
DESIGNING FOR AGING

Matt Bergstrom



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of Architecture and Landscape Architecture
of North Dakota State University

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Degree of Master of Architecture

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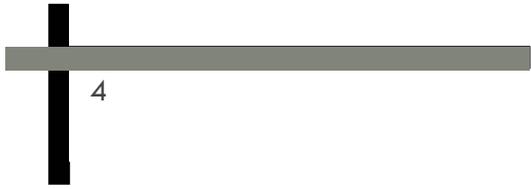


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Abstract

Designing for the Aging

Matt Bergstrom

The built environment must adapt to the increasing number of aged people by maintaining and improving the accessibility of the built environment. Due to improvements in medicine, as well as the aging of the baby boomer generation, the United States is seeing an increase in this segment of the population. The built environment must do more than it currently does to accommodate for aging and adapt to improve accessibility for all people. One aspect of the built environment that is in dire need of investigation is the quality of assisted living centers and skilled nursing facilities.

The baby boomer generation is of particular interest and importance to this thesis because they are the end users of the project. The bubble in the population that occurred between 1946 and 1964 calls for a project of this type. The project will consist of an assisted living center with twelve units totaling 8,050 SF and an accompanying skilled nursing facility with seventeen units totaling 27,500 SF. It will be located in Crosslake, MN. This is a small town that currently does not have these facilities and is in need of this type of project. The project will emphasize the mobility of the men and women by allowing them to grow within the project and move within it as they require additional services.

Research is fundamental to this project's successful design. Case studies of previous successful buildings will be analyzed and diagnosed. The knowledge that is gained will inform all aspects of the design. The process associated with the design will be documented using digital means and serve as a guide to future scholars pursuing similar topics.

Keywords:

Assisted living center, Skilled nursing facility, Baby boomer generation

Problem Statement

How does architecture respond to an aging population?

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Statement of Intent



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Statement of Intent

Typology:

Assisted Living Center, Skilled Nursing Facility

The Theoretical Premise/Unifying Idea:

Claim:

Due to the increase in life expectancy, as well as the aging baby boom generation, the number of elderly people in the United States is increasing, and the built environment must respond accordingly.

Premises:

Baby boomers are defined as men and women born between the years of 1946 and 1964. This group of individuals numbers 78 million people and accounts for a large portion of the population.

Advances in medicine have led to men and women living longer, healthier lives.

The built environment must be maintained and made accessible to all ages.

The built environment must adapt to the influx of aged people.

Theoretical Premise/Unifying Idea

The built environment must adapt to the influx of aging people by maintaining and improving the accessibility of the built environment.

Project Justification:

Men and women are living longer than ever before. This is due to improvements in medicine. As the baby boom generation ages the built environment must do more than it currently does to accommodate these citizens and adapt to improve accessibility for all people.



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Proposal

Narrative

The built environment must adapt to the influx of aging people by maintaining and improving the accessibility of the built environment. Due to improvements in medicine as well as the aging of the baby boomer generation, the United States is seeing an increase of elderly men and women. The built environment must do more than it currently does to accommodate this aging and adapt to improve accessibility for all people. One aspect of the built environment that is in dire need of being investigated is the quality of assisted living centers and skilled nursing facilities.

The baby boomer generation is of particular interest to this problem. This generation is defined as men and women born between 1946 and 1964. This group of men and women are of importance because a large bubble was created in the population. This group is quickly approaching old age, and will be in need of assisted living and skilled nursing facilities.

Men and women are living longer, healthier lives. Advancements in medical care and technology have had a definite impact on the increase in life expectancy. The improvement of the medical field, coupled with the approaching bubble of baby boomers in the population, will need to be provided for through additions and accommodations of the current built environment.

Narrative

The current built environment is not prepared for the needs of the future. It is lacking in many areas including skilled nursing facilities and assisted living complexes. Spaces need to be created that can facilitate the care that elderly men and women will need.

The built environment must respond adaptively. It must change in its makeup and organization in order to accommodate the influx of elderly individuals. The status quo of the built environment is ill suited and unprepared for the approaching bubble of elderly men and women.

The baby boom generation will soon surpass the available facilities providing elderly care. Adaptive action must be taken to supplement the current supply of skilled nursing facilities and assisted living centers. The method and means associated with this will serve as a guide for the research to follow.

User/Client Description

The project will be designed for elderly men and women and their families. The elderly will be the primary users of the spaces and permanent residents of the project.

Many of the elderly residents will have health and mobility issues. Due to advances in medical care, men and women are living longer lives; however, as they age they require more assistance. Universal design will be very important to the project as some of the residents will have difficulty walking and will use walkers or wheelchairs. Many of the elderly residents will be unable to drive so bus and van transportation will need to be provided for the residents.

The number of residents will remain consistent and be determined by the size of the site as to how many units it will accommodate.

The secondary users of the space will be family members of the residents and other visitors. The number of visiting family members will fluctuate daily. The number of visitors will most likely be at a peak on summer weekends and over holidays. Parking will need to be provided for visitors.

Major Project Elements

Assisted Living Center

Dwelling Units	Community Spaces
One Bedroom	Lobby
Companion Suite	Laundry
Studios	Library
Administrative Spaces	Dining Room
Offices	Kitchen
Staff Lounge	Activity Rooms
Treatment Spaces	Social Lounge
Physical Therapy	Mechanical
Wellness/Activity Area	Circulation

Skilled Nursing Facility

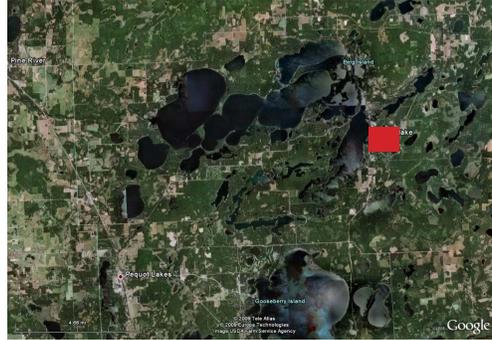
Dwelling Units	Community Spaces
One Bedroom	Lobby
Companion Suite	Library
Studios	Dining Room
Treatment Spaces	Kitchen
Physical Therapy	Activity Rooms
Wellness/Activity Area	Social Lounge
Nurse's Station	Mechanical
Service Spaces	Circulation
Housekeeping	
Laundry	

Shared Outdoor Spaces

Parking
Gardens
Walking Paths

Site Information

Left: State
Right: Region



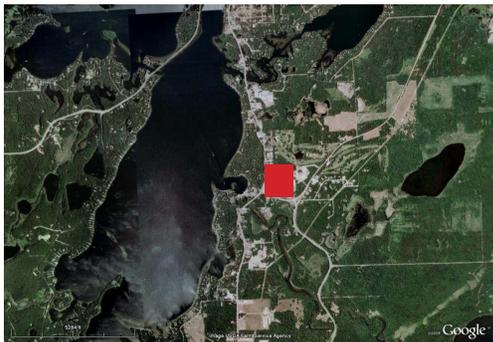
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The project will be located in Crosslake, MN. This is a small city that has shown consistent population growth among permanent residents. The city swells with tourists during the summer cabin season.

The site selected is at the intersection of a secondary and tertiary road in downtown Crosslake. It is within walking distance of both the recently redeveloped Crosslake Town Square and the Cross Lake public access and campground.

The property is currently undeveloped and borders the Crosslake Town Square. The Town Square has a strong pedestrian focus and provides a valuable community park. This may lead to a link between residents and the community which would be a benefit to both (Regnier, 2002).

Currently, residents of Crosslake have no options nearby for assisted living centers or skilled nursing facilities. This project will fulfill a need that is currently missing in the town.



Left: City
Right: Site

Project Emphasis

The built environment must adapt to the influx of aging people by maintaining and improving accessibility and usability of the built environment. The project emphasis will be on creating an environment that will be responsive to the needs of aging men and women. The project will accomplish this by providing multiple levels of assistance. Individuals will be able to remain residents of the designed project even as they require additional assistance. Individuals may begin in the assisted living center and if more care is needed move to the skilled nursing facility within the same complex.

Plan For Proceeding

Research Direction

Helpful and clear research will be fundamental to the success of the project. The statement of intent will serve as a partial outline to how and what will need to be researched. The specific areas that need to be researched are the theoretical premise/unifying idea. I will need to research how the built environment must adapt to the increase in the number of aging people.

