Healing gardens for Assisted living facility at Cortland Acres, Thomas, WV

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Healing Gardens for Assisted Living Facility at Cortland Acres, Thomas, WV

Pooja Keshav Pawar

Thesis submitted
to the Davis College of Agriculture, Natural Resources and Design
at West Virginia University

in partial fulfillment of the requirements for the degree of

Master of Landscape Architecture in
Landscape Architecture Department

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ABSTRACT
Healing Gardens for Assisted Living Facility at Cortland Acres, Thomas, WV
Pooja Pawar

The affection humans feel for nature is called biophilia. Connecting with nature helps in healing. The connection with nature can be established by incorporating biophilic elements like air, water, plants, and views of nature into the design. (Kellert, 2018). According to Kaplan’s Attention Restoration theory, exposure to nature improves focus and the ability to concentrate. (Kaplan, 1989)

Connecting with nature provides to be helpful in health care facilities for frail elderly, people with Alzheimer’s and Other Dementias, Hospice care facilities, Mental and Behavioral Health Facilities, and Assisted living facilities. (Marcus, 2013)

The aim of this project is to create comfortable, safe, and accessible outdoor space for elderly residents. The goal is to improve the outdoor experience and connection with nature. Also, to provide different activity areas that will improve the physical health and meditative areas to promote mental well-being.
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Introduction

The development of technology disconnected humans from nature. Once the hunter-gatherer human for survival started living in a sterile environment. Changes in the lifestyle reduced the exposure to nature. Due to losing contact with nature humans don’t respect nature. This loss of connection contributes to the extinction of species (Rogers, 2021).

According to Kellert (2018), the affection humans feel for nature is called biophilia. A harmonious and comfortable environment can be designed for humans by incorporating biophilic design principles. A natural environment that can support the mental and physical health of humans is considered biophilic design. Human performance can be enhanced with the help of biophilic design principles. Biophilic designs are helpful in contributing to the overall well-being of human beings.

Air, water, plants and animals, a landscape that has plants and trees, a view of nature, and fire are direct biophilic elements that connect humans with nature. When directly incorporating nature is not possible indirect nature can be added indirectly into the design. Image of nature, natural materials, textures, colors, information richness, and natural geometry can be used as indirect elements to connect with nature. Experience of the place can be crafted by creating refuge and prospect, introducing organized complexity, emphasizing mobility by clear pathways, designing transitional spaces that connect indoor with outdoor spaces, and finally creating a sense of place (Kellert, 2018).

Exposure to nature improves focus and ability to concentrate according to Kaplan's Attention Restoration theory. Psychologically detaching from present worries is being away. Being away helps to distract from the draining environment. Fascination means restoring an environment that holds attention. Comfortable and ease in the environment are extent. Compatibility means feeling enjoyment in the environment and engaging in activities that are familiar.

According to Kellert (2018), biophilic design principles can be incorporated into residential, educational, hospitality, and urban settings. But incorporating biophilia is beneficial in a healthcare environment.

The healing garden should fulfill the requirements of patients, visitors, and staff using it according to Rawling. Reducing stress and helping in healing is the main purpose of a healing garden. The change in the environment is experienced by patients and their relatives as they enter health care facilities. Providing them with a comfortable environment and managing stress through design is very important.
1. Literature Review

Chapter 1.1 - Biophilia

Biophilia is human affection and inclination towards nature and other life forms (Kellert, 1993). Whenever humans are exposed to natural world rich in diversity of shapes, colors, life it is universally appreciated. Affection humans feel in presence of nature lies in genetic basis (Kellert, 1993). During evolution human stayed close to nature and formed connection with the nature. Connection humans feel with nature is also visible today in certain human responses. Then development of technology in 19th and 20th century affected connection with nature. People started living in closed sterile environments and that affected their exposure to nature. Similar to Biophilia there is term called Biophobia which is used for fearful response to natural phenomena. When humans were living in wild sight and sound were vital clues for their safety. Running away from the threat (flight response) or fighting with the threat (fight response) are psychological response to harmful situation (Kellert, 1993). Flight or fight response helped humans to protect themselves from predators. Biophilia plays important role in conservation. Due to losing contact with nature human don’t respect nature. This loss of connection contributing to extinction of species (Rogers, 2021).

According to Kellert (2017), there are eight values humans connect nature with. Affection is emotional attachment and love with nature. Affection gives the ability to care, bond, connect emotionally. Attraction means aesthetics. The human brain likes seeing harmony and symmetry in their surrounding as it appears in nature. Attraction boosts imagination and creativity. Aversion is the human tendency to avoid danger and seek a safe environment. Aversion is beneficial for survival and safety. Aversion reflects respect for a power greater than humans. Control is the ability to dominate nature. Control gives human’s ability to modify nature to fulfill their needs and contributes to problem-solving capacity. Exploitation is utilizing nature for benefit. It enhances extracting abilities and practical skills. Intellect development helps in developing skills, critical thinking, and cognitive development. Symbols to communicate and abstract thoughts are symbolism. Symbolism is essential in the development of culture and language. Spirituality is a sense of meaning that gives meaningful existence to humans. When these values are incorporated in the design people connect with the design.

“Humans evolved in the adaptive response to nature” (Kellert, 2018). The affection humans feel for nature is called biophilia. There are biophilic design principles that can be incorporated into the design to make it more harmonious and comfortable for humans. A natural environment that can support the mental and physical health of humans is considered biophilic design. Biophilic design is helpful in enhancing performance of humans and also contributes to their wellbeing. The design should be an ecological holistic that encourages engagement in the natural process. Biophilic design elements that are incorporated in the interior, exterior, and transitional spaces help to create the holistic biophilic design. The designed places that give comfort,
satisfaction, health, enhance productivity and wellbeing are liked by humans. Affection humans feel for the nature helps to connect them emotionally to the biophilically designed space. Emotional attachment plays important role in the conservation of the place (Kellert,2018).

According to Kellert (2017), there are different ways to incorporate nature in the design. The direct experience of nature includes adding natural elements to the design. A light that is one of the most important elements of biophilic design can be incorporated to enhance comfort. Circadian rhythm is associated with natural light which plays important role in mood and behavioral patterns. Air flow helps in the ventilation of the place and affects how people feel in that place. Water is one of the elements that brings calmness to the design. Water can be added for aesthetics but it can also provide other benefits. Hearing the sound of water can help in healing (Kellert,2017). It can be also used as a white noise to buffer other disturbing noises (Rawlings, 2017). Humans evolved along with plants and animals, so incorporating them in design can help to enhance biophilic character. Humans like landscapes that have shrubs and trees, colorful foliage, flowers. Savannah like landscapes that have shrubs and trees, colorful foliage, flowers. Savannah like landscapes satisfies human basic necessities (primitive) and these kinds of environments are still liked by humans. Primitive humans survived by predicting whether for food, availability of water, and safety. As a result, design that helps predict weather like windows, balconies, or any kind of opening that connects humans with nature is comforting. View of nature from the windows helps bring nature indoors. Fire helped primitive humans for their development and is still considered a comforting factor in the design.

According to Kellert (2017), when direct exposure to nature is not possible nature can be added indirectly to the design. In the indoor spaces without windows images of nature can help connect with nature. Naturally occurring materials like wood, earth, stone can be added to the design. The presence of natural materials helps connect people with nature. Textures that appear in nature can be added to the design to enhance biophilic comfort (Kellert,2017). Colors that occur in nature like blue shades of sea, green shades of vegetation, and multiple shades of the sky can be incorporated into the design. Earthy tones that symbolize harmony in nature are liked by humans (Coulthard,2020). Information richness that is detailed in the design is liked by humans as it activates their brains to process the details. Natural geometry that emphasizes balance, symmetry, and harmony bring similar benefit to the design. The fractal that is repeating of simple design to form more complex form but has organized complexity is seen in many natural forms like snow flex and the human body as well. These fractal patterns are indirect biophilic elements of design. Biomimicry is a design reflecting the evolution of non-human nature.

People with distinctive backgrounds, experiences, learning, and cultures experience place differently. But there are few common factors that contribute to the experience of the place. The prospect is viewing open space without any obstruction. Prospect symbolizes confidence and is generally liked by males rather than females. The refuge is a covered area from the top or behind. It emphasizes safety and protection. Refuge
area is liked by females. The theory of Prospect and Refuge is originating from human evolution. When males are generally hunters and females are gathers. Organized Complexity is another element that adds to the experience. Complexity means richness and diversity, and organized means orderly (Kellert,2018). When it is organized it will guide a user in the right direction and complexity is essential to not make it boring. Mobility with designing a clear pathway is essential in creating flow in design and avoid confusion. To connect interior to exterior transitional spaces are required. Transitional spaces ensure a smooth flow in the design. Creating a sense of place where people are connected emotionally to the place. Designing as a whole design to work together (Kellert,2018).

