ABSTRACT

Title of Thesis:	A NATURE SPACE FOR WELLNESS: OUTDOOR DESIGN FOR THE VILLA ROSA NURSING AND REHABILITATION CENTER
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Compared with other age groups, seniors are more physically vulnerable and more likely to experience feelings such as boredom, helplessness, and loneliness (Cooper Marcus & Sachs, 2014). Living in long-term care facilities such as assisted living and nursing homes may worsen the situation, leading to feelings of dehumanization, fear, discomfort, and under-stimulation (Dahlkvist et al., 2016; Verderber & Fine, 2000). Well-designed outdoor spaces that encourage interaction with nature benefit senior residents both psychologically and physically, promoting rehabilitation and making their lives more enjoyable.

Currently, residents at the Villa Rosa Nursing and Rehabilitation Center in Prince George's County, Maryland, lack suitable environments for outdoor activities. In this thesis, the back courtyard and the front entrance are redesigned to maximize nature's healing restorative effects for the residents, accommodating seniors' particular needs and increasing the usability of both sites.

A NATURE SPACE FOR WELLNESS: OUTDOOR DESIGN FOR THE VILLA ROSA NURSING AND REHABILITATION CENTER

by

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of the requirements for the degree of
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List of Abbreviations

ADA: Americans with Disabilities Act

ART: Attention Restoration Theory

CRT: Conditioned Restoration Theory

COVID-19: Coronavirus Disease 2019

GATE: Garden Assessment Tool for Evaluators

GNA: Geriatric Nursing Assistant

HDPE: High-Density Polyethylene

HVAC: Heating, Ventilation, and Air Conditioning

MLA: Master of Landscape Architecture

NBR: Nature-Based Rehabilitation

NK: Natural Killer

PFA: Perceptual Fluency Account

SCA: Student Conservation Association

SMT: Search and Memory Task

SRT: Stress Reduction Theory

Chapter 1: Introduction

As early as the 19th century, the importance of the natural environment, which is included in the physical environment, had already begun to be systematically recorded and linked with the recovery efficiency of patients (Nightingale, 1859/1989). After over 100 years of development, with the theories about how the physical environment influences human health being constantly updated, incorporating nature's healing effects into hospital and other healthcare facility designs is paid more attention today. However, many facilities still do not apply the theories, which leads to the underutilization of designed outdoor space.

Compared to younger people, spending time in nature can ameliorate more aging-related health problems experienced by older adults, especially those who are hospitalized that may have a higher level of negative feelings and limited mobility (Cooper Marcus & Sachs, 2014; Dahlkvist et al., 2016; Verderber & Fine, 2000). In the meantime, more design factors specifically related to seniors (referring to senior citizens – anyone of retirement age) should be considered to improve the accessibility, safety, and usability for older adults (Rodiek, 2009).

To maximize the benefits that the residents of Villa Rosa Nursing and Rehabilitation Center (the Center) can get from its outdoor spaces, I took four steps to develop my thesis project: the first step was to review the development of theory, research, and application of nature's healing effects and characteristics of the elderly; the second step was to conduct site inventory and analysis of Villa Rosa Nursing and Rehabilitation Center; the third step was to extract useful information from the

literature and the site study to form guidelines about designing outdoor space for older adults; and the last step was to apply the design guidelines to the two outdoor spaces at the Center – the front entrance and the back courtyard.

Chapter 2: Literature Review

As the first person who systematically recorded the importance of the natural environment, the founder of modern nursing Florence Nightingale realized the healing effects of nature and applied them to hospital design in the 19th century (Nightingale, 1859/1989). However, it was after the 1990s that more related theories were put forward. With the development of theory, the design concepts and guiding ideologies of healthcare facilities – one of the architectural forms that need therapeutic effects the most – have been improved constantly (Miller et al., 2002). Meanwhile, the previously declined focus on the importance of incorporating the natural environment in design in the earlier centuries, which was due to the development of medicine, therapeutic technologies, advanced architectural methods, and the concept of "specialist hospitals," has been more reemphasized (Miller et al., 2002; Riva & Cesana, 2013).

Many people have negative feelings associated with healthcare facilities, which are thought of as dehumanizing, frightening, and uncomfortable. Considering the healthcare demands required by the growing aging population of the U.S., incorporating nature's healing effects, which are suggested to benefit patients, especially older adults, is likely to be a continuing trend for healthcare-related design (Cooper Marcus & Sachs, 2014; Kuo, 2015; Miller et al., 2002; Verderber & Fine, 2000).

2.0 From Ancient Healing Settings to Contemporary Design Paradigms

Taking advantage of beneficial environmental conditions when designing medical institutions is not a new topic. Verderber and Fine (2000) identified six periods of the history of health architecture, including the Ancient, the Medieval, the Renaissance, the Nightingale, the Modern Megahospital, and the Virtual Healthscape.

Dating back to when civilization and medicine emerged – organized institutions used as healing places began to exist in the ancient Egyptian, Greek, Middle Eastern, and Eastern cultures, which were always integrated into religious settings such as temples and monasteries (Griffin, 2010; Verderber & Fine, 2000). Although it was believed that curing was from the healing power from the gods, favorable environmental conditions had already benefited the patients, owning to the standard features of the ancient healing places, including sufficient sunlight, hot and cold baths, clean water from healing springs, good air, and special rocks (Cooper Marcus & Barnes, 1999; Griffin, 2010; Miller et al., 2002; Riva & Cesana, 2013; Verderber & Fine, 2000).

During the Medieval period, monastic hospitals, which are regarded as the origins of the modern medical center, began to flourish with the arising of the Catholic Church (Riva & Cesana, 2013; Verderber & Fine, 2000). Because of the prevalence of walls, gardens and yards began to be enclosed with the walls and lines of the hospital buildings (Gerlach-Spriggs et al., 1998). Moreover, documentary records of their healing effects began to appear (Gerlach-Spriggs et al., 1998):

> With this enclosure, many and various trees, prolific with every sort of fruit, make a veritable grove, which lying next to the cells of those who are ill,

> lightens with no little solace the infirmities of the brethren, while it offers to those who are strolling about a spacious walk, and to those overcome with the heat, a sweet place for repose… he is secure, hidden, and shaded from the heat of the day… for the comfort of his pain, all kinds of grass are fragrant in his nostrils. The lovely green of herb and tree nourishes his eyes and, their immense delights hanging and growing before him… (Saint Bernard, quoted in Gerlach-Spriggs et al., 1998, p. 9)

Later, during the Renaissance, hospital design went through a reform period, which was mainly developed in Italy (Riva & Cesana, 2013). The concept of "great hospitals," which takes advantage of combining the charitable systems and more recent hygienic notions into a single big building for healing, was put forward (Riva & Cesana, 2013). The Renaissance humanists and architects also began to suggest the importance of pure air and clear water (Riva & Cesana, 2013). The design of the "Ospedale Maggiore" of Milan, which was founded in 1456 and is one of the most ancient hospitals in Italy, already used innovative sewer systems and considered creating ventilation conditions with the whole construction to prevent the

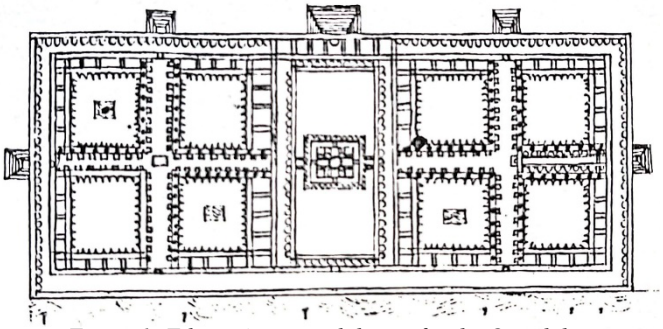


Figure 1: Filarete's original design for the Ospedale Maggior, Milan (1456) (Thompson & Goldin, 1975, p. 31)

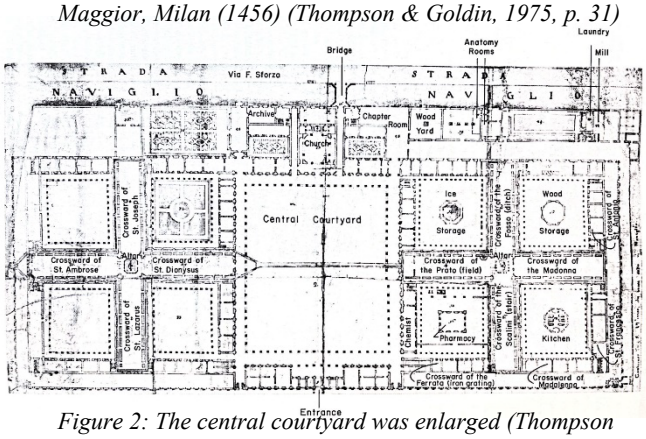


Figure 2: The central courtyard was enlarged (Thompson & Goldin, 1975, p. 32)

spread of infectious diseases among the patients living in different wings of the building (Riva & Mazzoleni, 2012). This design also reflects a positive connection to nature by including a central courtyard (Figure 2), which was greatly enlarged in execution compared with Filarete's original design (Figure 1), and four sub-courtyards in each of the two wings (Riva & Mazzoleni, 2012; Thompson & Goldin, 1975).

However, despite including beneficial physical environments in design, the relationship between the environment and patients' recovery had not been systematically studied until the 19th century when the nurse Florence Nightingale identified five environmental factors essential to health and healing: cleanliness, light, pure air, pure water, and efficient drainage (Nightingale, 1859/1989). Nightingale's theories were first used in hospital design in 1871, at the new St. Thomas Hospital in London, England, whose wards were planned based on her guidelines (Hussain & Babalghith, 2014; Verderber & Fine, 2000). The Hôpital Lariboisière, which incorporated the earlier developed "pavilion hospital" concept – an architectural style that uses corridors to separate open wards – also illustrated Nightingale's model (Gerlach-Spriggs et al., 1998). Despite limitations due to the unadvanced scientific research conditions, Nightingale's Environmental Theory can still be regarded as a pioneering theory, especially considering that some of its arguments echo the more recent theories and evidence. For example, in the sections on Light, Nightingale emphasized the importance of enabling patients to easily look through the window for natural views (Nightingale, 1859/1989):

> …[T]hey should be able, without raising themselves or turning in bed, to see out of window from their beds, to see sky and sun-light at least… at least something very near it… If they can see out of two windows instead of one, so much the better. (p. 70)

Similar opinions can still be found in both Ulrich's Stress Reduction Theory (SRT) and Stephen and Rachel Kaplan's Attention Restoration Theory (ART) (Kaplan & Kaplan, 1989; Ulrich et al., 1991).

In the mid-20th century, although research on the relationship between humans and the natural environment continued, the emphasis on the natural environment in healthcare facility design entered a stagnation period. Because of the progress of medical science and technology and the development of architectural technology, the medical system had become different from Nightingale's time when nature was taken as the priority of patients' recovery – "nature along cure" – while medicine and nursing practice were used to "[assist] nature to remove the obstruction" and to "put the patient in the best condition for nature to act upon him" (Nightingale, 1859/1989, p. 111). Advanced medical practices took over the priority from nature and the improvement of internal environments, including the introduction of mechanical, HVAC, and other electrical components, led to the situation where healthcare facilities became more specialized and focused on indoor therapy (Miller et al., 2002; Peters, 2017). In this process, the use of natural elements declined.

At the end of the 20th century and continuing today, the healthcare industry is experiencing paradigm shifts that will increase its maturity, health, inclusiveness, wholeness, functionality, and participation ability, according to Miller et al. (2002).

Therefore, it is reasonable to speculate that the healing effects of nature will inevitably return to the public's vision in terms of healthcare facility design, which is also suggested by recent research focus and other contemporary design cases (Jiang, 2015; Kellert, 2012; Yao & Chen, 2017).

2.1 Theories and Research

As early as 1865, Frederick Law Olmsted keenly suggested the psychological and physiological benefits humans gain from the natural scenery (Olmsted & Roper, 1952):

> [T]he enjoyment of scenery employs the mind without fatigue and yet exercises it; tranquilizes it and yet enlivens it; thus, through the influence of the mind over the body, gives the effect of refreshing rest and reinvigoration to the whole system. (p. 21)

The link between humans and the natural environment has been further explored in the late 20th century by scholars who proclaimed that the environment not only acts as material and physical support for human beings but also satisfies the more profound needs for humans, including the aesthetic, intellectual, cognitive, and spiritual meaning and satisfaction (Kellert & Wilson, 1993).

General Benefits of Nature

1. Biophilia

Originated by the social psychologist Erich Fromm (1973/1992) in 1973, biophilia was defined as "the passionate love of life and of all that is alive" and "the wish to further growth, whether in a person, a plant, an idea, or a social group"

(p.406). Later, the concept was inherited and popularized by the biologist Edward O. Wilson. In his book *Biophilia* (Wilson, 1984), Wilson interpreted the concept as people's "innate tendency to focus on life and lifelike processes" (p. 1). The biophilia hypothesis also suggests that, instead of being a single instinct that might be lost with the change of human living environment, biophilia is a complex system of learning rules and a biological need that humans have inherited since that period of genus *Homo* and will pass by generations even if a generation is removed from the natural environment (Kellert & Wilson, 1993; Wilson, 1984). In this case, although biophilia is a "weak" tendency that can be varied and influenced by human choice and free will, meeting biophilic needs potentially benefits human health, productivity, and wellbeing (Kellert et al., 2011).

To test the positive impacts of outdoor experiences, Kellert (1998) worked with the Student Conservation Association (SCA) to conduct a large-scale experiment with 429 participants in broad age groups. The experiment suggested various benefits the participants experienced by being exposed to outdoor wilderness, including outdoor skill improvement, increased interest in relevant disciplines, and an increase in self-confidence, self-esteem, independence, autonomy, and initiative (Kellert, 1998). Kellert et al. (2011) integrated other theories and concluded that contact with nature could enhance healing and recovery, help with childhood maturation and development, reduce health and social problems, improve worker's performance, reduce stress, increase motivation, and restore cognition. Based on the theories and conclusion, the concept of biophilic design was also proposed, which consists of an organic (or naturalistic) dimension and a place-based (or vernacular) dimension,

translating the biophilia hypothesis into design of the built environment (Kellert et al., 2011).

At about the same period as the biophilia hypothesis was put forward, two dominant theories stating the positive influences of nature on human beings were raised after years of theoretical and experimental accumulation – the Kaplans' ART and Ulrich's SRT (Kaplan & Kaplan, 1989; Ulrich et al., 1991).

2. Attention Restoration Theory (ART)

Philosopher, historian, and psychologist Williams James divided "attention" into several different components in his book *Psychology: Briefer Course* (James, 1892/1984). One of the ways is either "[p]assive, reflex, involuntary, effortless" or "[a]ctive and voluntary" (p. 195). Involuntary attention, which was later substituted by the Kaplans with the term 'fascination' to avoid confusion, does not require effort and is tied to stimuli with particular characteristics; voluntary attention, which was later adopted as directed attention, requires effort and can only last for a few seconds per time (James, 1892/1984; Kaplan & Kaplan, 1989; Kaplan, 1995a).