The project typology will need to be studied as well. This will be done by locating and analyzing case studies of existing assisted living centers and skilled nursing facilities.

The site that has been chosen will need to be researched extensively. It is necessary to know the history of the specific site as well as the surrounding community. The site will need to be analyzed according to climatic conditions, views, and surrounding context.

I will also need to research the programmatic requirements of the site. This will relate closely with the case studies of previous successful designs. I will need to determine the required spaces, their relationships to each other, as well as their relative size and orientation.

These are the direct lines of inquiry that will drive the research for this project. They have been predetermined and laid out in the statement of intent.

Plan For Proceeding

Design Methodology

My research will follow a mixed method, quantitative/qualitative approach. The strategy that I will employ will be the concurrent transformative strategy. The premises outlined in the statement of intent will guide the strategy. I will gather quantitative research simultaneously with qualitative research. The emphasis of the research will be on the built environment, specifically utilizing case studies of existing assisted living and skilled nursing facilities. The data will be integrated at several stages in the process of research and will depend on the requirements of the examination of the premises. My analysis, interpretation, and reporting will occur throughout the research process and will be presented utilizing both text and graphics.

Documenting the Design Process

I intend to compile my documentation and research digitally. I will scan or otherwise create a digital copy of all drawings and process elements. I will organize my process and findings using folders which will be burned onto a disk at the completion of the thesis. This disk will accompany the thesis book that is required. The thesis book and accompanying disk will allow for analysis by future scholars. The process will be continuous, and will be converted into digital means every two weeks.

Previous Studio Experience

Second Year

Fall - Stephen Wischer

Tea House - *Fargo, ND*

Boat House - *Minneapolis, MN*

House for Twins - *Fargo, ND*

Spring - Joan Vorderbruggen

Montessori School - *Moorhead, MN*

Prairie Dance Academy - *Fargo, ND*

Third Year

Fall - Steve Martens

Nunavik School - *Inuit Village, Alaska*

Mankato Pediatric Center - *Mankato, MN*

AIA Competition

Spring - David Crutchfield

Mixed Greens - *Fargo, ND*

Steel Structural Study

Fourth Year

Fall- Bakr Aly Ahmed

Truss Tower - *San Francisco, CA*

Flad Architects Competition

Life in a Cigar Box

KKE Competition

Spring - Darryl Booker

Keyhole Commons Master Plan- *Santo Domingo, DR*

Tinga School - *Tanzania*

Marvin Windows and Doors Competition

Keyhole Commons Community Center - *Santo Domingo, DR*

Fifth Year

Fall - Mark Barnhouse

Water Experimentation Center - *Linton, ND*



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Program

Theoretical Premise Results

How can architecture respond to an aging population? This is a very timely question to ask of the design profession and is the foundation of this thesis. The purpose of the thesis is to answer this social question and clearly illustrate the success of the solution. However, before forming an architectural response to this issue, research must be conducted to better understand it.

The research required to fully understand this issue will cover many different areas. First, it is important to understand the trends related to population growth in the United States. Second, determine what factors affect the current growth trends. Extensive research was done in the area of demographics to understand these growth trends. The factors associated with the aging population required additional research to be done in the medical fields to understand how advances in medicine have led to an aging population.

The thesis will provide an assisted living center and skilled nursing facility to the community of Crosslake, MN. It was important to research what the users of these buildings are like, and the services a typical elderly resident will require since this will inform the program. Finally, it was important to understand the future of elderly care facilities and how residents will relate to this building type.

Theoretical Premise Results

Between the years 1900 and 2000 the distribution of population in the United States changed greatly. In 1900, the US had both a high mortality rate and a high fertility rate. By the year 2000, the US had moved to a low mortality rate and a low fertility rate (Vierck, 2003). This led to the population of the US aging significantly over this time period. There are several reasons that contribute to the aging of the US population.

The first reason is that the life expectancy at birth has changed drastically since 1900. According to the National Vital Statistics Report produced by the Center for Disease Control, the life expectancy in 1900 was 47.3 years. The life expectancy in 2004 was 77.8 (Center for Disease, 2007).

The second reason that the US population is aging is the advancements in medical care. In 1900, influenza and pneumonia killed 202 out of every 100,000 people. By 1998 that number dropped to 34 out of 100,000 (Vierck, 2003). This illustrates that the level of understanding of deadly diseases has vastly improved over time. Doctors and researchers have been able to understand diseases better, and they have been able to develop successful treatments or vaccines.

Theoretical Premise Results

The advancements in medical care have led to developing vaccines for the various diseases. The effect that vaccines have had can be illustrated by tuberculosis. In 1900, tuberculosis killed 194 out of 100,000 individuals (Vierck, 2003). According to the Center for Disease Control, in 2008 only 4.2 out of 100,000 individuals contracted tuberculosis. This is down 3.8% from 2007. The tuberculosis rate has been consistently declining since 1992, and has been at a low since 1953 (Center for Disease, 2009). Tuberculosis is one of many diseases that over the last century has been curbed by advances in medical care. There are several other important vaccines that have been developed over the twentieth century that have diminished the threat of disease, and many will continue to be developed in the twenty-first century.

The third reason that the US population is aging is the effect the baby boomers are having on the population. The baby boom generation includes individuals born between 1946 and 1964. At the conclusion of World War II a sudden and dramatic increase in births occurred. The baby boom generation will begin to turn 65 in 2011. The number of people age 65 and above is predicted to swell from 39.7 million in 2010, to 53.7 million in 2020, and 81.9 million in 2050 (Vierck, 2003). The baby boom generation will soon lead to a grandparent boom and a rapid growth in the elderly population.

Theoretical Premise Results

Men and women in the United States are aging. Individuals are considered elderly if they are over 65 years old. Currently, 1 out of 8 individuals is elderly. This is up from 1 out of 25 at the beginning of the twentieth century (Vierck, 2003). With elderly people accounting for almost 13% of the population, the needs that they have must be taken into account by architectural design.

The number of elderly people is rising and will continue to rise. Currently, the fastest growing segment of the US population is individuals over age 85 (Vierck, 2003). Men and women in the United States are living longer, more productive lives. In 1900, there were only 122,000 adults over the age of 85 living in the United States. In 2000, there were over 4.2 million adults throughout the United States over the age of 85, and 65,000 over the age of 100 (Vierck, 2003).

The elderly are not only increasing in number, they are increasing in age. Between the year 1990 and 2000, the number of people over the age of 85 increased from 3 to 4.2 million and is projected to reach 19.3 million by 2050 (Vierck, 2003). This is a drastic increase in a relatively short amount of time. Since growth of this magnitude is expected to remain for some time, architecture must respond in a meaningful and decisive way, and do so soon.

Since 1960, the population of individuals over the age of 65 has increased by more than 100%. This contrasts a total population growth of only 50% in the same time period (Vierck, 2003).

Theoretical Premise Results

In order to successfully design for the elderly, we must understand who the elderly are. The elderly in the United States are predominately female. In fact, elderly women outnumber elderly men 3 to 2. This percentage of women to men increases as age increases. By age 85 women outnumber men 7 to 3 (Vierck, 2003). Women outlive men by an average of 7 years in the United States. (Regnier, 2002).

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Women are more likely to end up in skilled nursing facilities than men. Women tend to outlive their spouses. Studies show that 75% of men over age 70 are married and live with their spouse, while only 33% of women over age 70 live with their husbands (Regnier, 2002). This shows that the likely inhabitants of the skilled nursing facility will be widowed women. Married couples may still be present but the majority of the residents will be widowed females.

Men and women who are living in skilled nursing facilities are among the oldest of the old population. The average age of men in nursing homes is 82.5 years, while the average age of women is 84.3 years (Regnier, 2002).

Typical elderly residents would be physically frail. They would most likely suffer from one or more chronic ailments that restrict mobility, have limited fine motor skills, or issues with balance. The ailments could include arthritis, hypertension, heart disease, diabetes, or hearing and visual impairments (Regnier, 1994). Studies show that 38% of residents require the use of a walker or a wheelchair (Schwarz, 1999).

The services required by the residents could include assistance with bathing, dressing, medication supervision, using the toilet, eating, and grooming (Regnier, 1994).