Frank Lloyd Write's Falling water is an example of incorporating biophilia in design. The design includes water flowing in and out of the structure. Biophilic elements incorporated in the design include natural materials like stone, wood and earth; color that represents earthy tones; textures that appears in the nature and organic shapes and forms. Points of prospect and refuge were created in the design. The design has well thought transitional spaces. The design is according to the geological surrounding. The element of fire is incorporated by adding hearth-like settings. The design reflects elements of fear, awe, and spirituality. So multiple elements contribute together to give a design a biophilic character (Kellert,2018).

Living architecture means inserting living organisms mostly plants into a modern building. Building types that can incorporate biophilic elements that include healthcare, the building of work, education, shopping centers & districts, homes, hospitality-oriented structures. The sacred architecture feels sacred because of biophilic design characters. Biophilia can be incorporated at an urban design scale (Kellert,2018).

According to Kellert (2017), the conclusion of biophilic design study include, “Effective biophilic designs evoke a variety of responses based on inherent values found in nature” (Kellert,2018, p. 184 ) The values in nature like symmetry, balance, and harmony can be adapted into the design. These values contribute to the comfort, mental and physical well-being of the user. “Emotional attachment is key” (Kellert,2018, p. 184) and a strong sense of attachment to place, an essential part of biophilic design, includes both physical and social dimensions. Creating a sense of place in the design is important as it emotionally connect people with the design. “Experiential engagement and immersion are necessary” (Kellert,2018, p. 185). The programming and activities that allow the user to engage and connect with nature are essential. “Direct and indirect contact with nature, as well as a satisfying experience of space and place, enhance a design’s biophilic appeal” (Kellert,2018, p. 185). “A building or landscape should be experienced as part of a functional and integrated whole” (Kellert, 2018, p.186) and “Effective biophilic design contributes to the ecological resilience and integrity of the natural environment over time” (Kellert, 2018, p.187). The user should experience biophilia throughout the design. It should be reflected in indoor, outdoor, and transitional spaces. The design should also have incorporated a system to support the biophilic
environment for the successful working of it. “Successful biophilic design enhances health, productivity, and wellbeing” (Kellert, 2018, p.186). It helps in restoration and stress reduction which contributes to physical and mental health. “Ideally, biophilic design motivates people to sustain, retain, and restore their structures and places” (Kellert, 2018, p.186). This helps in the conservation of places. “Successful biophilic design contributes to a perception of beauty and harmony” (Kellert, 2018, p.188).

Grinde and Patil (2009), discussed the connection between human evolution and nature. During evolution food and shelter were provided by the plants. Lack of plants created discord. Elements that reflect nature like complexity, choice of colors, and balance are appreciated by humans. Their presence subconsciously affects the human mind. The absence of plants is perceived as unnatural and unsafe. Other positive characters of plants are fragrance, improving acoustics, microclimate, humidity, and air purification. Mental advantages of spending time in nature include reducing stress, improving attention, mental restoration, and coping with attention deficits. Exposure to plants like wilderness, neighborhood parks, gardens, and natural features give similar benefits. Visual contact with nature through the hospital windows also has a positive effect on the healing of patients. It is helpful is pain medication and recovery from surgery (Ulrich, 1986). Adding indoor plants that are pleasant are useful in attention-holding (positive distraction) to keep patients focus away from the pain (Ulrich, 1986). The plants that have flowers show more benefits than plants without flowers. Visual contact of plants helps to restore attention by relaxing and recovering from mental fatigue. Nature deficient environment causes obesity, attention disorder, and depression among kids that are not exposed to nature.

Zeinab (2019), studied the awareness assessment of the biophilic design principle application, suggesting that external natural elements help to reduce physiological and neurological distress. It also focuses on biophilic elements in architecture and interior design particularly in the office space and their role in reducing stress and anxiety. In Zeinab’s (2019) study biophilic design incorporates connecting with natural elements like sunlight, air, and plants, along with the natural processes. Zeinab’s (2019) study on biophilic design shows that such exposure to nature provides health benefits to workers. These benefits can be classified in two ways. One is attention restoration and another is stress recovery. This study includes the direct experience of nature by adding natural light, water, natural landscapes, and the ecosystem to the design. Indirect elements are added through an image of nature, in forms of natural materials and natural geometries that include basic shape repetition to give variety and simplicity. The benefits achieved by these biophilic design elements include economic, physical, and mental benefits. The economic benefits include (1) energy-saving from daylight schemes or making use of sunlight in the working environment. It also includes (2) enhanced productivity of employees that contributes to efficient work. The physical improvement includes lower blood pressure seen in working employees. Increased comfort and improved health of employees is observed due to exposure to nature. Employees also indicated mental health improvement like reduction of stress level, increase in motivation and creativity.
flow. The concentration of employees increases because of these biophilic design elements. According to Zeinab’s (2019) study, the biophilic design principles that can be added are natural illumination, that is using sunlight wherever possible. This study suggests designing/orienting buildings according to the solar path and encourages façade treatment that emphasizes natural light use. Nature can be added to the indoor work environment by adding indoor plating.

According to Beatley (2016), the biophilic design can be incorporated on different scales in the design. The Handbook of Biophilic City Planning and Design (Beatley, 2016) suggests due to the rapid rate of urbanization adding biophilic design in the urban plan can be helpful to benefit the urban population. According to the study conducted by Beatley (2016), exposure to nature is helpful in becoming a better, caring, and compassionate human being. It also enhances creativity. The economic benefits include improvement in learning and working environment that adds value due to better results by students and employees. It also adds market value to the space. For example, a house which has a nearby park has more market value.

Biophilic character of cities suggests that cities’ ecosystems and habitats have too many other species that contribute to biophilia. It includes ecosystems, flora, and fauna. These elements adapt to the change in the cities. The nature in the cities is multisensory. Nature is perceived by the sight of different views and sounds of nature. For example, the sounds in nature like the chirping of birds ensure that humans are not alone but sharing space with other species. It is important to integrate quiet areas in urban spaces. Nature can also be felt by smell. The smell of natural materials like soil or wood, or the smell of flowering plants helps to connect with nature. Taste and texture can also be helpful to perceive nature. Nature in the cities is based on the landform, topography, weather, climatic condition of the city and it is unique for different cities (Beatley, 2016).

According to Beatley (2016), to incorporate biophilic elements the designers should incorporate few details in the design. This detail includes physical or visual access to nature. Nature can be included directly or indirectly in the design of an urban plan. Nature can be added and emphasized by restoring the river and by adding new points of access and connection. Nature in the cities includes human-designed features like green roofs and green walls along with pre-existing nature like microorganisms or a fringe of the forest. There are efficient ways to incorporate nature into the design. According to Beatley (2016), the design should emphasize engagement with nature. Walking, hiking and swimming can connect humans with nature. The design should be well thought off to people to ponder, gaze actively, explore, and learn. Adding nature in interiors, buildings architecture, and on an urban level is helpful to connect people with nature. Creating curiosity of nature in design for people to celebrate the diversity of life and the complexity of the natural system is an important aspect in creating biophilic design. Designing by considering the city itself as an ecosystem is a helpful aspect to see it as a whole. Creating a diversity of experience for users helps to keep them engaged with nature.
The biophilic cities are considered less resource-intensive. The cities that use less water, have better adaptation for chronic drought are considered biophilic. The cities that are designed to reduce heat, consume less energy, and help in some food production are biophilic cities. Another aspect of looking at biophilic cities includes that the cities improve the physical and mental well-being of residents who are biophilic. The case study of Singapore city, Singapore is added to understand the biophilic nature of the city. Singapore city is called a city in a garden. Nature is added in the form of vertical features, by adding vertical green gardens, green walls, green roofs, sky parks, and terraces. An extensive system of parks is tied together with a park connector network for better access. Trails, bike paths, and dramatic walks are designed for people to engage with nature. This biophilic design is also supported by an efficient Storm Water collection system (Beatley, 2006).

The study conducted by Marte, Calumpit, de Sá Bessa, Bárbara, Fadda, Skoler (2020), suggests that due to lack of open space children are not exposed to nature in urban areas. This study is done in an indoor urban setting to learn the benefits of the biophilic design principle in the interior play area. For this study visual elements, natural elements, and texture are added in the play area. The light and space relationship is manipulated with design elements. The focus areas for light manipulation are natural light, flittered & diffused light, reflected light, and warm light. The relation to the space spaciousness, spatial variability, space as a shape & form, spatial harmony, and inside-outside space is studied. In conclusion adding biophilic elements help in the cognitive development of children.

Understanding biophilic design principles and their benefits to improve cognitive capacity is studied by Abdelaal (2019). Access to nature helps to improve cognitive capacity. The views of water and vegetation holds attention which helps in restoration (Ulrich, 1986). The physical and physiological restoration is helpful in reducing stress and occurrence of illness and headaches. The psychological restoration reduces anxiety as well as improves self-esteem and mood. The spiritual restoration gives a sense of purpose.