On the basis of James' (1892/1984) perceptive analysis of attentional processes, Rachel Kaplan and Stephen Kaplan (1989) jointly put forward Attention Restoration Theory (ART), which emphasizes the significance of directed attention, expounds on the reason and costs of directed attention

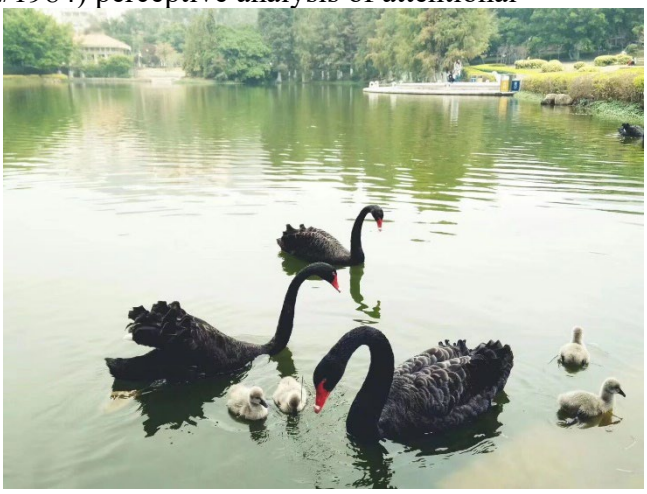


Figure 3: Swans in the Lake of Xiamen University (Ren)

fatigue, and elaborates on the components of a restorative environment. These components include (a) (soft) fascination (Figure 3), which is the central component of a restorative experience; (b) being away, which provides the opportunity for one to stay away from directed-attention-required mental activities; (c) extent, which means that the environment needs to be rich in content and sufficient in scope for one to engage and experience (Figure 4); and (d) compatibility, which meets one's purposes and inclinations (Kaplan & Kaplan, 1989; Kaplan, 1995a, 1995b). ART suggests that exposure to nature, which tends to contain all four components, not only helps to restore directed attention but also has other functions, including clearing the cognitive leftovers, quieting "internal noise" (p. 197), and, if it reaches the required environment's quality and the duration, improving one's reflections on life (Kaplan & Kaplan, 1989).

Figure 4: Morning at Lake Artemesia (Ren)

A meta-analysis of the experiments of Search and Memory Task (SMT) in Ohly et al.'s (2016) review indicated some results contrary to ART. For example, the participants got significantly higher attention scores after exposure to non-nature settings than natural settings (Ohly et al., 2016). A followed systematic review conducted by Stevenson et al. (2018) clarified some of the remaining questions, such as which cognitive processes may be improved by exposure to nature, including working memory, cognitive flexibility, and possibly, attentional control. However,

the quantity of the attention restoration of each aspect was still uncertain (Stevenson et al., 2018). It was also pointed out that ART research had no adequately tested its main predictions and the definitions and manipulations of nature were tremendously various in the study, making it doubtable whether the restorative effects are from nature itself or other causes (Dillman-Hasso, 2020; Joye & Dewitte, 2018). Ulrich et al. (1991) asserted that ART is inadequate to explain nature's restorative effects and proposed Stress Reduction Theory (SRT).

3. Stress Reduction Theory (SRT)

Unlike ART, which advocates the restorative effects of more extreme or unusual environmental conditions such as fascination, the theory proposed by Roger Ulrich focuses on the daily, non-extreme physical environment. Based on a great deal of studies, Ulrich proposed Stress Reduction Theory (SRT), suggesting that compared with the urban environment, exposure to unthreatening natural environments would foster faster and more complete recuperation from stress (Ulrich, 1979; Ulrich et al., 1991). The exposure would also lead to positive effects that are central to the psychological component of restoration, including a reduction in levels of negatively toned feelings such as fear or anger, and elevated positively toned emotions such as affection, friendliness, playfulness, and elation (Ulrich, 1979; Ulrich et al., 1991; Zuckerman, 1977). The 'psycho-evolutionary' framework SRT is derived from embraces a broad range of emotional and physiological arousal responses (Ulrich et al., 1991). SRT also addresses and includes the recovery from understimulation or excessively low arousal (Ulrich, 1981; Ulrich, 1983). This in particular is important in environments for the elderly, who often suffer from loneliness and boredom.

Ulrich's supporting studies contained four physiological response indicators: muscle tension, pulse transit time, spontaneous skin conductance response, and heart period (Ulrich et al., 1991). The findings of the studies suggested that the influences may widely affect the body, and the restorative impacts are speculated to lead to behavior improvements or functioning enhancement as well (Ulrich et al., 1991). Mary Krehbiel Honeyman's (1987) study, which included a third group of urban scenes with vegetation in addition to the groups of the vegetated countryside and unvegetated urban, further supported the restorative effects of natural elements. In the study, urban scenes with vegetation turned out to produce more significant restorative effects than those without vegetation (Honeyman, 1987).

SRT has been supported by various research and experiments but still lacks empirical studies to explain how stress is reduced by nature (Dijkstra et al., 2008). Accordingly, Dijkstra et al.'s (2008) study focused on exploring the relationship between the attractiveness of the indoor environment brought by plants and the stress-reducing effects. The positive relationship found in the study, on the one hand, contributed to the explanation of the mechanism, but on the other hand, may lead to the question about whether any elements with high levels of attractiveness can reduce stress and, therefore, deny the particularity of the natural environment and factors (Dijkstra et al., 2008). The problem of whether nature is restorative itself has been tested recently by Scopelliti et al. (2019), from a perspective of comparing nature with artistic and historical settings. As the first empirical evidence, despite the possible bias caused by the selection of participants, the study supported the idea that nature itself is restorative (Scopelliti et al., 2019). The study also suggested new

directions of restorative environment study: the restorative potential of enjoyable historical settings (Scopelliti et al., 2019).

Moreover, Egner et al. (2020) argued in their newly published essay, where they put forward the Conditioned Restoration Theory (CRT), that the psycho-evolutionary theory might be inadequate as an explanation as some restorative features could be related to threatening contexts, e.g., water, an element proved to have restorative properties, could also attract predators, which requires people's high alert when near water.

The positive impacts of unthreatening natural environments on human wellbeing have almost become a consensus. However, the mechanisms behind it are still not clear enough. Thus, the existing gap in mechanisms and theories still needs great effort to fill. Undoubtedly, the process of exploration will gradually enrich the theory and lead to new ideas and directions.

4. Other Theories

In addition to the prementioned evolutionary perspectives, many other theories have also been posited to explain nature's recuperative power. Ulrich et al. (1991) mentioned the Arousal Theory and the Overload perspectives. The former theory suggests that settings with lower levels of arousal, i.e., in this case, natural settings compared to the urban environment, should lead to more rapid recuperation; while the latter implies that environments with high levels of stimulation place taxing processing demands which impede the stress restoration processes (Ulrich et al., 1991). More recently, the Perceptual Fluency Account (PFA) has posited and attributes nature's restoration to the evolutionary consequence that unthreatening

natural scenes can be more efficiently visually processed than threatening urban views (Joye & Van den Berg, 2011).

Another theory explaining nature's healing effects is the concept of Shinrin-Yoki, translated from the Japanese as 'forest bathing,' which suggests that being in the forest atmosphere (Figure 5) helps with countering illness, e.g., fighting cancer by increasing the activity of natural killer (NK) cells – a type of cytotoxic lymphocyte critical to the innate immune system (Li et al., 2007).

Figure 5: Rock Creek Regional Park (Ren)

5. Practical Significance

Although the emphasis of different theories varies and the mechanisms proposed may not yet be precise enough, the positive influences of unthreatening natural environments are well documented. In addition, it is often suggested that the exposure methods are not only limited to direct interactions with nature (being physically in nature), but also include viewing natural elements and even pictures of nature (Kaplan & Kaplan, 1989; Nightingale, 1859/1989; Ulrich, 1979). Combined with the improved recovery time that could be achieved with nature supported by Ulrich's studies, it is reasonable to suggest that nature's healing effects can play an essential role under the rapid urbanization condition of the 21st century. This may be especially the case in healthcare facilities, where patients (as well as visitors and care

providers) are more likely to experience emotional duress, need therapies, and might be separated from the natural environments or only have little interaction opportunities due to various reasons (Ulrich et al., 1991; Verderber & Fine, 2000).

Heal the Patients

The trend of applying nature's healing effects to healthcare has been recognized by researchers and reflected by many contemporary research and studies (Cooper Marcus & Sachs, 2014). Before proposing SRT, Ulrich (1984) had already begun to record nature's restorative influences. By comparing recovery after cholecystectomy (gall bladder surgery) of patients who could view a nature scene through a bedside window and those who could only view a brick wall, he found that patients with the nature view had shorter hospital stays, experienced fewer adverse postoperative reactions, received more positive evaluative written comments from staff, and demanded fewer potent pain relievers (Ulrich, 1984). Ulrich (1999) also thoroughly demonstrated that stress, which is a major and vital health-related problem, experienced by hospital patients, could be reduced through nature and gardens. In his Theory of Supportive Garden Design, Ulrich laid out four key stress-coping resources of gardens: sense of control and access to privacy, social support, physical movement and exercise, and positive natural distractions (Ulrich, 1999).

More recently, Ming Kuo (2015) identified 21 plausible causal pathways from nature to health through interacting with nature (Figure 6). Kuo focused more on specific diseases or disorders such as depression, anxiety disorder, and respiratory disease than general benefits for healthy individuals. A longitudinal single study

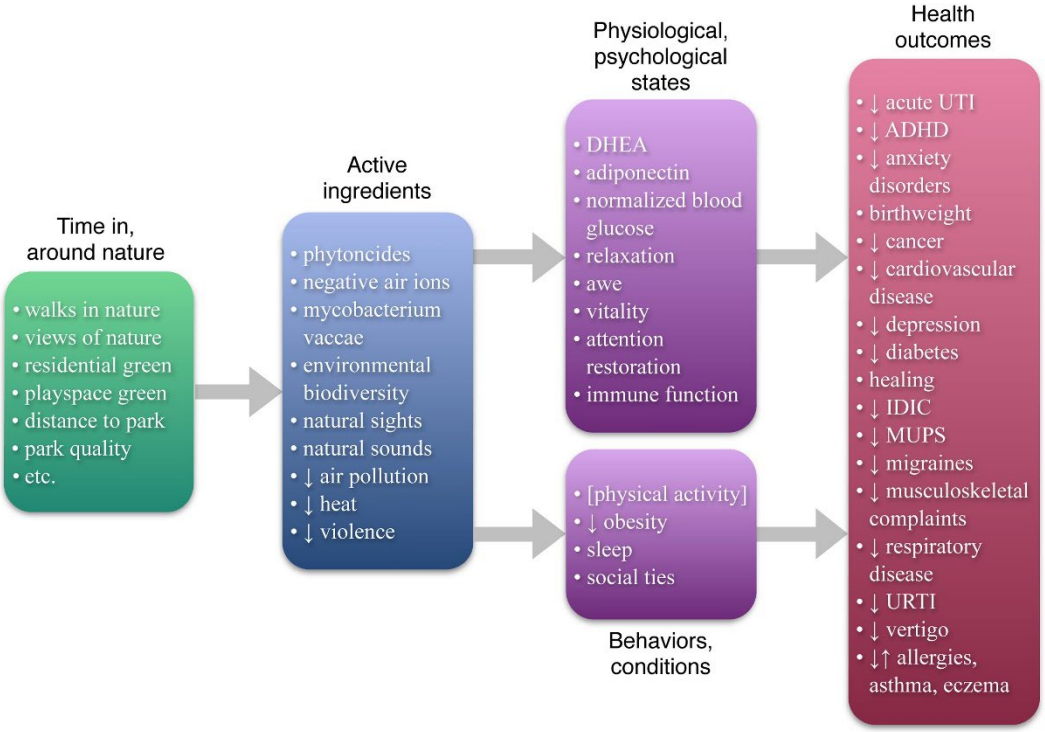


Figure 6: The Nature-Health Link (Kuo, 2015)

conducted by Pálsdóttir et al. (2014) at the Alnarp Rehabilitation Garden in Sweden also addressed nature's rehabilitation ability. The study described the "non-verbal communication with nature" as "not only to be source of restoration but also to have reconciled complex mental processes during the [nature-based rehabilitation (NBR)]" (p. 7110). Then, an experimental study to test Ulrich's theory of supportive design was published in 2015. It focused on the hospital environment, and the findings suggested that the exposure to the elements that foster perceptions of control, social

support, and positive distraction could significantly reduce participants' stress levels (Andrade & Devlin, 2015).

Heal the Seniors

Compared to younger patients, seniors tend to be frailer and experience more aging-related physical and psychosocial health problems such as loss of balance, lower bone density, difficulty sleeping, and depression (Cooper Marcus & Sachs, 2014). Clare Cooper Marcus and Naomi Sachs (2014) suggested in their book that exercising in nature helps to alleviate all the issues mentioned above. In addition to physical abilities, seniors are more likely to experience challenging situations such as loss of friends and family members, employment, and familiar surroundings, which can also lead to their anxiety and depression (Cooper Marcus & Sachs, 2014). The natural environment can help with buffering experiences of boredom, reducing the feeling of helplessness, and decreasing loneliness by contributing to social support, and therefore, significantly benefit aging populations (Cooper Marcus & Sachs, 2014).

More evidence supports the benefits for seniors brought by nature. A review by Carver et al. (2018) concluded that, exposure to nature in residential aged care facilities presented the potential to improve mental health. Research done by Rodiek (2002) indicated a decreased anxiety level in elderly populations after exposure to garden conditions. A Swedish study conducted recently also suggested that frequent visitations to garden greenery at residential facilities may lead to better self-perceived health by promoting older residents' experience of 'being away' and 'fascination,' the two components of restorative environments of ART (Dahlkvist et al., 2016; Kaplan

& Kaplan, 1989). For many older people living in residential healthcare facilities (e.g., assisted living, nursing homes) whose issue is under-stimulation instead of acute stress reduction, it can be enjoyable to experience nature (Dahlkvist et al., 2016; Ulrich, 1981; Ulrich, 1983).

In addition, as for the much more sever cognitive fatigue experienced by older adults, merely viewing nature pictures was found to restore cognitive abilities by improving executive attention (Ennis et al., 2013; Gamble et al., 2014). For people with dementia, whose prevalence increases with age, multiple research studies have suggested that interventions with nature and natural elements could help satisfy patients' psychological needs, improve their physical, social, psychological and mental status, and significantly reduce their disruptive behaviors (Collins et al., 2020; Gonzalez & Kirkevold, 2014; Launer et al., 1999; Uwajeh et al., 2019).

2.2 Therapeutic Garden and Design-Related Theories

Considering the functions and scales of healthcare facilities, incorporating therapeutic gardens into the design can be an efficient way for patients, especially seniors, to embrace nature and reap its health-promoting rewards.