Theoretical Premise Results

Architecture must respond to the increasing elderly population. The means to do this is to design and construct assisted living centers. An assisted living center is defined by Victor Regnier as, “a long term care alternative that involves the delivery of professionally managed personal and health care services in a group setting that is residential in character and appearance in ways that optimize the physical and psychological independence of residents” (Regnier, 1994 pg 1). An assisted living center is a housing option for the physically frail due to old age.

The demand for assisted living units is increasing. In 1996 it was estimated that 457,000 beds were required. This number is projected to jump to 1,164,000 by 2030 (Schwarz, 1999). The increase in demand is directly related to the growth in the elderly population.

Elderly men and women face financial difficulties as they age. Assisted living and skilled nursing facilities are a great financial burden for the residents. The average cost of staying in a nursing home is over \$45,000 a year or about \$124 a day (Vierck, 2003). Assisted living centers are relatively affordable and cost around \$66 a day (Schwarz, 1999). However, it is important to note that the residents are elderly and are no longer working to generate income. As people begin to live longer lives it is expected that they will have to work longer before they retire to be able to afford assisted living when they require it.

Theoretical Premise Results

The purpose of this thesis is in part to provide an improvement to the assisted living typology. In order to do this it is important to understand what makes an assisted living center successful or desirable for its residents. Benyamin Schwarz highlights the nine attributes of an ideal assisted living center (Schwarz, 1999). He developed these nine attributes by observing innovative assisted living facilities in both the United States and Europe.

The nine attributes of an ideal assisted living center:

- Residential appearance
- Smaller scale arrangements
- The person as a unique individual
- Family involvement
- Mental and physical stimulation
- Residential privacy and completeness
- The surrounding community
- Independence, interdependence, and individuality
- The frail older person

Not all assisted living centers will possess these nine attributes; however, Schwarz has set up a guide for the future of the typology. Many of the assisted living centers that are functioning today do not possess these attributes, and they are not fulfilling the potential of the typology. These attributes should serve as a measuring stick of the quality of assisted living centers.

Theoretical Premise Results

Finally, it is important to determine what services a typical assisted living center provides. William Brummett outlines the typical services, including personal care, medical assistance, security and oversight, meal preparation, social activities and community connection, commercial connections, and transportation (Brummett, 1997). These may be the typical services provided, but not all residents are going to require all of the services. A major advantage of an assisted living center is that the elderly residents can pick and choose the services they will receive. This allows for a continuum of care that can be kept up to date with the assistance needed.

In conclusion, extensive research is required before forming an architectural solution to the problem statement. This research has covered many disciplines and has been fundamental to the full understanding of the problem. The research began by understanding the trends related to population growth and what factors have contributed to these trends. It then progressed into determining information about the users of the assisted living center, the future of the typology and concluded with a discussion of what services are typically available. The research is complete and has provided the necessary information to be able to develop a physical architectural response to how to design for an aging population.

Theoretical Premise Summary

The population of the United States is aging. Demographics have proven that the number of elderly residents is increasing. This is an important issue that the architecture profession will be facing in the near future and is the foundation of this thesis work.

Elderly men and women are living longer lives. Since the beginning of the twentieth century, life expectancy has increased 30 years. This is a great medical achievement and is directly related to the advances in medical care that have been developed since the turn of the century. For example, doctors have developed treatment and vaccines for many deadly illnesses. This is shown by the drastic decrease in influenza and pneumonia-related deaths. In 1900 tuberculosis was the second leading cause of death; however, today it kills fewer than 1 out of every 100,000 people.

The baby boomer generation is about to have a big impact on the number of elderly men and women. Baby boomers were born after World War II, between the years 1946 and 1964. The first of this generation will be turning 65 years old in 2011. The baby boom will soon become a boom to the elderly population.

A demographics study has shown that the elderly are not only increasing in number but they are also increasing in age. The fastest-growing segment of the population are the elderly over the age of 85. In the last 50 years the number of men and women over the age of 65 has doubled.

Theoretical Premise Summary

The elderly in the United States are predominately female. The ratio of women to men increases as age increases. Women live an average of 7 years longer than men. This means that the users and residents of the assisted living center will be predominately single elderly women.

Typical residents of an assisted living center would be in their mid 80's. They would be frail and suffer from chronic ailments. These ailments could affect their mobility, fine motor skills, and balance. They would require a range of services from, assistance with bathing or using the toilet, to grooming and eating.

The increase in elderly men and women has led to an increase in demand for elderly care. The demand is expected to double by the year 2030. In addition to creating new elderly housing options, changes must be made to the typology itself.

Benjamin Schwarz has outlined nine attributes for an ideal assisted living center. An ideal assisted living center should be residential and small in scale, regard the residents as individuals while incorporating family involvement in the care. It should provide mental and physical stimulation while offering residents privacy. It should care for the frail, while encouraging independence and interaction with the surrounding community (Schwarz, 1999).

In conclusion, architecture must respond to the increase in the aging population and it must do so in a way that is responsive to the needs of the elderly.

Case Study - Steinflled

Nursing Home and Center for Seniors - Carinthia, Austria



Exterior

This nursing home is located in Carinthia, Austria. It contains 34 single and 8 double units. It is designed to have minimal physical barriers to allow ease of movement for the mobility-impaired elderly residents. Each dwelling unit has its own wheelchair accessible restroom. Kitchen spaces are shared and are placed between the dwelling units.

The building is oriented in an east-west direction. The form of the building is compact in size and has a monolithic appearance. The massing is rectangular and has a few subtractive elements. The areas that have been carved out of the overall mass create opportunities for decks and outdoor terraces.

This building responds well to the environment around it. The service spaces of the building create a buffer to block the noise from the highway to the north. The ceiling high windows have low sills to allow lots of natural light to penetrate while providing open exterior views of the landscape. Sun shading is controlled by individually adjustable sliding wood shutters. This allows for dynamic and ever changing light conditions on the interior.

Case Study - Steinflled

Nursing Home and Center for Seniors - Carinthia, Austria



Garden



Shared Kitchen Space

This building has a unique structural system. The lower floor is reinforced concrete, while the upper two floors are wood construction consisting of prefabricated wood walls and laminated timber columns. The strong ground floor is slightly set back on all sides creating a partially cantilevered wood mass above. The exterior cladding material on the upper mass is vertical larch boards.

Great care was taken in the design to provide flexible spaces. Many of the shared spaces serve multiple functions. For example, the large hall space on the first floor is used as dining space, a library, a chapel, as well as space for special events. The functions also extend to the community as the facility is used by children after school.

The design emphasizes passive energy strategies. The atrium in the center of the building combines natural ventilation with geothermal technology, creating a building that uses 30% less energy than similar building types. The geothermal system preheats the air in the winter, and cools the air in the summer. Fabric sunshades are employed for the skylight at the top of the atrium to further control direct heat gains. The form of the building is compact and it is highly insulated.

Case Study - Steinflled

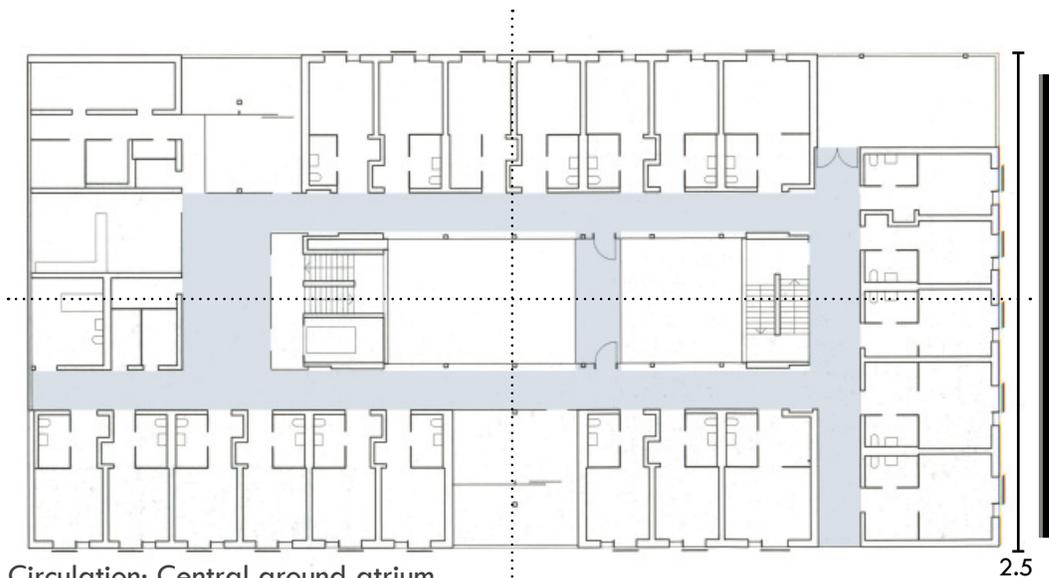
Nursing Home and Center for Seniors - Carinthia, Austria

The dwelling units are designed to encircle the central atrium space. Circulation centers around this atrium space and utilizes visual links to orientate and inform movement throughout the building.

