones based on yellows and reds are most easily seen.

Finishes on walls, flooring, furniture etc. should be non-glare, preferably solid colour without a pattern or very subtle pattern of low contrast. On the walls eggshell or silk finish paint is recommended to reduce glare. Ceilings should have a Light Reflective Value (LRV) of greater than 80, walls greater than 60, and floors 30 to 40 (matt finish).

Provide contrast between walls and floors: base boards should contrast with walls and floor. Chair backs should contrast with walls and chair legs with floors. Doors should stand out from surrounding walls by use of colour and contrast with the wall or door frame molding. Some facilities are using different door colours and styles to distinguish resident rooms. Handrails should contrast with walls.

Acoustic ceiling tile, drapery and wall hangings can soften hard surfaces and mitigate noise.

Consider wall and corner protection such as chair rails, corner guards, crash rails, acrovyn type lower wall covering. One caution: acrovyn type wall covering can blister if installed above electric heaters or exposed to direct heating by the sun.

## **FEATURES:**

Special Features are useful to add attractiveness and points of interest : for example, an aquarium, aviary, fireplace, grandfather clock, retro elements, etc. These can be placed at navigational decision points to act as landmarks or be part of a feature wall. (Benbow, Wayfinding) Bright and colourful hanging works of art and murals can provide pleasant memory stimulation. Cushions and throws can

add warmth and accent colour. Plants are appreciated and help to create a homelike ambiance and in the residents' own rooms they can provide something for them to be responsible for.

Designers need to utilize indirect lighting, Light Reflective Values in ceilings and walls, and value contrast for the safety of those with low vision so that they can see and navigate their environment in order to:

- Detect level changes: ie. the edge of a table or counter top,
- Locate a handle or door,
- Determine where the floor and wall meet,
- Distinguish objects from their background: i.e. chairs and carts in their path, toilets, table settings. (Dupuy)

In addition familiarity, safety, durability, warranty, and on-going service are all important in the selection of fixtures, fittings, furniture and finishes.

## 12: MEANINGFUL ACTIVITY: NURSING HOME DESIGN

Dementia and Complex Care facilities need to be designed to enable meaningful activities.

Designing a care facility building for meaningful activity is based on two principles:

- first ensuring that all of the foregoing principles of the Benbow Best Practice Design Guideline are adhered to in terms of dementia friendly design that minimizes barriers to residents pursuing activities, balancing safety and risk;
- and secondly, grounding the design on the concept of enabling residents to maximize their remaining abilities by encouraging and facilitating the pursuit of skills and activities that are based on their own life skills and past experiences.

### **BARRIERS to ACTIVITY PARTICIPATION:**

So the first step is to ensure that the design of the care facility does no harm: i.e. that it does not create barriers to involvement in activities. Brawley points out that the layout and design of the physical environment can hinder participation in activity. She lists several hazards:

- insufficient lighting and excessive glare,
- Uncontrolled noise and lack of sound mitigation,
- Rough walking surfaces,
- Poor stair design,
- Poor quality of seating,
- Unsafe bathroom design. (Brawley, 2001)

### **WHAT RESIDENTS WANT:**

In a Scottish study of six nursing homes Innes used focus groups of dementia residents and their families to discover aspects of design that are important to them . She relates that factors such as noise levels, lighting, visual contrast, acoustics, colour and cues all can influence the person with dementia's ability to participate. She adds that no single environment will suit all residents: some will need more security while others will need freedom to move about. Residents prefer variety and choice in terms of where to spend time; sometimes preferring quiet, and other times more actively joining in the life of the home. They were less concerned with specific building features and more with what you do in a building. One finding was the popularity of lounge areas with a view of the entrance or of the staff work area. Watching the comings and goings of visitors and staff was a main routine activity. Wayfinding and access to outdoors were identified as important design features of the building. (Innes)

A Canadian study specifically set out to discover what meaningful activity means from the perspective of persons with dementia. They found that the single most driving force for many participants was being active and doing as much as they possible could, including leisure pass times, household chores, work-related endeavours, and social involvements. “I want to do everything I can for as long as I can”. Three things defined meaningfulness: feelings of enjoyment, a sense of belonging, and personal autonomy or choice: i.e. meaning through doing. In answer to the question ‘what situations created this possibility for them’ their findings suggested that familiarity of the physical environment was an important factor in encouraging involvement in activities: i.e. familiar places, familiar objects, and familiar activities. (Phinney, 2006)