Therapeutic Garden Concept and Three Schools

Different scholars have defined the concept 'healing garden.' In the book *Healing Gardens: Therapeutic Benefits and Design Recommendations*, healing/therapeutic gardens was defined as the "green outdoor space within a healthcare setting that is designed for use" to promote the well-being of users by relieving their symptoms or decreasing their awareness of the symptoms, reducing

stress, increasing comfort, and/or improving their "overall sense of wellbeing and hopefulness" (Cooper Marcus & Barnes, 1999, p. 3-4). According to the American Horticultural Therapy Association, "A therapeutic garden is a plant-dominated environment purposefully designed to facilitate interaction with the healing elements of nature. Interactions can be passive or active depending on the garden design and users' needs" (*About Therapeutic Gardens*, n.d.)

The definitions above reflect that the "garden" is not a narrow concept but a broader notion that provides designers with a wider range of possibilities and requires of designers' more comprehensive thinking and design ability. Some other definitions tend to be narrower and include more detailed classifications. For example, in a review of therapeutic gardens in healthcare settings, gardens used in hospitals were classified into therapeutic garden, which adopts both horticultural and non-horticultural activities and focuses on ameliorating diseases rather than curing in spiritual context; 'horticultural therapy gardens,' which rely on horticultural activities for healing effects; and 'restorative/meditation gardens', which emphasize nature's restorative value to reduce users' stress and promote their physical and mental energy (Thaneshwari et al., 2018). In my design, I adopted the broader concept of therapeutic garden to ensure that the users' needs could be met as much as possible.

Ulrika K. Stigsdotter and Patrick Grahn (2002) summarized three theories of research disciplines on the healing effects of gardens including the Healing Garden School, where healing effects are derived from experiencing the natural environment; the Horticultural Therapy School, where the effects are mainly derived from the

activities in the natural environment; and the Cognitive School, where the user's background and character also play a role in the healing process.

The Healing Garden School can be subdivided into three theories. The first two theories are related to Ulrich's SRT, James' attention processes, and the Kaplans' ART, while the third theory raises another explanation of the health effects (Stigsdotter & Grahn, 2002). The third theory asserts that gardens and nature tend to demand less of an individual than people do and, therefore, provide more healing effects (Stigsdotter & Grahn, 2002). The theory also suggests that design choices can help build different level of demands, e.g., animals and plants demand more than rocks and water (Stigsdotter & Grahn, 2002). Compared with the relatively passive interactions of the Healing Garden School, the Horticultural Therapy School highlights the essential roles played by participatory activities in nature, which are claimed to be "self-rewarding flow-experiences" that are pleasurable and healthful in themselves (Csikszentmihalyi, 1990; Stigsdotter & Grahn, 2002, p. 63).

By demonstrating these theories, Stigsdotter & Grahn (2002) encouraged designers to understand users' needs and achieve a balance between passive and active experiences. They further introduced the mental power pyramid of visitors that influences their needs, experiences, and involvement patterns, which will be included in the following section (Stigsdotter & Grahn, 2002).

Significant Design Factors

Understanding users' needs is the prerequisite of a successful design, particularly for seniors who may often have different physical (as well as emotional

or cognitive) needs than younger users. To achieve the goal of “design for all,” there are many crucial considerations, as put forward by Stigsdotter & Grahn (2002).

1. Mental Power Pyramid

To accommodate the demands of different users, both mental and physical characteristics are important. Stigsdotter & Grahn (2002) provided a useful model, modified from Grahn's model (1991), (Figure 7) to understand the users' mental status. They suggested that the level of absorption from the environment and the mental power strength determines a person’s experience of nature (Stigsdotter & Grahn, 2002). They used a pyramid model to illustrate the four levels of involvement, including directed inwards involvement, emotional participation, active participation, and outgoing involvement (Stigsdotter & Grahn, 2002).

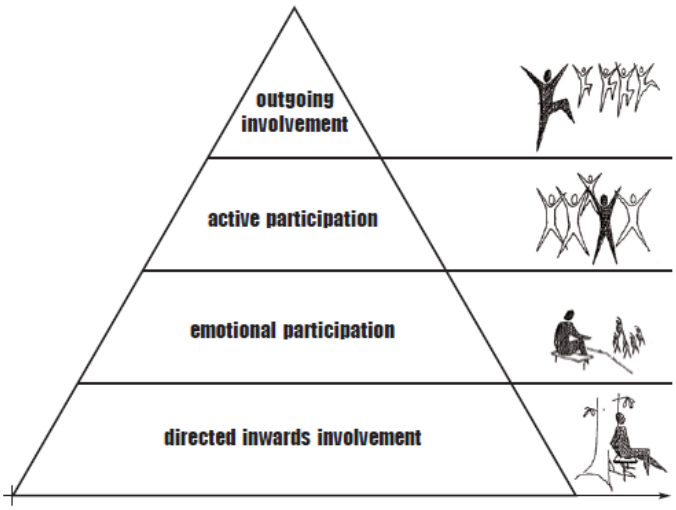


Figure 7: Type of involvement depending on the individual’s mental power. Modification of Grahn’s model (1991). (Stigsdotter & Grahn, 2002)

The directed inwards involvement level is on the bottom, where the individual’s mental power is weakest and their need for environments with few demands is the greatest (Stigsdotter & Grahn, 2002). The individual prefers private activities, dislikes new experiences, wishes not to be disturbed, and is not likely to interact with others (Stigsdotter & Grahn, 2002).

The second level up is emotional participation, where the individual has greater mental power than the bottom level and can be involved more in conversation (Stigsdotter & Grahn, 2002). Although they become more interested in their social surroundings and begin to observe people, their mental strength is still too low for them to actively participate in the surrounding activities (Stigsdotter & Grahn, 2002).

Individuals in the active participation and outgoing involvement levels can take part in group activities(Stigsdotter & Grahn, 2002). Still, the active participants have lower mental power, making them unable to be in charge and complete their activities without other people's help, like the outgoing participants who are mentally strongest (Stigsdotter & Grahn, 2002). However, they can already give, share, and be creative (Stigsdotter & Grahn, 2002).

To satisfy the users with different levels of mental power, a successful healing garden design should provide everyone with various opportunities to stay private, semi-private, or actively interact with others.

2. Accessibility and Safety

In addition to mental characteristics, users' physical needs should be met by design to maximize the useability of healing gardens. One of the most important design factors appearing frequently in literature is accessibility (Cooper Marcus, 2007; Cooper Marcus & Barnes, 1999; Dahlkvist et al., 2016; Duzenli et al., 2017; Pasha et al., 2010). According to a study aimed to better understand the preferred environmental features of assisted living residents, well-designed paths and indoor-outdoor transitions were two of the main features that encourage outdoor usage because they lead to higher accessibility (Rodiek & Fried, 2005). Dahlkvist et al.'s

(2016) study suggested that multiple barriers that reduce the accessibility of the outdoors, may reduce older residents' health benefits from the gardens by hindering their visitation and experiences of 'being away.'

Another factor closely related to accessibility is safety, which can never be overemphasized, particularly for the elderly. A study published in 2010 identified falls, which are a common cause of injury in the elderly, as an economic burden to society (Heinrich et al., 2010). A well-designed environment is not only easy to access but is also as safe as possible.

To enhance accessibility and safety, various methods can be employed, including but not limited to ensuring the quality, safety, and width of paths (Figure 8); using automatic doors and smooth thresholds; and making it easier for staff to supervise people who are using the outdoor spaces (Cooper Marcus, 2007). Yet, it is worth noting that sometimes beneficial desirable challenges for wheelchair users can be acceptable (Worden & Moore, 2004). In addition, designs can create opportunities for older people to gain independence and autonomy (Cooper Marcus & Sachs, 2014). For example, installing raised planting beds makes it possible for users to interact with plants even if they use a wheelchair or lose the ability to lower their bodies (Worden & Moore, 2004).

Figure 8: Garden at a facility for Alzheimer's patients in Victoria, BC, Canada. Designed by Deborah LeFrank / image: Clare Cooper Marcus (https://thefield.asla.org/) Railings make the place safer.

Small adjustments such as improving handles and thresholds, paving, and seating, as well as shading measures (Figure 9) can also make the space safer and more accessible (Rodiek, 2009).

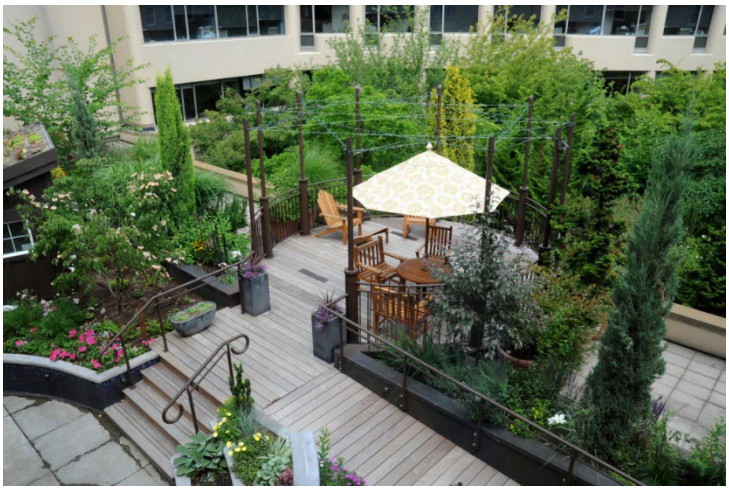


Figure 9: Terrace Garden at Legacy Emanuel Medical Center (https://naturesacred.org/)

3. Visibility and Awareness

Another important factor is visibility, which benefits both patients and caregivers by promoting users' awareness of the garden's existence, helping with wayfinding, and providing caregivers with supervision opportunities (Cooper Marcus, 2007; Pasha et al., 2010). Preferred features selected by participants, including 'views' and 'windows,' in Rodiek and Fried's (2005) study supported this perspective. The increase of visibility also helps with enhancing accessibility and safety. According to Rodiek (2009), with guaranteed visual surveillance, staff members could better care for residents who were using the outdoor space.

Awareness, knowledge of the garden's existence, is also related to visibility and plays a vital role in design. According to the findings of a study in a children's hospital done by Whitehouse et al. (2001), one of the major barriers of garden visitation was the lack of knowledge of the garden: 80% of patients and 48% of families did not know about the healing garden, while 54% of the family members only knew about the garden coincidently.

To improve visibility and awareness, researchers and scholars realized the significance of the location of the outdoor space. An entry garden or a garden located at a spot that can be seen easily is suggested by both Cooper Marcus (2007) and Rodiek (2009). Rodiek (2009) emphasized the importance of making the outdoor space relate to the layout of the building. For example, transition zones and interfaces between indoors and outdoors can be good ways to increase visibility, attract residents to the outside, and provide visual surveillance (Rodiek, 2009). Sometimes, merely improving visibility is not enough, because not knowing the function of the space may also create patients' 'invisibility' and 'unawareness.' In this case, introducing the space to the patients or residents and encouraging them to use it can be helpful (Pasha et al., 2010). At the same time, it is also essential to find the balance between providing enough visibility to the garden and causing potential privacy issues that go against the recommendation of SRT (Ulrich, 1999).

4. Familiarity

Familiarity significantly helps to improve users' experience. Cooper Marcus (2007) emphasized the benefits of including elements familiar to patients or residents culturally, spatially, or sensually. These elements can be stress-reducing and soothing, especially for patients with Alzheimer's disease and other forms of dementia (Cooper Marcus, 2007). A study conducted by Haq and Zimring (2003) showed an increasing comprehensible spatial experience when connectivity and integration – two factors for people to explore an unfamiliar setting and further use a familiar setting, respectively – were highly correlated, indicating that a well-designed environment encourages users to explore the space more efficiently, thoroughly, and beneficially.

This study can be linked with “coherence” and “legibility” emphisezed by Kaplan (1987), which are two aesthetic variables preferred by users for that they help with understanding the environment.

Other beneficial design factors suggested by scholars and researchers include quietness, comfort, sociality, territoriality, stability, and livability (Cooper Marcus, 2007; Rodiek & Fried, 2005; Yoo, 2016). It is worth noting that the quietness here does not mean no sounds at all. It emphasizes the distinctions between the soundscapes of designed environments and nature: pleasant natural sounds, such as birds, wind, and water, can be encouraged; while mechanical sounds should be minimized as much as possible (Cooper Marcus, 2007; Cooper Marcus & Barnes, 1995).

2.3 Sensory Design Principles for Older Adults

In addition to the design factors mentioned in the section above, sensory experiences should also be carefully created in the design process. Opportunities to perceive and respond to sensory variability, especially when well-structured and organized, can be satisfying and beneficial to human well-being (Kellert et al., 2011). According to the under-stimulation condition experienced by many seniors in healthcare facilities, gardens can be designed for users to experience the environment through one or more of the five senses (sight, hearing, taste, smell, and touch) (Asmervik, 2014; Gonzalez & Kirkevold, 2014). Considering the fact that older adults are more likely to experience gradual changes in visual, hearing, odor, flavor, touch, and temperature perceptions, design principles need to accommodate these conditions (Farage et al., 2012).

Visual Perception

As a perception conducting about 90% of daily information, visual perception is crucial in the sensory garden design process (Asmervik, 2014). Generally, visual stimuli can be provided by creating contrasts of color, visual texture, form, movement, and light and shadow (Gonzalez & Kirkevold, 2014).

Some common features of loss of visual function shared by older adults are cataracts and presbyopia, increasing sensitivity to glare, slower adaptation to changes in light and other changing visual stimuli, difficulty of distinguishing surfaces or objects, and diminishments in color perception (Figure 10). Thus, some designs used

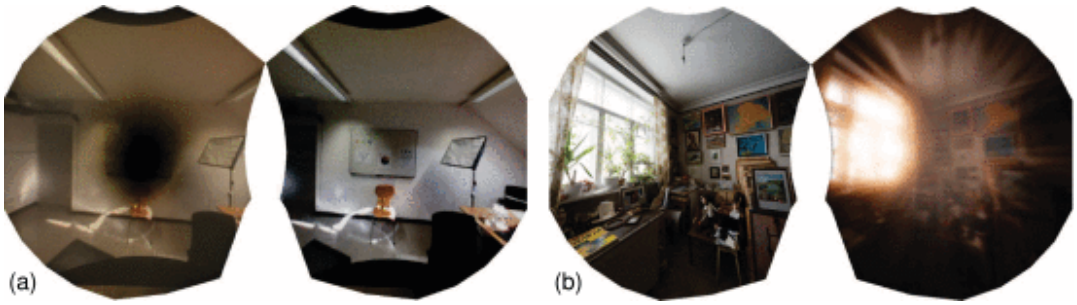


Figure 10: Simulation of cataract vision in eye-tracked stereoscopic head-worn display. (ieeexplore.ieee.org) Left eye of (a) and right eye of (b) are uncorrected.

commonly for visual stimulation should be avoided, such as the use of mirrors or glossy surfaces (Farage et al., 2012). Instead, materials with lower light intensity such as matte surfaces can be better choices (Farage et al., 2012).