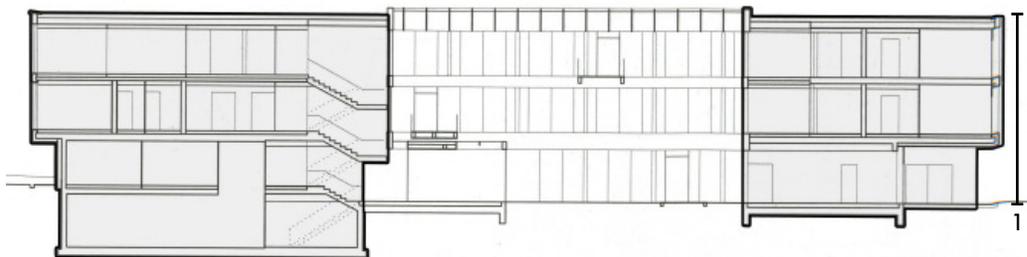
The overall form of the building is a ratio of 1:2.5 between the section and the plans. This creates a massing that is agreeable and balances on the concrete plinth that the first floor creates.

In conclusion, Steinflled provides an example of how sustainable and passive solutions can work with the required spaces to create a nursing home that is well suited to the elderly residents and to the environment.

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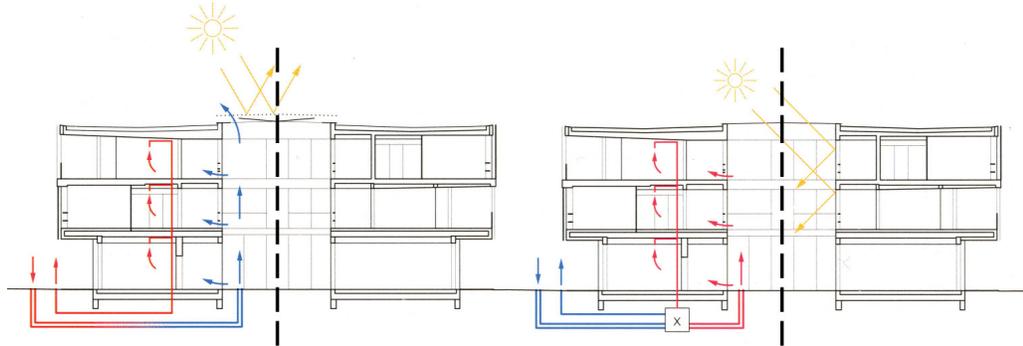
Circulation: Central around atrium
Balanced: Units balance each of the four sides



Mass and Void
Section relates to the plan at a 1:2.5 ratio.

Case Study - Steinflled

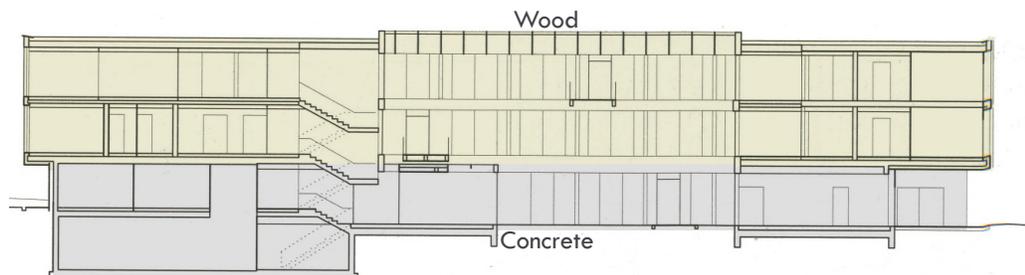
Nursing Home and Center for Seniors - Carinthia, Austria



Ventilation: Utilizing geothermal technology
Symmetry and Balance



Repetitive Pattern: Living units are similarly shaped



Structure: Concrete and Wood

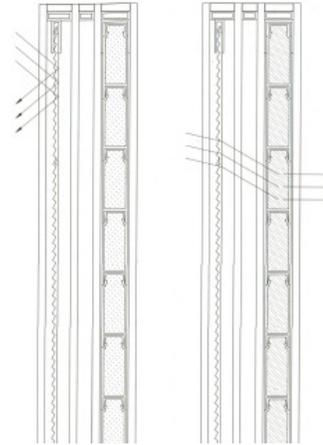
(“Nursing Home,” 2007, p. 628)

Case Study - Domat

Dwellings for Senior Citizens - Domat, Switzerland



Exterior North Side



Glazing Detail

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This project is located in Domat, Switzerland and contains 20 two-room dwelling units. The units are designed with the disabled in mind and organized over 4 floors, with 5 units on each floor. Each unit is approximately 615 ft² and includes two bedrooms, living room, kitchen and bathroom. Each unit also has access to private additional storage space.

A unique aspect of this design solution is the use of a high tech glass. Nearly the entire southern wall is clad in this glass. The glass is unique because it is triple glazed glass that controls the type of light to enter the building. The first cavity contains a series of prisms which allows the light from low angles to penetrate while not allowing the light from higher angles to do so. This glazing system allows winter light to enter the spaces but reflects the hot direct summer sunlight away. The second cavity contains a salt hydrate that acts as a thermal storage mass. It maintains its heat throughout the day and releases it in the evenings when it is cool outside.

Case Study - Domat

Dwellings for Senior Citizens - Domat, Switzerland



Circulation



Living Unit

This building responds well to its surroundings. It is especially responsive to local climate. It utilizes technology, such as a special glazing system to work with the environment in a passive way. The form of the building is open to the south and closed off to the north. This organization works well with the internal space layout.

Natural light is utilized well in this building. The dwelling units face south and are open to expansive views of the mountain landscape and a lot of natural light. The kitchens in each unit utilize borrowed northern light. The north light is diffuse and passes through the wide circulation spaces that act as a northern buffer.

The form of the building is very simple and monolithic. There are no subtractive elements and the building is rectilinear. The section shows a simple 1:3 relationship with the plan. The skin of the building responds to the building's orientation, with the south being open and glazed, while the north is closed off and clad in brick.

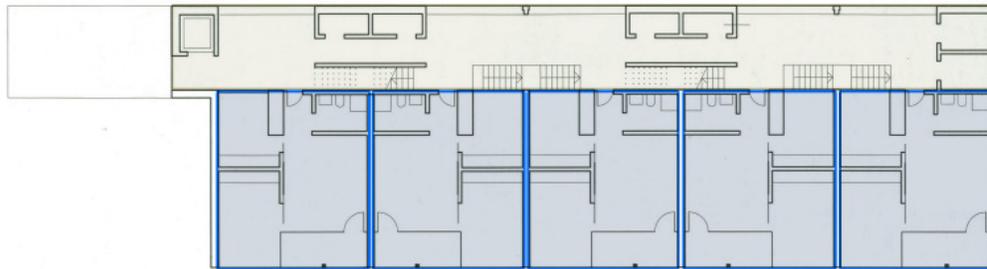
Case Study - Domat

Dwellings for Senior Citizens - Domat, Switzerland

The structure of this building is quite durable. The floors are concrete slabs and the walls are sandlime bricks. These massive materials provide thermal mass that is beneficial in Switzerland's cold climate. The building also has 8 inches of exterior insulation. The local culture in Switzerland requires a passive energy standard to which this building exceeds.