## **FEATURES THAT SUPPORT MEANINGFUL ACTIVITY:**

A 2006 British study explored the relationship between spatial settings and meaningful activity. The author concluded that meaningful space that supports activity is therapeutic but spaces that give confused messages are common in buildings used by older people. Residents often misread the space and setting. The functional purpose of rooms needs to be clear and recognizable: multipurpose spaces can be particularly confusing as can the size of communal spaces. She found that buildings that support activity positively are associated with well-being while buildings that only focus on safety and health were shown to be poorer in quality of life. She argues that this is likely due to the restriction placed on free movement such as locking doors to the outdoor garden. Risk needs to be balanced with autonomy. Supportive features include physical support for mobility and accessibility, a variety of spaces that facilitate activity, and links with the community. In addition she encourages good support for cognitive frailty and giving residents control of their environment. She emphasises that the physical environment is one of the major factors in influencing how a person derives meaning from their everyday activities. The study included a user needs survey of dementia residents and their families to identify activities that they enjoy. Highest ranked activities were recalling, reminiscing, old photos, visiting and socializing with family. Second ranked activities were walking and moving about. Third were outings, cleaning and dusting, kitchen chores, singing and music. (Torrington)

## **VALUE OF MOVEMENT:**

A more extensive systematic literature review of interventions to reduce wandering in dementia reported limited positive results in a study of an exercise program that showed a statistically significant reduction in wandering compared with the control subjects. Also, planned walking was found to increase both physical and social stimulation. Useful environmental modifications felt to be helpful included increasing the space available for safe walking. (Robinson)

Powell Lawton suggests that “Behavioural inactivity and sensory sameness are the enemies of quality of life”. Design solutions are suggested to decrease disturbing behaviour such as pacing and increase social behaviour by providing choices between private and social space, retreat opportunities, sitting areas which provide the opportunity for the resident to observe activity such as a front porch, and small groupings of chairs. In addition there needs to be opportunities for increased energy-releasing activity such as rummaging and simple chores such as folding clothes or mixing dough. (Powell Lawton, 2001)

## **VALUE OF COGNITIVE EXERCISE:**

A Hong Kong study explored whether leisure activities slow dementia progression in nursing home residents in the mild dementia stage. Mahjong, Tai Chi, and simple handicrafts (connecting beads) were the activities studied. Only the Mahjong group experienced a gradual improvement in global functioning and a slightly slower rate of dementia progression over time. The authors conclude that mahjong and other complex mental activity can lead to a slightly slower rate of progression of impairments in residents with dementia. (Sheung-Tak Cheng)

## **VALUE OF SOCIAL AND TASK ORIENTED ACTIVITIES:**

An American study of seven Maryland nursing homes researched what types of activities were most engaging for dementia residents. They found that one on one socializing (conversation) with a real person including a real baby was the most engaging, followed by activities involving family artifacts, and then simulated work experiences such as sorting and stamping envelopes, folding towels, etc. The most engaged participants responded best to social stimuli and the task-oriented activities. These task type activities conferred some observable positive effect and generally engaged the resident for a significant time period. (Cohen-Mansfield, 2010)

## **VALUE OF CHOICE:**

Davis et al describe the movement in Australia away from designing for the purpose of control or to diminish behavioural difficulties and instead developing environments that actively encourage pleasurable and satisfying experiences. They stress using the physical environment to provide a range of interesting everyday activities and give as examples the resident kitchen, a bus stop seating area, a washing line, and old car, an office area, a craft table with supplies, and of course the garden area. (Davis, 2009)

## **VALUE OF LIFE STYLE ACTIVITIES:**

These 'lifestyle activities' are being developed in a number of facilities to provide meaningful activities through 'life skill stations'. These are actually activity stations that are designed to spark memories of residents' previous hobbies and work life. The goal is to create small vignettes that help dementia residents recognize familiar activity objects and encourage interest, movement and interaction. Those with experience providing Life Skill Stations have found that they are helpful in the retention of older long term memories. (Abruzzo)

## **LIFE SKILL STATIONS:**

Stations give residents the opportunity to practice specific life skills and are chosen based on the life stories of the residents. Vintage furniture and props for each memory care station are chosen to be reminiscent of a time when residents may have put them to use. Examples are:

- Office Station: A vintage roll-top desk, telephone, and typewriter encourage recalling working at the office,
- Vanity Station: A vanity, antique mirror, and vintage jewelry awaken memories of grooming,
- Hall Tree Station: A hall tree with military uniforms or dress up clothes ,
- Kitchen Station: A hutch with vintage cooking utensils or a working resident kitchen with supervision,
- Laundry Station: Could be an ironing board with a non-functioning iron, clothes and linens to fold, or assisting with the residents' personal laundry.
- Doll Station: with crib, rocking chairs and baby dolls,
- Garden station: with pots to water, plants to rearrange,
- Travel Station: with travel guides, maps, books,
- Handy-man station: tool bench with user-safe tools and gadgets, things to take apart and repair,
- Old Music station: record player, records, headphones, posters,
- Veterans station,
- Medical Station, Lawyer, teacher station etc.
- Stations require restocking, maintenance and upkeep to stay fresh and stimulating.