Color is one of the most important elements that comprise vision (Figure 11). Different colors have different influences on psychological and physiological processes (Amber, 1980; Elliot & Maier, 2012). As early as 1980, it was suggested that colors can help with relieving different diseases: arthritis can be treated by a

combination of blue, green, and orange; migraines can be alleviated with a combination of green and yellow; and coughs can be treated by blue (Amber, 1980). Color also carries meaning related to contexts and cultures, e.g., red carries negative meaning in achievement contexts but positive meanings in affiliation contexts, according to experiments conducted among U.S. undergraduates (Elliot & Maier, 2012). Besides the general design principles of color choices, the elderly may have additional needs. For example, warm or hot colors, which have longer-wavelength, are better seen, while cool and pastel colors with short-wavelengths need to be used carefully because they are perceived as dull or gray (Cooper Marcus & Sachs, 2014; Farage et al., 2012).

Figure 11: Red Maple (Ren) The color of red maple makes the campus more vibrant.

When it comes to design form, rather than creating fragmented visual presentations, designs with simplicity, where information is "large, conspicuous, uncrowded, and in the central visual field," tends to be enjoyed more by older adults (Farage et al., 2012, p. 4). A good application of this concept can be the design of a shade structure. Creating uniform shadow is better than angular, broken up, or contorted ones, which can be perceived as threatening (Rodiek, 2009).

Hearing Perception

As one of the senses conducting 11% of daily information, audition plays a major role in how people perceive the environment, which leads to either positive or

unpleasant experiences based on the qualities of the sounds (Asmervik, 2014; Yin & Wang, 2019).

Common design features to create positive sounds (and mask negative sounds) include plants, animals, and accessories (water feature, chimes, and so forth). Plants can generate sounds when the wind rushes through leaves or when they are jostled by other external forces, e.g., crushed under feet (Worden & Moore, 2004). The types of animals that are most introduced in landscape architecture for pleasing sounds are songbirds. Insects, amphibians, and mammals can also become the sound sources in landscapes, which are either preferred by humans or may be perceived (negatively) as noises, such as cicadas' calls. By creating a livable environment, landscape architects attract desired creatures to a space and avoid the undesired ones. Plants and flowers for attracting songbirds produce edible seeds and fruit, possible nest-building materials, and suitable nesting spaces (National Geographic, 2017).

Audition (hearing) is also crucial in interpersonal communication. The significant loss of ability to perceive conversational speech by age 60 partly explains the sociopsychological issues of loneliness and boredom experienced by older adults (Farage et al., 2012; Schifferstein, 2006). With the development of presbycusis, aging populations are less able to perceive pure tones, handle sounds with low density and high pitch, and discriminate speech when there is background noise (Farage et al., 2012). Therefore, when using common design features to improve auditory experiences, high frequencies and pitches should be avoided to prevent discomfort (Farage et al., 2012; Gonzalez & Kirkevold, 2014).

Odor and Flavor Perceptions

Figure 12: A Courtyard in the University of Maryland (Ren) Plants, furniture, soils smell differently in the rain.

Smell and taste are closely linked; they play a complementary role to each other (Osei, 2014). It is suggested that smell works much more effectively than vision in memory and recall (Bowring, 2006). Through the olfactory system, people can tell the source of the smell and the state of the source (Figure 12), such as identification, humidity, temperature, and freshness, of the origin of the smell, and therefore, gain more invisible information. Thus, the sense of smell, which is deeply emotionally associated, is an important addition in design when the users are visually or auditorily impaired (Gonzalez & Kirkevold, 2014).

Compared to taste, which may not be influenced much by age, smell decreases dramatically in older adults (Ship, 1999). In this case, the principle of creating smell sense should focus on strengthening, such as plants with stronger fragrance (Farage et al., 2012). To enrich the sensory experience, edible fruits, herbs, and spices can be considered to stimulate the flavor perception. Compared to salt and bitter tastes, sweet and sour tastes were found to be better identified by older adults, with sweetness being recognized the most accurately (Winkler et al., 1999).

Touch and Temperature Perceptions

Another alternative or addition for users who are visually or auditory impaired is touch. Similar to the prementioned issues of mobility and balance, the sensitivity of touch, pressure, and vibration also declines with age (Farage et al., 2012). Older adults tend to have a lower tolerance to cold (Farage et al., 2012). Thus, when using features to encourage the sense of touch such as plants that offer interesting textures, more textured features than smooth ones are preferred (Farage et al., 2012). Sharp edges should be avoided to prevent harm (Rodiek, 2009).

When choosing furniture, the height, structure, and texture need to be analyzed to accommodate the ergonomics of the elderly. For example, as muscle strength and balance decline, high-positioned furniture may cause difficulties for seniors to reach and to balance their center of gravity (Farage et al., 2012). Seats with backs and arms enable users to sit comfortably and safely lower themselves down and raise themselves back up again (Cooper Marcus & Sachs, 2014). In addition, materials, which play an essential role in heat conduction, should be selected carefully to avoid being too hot or too cold. Accessories such as fans and heaters can be introduced for temperature control (Rodiek, 2009).

2.4 Gap Between Theory and Practice

In addition to the prementioned gap between theory and mechanism, another gap exists between theory and practice. With the accumulated theories and the advent of the Patient-Centered Care movement, hospital designs of the early 1990s began to experience a transformation (Cooper Marcus, 2007; Miller et al., 2002). In most western countries from approximately 1950 to 1990, nature's healing effects were

underestimated and design was purely for efficiency (Miller et al., 2002). After the transformation, designers began to consider the environmental impacts of patients' needs and preferences (Cooper Marcus, 2007; Miller et al., 2002).

Despite the trend in patient-centered care and increased access to nature, much healthcare facility design still often fails to make good use of the natural environment, wasting a therapeutic opportunity, which reflects the gap between theory and practice (Jiang, 2015). Contemporary healthcare facility design needs to address three main problems. The first problem is the lack of awareness that leads to the separation between patients and residents and the natural environment in the first place (Jiang, 2015; Verderber & Fine, 2000). The second is the deficiencies in designs that impede users from fully benefiting from natural environments (Dahlkvist et al., 2016; Duzenli et al., 2017; Pasha et al., 2010). When the outdoor space is poorly designed, it tends to be underutilized (Rodiek, 2009). Last but not least, maintenance requirements may lead to extra financial pressure on healthcare facilities, which tends to be an important reason preventing facilities from incorporating a healing garden in the design or encouraging patients to use it (Pasha et al., 2010; Whitehouse et al., 2001).

In my thesis research, the literature was used as both guidance and motivation. My intention is to contribute to filling the current gap between theory and practice and with the design of my chosen site, the Villa Rosa Nursing and Rehabilitation Center.

Chapter 3: Methods

3.0 Site Selection

I sought a site that I could visit in person to establish a connection and conduct more detailed research, including physical, biological, and cultural site inventory using the method provided by James LaGro (2008) as well as other sensory observations. I explored different healthcare facilities close to College Park, MD and narrowed my selection down to two sites. Ultimately, I chose the Villa Rosa Nursing and Rehabilitation Center. In this section, I will discuss why I chose the site and describe in detail each factor in the following sections. In my site inventory and analysis, I will include my findings of a broader context based on LaGro's Site Inventory and Analysis methods but will focus more on the specific information about the site itself, which influences the design process more.

Located in Mitchellville, Maryland (Figure 13), Villa Rosa Nursing and Rehabilitation Center is an excellent location to practice incorporating nature's healing effects in designing an outdoor space for the elderly. The Center's outdoor space is currently underutilized because of design and maintenance challenges, limiting the accessibility of its

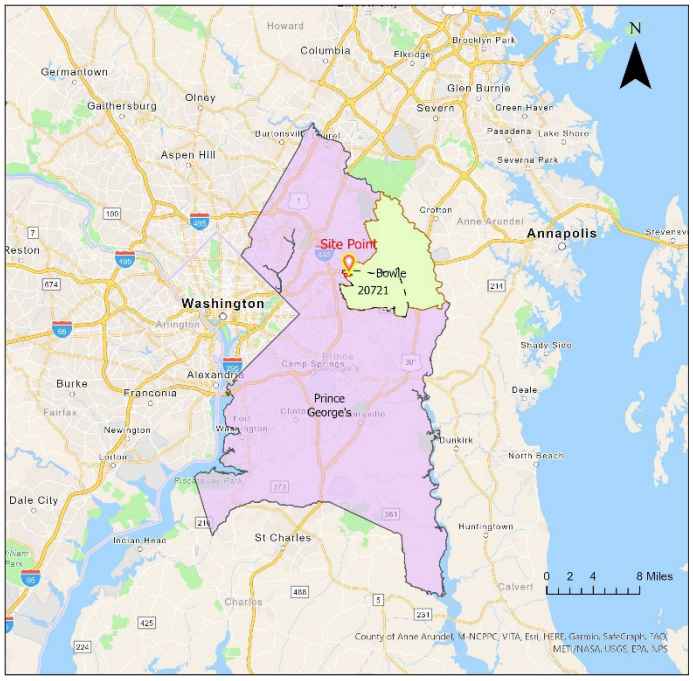


Figure 13: Location of the Site (Ren)

users, mainly the residents and staff members, most of whom are older adults. Fortunately, the natural resources of the larger site bring possibilities for its improvement. The design challenges, the user groups, and the abundant potentials constitute the three primary reasons for the site selection.

Reason 1 – Design Challenges

1. The Back Courtyard: An Underutilized Space

As a construction from the last century (1966), the building (Figure 14) was designed to have a central node, which functions as the front desk today, with six radiating wings connected to it. Outdoor spaces between the wings are mainly open spaces, scattered with one or two trees in each area. Two designed outdoor spaces are to the south and east sides of the building. Enclosed by fences, the courtyard (Figure 15) on the south side of the building, between the wing of the church and a branch of residents' rooms, was designed to be used by residents.

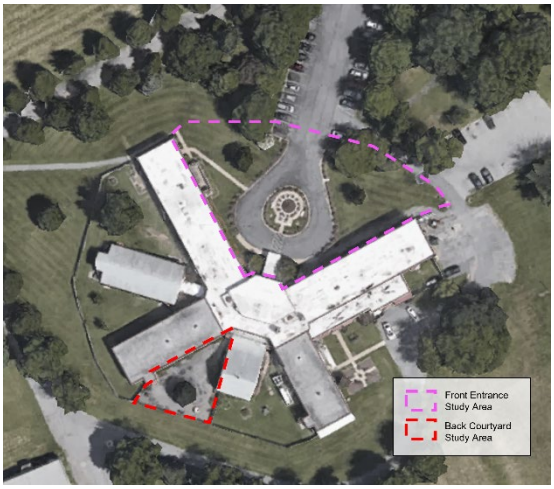


Figure 14: Top View of the Center (Modified from Google Earth)

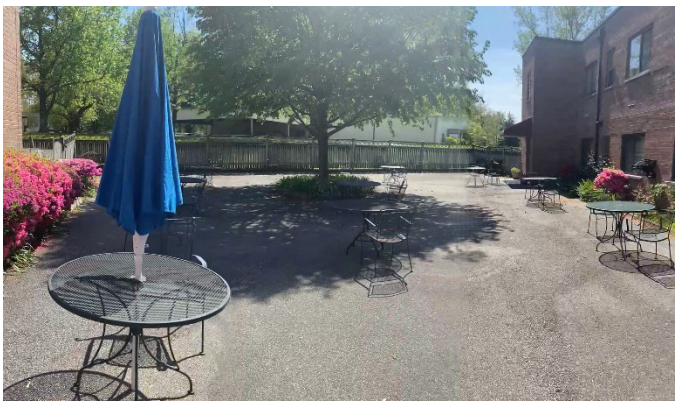


Figure 15: The courtyard in summer (Ren)

According to the administrator of the Center, Mr. Barry Grofic, much of the courtyard vegetation was chosen, and even planted, by the priest Fr. Anthony. The courtyard was

maintained by the nuns of the Missionary Sisters of Saint Charles until they left about two years ago.

Despite its large area (3777 sq ft) and the beautiful linden tree in the middle, the following reasons make the courtyard an underutilized space. Firstly, 90% of the courtyard is paved by asphalt. Due to disrepair and neglect, cracks and bumps (Figure 16) make the ground surface unsafe for older adults to navigate, especially those with wheelchairs, scooters, or walkers. The deficiency in stormwater management design, where roof runoff collects and pools, further worsens the status of the paved area. Secondly, although the existing plant species are abundant, many of them are poisonous and/or invasive, reducing the opportunity for the residents to interact with them and increasing potential danger. The surrounding trees that produce achenes (seed pods) dropping into the courtyard (Figure 17) also make the surface unsafe for users. Additionally, because of its location and lack of shade, the courtyard is not enjoyable or even safe for the residents to use during the summer. Furthermore, the courtyard's location minimizes its visibility from indoors, which both makes it hard for residents

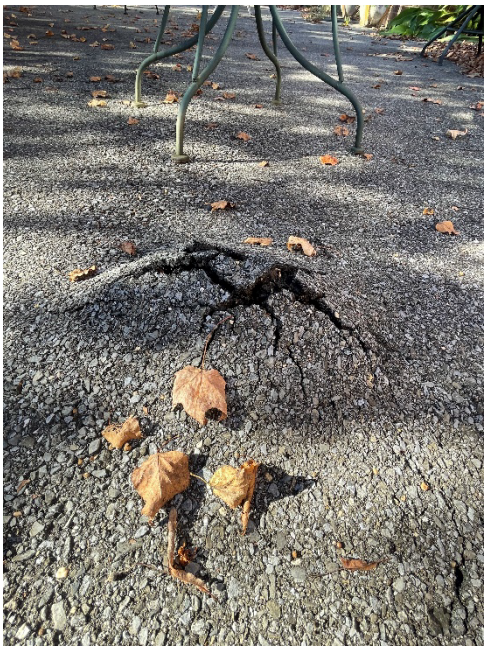


Figure 16: Cracks and bumps in the asphalt pavement (Ren)

Figure 17: Achenes in the courtyard from the surrounding sycamores (Ren)

to be aware of its existence and for staff to watch out for residents if they are outside in the courtyard. According to one staff member, the residents only spent about one hour outside under staff supervision during the summer.

2. The Front Entrance: A Wasted Opportunity

According to Susan Rodiek (2009), the front entrance of a nursing home is an attractive space for residents to use since it acts as a gateway to the outside world and provides opportunities for socializing.

Currently, the front entrance of the Center (Figure 18) is indeed an aesthetically pleasing area with open views, beautiful plants, and some additional decorations. The donated memorial garden in the middle of the turnaround acts as the focal point. However, the dimensions of the existing design such as the driveway, the portico, and the paths, fail to maximize the safety, accessibility, and mobility for different user groups. In addition, the pergola on the northeast of the Center is relatively far from the entrance, making it less possible for some seniors

Figure 18: View from the parking lot pointing to the front entrance (Ren)

Figure 19: Ponding area at the end of the swale after a rain event (Ren)

with mobility issues to reach. Moreover, the stormwater from the surrounding area, including the parking lots, drains into a grass swale that leads an open space in the east, creating ponding areas after rain events (Figure 19) and wasting the opportunity to improve the environment and promote beneficial interactions with nature.