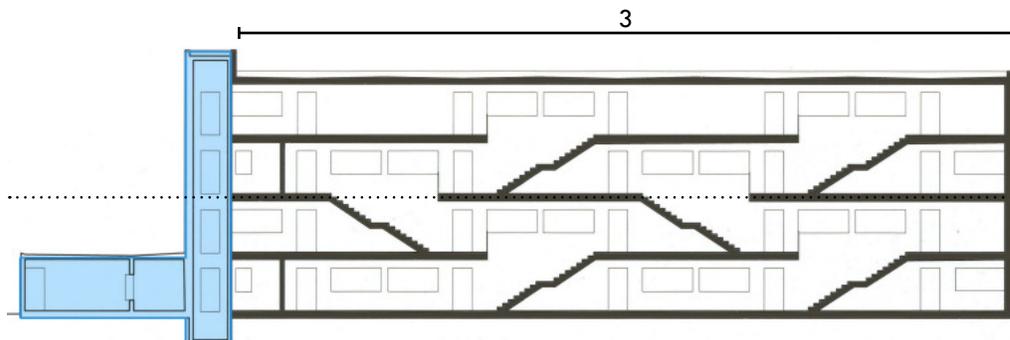
In conclusion, this is a good example of a simple building form. It responds very well to the environment and utilizes technology in a successful way. Simplicity in this case reveals a beautiful responsive building that creates great interior spaces for the elderly residents.

DESIGNING FOR AGING



Circulation: Linear along north

Repetitive Pattern: Dwelling units along the south



Proportions: Width = Height = $1/3$ length

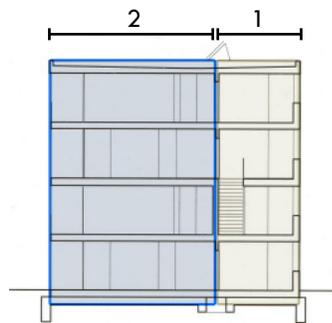
Uniqueness: Elevator core and service spaces are an unique language

Case Study - Domat

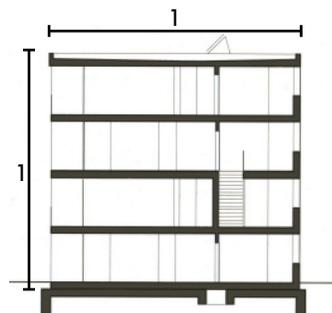
Dwellings for Senior Citizens - Domat, Switzerland



South Elevation



Circulation Ratio is 1:2



Proportions: Width = Height



South Facade

DESIGNING FOR AGING

Case Study - Liberty Garden

Liberty Garden Elderly Care House - Tokyo, Japan



Dining Room



Outdoor Garden

DESIGNING FOR AGING

This elderly care facility is located near Tokyo, Japan. The users of this building are capable of living alone but support is given for bathing, dining and health management if needed. This design solution provides a strong connection with nature through bringing in extensive amounts of natural light. During the day, no artificial light is needed for the interior spaces. The connection with nature is also shown through the designed gardens within the pattern of the building. There is a strong link between the gardens and the interior spaces.

A unique aspect of this building is that it has narrow hallways. This is done to provide more space for the apartments, where the residents spend the majority of their time. However, using narrow hallways hinders social interaction. Social space is provided at the west end of the building but would be more effective if space was provided throughout.

Case Study - Liberty Garden

Liberty Garden Elderly Care House - Tokyo, Japan



Garden



Lobby and Terrace

This building incorporates patterns into the design. The slit windows on the north facade are designed using the Fibonacci sequence. The dwelling units are organized in a repetitive pattern along the south side of the building.

The structure of this building is straightforward and easy to see in the plans. Between each dwelling unit is a bearing wall. These walls continue through the height of the building. Floors are supported by these walls and are concrete.

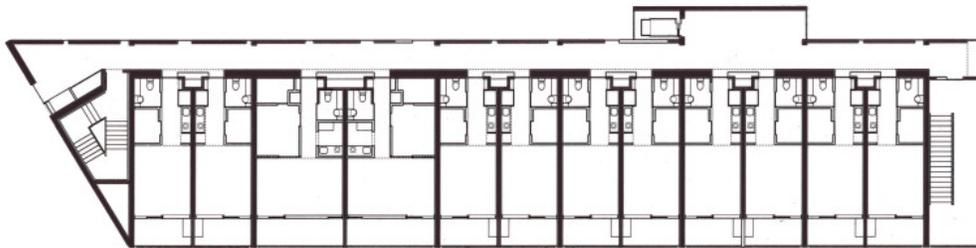
The massing of this design is unique compared to the other case studies. This solution shows a tall, 5 story mass in the center. On both the north and south there are shorter masses. The central mass is the dwelling units and the lower masses are the auxiliary and support spaces.

Case Study - Liberty Garden

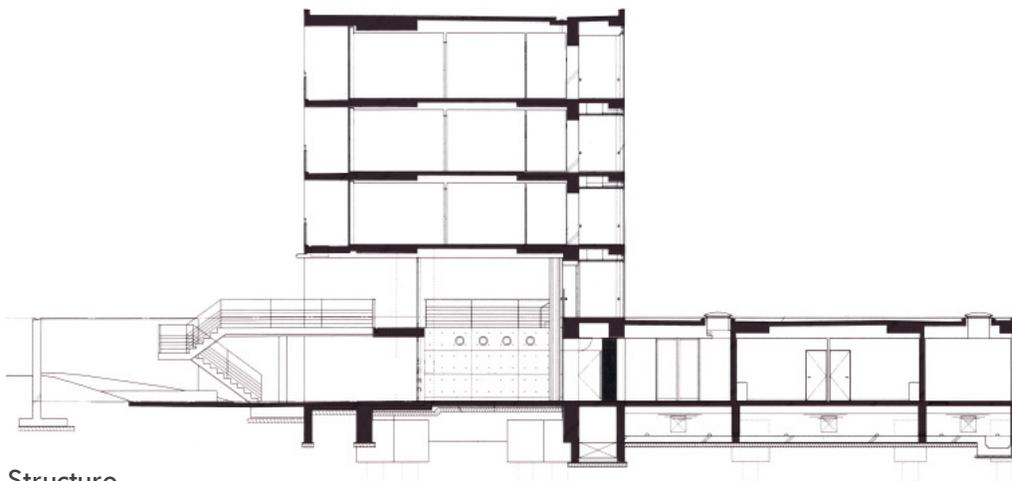
Liberty Garden Elderly Care House - Tokyo, Japan

In conclusion, this design solution shows that elderly care options can be designed in a way that create a strong connection to the environment. This solution emphasizes a connection between the built environment and the natural environment. Exterior spaces like the gardens are well thought out and incorporated into the design. The adjacent interior spaces connect the exterior spaces with the building. Residents are able to enjoy the exterior spaces through well thought out views even from the interior of the building.

DESIGNING FOR AGING



Structure



Structure

Case Study - Liberty Garden

Liberty Garden Elderly Care House - Tokyo, Japan



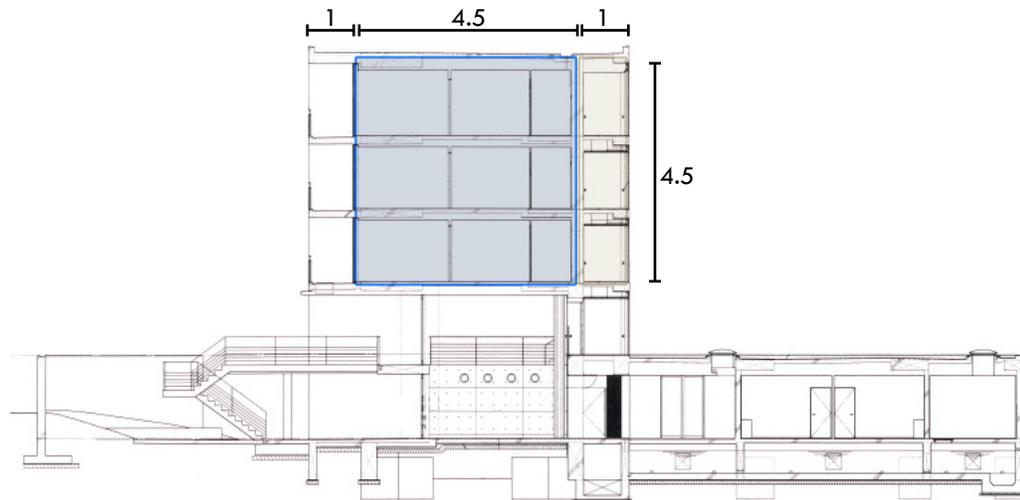
North Elevation



Circulation: Linear along north

Repetitive Pattern: Dwelling units along the south

Uniqueness: Triangular element along west



Proportions: Circulation = Balcony = 1/4.5 Dwelling units

("Liberty Garden," 2000, p.74)

Case Study Summary

Each of the case studies analyzed has revealed beneficial knowledge of the typology. Assisted living centers and skilled nursing facilities are prevalent throughout the world, and each responds to issues of form, context and its residents in a unique way. By looking at the case studies as a whole conclusions can be drawn, and assumptions made, about the future of the typology.