Hart features these life skill stations in her model care facility that she calls the Hart Home away from Home (HHH). She describes these activity stations as comforting and reminiscent of who the individuals were and what they did before they moved to a care setting. These familiar activities can restore a sense of purpose and meaning and some sense of self. (Hart)

## **MEMORY TRAIL:**

A British Architect, Martin Habell who has designed dementia facilities over twenty years, has evolved the concept of 'the environment as a tool for care' into an activity based model. He sees the internal environment being used for therapeutic benefit using movement, memory trails, behaviour cues, signage, sun light therapy, light spectrum control and landscape. The design is based on a movement trail or loop which has activity and memory stations along the way. Resident rooms are located around the perimeter, and are linked by the trail which passes through lounges and a variety of activity areas such as large communal spaces, smaller semi-private seating, a snoezelen area, interactive stations such as computer, office, music, a tasting station beside a small residents' kitchen, all with views to a central easily accessed indoor paradise garden. The layout is quite open with good visibility across the centre. He is particularly concerned with providing plenty of natural light and views as well as ample directional cues. Along the route there are changing sensory displays which act as memory triggers such as old holiday posters, movie posters, vintage items, old photos, and even a variety of olfactory stimulations which he calls 'nostalgic aroma packs'. As an architect he is conscious of functional space

requirements for care facilities and maintains that his model approximates the UK average of 50 square metres per resident. (Habell, 2013)

This model has been replicated by Horizon Bay in Tampa Bay Florida in a two story building with 24 resident rooms surrounding a courtyard. The circular floor plan allows residents to wander through 14 life skill stations as well as purposeful destinations such as dining, activity and lounges. The layout is designed to stimulate the minds of the residents and bring them back to constructive and pleasant memories.

<http://www.aptura.net/Aptura/resources/Horizon-Bay-Success-Story.pdf>

## **CONCLUSION:**

Clearly, the physical design of a building can impede or support meaningful engagement in activities. Design features for dementia care are evolving as we learn more about the effect of environment upon care. One explored area is the use of technology in stimulating memories and providing meaningful activities. One example the writer has observed is the use of a corridor mounted flat screen TV to showcase a resident on a special occasion or by rotation with pictures and videos from their life.

In summary, an experienced architect suggests that translating our evidence-based and experience based knowledge into a constructible well-programmed place requires that flexibility be designed into it. This is so that the building can support activities that can be altered and modified to meet the needs of specific residents. He suggests the physical environmental aspects of the facility could include the following:

- Design a unique and individual surrounding. The visual theme would be inspired by the resident's past and personal experiences.
- Provide the resident with opportunities for solitude and dignity, accessible through personal choice.
- Provide the resident with spaces for social interaction, accessible through personal choice.
- Protect the resident from physical trauma, social or environmental in nature.
- Utilize light, natural and artificial to benefit the resident.
- Provide engaging outdoor areas where there are opportunities for group socialization and activities as well as solitude.
- Build in spaces for staff retreat and meditation.
- Provide spaces, elements, and view vistas that engage the resident and do not encourage the thought to leave.
- Support the ability to change elements in the future.
- Include clear simple way-finding cues in the architecture and color.
- Be mindful of the importance of color from the elderly perspective.
- Select furnishings, accessories, and finishes that address the realities of the AD resident facility, including but not limited to soiling, flammability, fluid barriers, accidental impact, and antimicrobial finishes. Be aware that bed requirements for the aged are unique and specify accordingly.
- Develop the proposed facility around a sustainable model. (Olinger)



## LIFE STATION GRAPHICS



<http://www.providermagazine.com/archives/archives-2011/Pages/0211/%E2%80%98Life-Skills%E2%80%99-Bring-Solace-And-Purpose.aspx>





[http://www.plantationsouth-dunwoody.com/p/senior\\_living/photo\\_album/dunwoody-ga-30338/plantation-south-dunwoody-3200](http://www.plantationsouth-dunwoody.com/p/senior_living/photo_album/dunwoody-ga-30338/plantation-south-dunwoody-3200)



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<http://www.jointheirjourney.com/memory-care-stations/>