Reason 2 – User Groups

Compared to younger adults, seniors experience more physical and psychosocial issues and are less likely to have opportunities to interact with nature. Meanwhile, they are a population that can benefit tremendously from nature's healing effect, making them one of the best user groups for healing gardens. The Center has large potential user groups, including the residents, staff members, and visitors (family members and friends). In addition to benefiting the residents directly by enabling them to be in nature, the cognitive and emotional restoration of the caregivers provided by a well-designed outdoor space benefits both themselves and the residents.

According to the most recent rating, the Center has performed well in caring for its residents, including with its response to the COVID-19 pandemic. Most of the ratings are better than the Maryland and national averages except for Physical Therapist Staffing and Ability of Self-Care (*Villa Rosa Nursing and Rehabilitation Ratings, Pricing & Reviews*, 2022). A healing garden provides extra therapeutic effects and horticultural opportunities, which can make up for the current deficiency in the physical therapy category. To accommodate residents with different self-care abilities, a well-designed outdoor space should be safe and accessible.

After I started my research, the west side wing adjacent to the courtyard was turned into the COVID wing and remains closed to everyone but patients and staff most of the time (Figure 20). A beautiful garden space gives the patients a chance to benefit from viewing nature from indoors.

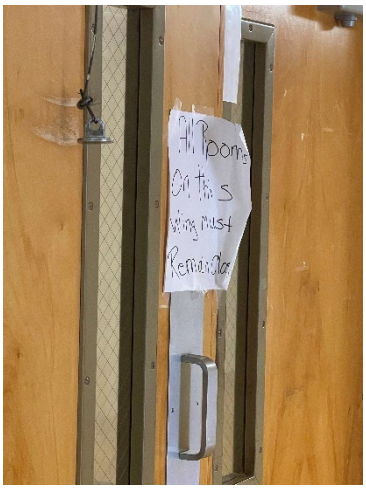


Figure 20: Signage on the door. "All Rooms on this wing must Remain Closed" (Ren)

Reason 3 – Abundant Opportunities

Despite the challenges, the site's location and natural environment provide numerous opportunities for design. High soil quality, proper water table, rich plant and animal species on-site, including a Champion tree and potential species from two nearby natural preservation areas, all, bring possibilities for the users to have a rich experience of nature.

3.1 Physical Attributes

The site is located in Mitchellville, a suburban neighborhood located in Bowie, Maryland. As one travels to the site and turns west to enter Father Anthony Road, street trees on both sides come into view. Behind the trees on the south is a vast open space, which is part of the property where the Center is located (Figure 21).

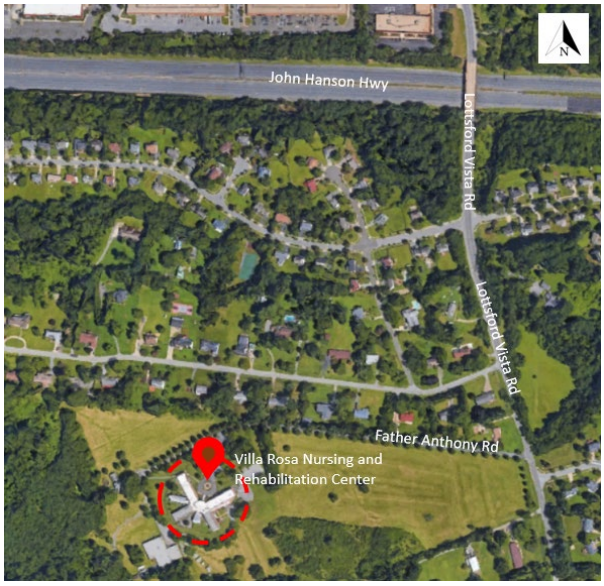


Figure 21: Location of the Center (Ren)

Parcel Size and Shape

The entire property has an area of 84.42 acres. Most of it is covered by vegetation; only 3.23 acres are impervious area, which accounts for 3.83% of the whole property. The impervious area is comprised of the main road, the Center, its courtyard, the driveway and parking lots, pathways, and some nearby building parcels.

The 3,777 sq ft triangular courtyard is enclosed by the building on two sides and a fence on one side. The size and shape influence the relationship between the indoor and outdoor areas and should be carefully analyzed.

Topography

The property is located between two river branches (Figure 22). The site (the Center) is located on the high point of its micro-watershed (Figure 23). The open space on its southeast is the highest point. The highest spot elevation is 212 feet above sea level and the lowest spot elevation is 150 feet.

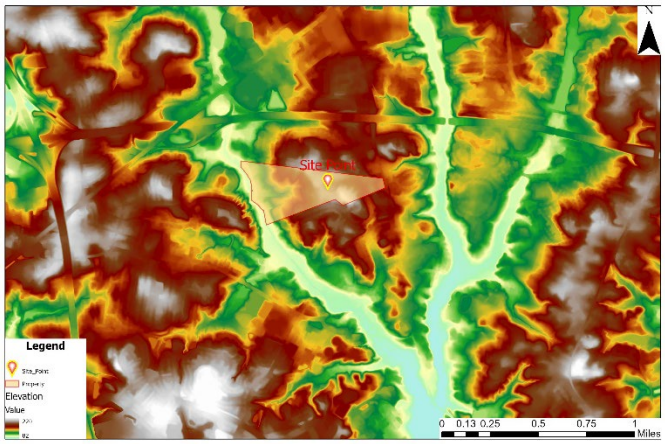


Figure 22: Topography of the larger context (Ren)

The courtyard is relatively flat, with a steep green lawn space outside of the fence whose slope is between 5-12%. According to my observations, the southwest corner of the courtyard is the highest spot, the northeast corner is in the middle, and the paved area closest to the wooden door on the southeast corner is the lowest (Figure 24). The predesigned topography guides the stormwater away from the main functional area. However, stormwater and debris from the higher area outside of the fence are flushed into the courtyard, creating potential useability and safety issues.

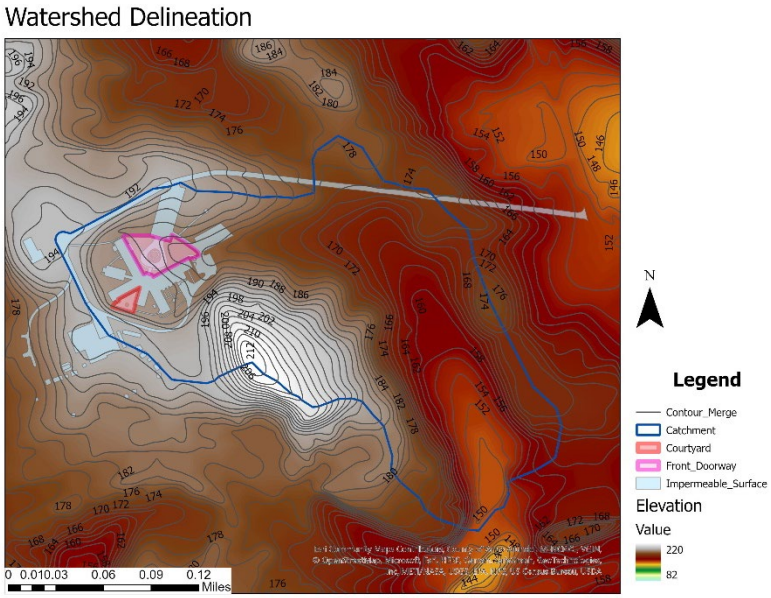


Figure 23: Watershed Delineation (Ren)

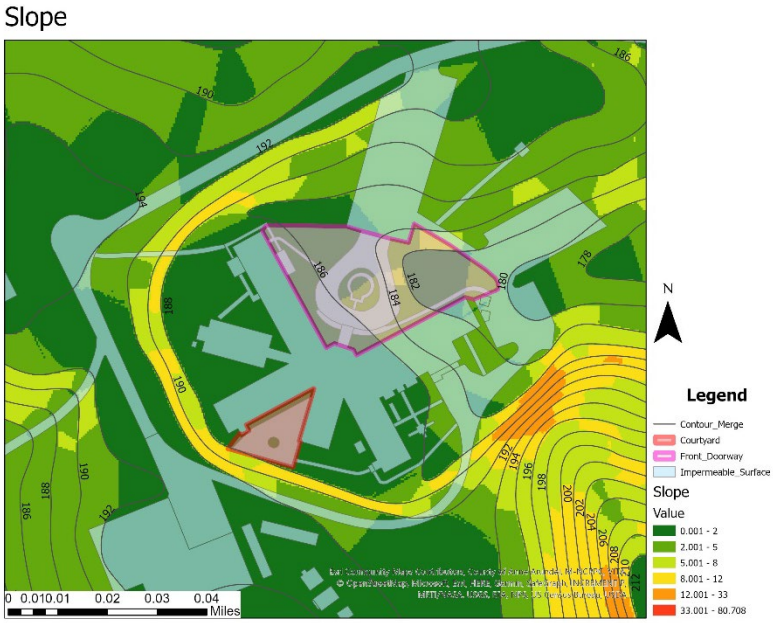


Figure 24: Slopes of the Site (Ren)

The topography of the front entrance slopes from west to east (Figure 24). The steepest area at the inlet spot on the east open space has a slope of 8-12%. The medium slopes near the edge of the east open space are 5-8%. The remaining area is gentle and has slopes between 0-5%. A swale is designed to drain stormwater from west to east, following the topography of the site (Figure 25).

Figure 25: Swale viewed from west to east (Ren)

Hydrology

1. Larger Context

The property is located upstream of the Western Branch Watershed (Figure 26), which is in the middle reaches of the Patuxent River Watershed. The Western Branch Watershed has a total area of 111.6 square miles. The two sub-watersheds that the property touches contain Bald Hill Branch, Folly Branch, and Lottsford Branch. The two sub-watersheds have a total area of 16 square miles, accounting for 14.3% of the Western Branch Watershed area. According to *Western Branch Watershed Characterization* (2003), "[l]and in Western Branch Watershed is mostly developed land (about 44%) and forest (about 39%)". The

Figure 26: Western Branch Watershed (Ren)

property borders the 100-year floodplain in the west, which is next to the Bald Hill Branch. Thus, the property has a 1% chance of being flooded by a 100-year storm in any given year.

2. Study Area

Stormwater flow (Figure 27) is an important factor that influences the scenery and functions of the site. According to the existing topography, stormwater from the parking lot and entrance both flows into a designed swale from the inlet on the east side, converges with waterflow from the west, and then flows to the east. Since overflow inlets were not found on-site and ponding areas were observed after rain

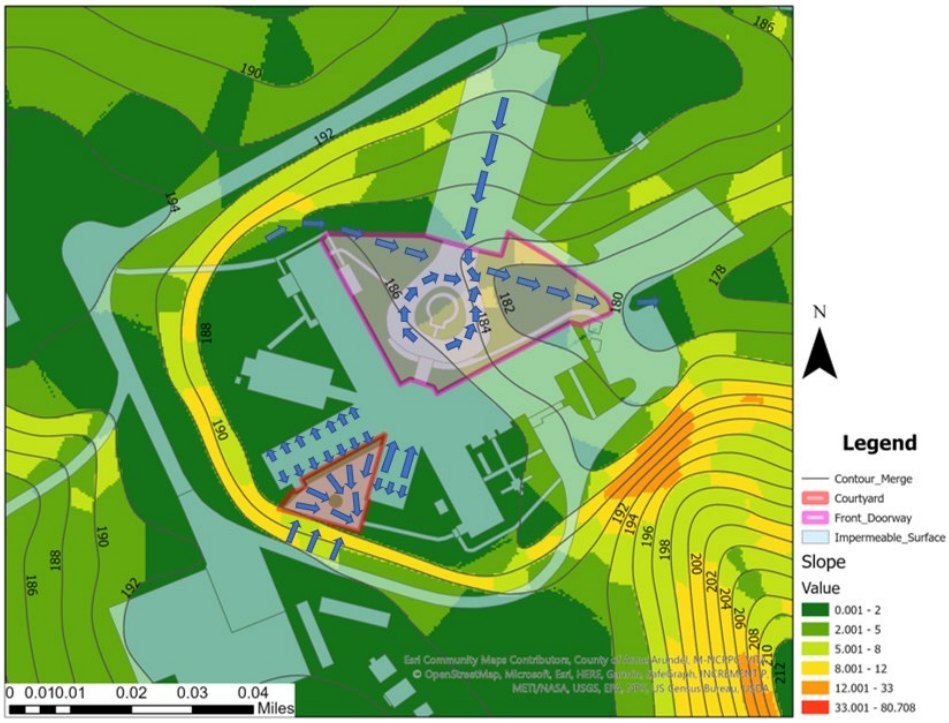


Figure 27: Blue Arrows indicate the drainage (Ren)

events, the site currently fails to treat or collect stormwater. Thus, the site may experience flood hazards during heavy precipitation events.

Figure 28: Downspouts indicated by blue arrows (Ren)

The roofs are equipped with gutters and downspouts to guide stormwater into the courtyard, or to open spaces between the wings. The downspouts (Figure 28) of the wings adjacent to the courtyard are symmetrically distributed on each roof. Thus, it can be speculated that stormwater from half of the roofs of the two wings drains into the courtyard. Due to a lack of stormwater management design on the ground level, the pavement at the lowest spot is deteriorated by frequently pooled stormwater. Fortunately, because the two wings adjacent to the courtyard do not have basements below (according to Mr. Grofic), stormwater does not cause further damage to the foundation of the building.

3. Environmental Site Design Stormwater Calculation

To evaluate the existing drainage conditions, the *Environmental Site Design (ESD) Process and Computations* was used to calculate the amount of rainfall required to be captured and treated (Hogan et al., 2010). Considering that the design did not cover the whole actual micro-watershed identified by the existing topography, the boundaries of the calculated areas were determined by observation, analysis, and decisions made by the author.

According to the calculations, the drainage area of the courtyard is 9,765 square feet (Figure 29), with 73.47% impervious area. To achieve "Woods in Good Condition," 1271.08 cubic feet of stormwater needs to be captured and treated. Because the design area of the front entrance is much smaller than the catchment defined by topography, the catchment area (Figure 30) used for calculation was determined according to topography and the author's decision of the treatment area. In reality, more green space is included in the catchment area and will contribute to a smaller percentage of impervious surface. Therefore, if the design can handle stormwater of the determined catchment, the performance can be guaranteed. The catchment area is 74,139 sq ft with 43.9% impervious surface. To achieve "Woods in Good Condition", 1.8-inch stormwater should be captured and treated, which can be converted to 5,004 cubic feet in term of volume.