Each of the case studies has shown a strong relationship to the context of the building. The physical surroundings of the site have influenced the design. The effect of the building's orientation is of particular importance to the layout of the interior spaces. The case studies have been consistent with the dwelling units facing in a southerly direction and circulation spaces being on the north side of the building.

The orientation of the building and its interior spaces is directly related to the quality of natural light that enters the spaces. The case studies have shown an emphasis on bringing natural light into a variety of spaces. The Liberty Garden Elderly Care House is designed so that no artificial lights are needed during the daytime hours.

The case studies have shown that sustainable solutions can be employed in the design of assisted living centers. The passive energy technology used in the atrium of Steinflod helped reduce the energy used by 30% compared to a typical elderly care facility. The high tech glazing system of Domat helps control indoor light and air quality. These sustainable solutions were successfully incorporated into the design of elderly care facilities.

Case Study Summary

It is interesting to note that all of the case studies treated circulation in a unique way. Liberty Gardens utilized narrow hallways in order to maximize the size of the dwelling units. Domat used wide areas as circulation in order to facilitate informal meetings for the residents and provide space for them to gather in groups to socialize. Steinfeld used centralized circulation around its central atrium space. Each of these approaches has its benefits and downsides; however, circulation that encourages socialization among the residents would be preferred by most elderly residents.

The research conducted revealed one negative aspect that was present in all of the case studies. Several sources during the research emphasized that assisted living centers have a 'homelike' quality. The examples used as case studies however, had a monolithic feel in terms of form. They were uninviting and did not portray residential character.

Men and women are increasing in age all across the world. The reason that the case studies were selected from outside the United States is because other areas are seeing faster and larger growth in the elderly population than the United States (Vierck, 2003). It is important to look to the leaders in aging population to learn from their successes and failures.

In conclusion, analysis of the case studies has proven to be beneficial to understanding how architecture is currently responding to the elderly's need for assistance. The conclusions drawn from these examples will shape the future of elderly care facilities.

Historical Context

Providing housing options for the elderly is not a new concept. There are many alternatives that exist to house and care for elderly people. Before assisted living became an option, there were four traditional options for providing elderly assistance. These options include home care by family members, in home professional medical care, board and care homes and nursing homes.

In home care by family members, or medical agencies, is quite common. At the age of 65, the elderly have a 72% chance that they will utilize home health care in their lifetime. There is only a 49% likelihood that they will utilize nursing home care in their lifetime (Vierck, 2003). Home health care is a valuable solution if available because it keeps the elderly in their own familiar surroundings. They are able to get the assistance that they need and still remain in their own homes.

Until the 1950's, receiving care from a family member was the only option. This is still a viable solution if the level of assistance needed can be provided by the family member. This method of care requires a change of lifestyle by the caregivers, allowing them to be available to take care of an elderly family member. If the elderly is suffering from mobility impairments the layout and design of the home can limit the quality of care provided.

It is common that the caregiver is a family member of the elderly person. More than half of the elderly receiving in-home care live with the family member taking care of them, and more than one third live alone (Vierck, 2003). It is more convenient for the elderly to live with the familiar caregiver because they are available if any assistance is needed. This can provide peace of mind for both the elderly and the family members. In-home care by a family member can be quite stressful and most appropriate for short, definitive time periods.

Historical Context

When more specialized assistance is needed than a family member can provide, medical agencies become the caregivers. This option is the preferred method because it allows the elderly to receive a high level of service while still remaining in their own homes (Brummett, 1997).

Although in-home care by a medical professional is the more desirable assistance option, the cost is prohibitory for many elderly men and women (Brummett, 1997). In situations when care is only needed for a definable time, such as recovering from an injury, or when care is only needed part time, this is a viable option.

The third option for elderly care assistance is board and care homes. Traditionally these are smaller facilities run out of the caregivers' home. In this situation the caregiver helps between one and three nonrelated elderly people. This option provides 24-hour assistance by a licensed or registered professional (Brummett, 1997).

The use of board and care homes is often quite expensive, and very few board and care homes are approved by insurance agencies. The total cost of the care is less than a nursing home but often the out-of-pocket costs are higher for the elderly because the care is not covered by insurance programs (Brummett, 1997). In recent years, board and care facilities are seeing many improvements and, perhaps in the future, this could become a more economic solution for providing elderly assistance.

The fourth and final traditional method of providing care for the elderly is a nursing home. For the elderly that have a long term intensive need for care, nursing homes are their best option. Nursing homes provide the highest level of care and offer the most services.

Historical Context

Although nursing homes offer the most services and are best suited to assist the elderly, the quality of the care provided is often criticized. The approach to care that many nursing homes use places all decision making power with the staff. This care is highly routine and uniform and often leads to over servicing the residents. This type of care can lead to an accelerated degenerative status (Brummett, 1997). The reason nursing homes rely on repetitive and uniform care is because of extensive government regulations.

Nursing home care has been questioned for the psychological effects it has on its residents. Residents of nursing home are often not involved in the decision making process for the care that they receive. In an environment such as this, the elderly are powerless to control the means and methods of receiving care.

Nursing homes make sense financially and provide the care needed; however, the quality of the environment is not ideal. Nursing homes appear hospital like and often do not make the elderly feel at home. This sterile, 'perfect' atmosphere can have adverse psychological effects on the elderly. A sense of alienation, hopelessness and loss of identity and individualism can be quite severe (Brummett, 1997). This shows that the quality of the architecture can have a significant effect on the psychology of the elderly. Care facilities should possess a home-like quality that makes the residents feel comfortable.

The cost of nursing homes is often subsidized by the government, which makes this option financially viable over the previous options. However, the over servicing that takes place shows that this is perhaps a wasteful solution to elderly care (Brummett, 1997).

Historical Context

Assisted living centers began in the late 1970s as a new alternative to the traditional methods of providing elderly care. Assisted living facilities positioned themselves between nursing homes and board and care home facilities in terms of care provided. The rising costs of nursing home facilities prompted a desire to have a housing alternative for the elderly that would be less expensive while still providing the amount of care needed. Assisted living centers were able to serve the needs of the elderly at 40% less cost than nursing homes (Brummett, 1997).

Due to advances in medical care and treatment, men and women are living longer more productive lives. This is leading to an increase in demand for elderly housing and care options. With medical advancements, men and women are no longer requiring the amount of care they used to. Elderly people may still require long-term assistance, but at a level that doesn't require them to enter a nursing home facility.

The evolution of medical and environmental-behavior research has led to an acknowledgement and support of the therapeutic potential of the physical environment of assisted living centers (Brummett, 1997). Since assisted living centers portray a strong home-like quality, they have been praised for their therapeutic potential for the elderly population. In addition to the quality of the environment, assisted living centers provide high quality care that is personalized to each resident.

Historical Context

An increasing elderly population in the United States validates the need for new assisted living centers to be designed. Medical advancements directly contribute to the increasing demand for assisted living centers. Advancements in medical care are leading to a decrease in chronically disabled elderly. The 1999 National Long-Term Care survey by Duke University showed that 19.7% of the elderly population was chronically disabled. That is a 25% reduction since 1982 (Vierck, 2003). A person is considered chronically disabled if the disability lasts for more than 90 days.

The demand for assisted living centers is greater than the demand for nursing homes for many reasons. First, the elderly are in better health conditions now than at any other point in history. Many elderly do not require the amount of services that nursing homes provide. The services provided at an assisted living center are appropriate for their needs.

The second reason the demand for assisted living centers is greater than nursing homes is economic. In many cases elderly people could receive the same level of care in an assisted living center as they are receiving in a nursing home at 40% less cost (Brummett, 1997). However, there is a limit to the amount of care an elderly person is able to receive in an assisted living center. There are cases when the only option is to enter a nursing home.

The final reason that the demand for assisted living centers is greater than nursing homes is related to psychological effects. An assisted living center has a stronger sense of homelike quality which is very important to elderly people. The care that they receive is personalized to their needs and the elderly are involved in choosing what services they receive. This provides the elderly with a greater sense of independence and dignity.