The following study discusses Kaplan’s Attention Restoration theory. According to this theory, exposure to nature improves focus and the ability to concentrate. The key components are being away, fascination, extent, and compatibility. Being away means being psychologically detached from present worries & demands and being distracted from a draining environment. For example, in a hospital setting, a view of nature or image of nature can psychologically detach patients from his/her pain and helps in being away from their worries. Fascination means restoring an environment that holds attention. Elements like a view of nature from a window, the image of nature, natural materials & textures, and indoor plants can be added in design for fascination and they prove to be helpful to hold attention. Extent means comfortable and eases in the environment. Extent can be added in design by earthy toned colors, airflow, and ventilation, balanced and harmonious design. Compatibility means feeling enjoyment in the environment and engaging in activities that are familiar. The benefits of restoration include reduction in fatigue, stress recovery. Restoration benefits of viewing nature
from the window helps in speedier recovery with less drug, reduces pain and anxiety in burn victims, improves attention in elderly. In the work setting, the employee shows few physical ailments and job satisfaction. (Ackerman, 2020)

Biophilic design principles can be incorporated into residential, educational, hospitality, and urban settings. But incorporating biophilia is beneficial in a healthcare environment (Kellert, 2018). The study conducted to design hospice care evaluates biophilic principles. According to this study, a healing environment can be designed with a natural approach, sensory approach, and psychological approach. The sensory approach includes incorporating sight, hearing, smell, taste, touch in the design. The psychological approach includes taking account of the patient’s choices and needs, and values their opinion. According to this study, the biophilic approach includes concepts like using natural materials, earth tones, and soft color combinations that symbolize calm and positive influence from nature. The benefits of incorporating biophilia in the design include reduction in stress and anxiety, pain, incident of an infection, improved sleep and recovery time (Yunida, 2021).

According to Rawling (2017), the healing garden should fulfill the requirement of patients, visitors and staff using it. The purpose of the healing garden is to reduce stress and help in healing. There are few design elements that can help to incorporate biophilic elements in the design. As patients and their relatives are entering health care, they deal with change in their environment. Providing them with a comfortable environment and managing stress through design is very important. The overcrowded entry that creates chaos can be designed efficiently. Separating arrival and entry can be helpful to avoid overcrowding. Creating a transitional zone can help users to settle in and adapt to change. Waiting areas with views can provide engagement and help in attention restoration as well as stress reduction. Creating different zones according to users’ needs are important. For example, an open area for arrival to accommodate large crowds entering the building without overcrowding, different kinds of seating areas like landscaped seating for a crowd, intimate seating for small groups (3 to 4 people) and space for personal meditation. Organic forms can be incorporated into the design. While designing for health care facilities, the needs of the staff should be taken into consideration. Staff generally have long shifts and recovery from stressful days is required for their healing. Small gardens or pocket parks can be designed for the staff that can be used by them in the breaks. These areas should have direct access from the staff area for better functioning of the design. These areas should be segregated from the general public to provide a more comfortable and relaxed environment for the staff.

Erickson’s (2012), study on restorative gardens suggests that stress relief can be achieved by different elements. Social support for garden users can assist healing. Opportunities for physical activity can help in health. Exposure to natural elements can help in healing. Wellness is a balance of physical, social, environmental, emotional, spiritual, and intellectual aspects. Suggested biophilic elements in this study include environmental features, natural shapes and forms, natural pattern, light and space
relationship. According to Ulrich’s theory of restorative design, stress mitigation can be achieved by social support, a sense of control, physical movement and exercise, access to nature, and other positive distractions. Positive distraction includes adding direct or indirect natural elements in the design.

Fry’s (1999), study of the Garden of hope helps to identify the importance of garden in wellbeing. The restorative power of the garden can rejuvenate the body and mind. Garden gives new hope of life. Not just the presence of a garden but gardening as an activity plays an important role in healing. Gardening is a good form of exercise, it improves motor skills, builds strength and stamina, improves problem-solving skills. Gardening also boosts a sense of accomplishment, purpose, and hope. Nurturing plant help patients in their healing

According to the study by Francis, Wood, Knuiman, Giles-Corti (2012) on the relationship between public open space and better mental health, the quality of Public Open Space (POS) is more important than the quantity of POS. The factors studied in this study are Body Mass Index (BMI), level of crime in the neighborhood, social network, social support, and sense of community to understand the benefits of public open spaces. The features mentioned to enhance the quality are water features, birdlife, reticulated lawns, walking paths, playgrounds, and adequate lighting. Natural environments provide restorative benefits by viewing and by actual exposure. The provision of open green space also provides the opportunity for social interaction. According to this study, the requirements are different for different people. Men and women utilize public open spaces differently.

The study by Wagenfeld, Fisher, Mitchell (2013), on outdoor environments for veterans with PTSD provides guidelines for the design. Creating meaningful and purposeful spaces includes incorporating tasks and activities veterans want to do and need to do. Physical and psychological rehabilitation therapies, athletic training, reestablishment of close social connection, and farming are the activities that can be incorporated. Design a space that can provide a sense of control. This can be done by adding familiarity, reducing perceptual and sensory distortion, avoidance of ambiguity, creating self-care activity space. Defensible spaces are also helpful in providing a sense of control. These spaces can be designed by providing opportunities to restructure interior and exterior spaces. Avoiding sharp turns and blind corners are recommended in the design. A readily perceived layout makes the design comfortable for the user. Wayfinding can be incorporated in design by easy-to-understand signs, color coding, and numbering. Providing choices is helpful in enhancing a sense of control. Providing different options to choose from gives a sense of control and reduces stress and anxiety. Exposure to nature in the form of outdoor activities like exercise and gardening is helpful. In an indoor setting bringing nature indoors is helpful in restoration and recovery.

According to Angeliki, Emmanouela (n.d) studies evidence-based design and is categorized into four categories. (1) Pediatric hospitals require bright colors, the sound
of running water, plants, artworks, and a sense of enclosure in their design. Other characteristics of healing gardens include engagement of senses, multi-sensory stimulation, sensory seeking and contact with nature, and fresh air. Evidence-based design recommendation for pediatric hospital includes trees and greenery, water features with the sound of running water. Design features that are bright, colorful, novel, and child-scale artwork that are highly familiar are advisable. Features that emphasize personal interaction are important to incorporate in the design. The design should be universally accessible. Reducing the distance between patients’ rooms and gardens where feasible to increase the use of healing gardens. Providing comfortable, movable, and diverse seating options to give a sense of control. (Whitehouse 2001); (Sherman 2005); (Pasha 2013). (2) Evidence-based design for cancer hospitals includes variety and plenty of planting, shade. It also includes avoiding glare and strong fragrances. The design guidelines emphasize comfortable seating that includes private and semi-private spaces. Incorporating soothing sounds and avoiding noise. Design path with a smooth surface. For a visual access room that has a view of a garden. (Busa 2013); (Valente and Marcus 2015). (3) The design recommendation for mental disorders includes a design that provides contact with nature, provides a multi-sensory experience, and a view of the garden from the patient’s room. The design should also provide comfortable seating. It should be sheltered from the sun. The design should emphasize physical activity. (Söderback 2004); (Rivasseau Jonveaux 2013); (Erbino 2015) (4) The design recommendation from evidence-based design for Obstetrics hospitals includes pathway, seating, flowering plants, and fragrant flowers. It also includes features like a labyrinth and water features. According to Naderi and Shin (2008) the guidelines for designing to serve hospital staff are discussed in the study. The design guidelines include creating a sense of privacy block views from surrounding building windows using planting, plant along paths, and around seating. Usable areas under various weather conditions. Provision of movable seating. Creating an aesthetic garden that contrasts with the environment inside the hospital. Emphasize thresholds and edges of the garden to heighten the sense of place. Design to emphasize quality views.

According to Goto, Park, B.-J., Tsunetsugu, Herrup, and Miyazaki (2013) visual contact of the structured garden can help to improve mood and lower heart rate. This study included three types of gardens that are Japanese garden, herb garden, and garden with a simple tree. Observing different gardens created different results in the elderly population. The most favored garden was the Japanese garden. The favorable features of Japanese gardens are stone lanterns, ponds, and Japanese maple trees as a focal point. This garden has good views from the walkway. The planting style varies in height and texture. The planting style also has a ground cover as a foreground, rock, and shrub as a middle ground, and different textures of a tree as a background. It was well shaded by tall canopies. The study concluded that viewing the Japanese gardens helped in reducing heart rate. The comparative analysis among three gardens suggests that different responses are created by different gardens. This suggests the biological responses vary according to the environment.
According to McCaffre (2007), walking in a garden and art therapy is helpful tool in managing mild to moderate depression in the elderly. The study suggested that walking alone in the garden provided elderly people the time to reflect on their life. Walking in a garden with the group and good views helped the elderly population to share their feelings. These activities helped them to connect with nature and reduced stress. Art sessions helped in reducing depression and improving mood. This study concludes that walking in a garden and art therapy is for the elderly population to reduce stress and fight depression.