Figure 29: Catchment of the courtyard (Ren)

Figure 30: Catchment of the front entrance (Ren)

Soils

Based on Web Soil Survey and GIS data, the property's hydrological soil groups vary from A to D (Figure 31). The study area is covered by A soil, which has a high infiltration rate (low runoff potential) when thoroughly wet. The soil of the study area is defined as Collington-Wist-Urban land complex, with 60% Collington, Wist, and similar soils, 25% Urban land. Both Collington and Wist complexes are identified as well-drained (Figure 32)

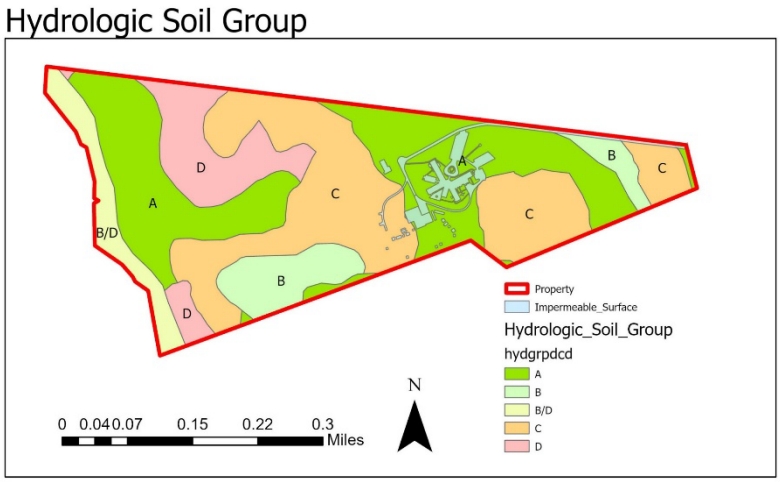


Figure 31: Hydrologic Soil Group (Ren)

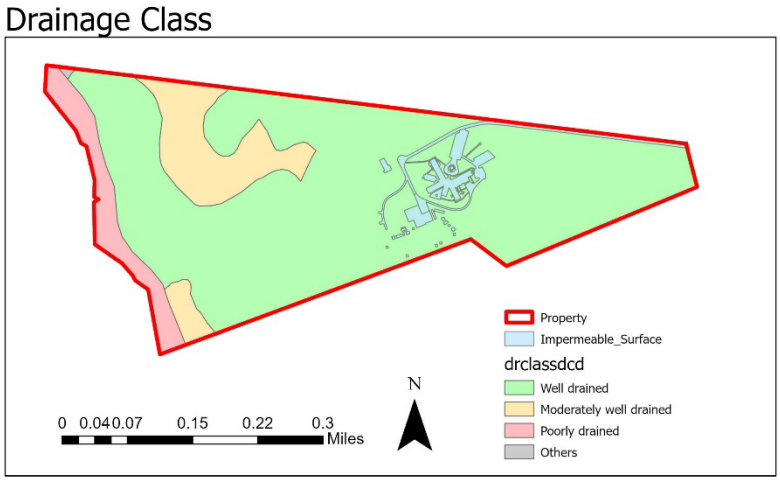


Figure 32: Drainage Class (Ren)

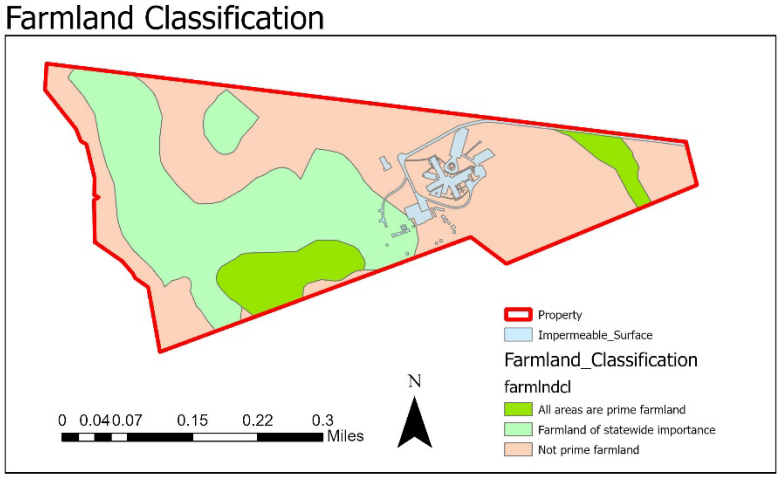


Figure 33: Farmland Classification (Ren)

and mainly composed of loams – an ideal soil type for plant growth. Water table depths of Collington and Wist complexes are more than 80 inches and about 40 to 72 inches, respectively. Both complexes have more than 80 inches of depth to restrictive features. Currently, the site is classified as "not prime farmland," while some of the surrounding areas are classified as "prime farmland" and "farmland of statewide importance" (Figure 33), which may owe to the preservation policies.

Climate

Because older adults tend to be more vulnerable to extreme weather and temperature changes, climate features provide essential information for design. In Prince George's County, four primary hazard types are flooding, storms, extreme heat, and high winds (*Hazard Mitigation Plan | Prince George's County, MD*, n.d.).

According to online data (bestplace.net) (Figures 34, 35), the county's annual rainfall and snowfall are 44 inches and 14 inches, respectively. Annual precipitation days, including rain, snow, sleet, and hail, are 110 days. The hottest month is July, with an average high temperature of 88.1 degrees Fahrenheit (º F). 'Very hot days,' when high temperatures are over 90 º F, are 31.3 days annually. In addition, July is also the most humid month, making it feel even hotter. The coldest month is January,

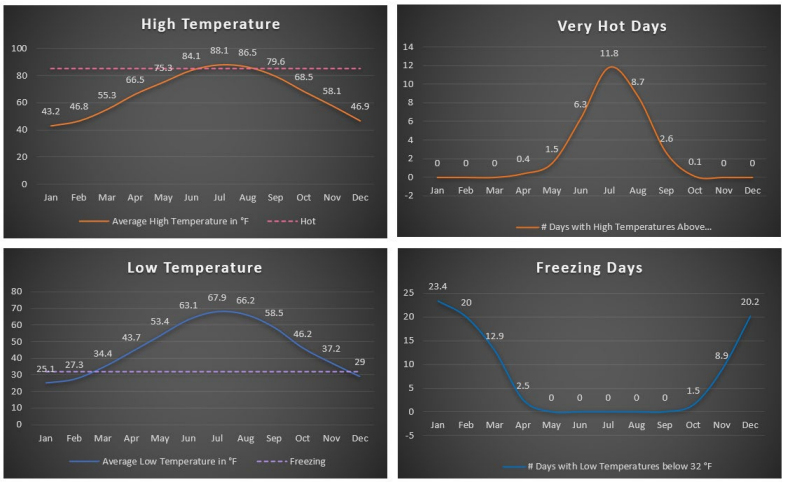


Figure 34: Prince George's County temperature data (Ren)

with the coldest nighttime temperature of 25.1 º F. 'Freezing days,' when the nighttime low temperature falls below freezing, are 89.4 days annually.

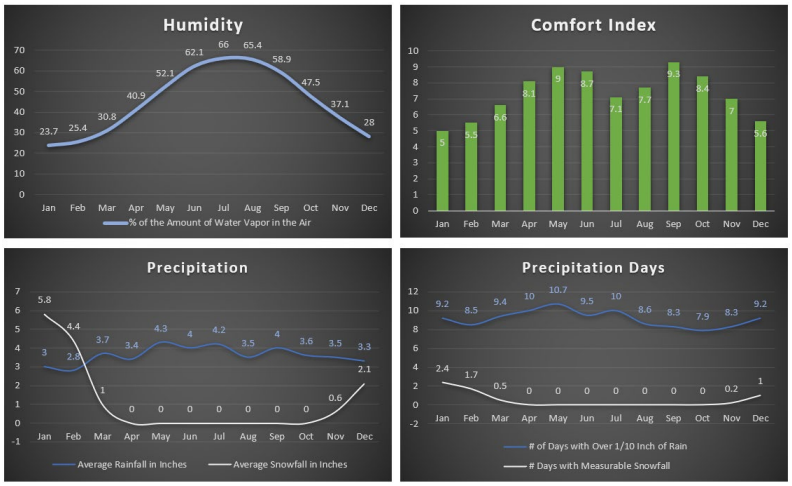


Figure 35: Humidity, Comfort Index, and Precipitation, based on the data from bestplace.net (Ren)

The most pleasant months are May, June, and September, with high temperatures of 70 to 85 º F. Located in the northern hemisphere, the wind of summer mainly comes from the southwest, while the winter wind comes from the northwest.

A sun/shade study (Figure 36) was also conducted. If the existing trees are not included, the two-story building can barely provide shade for either the courtyard or the front entrance in the afternoon of the hot summer seasons.

Thus, shelters for rain events, shade structures for heat, stormwater management methods, and screens for high winds should be considered.

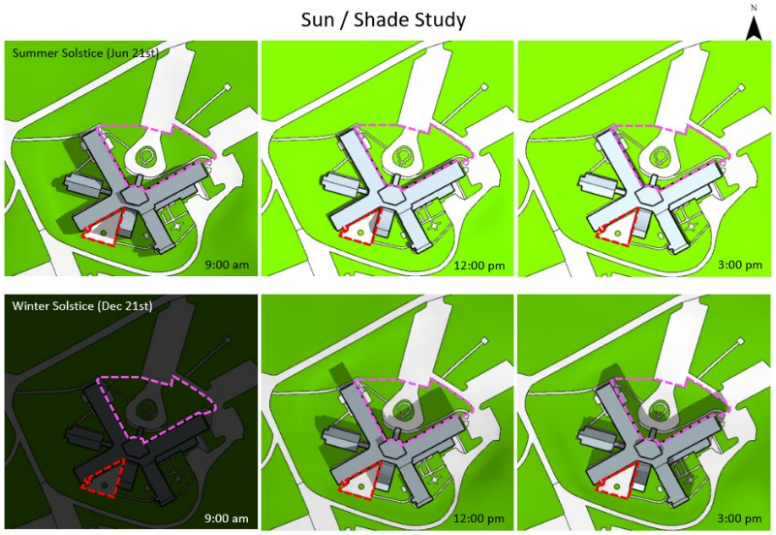


Figure 36: Sun / Shade Study of the site (Ren)

3.2 Biological Attributes

Ecological Values

With only 3.83% of impermeable surface, the property has high ecological values. According to GIS data, the west side of the property touching the Bald Hill Branch has the highest ecological value (Figure 37), equal to 750-900 dollars per unit per year. Ecosystem service economic value reflects a combination of various ecological services such as carbon sequestration, flood prevention, wildlife habitat and biodiversity potential, and surface water protection, contributing to high biodiversity and aesthetics of an ecosystem. About half of the property is identified as "Targeted Ecological Areas" (Figure 38), defined as the "best in best" – land and watersheds of high ecological value that have been identified as conservation priorities by the Maryland Department of Natural Resources (DNR) for natural resource protection (data.imap.maryland.gov).

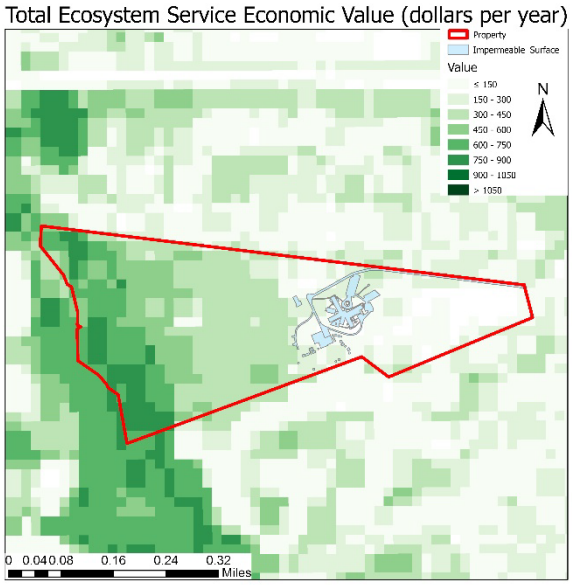


Figure 37: Ecosystem Service Economic Value (Ren)

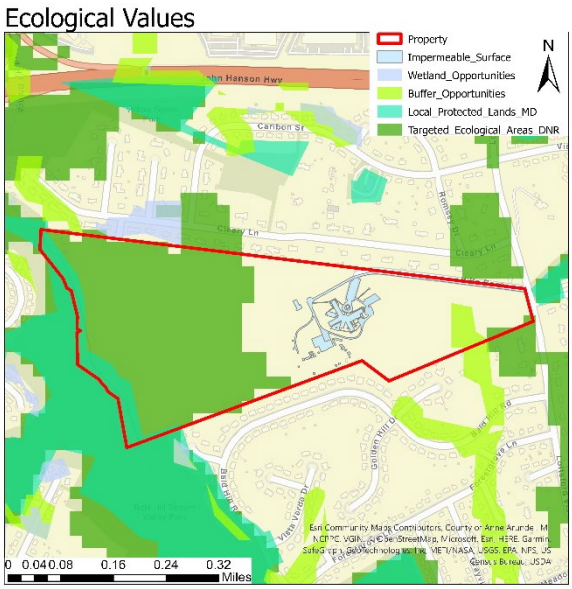


Figure 38: Ecological Value (Ren)

Wildlife and Champion Trees

There are many ways to provide soft fascination. Plants and animals can create interesting and splendid scenes. The larger context of the site creates good opportunities to do so.

The 12,800-acre Patuxent Research Refuge, established in 1936 by the executive order of President Roosevelt, is about ten miles away (Figure 39). With the mission of "conserving and protecting the nation's wildlife and habitat through research and wildlife management techniques," the refuge functions as the habitat of numerous wildlife, including mammals, birds, pollinators, and amphibians. Another place with rich wildlife resources near the site is Greenbelt Park, about five miles aways. The Park has one of the largest tracts of forest inside of the Washington Beltway.

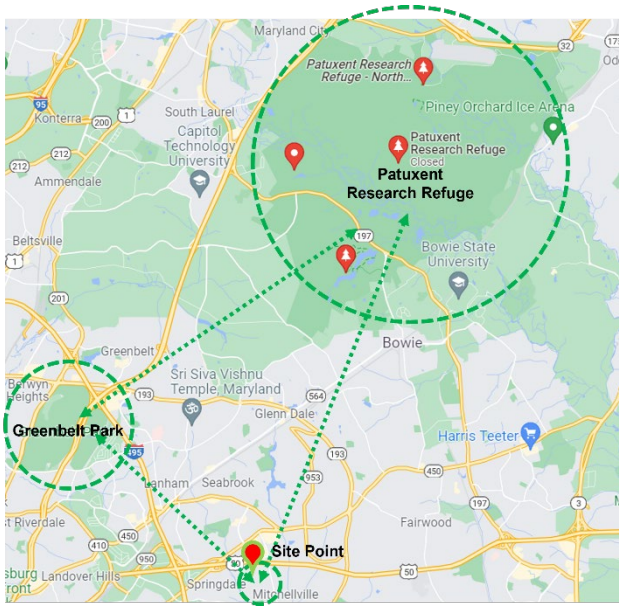


Figure 39: Research Refuge and Park Nearby (Ren)

Although 5-10 miles does not seem very close, it is easily within the travel distance of most birds. Bird species observed on site were identified as bald eagle *(Haliaeetus leucocephalus)*, red-tailed hawk *(Buteo jamaicensis)*,

Figure 40: A starling singing on the linden tree in the courtyard (Ren)

Carolina wren *(Thryothorus ludovicianus)*, European starling *(Sturnus vulgaris)* (Figure 40), and American crow *(Corvus brachyrhynchos).* Therefore, providing a well-designed environment will benefit both wildlife, when they migrate to and from the site, and human beings, for providing unexpected, interesting views of the wildlife.