Historical Context

In conclusion, assisted living centers have developed and become increasingly popular in a relatively short time period. This typology fills a gap between the existing elderly care alternatives. It provides the amount of care that is needed by the majority of the elderly, and is flexible to provide the services that the elderly need.

The advances in medical care have increased the life expectancy of men and women in the United States. Elderly people are living longer, healthier, more productive lives. The number of elderly people with disabilities is decreasing; therefore, they can utilize an assisted living center rather than a nursing home facility for their long term care needs.

Finally, assisted living centers are extremely valuable for the elderly population because they provide a sense of dignity and independence while still providing the level of care needed. They utilize personalized care that is carefully shaped to the needs and desires of the elderly on an individual basis. Assisted living centers will be valuable for future generations provided the predicted trends continue.

Goals For Thesis

The thesis exists in three different contexts, the academic, the professional, and the personal. Within each of these contexts the thesis takes different meanings, therefore each context must have its own unique goals.

The Academic

The completion of an architectural thesis is a necessary component required to receive a Master of Architecture from North Dakota State University. The thesis should include a well thought out and clearly stated Theoretical Premise or Unifying Idea. The Theoretical Premise should be developed in the Statement of Intent and continue to be refined through the proposal and program documents.

The thesis should be based on substantial research of the theoretical premise and unifying idea. The research should be conducted utilizing reliable and accurate sources that will be cited accurately throughout the document.

The Professional

The thesis project will serve two purposes professionally. First, it will serve as an example to future employers of what I am capable of producing. It should serve as an example of my design process, as well as showcase aspects of design, such as sustainability, that I feel are important. The project should provide opportunities to open conversation with prospective employers about what I feel is important in a successful design solution.

Goals For Thesis

Second, upon completion of the thesis it will be added to the architecture library to serve as a resource for future scholarly work. The published thesis should accurately synthesize the research that was conducted. The conclusions that are drawn from the research, as well as the design solution, should be unique, thoughtful and beneficial for future study.

The Personal

The thesis project will be the last project of my educational career at NDSU and should represent my best work in terms of design quality and graphic presentation. The project should be completed and presented with the highest quality possible. It should showcase the skills that I have developed throughout my studies.

The thesis should be completed, presented and displayed in such a way that in the future I can look back at this project and be proud of what I accomplished.

The thesis is one project that exists in three different contexts, the academic, the professional, and the personal. The specific goals of each context will shape the finished project which should meet and exceed these goals.

Site Analysis

Narrative

The site for this assisted living center is located in Crosslake, MN. Crosslake is a small town of about 2,000 permanent residents located in northern Minnesota. In Crosslake, 60% of the homes are only used seasonally as summer cabins. The city spans 37 square miles, and over one third of the land is covered by water. Crosslake has more than 121 miles of shoreline (Crosslake, n.d.).

Although the city is small it has shown high population growth; since 2000 the population has increased 11.4%. The average age of Crosslake residents is 55 years old (City Data, 2009). This is a town that currently does not have any options for elderly care and is in desperate need of housing and care alternatives.

The specific site chosen for this assisted living center is near the heart of downtown Crosslake. It is adjacent to the newly developed Crosslake Town Square. This location is ideal for an elderly care facility because it opens up a strong connection to the rest of the community. For example, every Saturday evening in the summer, the town square has live music in the gazebo. This is a great opportunity for the elderly residents to mingle and enjoy the warm summer nights with the rest of the community.

The site is currently undeveloped and has no permanent structures on it. It does have extra parking that is no longer needed for the town square. The site is approximately 3.3 acres in size, and is covered predominately with deciduous oak and poplar trees. The ground is covered with a consistent layer of grasses. On the eastern edge of the site there is a natural buffer of smaller trees that is densely spaced. This is advantageous because the views from the site in that direction, towards Ace Hardware and Reed's Market, are undesirable.

Site Analysis

Narrative

The trees that cover the majority of the site contribute to a unique sense of light quality. The sunlight is diffused through the trees and is ever changing due to even the slightest breeze moving the leaves. The light provides a sense of warmth and motion even on a cool fall day. During the summer months, when the trees are full of leaves, they will shelter the site and cut down the light intensity. The light that penetrates through the trees is diffuse and warm.

The site is mostly undeveloped and in its natural state. A portion of a small parking lot is the only manmade feature on the site. The site is bordered by manmade roads, but these only create a frame for the site. The rest of the site has been untouched and the vegetation is natural. There are no signs of distress and the site appears to be largely untouched even though it is surrounded on all sides by human influence and development.

This site is located in downtown Crosslake, which is a good location for new construction to occur. The utilities in the downtown portion of the city are far superior to the outskirts. The site is able to be connected to the city sewer system and connected to power through buried lines. The soils on the site seem to be consistent with the surrounding area. The soil is predominately sand, which is beneficial for draining water.

Crosslake has taken great steps to reorganize movement through the town in recent years. The addition and location of Crosslake Town Square was chosen to move the heart of the city away from the traffic of County Road 66. This was done to encourage pedestrian movement. The site of the project is between the town square and the major vehicular traffic route. This is advantageous because the site will be able to link the pedestrian emphasis that the town square currently possesses while still being near the major vehicular axis through town.

Site Analysis

Narrative

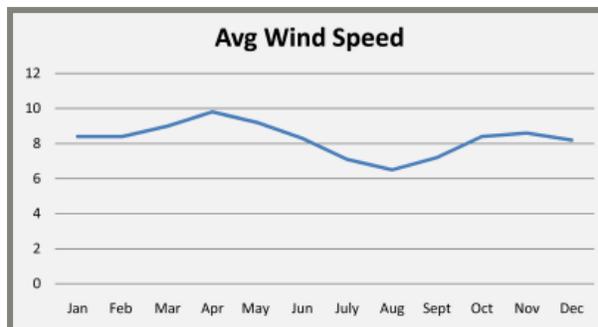
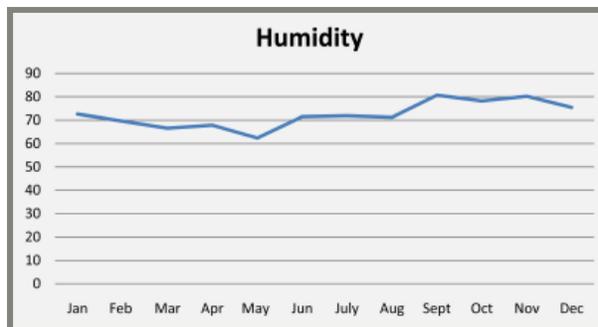
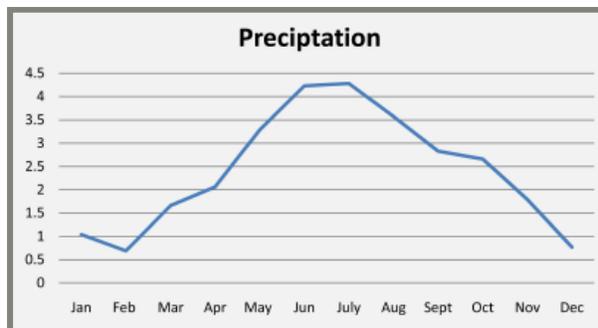
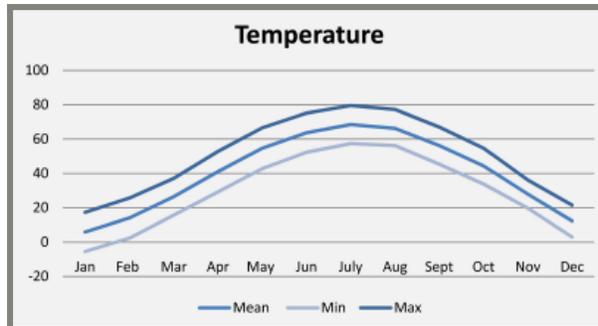
The location of the site within the community will provide many options for the elderly residents. The site is located adjacent to the town square that will provide retail and eating options. The site is also close to Reed's Market. The elderly residents who are still mobile and able to cook their own meals will benefit from this close proximity.

Many of the residents of this assisted living center will have been long time residents of Crosslake. This location will keep them close to where they grew up even though they require more care than they can provide themselves. The location is close to Cross Lake, and by walking or a taking a shuttle the elderly residents will be able to visit the Cross Lake public access. The public access adjoins the campground and the Corp of Engineers dam. The residents will be able to visit the lake and maintain the connection to the water that they grew up around.