Chapter 1.2 - Assisted Living Facilities

The research by Lu, Rodiek, Shepley, and Duffy (2011), indicates that the physical and psychological benefits of walking can be enhanced by providing a suitable environment for the elderly. Corridor walking includes (1) walking to a destination, (2) walking for exercise, and (3) walking for interaction. The walking is influenced by design elements. Safety is one of the elements considered by frail elderly while walking. Providing handrails in the design that are continuous and graspable influences the walking of the elderly. Elderly people prefer carpet floors over concrete or highly polished floors. The comfort in the walking can be added by providing seating along the walking path. The length and width of the corridor also define comfort. The length of the walkways along with the signage helps the elderly who walk for exercise to know how much distance they have covered. The need for the elderly to walk with their walker should be considered while determining the width of the walkways. Elevators should be designed by considering the size of walkers and wheelchairs. Convenience in the design includes providing activity spaces together. The location of restrooms should also be at appropriate locations. Designing aesthetic elements in walking includes adding artwork along the walkway. Providing windows can help in bringing in light and a view of nature. Nature can be incorporated by indoor plants like shrubs and flowering plants. Indoor walking is preferred by the elderly as it is safe, comfortable, convenient and it protects them from bad weather. But indoor walking lacks interesting things. Walking in nature provides different views.

The study by Lu, Rodiek, Shepley, and Tassinary (2015), indicates the factors that influence the walkability of the elderly in assisted living facilities. An assistive device used by the elderly includes a cane, walker, wheelchair, and power scooter. The space required by assistive devices should be considered while designing. Elderly face physical challenges like falling easily, vision problems, shortness of breath, weakness in the legs, and pain in the legs, hips, knees, ankle, or feet. Design should incorporate strategies and materials to solve these barriers in walking. There are two types of walking (1) recreational walking and (2) utilitarian walking. These types are further classified into a walk to meals, a walk to exercise, a walk to games, a walk to the mailbox, a walk to visit friends and other walks. Design features that influence walking includes handrails, seating, floor materials, artwork, plant, window, view. Wayfinding strategies like layout, signage positively influence walking. The looped path also encourages the elderly to walk. Providing homelike spaces and walking tours to make
the elderly familiar with the assisted living facility helps them to connect with the space. To promote outdoor walking, a smooth transition from indoor to outdoor is essential. Automatic door opener and gradual slope ramps help in creating a smooth transition. Comfortable seating near the mailbox and other facilities encourages social interaction. The number of building stories also influence the walking of the elderly. The higher the structure is, the walking becomes more difficult for the elderly who can't use the elevator. The design elements influence the walking of the elderly and should be well thought to promote walking.

Providing recreational opportunities helps in assisted living to improve the well-being of the elderly. Activities like exercise classes, gardening, and walking can help to improve physical wellness. Birthday celebrations, social tea gatherings, and group outings provide opportunities to socialize. Socialization plays an important role in the mental health of residents of assisted living facilities. Socialization creates a personal connection and provides an opportunity to create caring relationships which address the issue of isolation. Recreational activities create a sense of community among the elderly in assisted living facilities (Hanson, Hoppmann, Condon, Davis, Feldman, Friesen, Leung, White, Sims-Gould, Ashe, 2014).

Independence in assisted living is studied by Ball, Perkins, Whittington, Hollingsworth, King, and Combs (2004). Independence depends on (1) self-reliance that includes doing things for self. (2) Continuity of identity that is performing daily tasks. (3) Meaningful activity that includes cleaning or helping in cooking. Meaningful activities keep elderly residents busy. (4) Valued roles include serving others. This can enhance independence for the elderly. (5) Maintenance of function includes retaining or improving the ability to perform daily functions. Assisted living facilities emphasize health-promoting activities like gymnasium, fitness classes, and walking.

The study by ÇAGRI IMAMOGLU and E. OLCAY IMAMOG (2006), compares assisted living facilities and nursing homes. Elderly people preferred living in assisted living facilities over nursing homes. The reason for this preference is the familiarity the elderly feel with the assisted living facility. The environment of the assisted living facilities is homelike. Assisted living facilities also create a positive impression for the elderly. So elderly people see it as a facility where they can live in the future. On the contrary, the nursing home has an institution-like setting. For the elderly, it is a weaker homelike representation.

The access to the outdoor and preferences by the elderly population is studied by Rodiek and Fried (2005). It suggests weather and health conditions are a barrier for the elderly population to use outdoor spaces. The outdoor areas are underutilized as they are not suitable for the behavioral needs of frail elderly residents of assisted living (Hiatt, 1980; Hiatt, 1982; Bite and Lovering, 1984; Regnier 1985; Cooper Marcus and Barnes, 1999). According to Rodiek (2003), the features preferred by the elderly population include (1) a Path that is walkways to access the landscape. The walkway should be hard-paved for the comfort of the user. (2) Comfort that includes adding shade and seating along the walkway. (3) Greenery that is adding vegetation to the
design. (4) **Views** that help to safely connect elderly people with the outer world. (5) **Windows** to preview outdoor from indoor. (6) **Transition** space that provides a smooth transition from indoor to outdoor.

The study by Zavotka and Teaford (1997) on shared open space in assisted living facilities examines the relation between spaces and psycho-social needs of the elderly. Elderly populations experience change in the environment of assisted living. The features that help them connect to their previous home are helpful to help them feel homelike. This can be done by adding familiar colors, personalized accessories, and places for privacy in the design. Lobbies, floor lounges, and dining rooms are places for socialization. Spending more time in this space creates a personal attachment for the place.

According to Rubenstein (1989), there are different ways to connect with the place. The social-centered process emphasizes providing privacy. Clearly separating public and private spaces is helpful in maintaining the privacy of elderly people. Providing semi-private space for meeting family members is helpful in maintaining privacy. The person-centered process emphasizes a display of personalized history that helps to connect a person with the space. The body-centered process includes adding familiar colors, textures, and shapes to the design.

The study by Zavotka and Teaford (1997) suggests that the design of assisted living for the elderly should be a personalized and homelike environment.

The study by Roth and Eckert (2011) on the vernacular landscape of assisted living suggests different spaces are modified by the user. The vernacular landscape means places shaped by users according to their needs. There are different categories of spaces. (1) Public space (planned) includes a lobby that is generally large and upscale to create the first impression. Unpleasant smells are avoided and controlled in planned areas. The dining area is also part of the planned space that can encourage social interaction. These public spaces (planned) are controlled by staff and administration and elderly residents have less control in these areas. (2) Public space (vernacular) includes public spaces that are modified by residents. For example, in the Murry Ridge facility informal seating is created by a group of women near the elevator. Vernacular spaces like this provide social and emotional support. (3) Private space (planned) includes room sizes, layout, and decor. The layout can vary from a one-room apartment to a suite that includes a living area, kitchen, and bedroom. (4) Private rooms (vernacular) include personalized and decorated rooms by users. For example, conversion of a room into an art studio.

According to Goto, Park, B.-J., Tsunetsugu, Herrup, and Miyazaki (2013) visual contact of the structured garden can help to improve mood and lower heart rate. This study included three types of gardens that are Japanese garden, herb garden, and garden with a simple tree. Observing different gardens created different results in the elderly population. The most favored garden was the Japanese garden. The favorable features of Japanese gardens are stone lanterns, ponds, and Japanese maple trees as a focal point. This garden has good views from the walkway. The planting style varies in height and texture. The planting style also has a ground cover as a foreground, rock, and
shrub as a middle ground, and different textures of a tree as a background. It was well shaded by tall canopies. The study concluded that viewing the Japanese gardens helped in reducing heart rate. The comparative analysis among three gardens suggests that different responses are created by different gardens. This suggests the biological responses vary according to the environment.

According to McCaffre (2007), walking in a garden and art therapy is helpful tool in managing mild to moderate depression in the elderly. The study suggested that walking alone in the garden provided elderly people the time to reflect on their life. Walking in a garden with the group and good views helped the elderly population to share their feelings. These activities helped them to connect with nature and reduced stress. Art sessions helped in reducing depression and improving mood. This study concludes that walking in a garden and art therapy is for the elderly population to reduce stress and fight depression.

2. Case Study

2.1 Gardens for Frail elderly by Marcus (2013)

According to Marcus (2013), for the physical and mental wellbeing of frail elderly exposure to the outdoors is important. The required design guidelines for frail elderly include (1) The look of the garden should be domestic in terms of scale detail and plantation. (2) The layout of the garden should be clear and easy to understand. Pathways should be circular loops. (3) The garden should include destination points like a gazebo, pavilion with comfortable seating. These destination points should be designed to conduct social events or activities for the frail elderly. The destination points should have been designed to serve different climates. (4) There should be a choice in the type of seating, pathway, views, and destination. Cultural aspects should be considered for a user group for the garden and incorporated into the design.