Two Champion Trees grow within the property (*Big Tree Champions of Maryland*, n.d.). One of them, a ginkgo tree *(Ginkgo biloba)* nominated in 2016, is within walking distance from the Center. Observed recently, the tree still looks splendid (Figure 41). It can provide impressive seasonal interest (bright green in Spring and Summer, golden yellow in Fall, and a striking form in Winter), which can be included in the design.

Figure 41: The huge ginkgo (Ren)

Hardness Zone and Existing Plants on Site

According to online resources (plantmaps.com), the site is within Plant Hardiness Zone 7a. The coldest temperatures fall between 0 and 5 º F. However, as temperatures rise due to climate change, the zones have been moving northward. Thus, the zone may change to 7b or even 8 in the future. And therefore, plant species hardy in Zone 7a-8 are preferred.

To learn about the existing plants on the site, I recorded the type of species at the front entrance and in the courtyard. The street trees by the sides of the main parking lot that are mainly red maples *(Acer rubrum)* and pines *(genus Pinus)*. Other plant species close to the front entrance include Kousa dogwood *(Cornus kousa)*, southern magnolia *(Magnolia grandiflora)*, hydrangea *(genus Hydrangea)*, forsythia *(genus Forsythia)*, rose *(genus Rosa)*, boxwood *(Buxus sempervirens)*, violet *(genus Viola)*, sage *(Salvia officinalis)*, and daffodil *(genus Narcissus)*. Most of the plants are located symmetrically to echo the design pattern of the hardscape. Most plants are in good condition. Thus, I tried to preserve all of them in my design.

Figure 42: The little leaf linden as the only tree in the courtyard (Ren)

Twenty-two plant species were observed in the courtyard, including one little-leaf linden tree *(Tilia cordata)* (Figure 42), Hosta *(genus Hosta)*, creeping lilyturf *(Lirlope spicata)*, Indian shot *(Canna indica)*, rose *(genus Rosa)*, garden privet *(Ligustrum ovalifolium)*, azalea *(genus Rhododendron)*, Virginia creeper *(Parthenocissus quinquefolia)*, sacred datura *(Datura wrightii)*, black-eyed Susan *(Rudbeckia hirta)*, trumpet vine *(Campsis*

radicans), grapevine *(genus Vitis)*, woodsorrel *(genus Oxalis)*, oriental bittersweet *(Celastrus orbiculatus)*, beefsteak *(Perilla frutescens)*, porcelain berry *(Ampelopsis brevipedunculata)*, foxtail and bristle grass *(genus Setaria)*, sow thistle *(genus Sonchus)*, Dove's-foot crane's-bill *(Geranium molle)*, violet *(genus Viola)*, daffodil *(genus Narcissus)*, and common ivy *(Hedera helix)*. Nine species of these are toxic and eight are invasive. Due to a lack of care, some of the plants grow long stems and cover the pavement (Figure 43). In my design, I developed a new plant palette for the courtyard and replaced most of the species.

Figure 43: Sacred daturas are toxic and covering the pavements (Ren)

3.3 Cultural Attributes

History of the Nursing Home

Born in 1879 in Avigliano (Naples), Italy, Father Nicolar Decarlo was the "spiritual founder" of the nursing home. After serving as a parish priest in Naples from 1908 to 1912, Father Decarlo began his assistance in the newly established Italian Parish of St. Rita in Philadelphia, PA. To take care of the elderly parishioners, he purchased a farm in Mitchellville, Maryland, and willed to turn it into a rest home, which he named Villa Rosa after his own mother. When contemplating retirement, Father DeCarlo recruited the Society of Saint Charles Scalabrinians, founded on

November 28th, 1887, to serve migrants and refugees of different cultures, religions, and ethnicities, to continue supplying Italian-speaking priests to the community. In 1963, they were joined by the Missionary Sisters of Saint Charles, who later staffed Villa Rosa. (*Our History*, n.d.; *SCALABRINIANS Missionaries of St Charles*, n.d.)

Father Decarlo passed away before the Center was constructed. Fr. Anthony Dal Balcon, a priest of the Society of Saint Charles Scalabrinians founded the Center and became the first administrator (Levey, 1980). He dedicated his life to serve the community until he passed away in 2013 ("Remembering Father Anthony Dal Balcon | Ciao Washington!," 2013). The building was designed by the late Holy Rosary parishioner and architect Anthony Campitelli. Construction began on September 15th, 1963 and was completed in 1966 (Figure 44). The Center opened in 1967 ("Italian

Figure 44: Construction time of the building (Ren)

Figure 45: The flyer of the 52nd Italian Festival (ciaowashington.com)

Festival at Villa Rosa September 11 | Ciao Washington!," 2016; *Our History*, n.d.).

Although Fr. De Carlo wanted to limit the residents to be just Italian and Roman Catholic, under Fr. Anthony's direction, the residents are not entire Italian anymore (Levey, 1980). However, the influence of history has lasted till today. In addition to the architectural styles influenced by the Catholic religion and Italian culture, residents can use the onsite chapel and enjoy the worship services. Festa Italiana (Italian Festival) (Figure 45) has also been held annually on the grounds of Villa Rosa since 1963. Guests can enjoy various Italian foods, performances, and other entertainment. The funds raised from the festival are used to support Villa Rosa and Holy Rosary Church, which was also founded by Father Decarlo ("Italian Festival at Villa Rosa September 11 | Ciao Washington!," 2016).

Site-Specific Information

During the past months, I scheduled several site visits with Mr. Barry Grofic, the administrator of the Center, and Ms. Johnna Hock, Mr. Grofic's assistant. These visits were supplemented by emails and online conversations, yielding the following information.

According to Ms. Hock, the Center prefers to use the term 'residents' instead of 'patients' for the people living in the Center. The Center has 107 beds for residents, with 60 on the second floor and 47 on the first floor. Twenty percent of the residents are short-term residents, who use the first floor more often for the gym. Most of the rooms have windows. However, they can only be opened to six inches to avoid danger. During the daytime, each geriatric nursing assistant (GNA) needs to

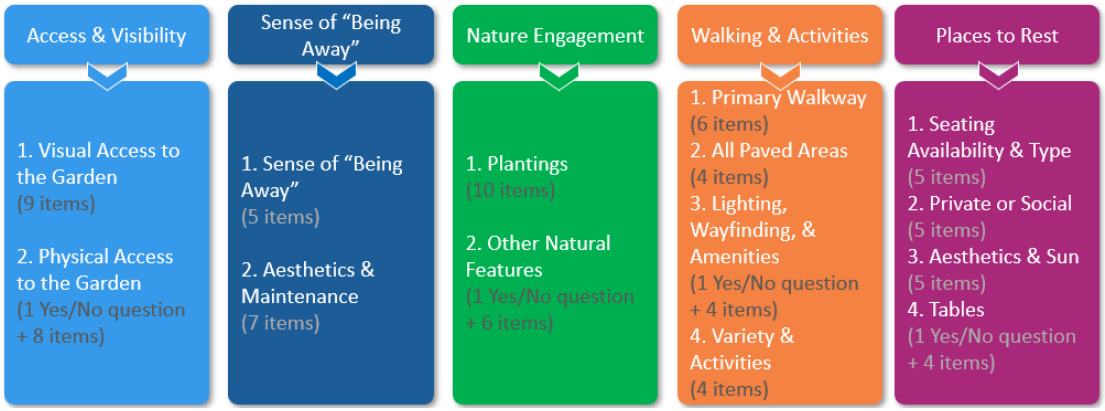
care for around ten residents. While for the evening shift, it is about twelve residents per GNA and 14-15 residents per GNA for the night shift.

The time for residents to spend outdoor depends on the day, the weather, and the residents' health conditions. When activities are held outdoors, the residents are taken out by a staff member. During the hot summertime, the average outdoor time for more active residents is one hour a week to keep residents from overheating. Mr. Grofic stated that they preferred a fully accessible design to accommodate residents in all conditions. He also stipulated that the space needs to be safe, and more greenery is preferred.

3.4 GATE Survey

To further assess the existing site condition, the Healthcare Garden Assessment Tool for Evaluators (GATE), developed by Dr. Naomi Sachs (2017), was used. The GATE is "an environmental assessment instrument that facilitates standardized, systematic evaluation of physical, programmatic, and policy features related to healthcare gardens," (p. 38) The GATE contains five domains (Figure 34) to assess the chosen space thoroughly: Access & Visibility, Sense of "Being Away",

Table 1: Structure of GATE survey (created by Ren based on Sachs (2017))



Nature Engagement, Walking & Activities, and Places to Rest (Sachs, 2017). Each domain includes two to four subdomains, and each subdomain contains multiple "items" – statements to be agreed or disagreed on a 4-point Likert scale as well as not sure or N/A (Sachs, 2017). A few items are simple Yes/No questions (Sachs, 2017) (Table 1).

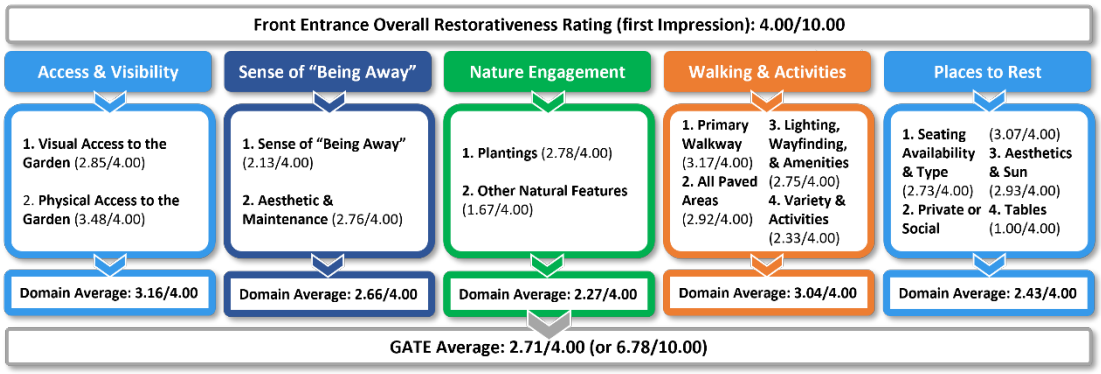
On Nov. 5th, 2021, I visited the site with Dr. Sachs and another MLA student Jonathan Mallory. The three of us conducted the GATE evaluation together, focusing on the front entrance and the courtyard. Afterwards, I used Excel to calculate the average scores. The 4-scale scores were also converted to 10-scale to compare the overall averages with the "first impression" scores. It needs to be mentioned that some of the scores were changed after I revisited the sites. For example, the "shed or other place to store tools" for the front entrance was not noticed but was found during later observations (Figure 46).

Figure 46: Cart and other tools were observed here (Ren)

The Front Entrance

The overall average score of the front entrance is 2.71 out of 4.00 (or 6.78 out of 10.00) (Figure 35) and the condition of each domain is as follows (Table 2).

Table 2: GATE score of the front entrance (Ren)



1. Access & Visibility (Score: 3.16/4.00)

Because of the location, although the front entrance lacks signage introducing the central memorial garden, it still has good visibility from both the parking and driving areas and floors above. The symmetrical design of the garden also forms a "destination" and draws people's attention quite well. The space is only half visible from indoors since the portico blocks part of the view. There is no fence around the space, so it can be accessed by the public 24 hours. The main entrance has automatic doors with flat and smooth thresholds, which makes it easy for people with different mobilities to use. However, there is no emergency phone in the open space of the front entrance.

2. Sense of "Being Away" (Score: 2.66/4.00)

Sense of "Being Away" is an important component that leads to the restorative effects in ART. Some challenges prevent the front entrance from achieving a high score. Firstly, the space is dominated by open lawn area, low shrub hedges, and some trees, which fail to provide a good sense of privacy and enclosure either for outdoor users or indoor viewers. The current design also does not create enough sensory experience for users. Secondly, the plants fail to hide or soften

unsightly views such as the parking lots. The site does provide a fully covered (roofed) area, which is the portico, and is free from trash and unpleasant odors.

3. Nature Engagement (Score: 2.27/4.00)

During the observation, we noticed that most of the plants are well-maintained and in good conditions. However, considering the big scale, the plant species, which are mainly trees and low shrubs, fail to provide enough sensory stimulation or "fascination." The strength of the current plant design is that it creates year-round interest with a combination of deciduous and evergreens. Also, almost all the plants have beautiful flowers or colorful leaves in at least one season. The plants provide food and habitat for different types of birds, but the site does have even greater potential wildlife habitat.

4. Walking & Activities (Score: 3.04/4.00)

The site provides opportunities for walking and activities with its relatively flat topography and wide, smooth pathways. Also, being far from most of the trees, the paved areas are clear of debris and other obstacles, making them safer for users. However, curbs that can provide edges for safety are absent and one of the existing paths has a steep slope that is hard to access by people with mobility issues. One of the biggest problems is that because the existing traffic circle is surrounded by a two-way drive without any speed control measures or barriers around the paths, the space can be potentially dangerous for pedestrians.

5. Places to Rest (Score: 2.43/4.00)

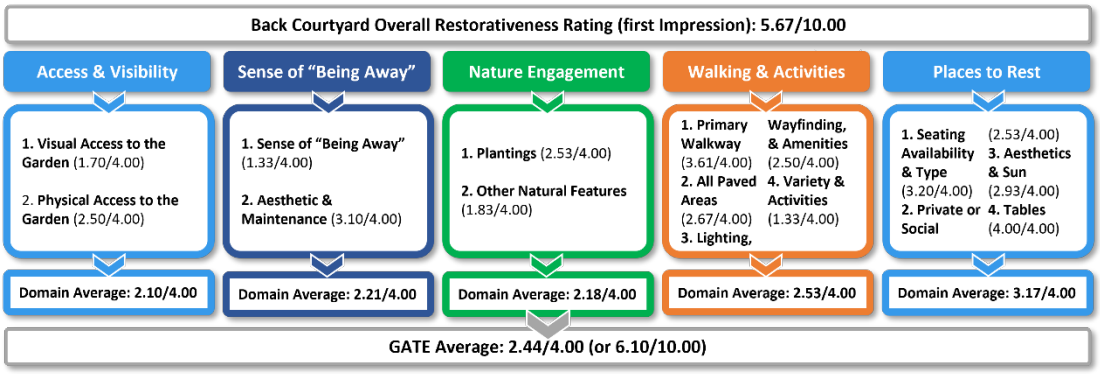
The site has great potential for people to sit, lie down, or engage in social activities if well-designed. Currently, the main sitting area is the narrow portico space. Users have the chance to watch others from a distance, but the design does not have any private seating for one or two people. There are no tables in this area. The existing picnic tables which are far from the entrance and are not in good condition (Figure 47). The existing furniture under the portico is dark in color, so it does not produce glare. However, the benches in the memorial garden are white stone, which can produce glare in bright sunlight and is cold and hard to the touch. Most of the furniture is metal, which can get too hot or cold during extreme weather.