In conclusion, the site selected for the assisted living center has many benefits. The site is rich in natural vegetation and light quality. It is an untouched site that is in close proximity to the town square and the heart of activity of the town. This will provide the residents a link to the rest of the community that is especially desirable in any assisted living center.

Site Analysis

Climate



DESIGNING FOR AGING

Site Analysis

Neighboring Buildings



Pine Peaks Lodge and Suites



Whitefish Lodge and Suites

DESIGNING FOR AGING



Reed's Supermarket



Ace Hardware

Site Analysis

Neighboring Buildings-Crosslake Town Square



Pond



Clock Tower



Gazebo



Retail Shops

DESIGNING FOR AGING

Site Analysis

Views From the Site



DESIGNING FOR AGING



Site Analysis

Views Toward the Site



DESIGNING FOR AGING



Site Analysis

Traffic Analysis

DESIGNING FOR AGING

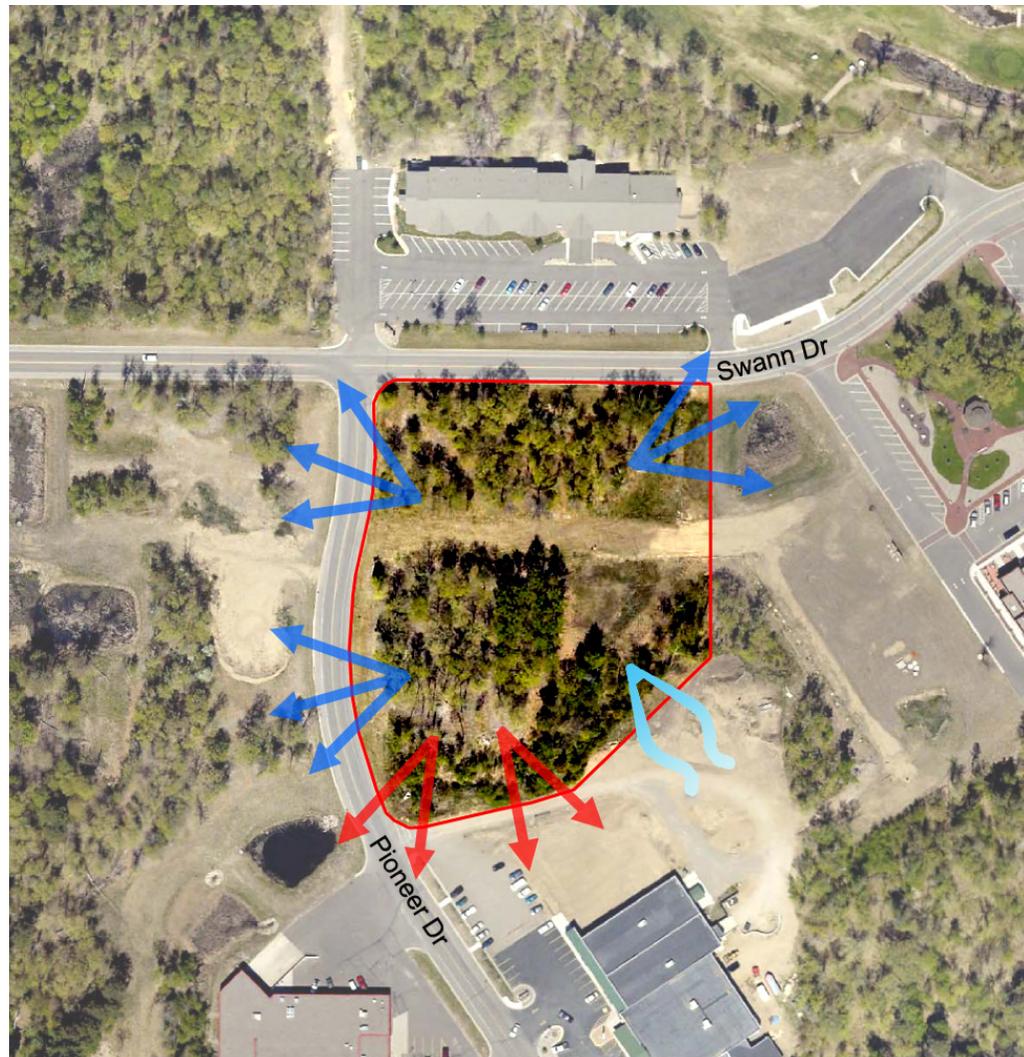


- Primary Traffic
- Secondary Traffic
- Tertiary Traffic

0 50 100 200 N

Site Analysis

Views and Wind Analysis



DESIGNING FOR AGING

- Blue Desirable Views
- Red Undesirable Views
- Cyan Predominate Wind Direction



Programmatic Requirements

Through analysis of case study examples, as well as additional research, the required spaces and their approximate sizes have been determined. This section will outline the required spaces, their size, and adjacencies for the architectural solution.

Studio Unit - 20% of units 320 SF

These units should include a private bathroom and a small kitchenette in the living/sleeping space.

One Bedroom - 70% of units 520 SF

These units should include a small kitchenette, living room, bedroom, and private restroom. The units should be wheelchair accessible.

Two Bedroom - 10% of units 620 SF

These units should include all the functions of a one bedroom unit with an additional bedroom.

Kitchen 400 SF

Needs to be adjacent to the dining room. Space must be provided for a commercial dishwasher, oven, refrigerator, freezer and sinks. Counter tops and space for food preparation are required.

Kitchen Storage 150 SF

Storage space for food and supplies. Must be adjacent to kitchen.

Public Restroom - 2 per floor 60 SF

One men's and one women's per floor. All fixtures must be wheelchair accessible. Restrooms should be near high use spaces, such as dining and family rooms.

Programmatic requirements

Dining Room 650 SF

Large gathering space for meals. Multipurpose space with flexible seating options accommodating 4-6 people per table. Should be centrally located and easily accessible.

Lobby 200 SF

A space to welcome family members and other visitors. Needs to be adjacent to reception, mail and main circulation.

Reception 80 SF

Receptionist should be available to greet any guests in the lobby as well as answer phones and observe when and why residents are leaving.

Mail 80 SF

Storage and distribution of residents' mail. Should be adjacent to reception and lobby.

Family Room - 1 per floor 300 SF

A gathering space for the residents. This space should facilitate communication and interaction amongst the residents.

Library 200 SF

A place for quiet reading. Should include book shelving and seating options. Could also include a fireplace.

Activity Room 150 SF

A multi-function space to house a variety of activities.

Lounge - 1 per floor 120 SF

A sitting room with a lot of access to natural light and views. This would serve as an informal gathering space.

Programmatic Requirements

Treatment Room - 2 per building 120 SF
Flexible treatment spaces for a variety of visiting physicians and specialists to work with the residents in small groups.

Treatment Office - 2 Per building 80 SF
Should be adjacent to treatment room. Private office for individual treatments with residents.

Nursing Station - 1 per floor 120 SF
Central location near dwelling units.

Head Staff Office 120 SF
Director of facilities private office. Should be adjacent to staff retreat.

Staff Retreat 200 SF
Break room space for staff including small kitchenette and seating area. Should include private restroom and access to private outdoor space.

Assisted Bathing - one per floor 100 SF
Some residents will require assistance with bathing. The space should be wheelchair accessible and include toilet and sink.

Laundry - 1 staff and 1 public 140 SF
Should include 2 washers, 2 dryers, a folding table and an ironing board.

Programmatic Requirements

Outdoor Spaces

Porches, as well as outdoor rooms, should provide residents the ability to enjoy Minnesota weather. Walking paths will provide the residents with an exercise option and should link to the Crosslake Town Square.

Parking

Visitor parking should be located near the building. Parking should also be provided for staff vehicles and vans that will be used by staff to transport residents about town.

Mechanical

600 SF

Space to house heating and cooling equipment as well as additional mechanical equipment.

Circulation

25 % of building area.

Hallways should be wide to provide ease of movement even for mobility impaired residents. Handrails should be present.

Maintaining the elderly's mobility is fundamental to the assisted living center, so all spaces should be wheelchair accessible. Barrierfree design methods and details should be included throughout the building. The spaces outlined here are suggestions and are flexible in size and location as the schematic design dictates.

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