The recommended design guidelines include (1) an Attractive, well-maintained garden with amenities that can help to improve the garden usage by elderly residents. (2) designing to incorporate a view of the wider landscape is helpful in connecting elders with the community and boost the sense of belonging to the broader community. (3) Providing the gardening area with raised beds, tool shades, and access to water to promote gardening. Benches with three heights for a person sitting, standing, and using a wheelchair. (4) Incorporating recreational amenities and stored equipment for visiting family members. (5) Glass enclosed the atrium for year-round use (Marcus, 2013).

According to Marcus (2013), the requirements for visual access include (1) Outdoor areas visible from indoor frequently used areas. Low sill level for windows to make the view enjoyable for the person seated. The recommended design guidelines for visual access include (1) Attractive foreground with distant views and (2) outdoor areas visible from staff desk to help them keep eye on elderly residents that are using the outdoor space. For providing physical access (1) Transitional space from indoor to outdoor should be part of the design. These transitional spaces are helpful for the elderly to
adjust to the outdoor temperature and light. (2) Entry patio for the garden should be large enough to accommodate several people. Elderly residents sometimes prefer to spend their time around the entrance patio area rather than actually going inside the garden. The recommended design for physical access includes the provision of the semi private garden on different floors of a multistory facility. The required design aspects for pathways incorporate (1) Pathways that are leveled and free from glare. The pathway should have good traction to prevent residents from falling. (2) The corridor handrail should be continued from indoor to outdoor to promote outdoor area usage. (3) The pathway color should be consistent. (4) The locations of a pergola or any other structure should not cast a shadow on the pathways. For the design for the seating, the height should be higher than usual. (1) The required height for the seating should be 18” to 19”. The seat depth should be at least 20”. Arm height should be 25” to 26”. (2) Provision of fixed as well as movable seating with table. (3) There should be contrast between seating and ground. The seating areas should be spaced at 15’ to 20’. (4) There should be a provision of semi-private outdoor areas for family visits. (5) Seating at the right angle or opposite to each other should be provided in the design to make the conversation easy with elderly residents who have a weak hearing.

The planting design requirements include (1) a Plant that is attractive throughout the year. A broad range of plants to provide visual attraction. (2) Flowers or foliage with saturated colors like red, yellow, and orange. Avoid blue and lavender colors as they are perceived as gray by the elderly due to cataracts. (3) Plants with a variety of textures and colors at and below eye level. (4) Small scale changes in plants along pathways to add a variety of experiences for elderly residents. (5) Plants that can be touched and smelled for elderly residents who use wheelchairs. (6) Incorporation of a scented plant into the design. (7) Incorporating wildlife in the form of birds and butterflies (Marcus, 2013).

2.1.1 Roger Smith Memorial Garden, Friendship Village, Schaumburg, Illinois (Case Study) (Marcus, 2013)

Designer – Hitchcock Design Group, Naperville, Illinois

Description – Large retirement facility that accommodates (1) Small houses and apartments for independent residents, (2) Assisted living units, and (3) Memory support wing for residents with dementia.

Design philosophy – This design is a living tribute to Roger Smith a former resident and board member at Friendship Village.

The design includes outdoor seating, seasonal planting, and activity/ multi-use space.
Image 2.1 – Plan
Courtesy - Hitchcock Design Group

Image 2.2 – Seating along the path
Source - https://friendshipvillage.org/photo-gallery
Description of outdoor space - The garden is enclosed by a two-story residential structure. The feature of outdoor space includes human-scale design, a variety of well-maintained planting, a clear layout, seating, and pathways with long and short loops for exercise. The path is wide enough for two to walk abreast. The entry has a brick-paved patio. The feature of seating includes seating with back and arms, seating that provides an opportunity to sit in sun and shade, and seating with a movable chair and table. Plants with different colors, textures, and seasonal change. The ratio of green to hard surfaces is high. The design includes an activity space for young visitors. Central shuffleboard and seating around it are helpful in increasing the use of the garden.

Post occupancy study – The garden is used by elderly residents for seating and talking. It is used for reading by some residents. Visiting family members used the garden for meeting elderly residents. The patio is the most used area of the garden.

2.2 Garden for people with Alzheimer's and Other Dementias by Marcus (2013)

According to Marcus (2013), loss of memory cells from the brain in Alzheimer’s patients affects memory, learning, and judgment.

The required consideration for design includes (1) The use of gardens by people with Alzheimer's depends on the caregivers and policy of the institution. Hence involving staff and management in the design of the garden is important. (2) The garden should be visible from inside the building to maximize the use of a garden. Views of the garden should be available to inform residents about the time of the day and season to residents. (3) The view of the garden should be available from staff areas to keep an eye on residents visiting the garden. (4) All parts of the garden should be visible to the user at all times. (5) The seating should be located for morning use. Exposure to morning sun is helpful in increasing vitamin D and also to help in sleep disorders and
depression. (6) There is agitation late afternoon in people with Alzheimer’s known as sundowning. The casting of shadows during the afternoon may also create problems in this case. The seating should be located to make use of the late afternoon sun. (7) The features that evoke memories should be incorporated by meaningful activities. For example, mailbox, vegetable garden, barbecue, cultural or religious icon, etc. (8) The garden should be attractive and well maintained to maximize the use of the garden. (9) The building edge should enclose the garden whenever possible. (10) The boundaries of the garden should provide a complete enclosure. Tree and tall shrubs screening should be used to hide fences or walls. The wall should be 8’ tall to avoid eloping. The focus should be within the garden (Marcus, 2013).

According to Marcus (2013), recommended designs include (1) a separate garden for patients in mild, moderate, and severe stages. (2) Elements that residents can use in taking care of the garden. For example, a gardening box that is raised with a supply of water. (3) Incorporating culturally appropriate activities by interviewing family members of residents, elders, and caregivers. (4) Providing water elements in the design. But the design of the water element should be safe for the residents. (5) To incorporate a play area or basketball hoop to engage visiting grandchildren.

Required elements for physical access include (1) a Single entry door that is visible from the garden. This will help residents to return indoors. (2) Easy access from the building to the garden that includes features like automatic doors and signs. The recommended design includes restrooms close to the garden entry. Seating requirements include (1) Seating at frequent intervals (2) Different types of seating like fixed and movable, seating in the location of sun and shade. Pathway requirements include (1) Simply looping of figure-eight pathways that are helpful in navigating through. No dead ends and forks in roads to avoid confusion. (2) Providing markers, landmarks, and interesting elements along the pathway. (3) level pathway system to avoid tripping or falling. Planting requirements include (1) Avoiding plants that are toxic and harmful to touch in the design. (2) Including plants that were popular when residents were young into the design. Incorporating plants that are culturally important and stimulate senses like smell and touch. Lighting should incorporate the following features (1) The lighting should be sufficient for using the garden at night. People with Alzheimer’s have difficulty sleeping at night. Wandering outside helps in alleviating restlessness and frustration. (2) The lighting features should be tall for safety (Marcus, 2013).

2.2.1 The living garden at family life center, Grand Rapids, Michigan. (Case study) (Marcus, 2013)


Description – It is a daycare center for Alzheimer’s and dementia.

Design philosophy – The design input is taken from the patient’s family, staff, and horticulture therapist.
Image 2.4 - Site plan of the Living Center garden by Martha Tyson. Courtesy of Douglas Hills Associates
Image 2.5 - A wooden arbor provides a sense of entry into the main garden. A view of a gazebo suggests a destination point for those with memory problems.

Photo by Clare Cooper Marcus


Description of the garden – The dining/ activity room and glass-roofed atrium have a view and access to the garden. There are two parts two the garden (1) Strolling and viewing garden (2) Working garden. The working garden includes raised bed for horticulture therapy, potting area, a small orchard, and a butterfly garden. The working garden is helpful in encouraging physical activity and also promote social interaction. The Garden also has features like a lawn, path, gazebos, waterfall and pond, and various places to sit. The garden has one entry door and a looped path. The layout of the garden is easy to understand. The building, walls, fence, and planting define the garden space. Jasmine and tobacco flower plants are used for smell and amaranths are used for bloom.