<http://www.westlakebayvillageobserver.com/read/2014/03/04/westlake-village-opens-new-memory-care-unit/photoGallery>

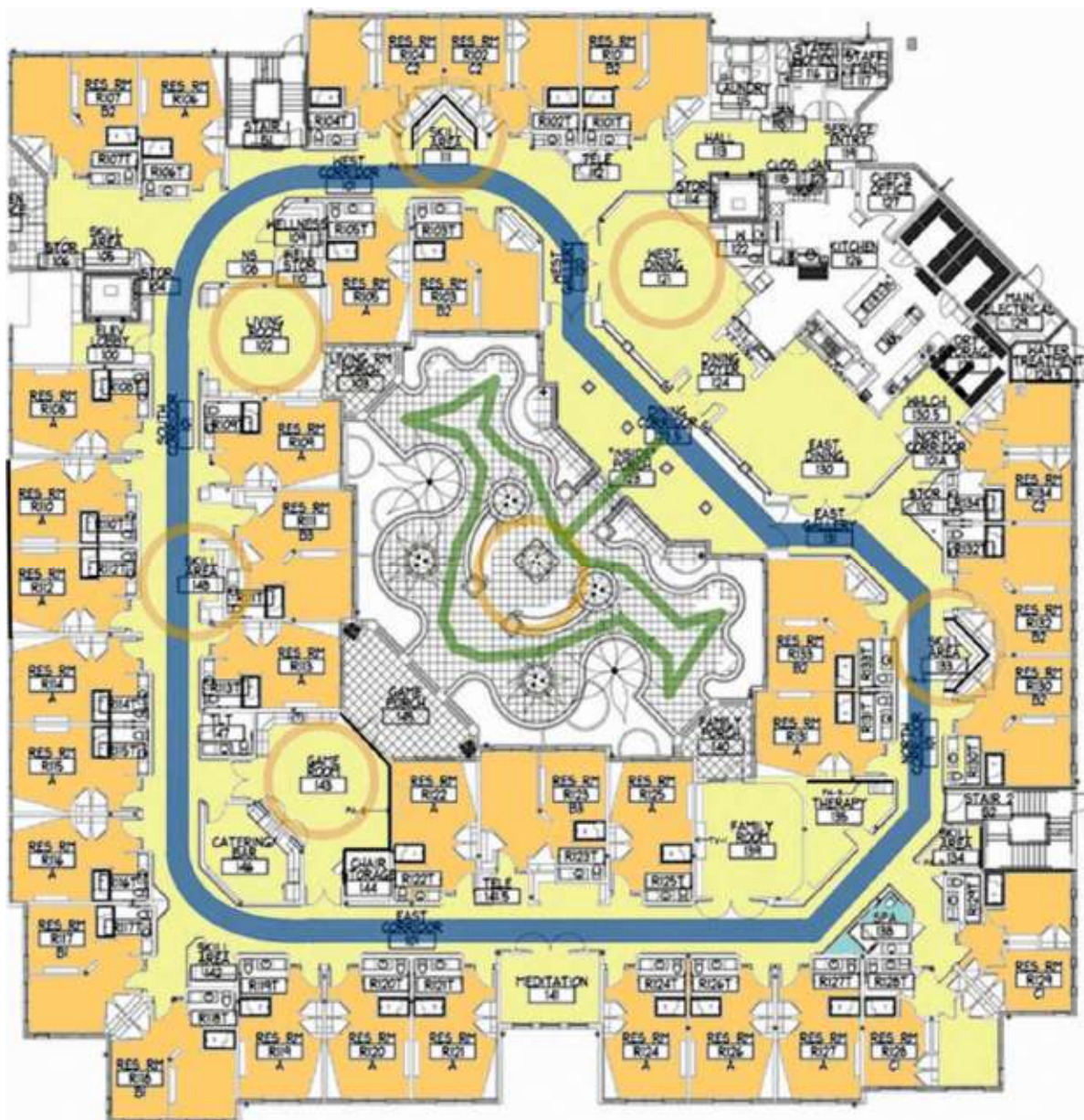






### A roadmap for success: the Horizon Bay floor plan

The two-story building surrounds a secure courtyard – this circular floor plan is perfect for memory care residents to wander, offering purposeful destinations throughout. Beyond dining, activity and unique common spaces, there are 14 life skill stations designed to stimulate the minds of residents, bringing them back to constructive and pleasant memories. Use the floor plan shown below and the legend shown at right to locate each area highlighted on the following pages.



<http://www.aptura.net/Aptura/resources/Horizon-Bay-Success-Story.pdf>

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