Post occupancy study – The garden is used for daily therapy for some users. The lawn area is used for activities. The Garden house is used for listening to music and singing.
2.3 Garden for Hospice care by Marcus (2013)

According to Marcus (2013), gardens for hospice care should include (1) Familiar landscape according to the region or culture where the hospice facility is located. (2) Belief of a person about life after death should be incorporated into the design (that is a challenging part for garden design) (3) Sun-facing rooms that provide access to natural elements like the sky, clouds, and sun. (4) Soothing natural sounds should be incorporated and other noise should be avoided/masked in the design. Water sound is preferred as a soothing sound and to mask other disturbing traffic noises. (5) The design should provide the sense of getting away. The meandering path, secluded seating, and plantation should provide privacy as well as a sense of getting away from the hospital setting. (6) Private garden with comfortable seating and water features for family members creates a peaceful environment for grief. (7) The reassuring first impression should be created for anxious patients and their family members. The parking should be close to the entrance and a planting style should be selected to soften the building. (8) Providing commemorative trees, plaques, or tiles for a deceased loved one if it is appropriate in the country or region of a hospice facility. (9) Outdoor play area for kids that is visible from indoor for children visiting and in children hospice care. The **recommended design** includes (1) Adding a bird feeder to provide patients and their family members positive diversion. (2) Water features that attract wildlife which symbolizes that life goes on. (3) Facilities to allow interaction with family pets that are therapeutic for the patients.

The requirement for **visual access** includes (1) a Semi-private patio or balcony that provides visual access to ground, vegetation, and sky for patients on bed or chairs. Knowing weather, season, and time of the day connects the patient with nature. (2) Panoramic view of lawn and mature trees from patient’s window and garden seating. Design for **physical access** includes a door outside for patio or balcony for fresh air, views, and for family members to take a break from a hospital environment. Planting requirement includes (1) Adding ornamental grasses and long-lasting perennials. (2) Incorporating fragrant plants like lavender and rosemary (3) Fragrant climbers like jasmine, clematis, and wisteria near the patient’s window. (3) Including aromatic herbs such as sage, thyme, or lemon balm along the pathway. (4) Annual plants that are dying or dead are not ideal for hospice care gardens. (5) Familiar plants should be incorporated. (6) Continuity can be reflected in the design by incorporating seasonal plants. The garden should be maintained from time to time (Marcus, 2013).

2.3.1 Bonner Healing Garden, Bonner Community Hospice, Sandpoint, Idaho (Case Study) (Marcus, 2013)

**Designer** – John Siegmund and Tom Runa by Chris Garcia

**Description** – Facility includes offices for hospice workers and does not include inpatient beds. Landscape architect, master gardener, interior designer, therapist, patients, and community volunteers contributed to the planning and promoting of the garden.
Design Philosophy – The place of comfort contrast to the chaos of the healthcare setting. The outline of the garden is to provide a healing garden for people of all backgrounds and beliefs. The contractor John Siegmund used feng shui design principles for path and structural layout.

Image 2.6 - Visitors enjoying the flowers outside the chapel at Bonner Hospice, Sandpoint, Idaho. Photo by Chris Garcia

The pathway of textured and colored concrete has heating tubes beneath it to ensure year-round access. 

Description of outdoor space – The garden is accessible from different locations. The garden is located on the banks of Sand Creek. Brown houses and old-growth forest cabins define the site boundary and provide a home-like setting. The layout incorporates different sensory gardens. The main path includes features like (1) 6 feet path (2) ADA compliant and (4) Heating tubes underneath for year-round access. The feature of the garden includes (1) Welcoming entry trellis and a dense row of pine trees, (2) Memorial wall, (3) Rose garden, (4) Cantilevered water wall, raised pond and stream bed, (5) Tea house, (6) Gable – roofed chapel without any religious imagery, (7) Children’s garden, (8) Walkway along the forested bank of Sand creek with two alcoves. The natural site and construction detail give the garden a sense of permanence. Sufficient lighting allows users to use the garden even at night.

Use of the garden – Garden has two user groups (1) patients, families, and hospital staff of the hospice facility and (2) the community using it as a public park. The garden is used for patients, families, and staff of hospice care for physical, emotional, and spiritual support. Chapel and tea houses are used for meeting patients’ families. The Garden is also used to meditate and stroll by families and friends. Two short stairways and a creek path are used by a physical therapist for exercise with a client. Outpatient’s
from adjacent medical facilities use it for relaxing before and after the doctor’s appointment.

### 2.4 Garden for Mental and Behavioral Health Facilities by Marcus (2013)

The **required** design guideline includes (1) Safety for patients, staff, and visitors. Including safety in design varies according to the mental healthcare facility. For example, the safety required for alcohol addiction is less than for patients with a high risk of suicide. (2) Avoiding objects that are harmful to patients. Any breakable object that can be used for self-harming or as a weapon should be avoided in the design. Decorative stones, lighting fixtures, bricks, wires, and pins, etc. should be avoided. Poisonous plants should also be avoided. (3) Trees, branches, retaining walls, movable objects that can be used by patients for climbing over the fence should be avoided. (4) Garden should provide privacy for patients but also be visible to staff for patients’ safety. (5) Garden should provide a homelike noninstitutionalized environment that will provide a sense of getting away. (6) Providing visual access from indoor spaces. (7) Providing social support by adding seating for one-to-one interaction as well as seating for large group therapy. Movable garden seating should be avoided for patient’s safety. (8) As patients are sensitive to UV rays in mental healthcare facilities, reflective surfaces like glass and metals should be avoided. The design should provide opportunities to sit in the shade. (9) Providing opportunities for outdoor exercise like paths for walking and jogging, outdoor equipment, etc. (10) Potentially threatening materials that can trigger the delusion should be avoided. (11) The garden layout should be easily legible and the design should provide wayfinding for patients to return to the entrance (Marcus, 2013).

According to Marcus (2013), **recommendations** for gardens in mental and behavioral health facilities include (1) a Human scale design for vegetation and features that are helpful in increasing comfort level. (2) Including indoor atria or potted plants to bring nature indoors and connect users with nature (3) Water features that are easy to maintain and safe for the patients should be incorporated into the design. The sound, sight, and smell of water can add soothing effects for patients. (4) Separate outdoor space for staff that is easily accessible from the break room should be added to the design. Outdoor areas for staff should provide privacy for patients and visitors. (5) Plant materials, clocks, sundials should be added to the design to provide patients with a sense of time and season.

#### 2.4.1 Rosecrance Healing Garden, Griffin Williamson Adolescent Treatment Center, Rockford, Illinois (Case Study) (Marcus, 2013)

Designer – Hoichi Kurisu, Kurisu International, Portland, Oregon

By Jessy Bergeman

Description - This provides outpatient and inpatient health assistance and additional treatment services for families, adults, adolescents, and children. This mental healthcare facility includes clinics, offices, residential houses, and campuses. The
facility for adolescents (twelve to eighteen years) includes an on-site school, chapel, gymnasium, fitness center, dining hall, and patio.

Design philosophy - Using water features with stone to create a Zen garden. Provide public and private spaces to engage with nature. Japanese design principle to design the garden. To encourage visitors to explore the garden the design does not include straight lines and emphasizes curved lines and pathways. Planting design does not have overwhelming colors and texture but has subtle variation.

Image 2.8 - The garden provides a variety of ways for patients, visitors, and families to interact with nature. The “serenity bridge” over the pond serves as a focal point. It is pitched symbolically “like a mountain, because one must work to get to a better place.”

Photo by Jessy Bergeman

Image 2.9 - The viewing platform is a popular spot from which to observe wildlife in the water below. Photo by Jessy Bergeman


Description of outdoor space – A pond that serves as a centerpiece of the garden features a deck. The deck is helpful for self-reflection and observing koi in the pond. The garden has bridges of different sizes and materials. The waterfall that cascades down twelve levels symbolizes the twelve-step recovery program. Six separate “serenity circles” of different sizes provide an opportunity for group seating (twenty people) in the largest circle and private seating (two people) in the smallest circle. Various pathways with different paving materials are provided in the design. These pathways encircle the pond and extend into woods. The bell tower is a symbolic and interactive feature. After successfully completing the program adolescents stick the bell during the ceremony.

Post occupancy study – The user group for the garden is patients, their relatives, staff, and the community. The patients use the garden for the therapy program. It is used for one-to-one sessions as well as group sessions. The garden is also used to practice meditation, walking, journaling, and breathing exercise. The garden is used by staff to walk and sit during their break. Family members use the garden during family orientation weekend. A public tour of the garden is also given when it is not in use by patients.
2.5.1 Isabella, New York, NY - Assisted living facility (Case Study) (Hong, 2017)

Isabella is a long-term health care center that provides facilities like 705-bed nursing homes, senior housing, rehabilitation center, and child care. The key principle is creating a sense of being home for the residents. The meals and daily activities of residents are scheduled according to individual preferences. A geriatric center that is a 17 story facility is a central hub that provides elder care services. Individual apartments that are part of the assisted living facility are connected to Isabella Geriatric Center by a podium (Hong, 2017).

Isabella House offers studio and one-bedroom apartments with a small kitchen, closet, and walk-in shower. A dining hall and communal lounge are provided on every floor. Other services like exercise equipment and barber/beauty services are provided at Geriatric Center. Other important services include 24-hour security with emergency pull cord services in every unit. Weekly activities and wellness activities for residents. The Isabella House is a universal design that provides barrier-free access (Hong, ).

The facilities provided by Isabella Nursing Home include long-term care, short-term rehabilitation, ventilator-dependent care, and dementia care. For chronically ill adults, the Adult Day Health Care Program is provided at Isabella Geriatric Center. Isabella Senior Resource Center provides guidance regarding issues and concerns. Isabella Institute for Older Adults has a program called Walking Works Wonders. Seniors meet three times a week for a one-hour session that is led by a professional coach (Hong, 2017).

Isabella Geriatric Center including nursing home, Senior housing, and daycare center provides services to the assisted living facility. Isabella Geriatric Center also provides facilities to the community and to seniors living independently in the neighborhood. The facility is located near a school to promote intergenerational interaction (Hong, 2017).

2.5.2 ElderSpirit Community, Abingdon, Virginia - Assisted living facility (Case Study) (Glass, 2012)

ElderSpirit Community is a co-housing facility for the elderly. The community has thirteen units (owned) either one story or grouped in duplexes and triplexes, sixteen subsidized low-income rental units, and four homes. Two-story housing design is incorporated as a response to the steep slope of the side. The spirit house is used for programs, weekly meetings, and Buddhist meditation. Almost twenty-nine units have one side facing the common green space (Glass, 2012).

According to Glass (2012), the design consideration for layout includes a requirement of parking for each unit. For residents that are physically challenged or are dependent on walkers or wheelchairs walking from parking to unit was also difficult. Due to the two-level structure, the upper-level units had a problem of facing retaining walls and parking rather than common open space.
Image 2.10 – Homes for sell - Source- https://elderspirit.org/homes-for-sale

Image 2.11 – Homes for Rent - Source - https://elderspirit.org/rental-homes
Chapter 3 – Site Analysis

3.1 Site location – Cortland Acres is a nursing home in Thomas, Tucker county, West Virginia.

3.2 Vision 2030 -
3.3 Site Inventory and Analysis -

The site inventory and analysis are conducted with the help of Arc GIS. It includes a study of site slope, contours, hillshade, and hydrology study that incorporates (water) flow direction, accumulation, stream order, and watershed study.

In the following maps, the white dashed line indicates the boundary of the site. The area within the site indicated by the white/green dashed line indicates the existing cemetery that is to be preserved. The footprint of the existing structures is represented by solid blue polygons.
3.3.1 Slope Map

The slope map study indicates the inclination of the land. The legend is classified into 5 categories based on 10% inclination. The legend in green shows the moderate slope of 0 to 10% and 10.1 to 20%. The yellow shows 20.1 to 30%, Orange shows 30.1 to 40%, and red shows 40.1 to 50%.

For this site, a slope of 0 to 20% is observed from this study. This slope is ideal for construction as well as determining drainage patterns for the site. The middle portion of the site shows a 20.1 to 30% slope that must consider while designing. The right side of the site indicates a 30.1 to 50% slope which is steep.

The steep slope is also observed towards North-East, East, and South-East along the periphery of the site boundary.
3.3.2 Contour and Hill Shade Map

Contour and Hill Shade Map

The contour map is created by considering 10 feet contours and 100 feet contours. It shows an elevational change between two lines is 10 feet. The bold lines show the elevational change between 100 feet between two lines. The contours lines that are close to each other show the steep slope and the contour lines that are at a distance show the gentle slope. The contour lines are equidistant indicating a unifying slope. The variation in the distance between the contour lines shows the uneven slope.

Hill shade map visually represents the formation of the site. This map is helpful to understand the slope better. Hill shade map indicates peaks and valleys on the site. This map is useful in locating uses and facilities and maintaining the ideal slope for ADA accessibility. It is also useful in developing path and trail circulation for the site. Low valley point for Storm Water Management can be studied and designed according to the help of hill shade map analysis.
3.3.3 Flow Direction Map

The values in the legend represents following direction-

1 = East
2 = South - East
4 = South
8 = South - West
16 = West
32 = North - West
64 = North
128 = North East

The middle portion of the site is represented by colors associated with 4 and 8. This indicates water flow direction as South and South - West. Other major portions of the site are represented by color associated with 1 and 2 that indicate East and South - East water flow direction. This study can be helpful in determining the location of a rain garden or naturalistic water feature.
3.3.4 Flow Accumulation Map

Flow Accumulation Map

The flow accumulation map indicates values higher than 1000 with a dark blue legend.

If there are 1000 cells flow to location with each cell being 3m by 3m, the total drainage area is $1000 \times 3 \times 3 = 9000$ M.Sq. or $9000 \times 0.0001 = 0.9$ hectares (2.22 Acres)

Hence the cell value is more than 1000 it is working as a drainage point of 2.22 acres of land.

By this process, all the major flow networks are identified. Flow accumulation map also helps to create a streamflow map.
Stream Order Map

Stream order map is helpful to identify the hierarchy of the stream order. The legend represents 6 classes. Class 6 being prime stream it reduces to 1 with lowest stream order.

The stream order map shows streams with colors represented by 1 and 2 which indicates lower stream order for the site. Higher stream order colors represented by 5 and 6 are observed towards the nearby waterbody.
3.3.6 Watershed Map

Different polygons represented by the watershed map indicate land that drains water into the river/stream.

A Watershed map can be helpful to prevent the contamination of streams by proposed land use.
3.3.7 Wetland Map

The Wetland map represents wetlands within the site and around the site. The freshwater emergent wetland is observed on the north side boarder of the site.

(Emergent wetland means a class of wetlands characterized by erect, rooted, herbaceous plants growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content, excluding mosses and lichens. This vegetation is present for most of the growing season in most years and is usually dominated by perennial plants.)

(Source - https://www.lawinsider.com/dictionary/emergent-wetland)

The forested wetland is also observed on the north of the site.

(Forested wetland means a class of wetlands characterized by woody vegetation that is six meters (20 feet) tall or taller. These areas normally possess an overstory of trees, an understory of trees or shrubs, and an herbaceous layer.)

(Source - https://www.lawinsider.com/dictionary/forested-wetland)

Water bodies like freshwater ponds and lake are also represented by wetland map.
Riverine is represented towards the north of the site and within the site.  
(Riverine means relating to, formed by, or resembling a river (including tributaries), stream, brook, etc.)

(Source - https://www.lawinsider.com/dictionary/riverine)

A Wetland map is helpful in identifying and preserving existing wetlands. A wetland map can also be considered as a guide for connecting the site to the naturalistic context of the site. It can also be helpful in selecting a plant palette for the site. The study of wetlands can also be helpful in enhancing biodiversity.
3.3.8 Existing Trail Map

Existing Trail Map

The existing trail map indicates the Blackwater Canyon rail trail that runs parallel to the waterbody. It also indicates Dale's trail and Dale's trail bypass. Junior Davis trail is on the North - East side of the site and it runs through the site. There is a connector that connects the Junior Davis trail to Dale's trail. The parking area for the City of Thomas trail is represented by a red circle.

With the help of this map, the new trail can be designed and connected to the existing trail system network.
US Highway 219 is the primary road to connect with the site. The internal road provides vehicular circulation and is connected to parking areas. Gravel Road loops around the existing cemetery.
3.3.10 Sun and Shade Study Maps

December cumulative solar study –

Winter solstice (generally 21st December in Northern Hemisphere) is the shortest day and the longest night of the year. The map indicates a solar study done on 21st December. The shadow pattern is studied at 9 am, 12 pm, and 3 pm. The shadows are overlapped to understand the cumulative shaded areas. The dark grey areas represent the shaded area for the maximum time of the day and the light area represents areas represent the areas that receive minimum shade.

The long shadows are observed from the map at North-West, North, and North-East sides. The West, South, and East sides are sunny throughout the day. The shadow cast by the topography is also observed during the Winter Solstice.
Summer solstice (generally 21st June in Northern Hemisphere) is the shortest night and the longest day of the year. The map indicates a solar study done on the 21st of June. The shadow pattern is studied at 9 am, 12 pm, and 3 pm. The shadows are overlapped to understand the cumulative shaded areas. The dark grey areas represent the shaded area for the maximum time of the day and the light area represents areas represent the areas that receive minimum shade.

The map indicates West, North, and East sides are lightly shaded. The South, and East sides are fully sunny throughout the day.
Equinox (from 19th to 21st March in Northern Hemisphere) indicates equal day and night. The map indicates a solar study done on the 21st of March. The shadow pattern is studied at 9 am, 12 pm, and 3 pm. The shadows are overlapped to understand the cumulative shaded areas. The dark grey areas represent the shaded area for the maximum time of the day and the light grey area represents areas that receive minimum shade.

The map indicates West, North, and North-East sides are shaded. The South and East sides are sunny throughout the day.
3.4 Composite Analysis Map

The composite analysis map synthesizes the information studied in inventory maps into a single map. The composite map shows the connectivity from the highway to the site and internal circulation on a site. The composite analysis map shows the terrain and contours to understand the topography of the site. Wetlands on the north boundary of the site show ecologically sensitive areas. The riparian area is shown on the north of the site boundary and it is partially within the southern portion of the site. The wind direction is prominently from South West and South. The cumulative solar study shows North-West and North-East as the majorly shaded area and Southern area as sunny throughout the year.
4. Design

4.1 Comparison with the previous plan (by Thrasher)

The changes include -

1. The previous plan had branched out road connections. In the proposed design, different clusters are created for long-term care facility, independent living, and quadruplexes. Outdoor activities are in the center and built structures loop around the open area to incorporate visual benefits. This also boosts a sense of community among residents.

2. Community center is shifted towards the road to improve the accessibility and separate it from the residential area.
4.2 Master Plan
4.3 Garden One

Garden one comprises three areas. The first area is the pollinator garden along with the community garden. The arrangement of flower beds in the pollinator garden is in concentric circles. Radiating pathway connects the seating with the central area of the garden. These pathways run through the pollinator garden. These immersive pathways are helpful in appreciating the garden. In the community garden, the raised bed is arranged in a radiating pattern. The radiation pattern is helpful in locating the entrance of the garden from anywhere in the garden. This area is designed to emphasize physical activity.

The second area is a game area. The game area has a board game to enjoy outdoor quality time with nature. The kids' play area is for grandchildren visiting their grandparents. The board game area and Kids' play are connected with the secondary pathway. This pathway has semi-covered pergola seating surrounded by a pollinator garden. This area is designed to support the play aspect and encourage communication.

The third garden is a meditative garden that has a central meditation area surrounded by an arched. It also has a labyrinth for a meditative walk. This garden is designed to connect with nature and promote mental well-being.

Garden one has an outer walking loop that connects all three areas. It has a central lawn area and an inner walking loop.
4.3.1 Plan and Planting Design

**Legend**
- Red Maple
- Sugar Maple
- White Oak
- Red Oak
- Sweetgum
- Eastern Redbud
- Dogwood
- American Sycamore
- White Spruce
- Colorado Blue Spruce

**Perennials**
- **Purple Coneflower** - *Echinacea purpurea*
  Upright appearance
  Draws bees and butterflies
- **Garden Phlox** - *P. paniculata*
  Large clusters of pink, purple, lavender or white flowers bloom
- **Daylilies** - *Hemerocallis*
  Single specimens or mass as a ground cover
  Easy to care
- **Delphinium** - *Delphinium*
  Showy, spiky blooms on a tall stem
  Blue flowers
- **Black eyed Susan** - *Rudbeckia hirta*
  Bright yellow flowers
- **Lavender** - *Lavandula angustifolia*
  Herb Plant
  Fragrant aroma
  Easy to care
- **Peony** - *Paeoniaceae*
  Flowers are large, showy
  **Indian blanket** - *Gaillardia aristata*
  Blooms in red and yellow colors
- **Hollyhocks** - *Alcea rosea*
  Flower stalks can reach heights of 9'

**Ground Covers - Shady Zone**
- **Periwinkle** - *Vinca minor*
- **Sweet Woodruff** - *Galium odoratum*
  White flowers
  Sweet-smelling foliage

**Buffalo Grass** - *Bouteloua dactyloides*
- Low maintenance
- Low shade tolerance
4.3.2 Sectional Elevation

Sectional Elevation AA’
Sectional Elevation BB'

4.3.3 Perspective

View of the garden from primary pedestrian pathway
4.4 Garden two

The second garden is a naturalistic garden. There are two loops that promote walking. Loop one is surrounded by a wooded area. Loop, one has a central lawn. Both loops provide different experiences for the user. Different types of seating are designed along the loops to rest and enjoy nature. There is a naturalistic rock formation along with the loops. The garden has a designed koi pond as a getaway or positive distraction.
4.4.1 Plan and Planting Design

Purple Coneflower - *Echinacea purpurea*
Upright appearance
Draws bees and butterflies

Black Eyed Susan - *Rudbeckia hirta*
Bright yellow flowers

Daylilies - *Hemerocallis*
Single specimens or mass as a ground cover
Easy to care

Hydrangea - *Hydrangea macrophylla*
The floral color changes with the pH of the soil

Hosta

Ground Covers - Shady Zone

Periwinkle - *Vinca minor*

Sweet Woodruff - *Galiun odoratum*
White flowers
Sweet-smelling foliage

Buffalo Grass -
*Bouteloua dactyloides*
- Low maintenance
- Low shade tolerance

Legend:
- Red Maple
- Sugar Maple
- White Oak
- Red Oak
- Sweet Birch
- Eastern Redbud
- Dogwood
- American Sycamore
- White Spruce
- Colorado Blue Spruce
4.4.2 Elevational Section
4.5 Garden three

Garden three has two designed areas. Area one is a meditative area that provides niches for individual and group meditation. The semicircular pathway has niches on either side. The Herb Garden that is part of the pathway provides exposure to the herbs. The second designed area is a family get-together area and flower garden. The radiating pattern of pathways is designed to make the entrance visible from anywhere in the garden.
4.5.1 Plan and Planting Design

Legend
- Red Maple
- Sugar Maple
- White Oak
- Red Oak
- Sweet Birch
- Eastern Redbud
- Dogwood
- American Sycamore
- White Spruce
- Colorado Blue Spruce

Lemon balm - Melissa officinalis
Rosemary - Salvia rosmarinus
Thyme
Lavender - Lavandula angustifolia
Garden Sage - Salvia officinalis
4.5.2 Elevational Section

4.5.3 Perspective
4.6 Garden four

The fourth garden is themed as a garden of elements (Air, Water, Earth, and Fire). The garden has three entrance plazas connected with the walking loop. The air element is shown in the design by planting tree-like weeping willow. The weeping willow has light descending branches that move with the air adding a light breezy experience to the design. Entrance plazas have a water pond to emphasize an element of water. Another designed water feature is a stream of water parallel to a walking pathway. Earth is represented by a mulch that also helps in protecting the soil. Fire is represented in a garden by incorporating plants showing red, orange, and yellow colors either in foliage or flowers.
4.6.1 Plan and Planting Design

Legend
- Red Maple
- Sugar Maple
- White Oak
- Red Oak
- Sweet Birch
- Eastern Redbud
- Dogwood
- American Sycamore
- White Spruce
- Colorado Blue Spruce
- Weeping willow

**Virginia Sweetspire** - *Itea virginica*
Fall color varieties: Red, orange, gold

**Rose of Sharon** - *Hibiscus syriacus*

**Red Coreopsis** - *Coreopsis verticillata*

**Indian blanket** - *Gaillardia aristata*
Blooms in red and yellow colors

**Daylilies** - *Hemerocallis*
Single specimens or mass as a ground cover
Easy to care

**Garden Phlox** - *Phlox paniculata*
Large clusters of pink, purple, lavender or white flowers bloom
4.6.2 Elevational Section
4.6.3 Perspective

View of the garden from the entrance

View of the garden and gazebo from the walking loop
4.6.4 Constructional detail

Construction Detail

Bare Root Tree Planting

Permeable Pavement
(Parking Area)

Permeable Pavement
(Walking Loops)

Raised Bed
(Community Garden)
Conclusion

The proposed design provides safe access to outdoor open space and provides exposure to nature. The walking path provides an opportunity for physical movement. A community garden can help to provide a sense of fulfillment, help in socializing and also promote physical movement. Outdoor game areas can be helpful to create a sense of community. Meditative areas are designed to help in self-reflection. Outdoor family areas can provide family get-together space.

Each garden has a theme for planting design that gives a unique experience for the user. Pollinator gardens have colorful planting designs that will invite butterflies. The meditative garden has an herb garden to promote healing.

The proposed design provides opportunities of different seating to choose from. Different designed areas cater to different needs and also can be helpful in increasing time spent outdoor. Time spent outdoor will help to get the health benefits from exposure of nature.
References


Image 2.1 – Courtesy - Hitchcock Design Group

Image 2.2 – https://friendshipvillage.org/photo-gallery

Image 2.3 – https://friendshipvillage.org/photo-gallery

Image 2.4 - Courtesy of Douglas Hills Associates

Image 2.5 - Photo by Clare Cooper Marcus

Image 2.6 - Photo by Chris Garcia
Marcus, Clare Cooper, and Naomi A Sachs. Therapeutic Landscapes : An Evidence-Based Approach to Designing Healing Gardens and Restorative Outdoor Spaces, John Wiley & Sons, Incorporated, 2013. ProQuest Ebook Central,
Image 2.7 - Photo by Chris Garcia

Image 2.8 - Photo by Jessy Bergeman

Image 2.9 - Photo by Jessy Bergeman

Image 2.10 - https://elderspirit.org/homes-for-sale

Image 2.11 - https://elderspirit.org/rental-homes