Figure 47: Dining table covered by moss (Ren)

The Courtyard

Compared to the front entrance, the back courtyard got a lower score of 2.44 out of 4.00 (or 6.10 out of 10.00). The details of the observations are as follows (Table 3).

Table 3: GATE score of the back courtyard (Ren)



1. Access & Visibility (Score: 2.10/4.00)

Because of a lack of signage and the hidden location of the garden entrance, the courtyard has very low visibility. The garden is locked and off limits to residents almost all of the time. Residents need to be supervised when using the courtyard to avoid danger. The linden tree in the center of the courtyard acts as a "destination" feature to some degree. Other than that, the current design does not really draw people's attention. The strengths of the Access & Visibility domain include the glass on the door, which makes the garden visible from inside, the automatic door, and the flat, smooth threshold.

2. Sense of "Being Away" (Score: 2.21/4.00)

The current courtyard is almost entirely paved with asphalt and does not provide good privacy or sense of enclosure. Except for the small awning structure at the entrance and the one shade tree, there is no other designed shade structure or rain shelter. The plant species are relatively rich, but they are mostly shrubs and groundcovers which are not well-maintained. Sometimes, the space can be negatively influenced by the sounds of the generator or mowing activity. But most of the time, it is free from bad odors and unpleasant sounds. The boundary of the area is sharply

defined by the building, the vegetation hedges, and the fence. A better design can soften unsightly views more compared to the existing one.

3. Nature Engagement (Score: 2.18/4.00)

Similar to the sense of "being away," the current small, vegetated area limits opportunities for people to engage with nature. Poisonous plant species and plantings that cover the pavement make it dangerous for nature engagement. The existing plants do provide seasonal interest with flowers and leaves, but their grade-level location does not take good advantages of their features. The evergreen azalea, acting as the hedge, also does not make the view interesting enough. The existing plants do attract wildlife, including pollinators and birds, but the limited amount and the dense fence make it hard for the space to provide high ecological value.

4. Walking & Activities (Score: 2.53/4.00)

The site does not have steep slopes or confusing paths, but the degraded asphalt does not provide a smooth enough surface for users in wheelchairs or other wheeled mobility devices. The acenes from the trees on the higher slope near the site and leaves are the main debris. The poisonous plant species make it dangerous for children to use the space. In addition, there are not sufficient features for therapists to use – the only raised planter is in bad condition and is not really accessible by users in a wheelchair. Finally, lights from the building may not be bright enough to support safe night use.

5. Places to Rest (Score: 3.17/4.00)

With the existing movable chairs and tables, the courtyard does provide opportunities for small groups or for large groups of three or more people to sit together. The large open area makes it possible for group activities. However, the space is not well-designed for users to engage in private activities – it does not create enough hierarchy or variety. Again, the material of the moveable furniture, which is mainly metal, can be hot during the summer and cold in the winter, making the experience less enjoyable.

Figure 48: Movable furniture in the courtyard (Ren)

Chapter 4: Design Framework

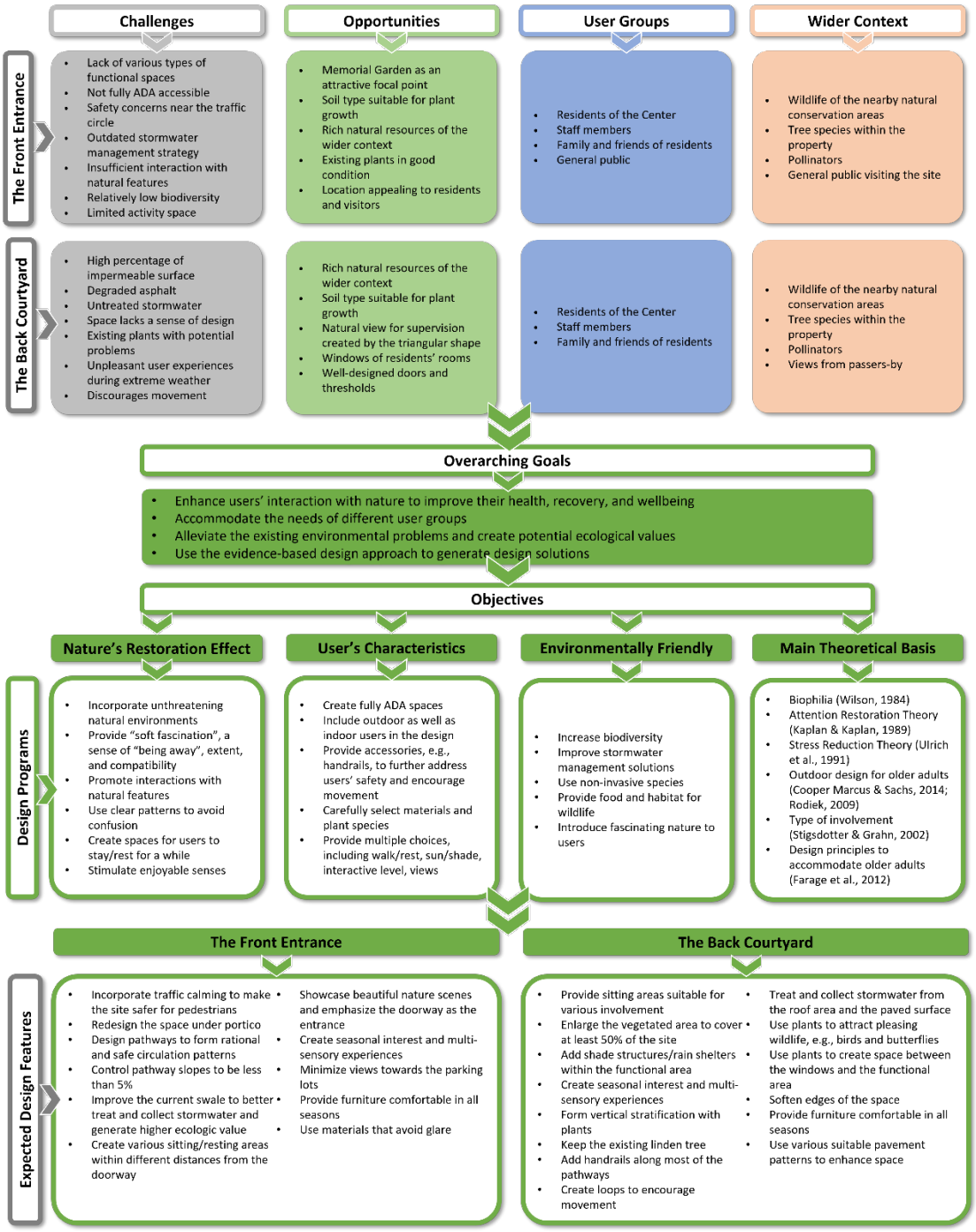
4.0 Design Strategies

Combining the literature review, the site inventory and analysis, and the GATE audit score, I synthesized the information to inform my design strategies. Firstly, I determined the overarching goals to address the existing challenges and opportunities of the site, accommodate the characteristics of the user groups, and generate benefits beyond the design scale. Secondly, I listed the objectives to demonstrate the methods for achieving the goals. And thirdly, I derived the programs from the literature review and other learned design principles to guide my final design. Because of the differences of space, user groups, functions, and objectives between the front entrance and the courtyard, they were analyzed separately.

4.1 Design Framework

Based on the design strategies, expected design features of each site were listed in detail, which further informed the design framework. All of the design features converted the qualitative overarching goals into more quantitative steps and acted as reminders and guidance for the design process, and eventually, help with achieving the overarching goals in steps. For example, the goal of enhancing users' interactions with nature was refined into creation of seating areas, planting design, furniture design, pavement material selection, regrading, and so on.

Table 4: Design Framework (Ren)



Chapter 5: A Natural Space for Wellness

5.0 Design Concept

Keeping the design framework in mind, I redesigned the outdoor space of the front entrance and the back courtyard to create hierarchical spaces that provide opportunities for various types of users to interact with nature safely, enjoyably, and inspiringly, and therefore, to improve their health, recovery, and wellbeing. The design not only focuses on the features within the design area, but also corresponds to the natural features, existing structures, and topography of the larger site context (Figure 49, Figure 50). For example, a sitting area was located to appreciate the beauty of the champion Ginkgo tree from a distance. The proposed paths will improve the circulation to enable more safe and easy access to the surrounding functional areas such as the parking lots and gazebo. The stormwater management solution purifies water before it leaves the site. The courtyard design takes into consideration the views from passers-by on the road just south of the courtyard fence.

Figure 49: Context of the Mater Plan (Ren)

Figure 50: Mater Plan (Ren)

5.1 The Front Entrance – An Entry Garden for All

Entering from the main parking lot along the Father Anthony Road (Figure 51), the symbolic sense of symmetry strongly displays the front entrance of the Center, drawing people's attention to the central memorial garden, which is dominated by roses, sages, and violets. As a space visited by the residents, staff members, and the general public, all with different ages and health conditions, a series of traffic calming methods are adopted to improve safety (Figure 52). Two pathways along the traffic circle lead the pedestrian to the entrance

Figure 51: View from the parking lot – before (Ren)

Figure 52: View from the parking lot – after (Ren)

of the Center, passing the shaded sitting areas on both sides. The portico with benches, decorated by potted flowers, creates a transition zone between exterior and the interior space. The east side of the lawn, which can be partially shaded by the building and the trees, contains dining tables for leisure time. Following the four radial pathways, users can reach the backside of the building along the wing on the west, a dining space near the woods, the existing gazebo, or the parking lots on the east of the site. From west to east, a bio-swale winds across the lawn, like a colorful ribbon, and leads to a rain garden, which attracts visitors as well as wildlife. The primary design features are demonstrated as follows.

Feature 1 – Transition Zone Under the Portico

Currently, the portico is equipped with metal chairs and light poles, and serves as a relatively safe sitting area (Figure 53). However, the space can be more enjoyable. Firstly, the columns can be renewed into stronger supporters to reduce the number of them and, therefore, leave more space in between. Lights can be attached to the new columns to replace the outdated existing ones. After the space between each two columns becomes 6'3" instead of 5'10" (about 2'6" if the light poles are counted), benches and chairs can both be provided between the columns to offer choices. In this case, wheelchairs can also fit in between to let everyone use the space comfortably. Potted plants can be added to decorate the space. In addition, an overhead fan or fans

Figure 53: View of the portico – before (Ren)

Figure 54: View of the portico – after (Ren)

can be attached to the portico to provide relief in the summer. recommended above head to relief the heat in summer heat. With the redesigned traffic circle, the users will see more plants than the parking lot (Figure 55) compared to the existing design.

Figure 55: View from the portico (Ren)

Feature 2 – Traffic Calming Solutions

The current two-way traffic at the entrance of the Center creates potential safety issues. In my design (Figure 56), the road is narrowed to accommodate one-way traffic circulation. Before vehicles enter the one-way traffic circle, they will be slowed with a raised crosswalk that acts as a speed bump. A drop-off area is included in front of the portico. In addition, some previous design mistakes were also corrected. The crosswalk for the path leading to the gazebo currently does not make sense and was modified in the new design (Figure 57, Figure 58).

Figure 56: Proposed traffic calming solution (Ren)

Figure 57, Figure 58: Crosswalk adjustment: left – before; right – after (Ren)

Feature 3 – Radially Distributed Resting Spaces

To accommodate the mobility of different users and to provide more choices, resting areas with different distances and various experiences were designed. In addition to the prementioned portico area, two sitting spaces symmetrical with the central axis are shaded by pergolas (Figure 59). From these benches, users' views are directed to the beautiful central garden. Shrubs are used to screen traffic so that

children do not run into the road. These areas act mainly as extensions of the waiting and resting areas of the portico, for users who prefer more open spaces.

Figure 59: Resting area under pergola (Ren)

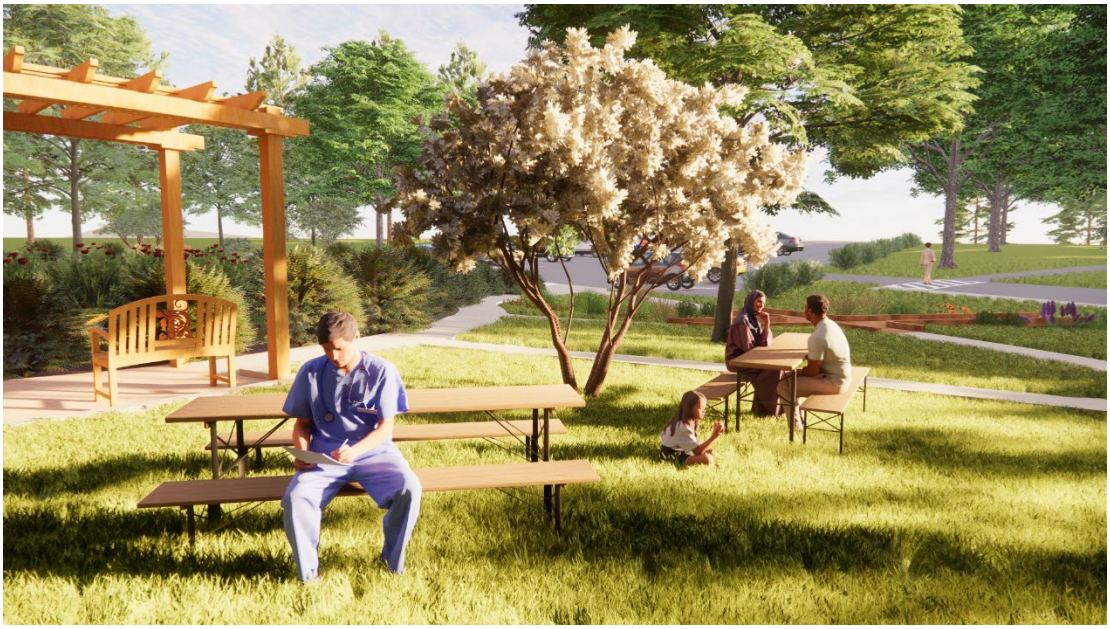


Figure 60: Dining space on the east (Ren)

Dining tables have been added to the open space on the east (Figure 60). With the existing pathway being removed, the widened lawn provides opportunities for residents and staff members to enjoy their meal under the newly added cherry tree.

This can also be a popular space for small-scale activities such as picnics and outdoor meetings. Compared to the portico and pergola spaces, this space provides more opportunities for users to interact with nature.

To further engage with nature, users can follow the path on the west (Figure 61), which leads them to a deck above the proposed bio-swale. There, the beauty of various plants and pollinators can be fully experienced. Users may even pick leaves from the nearby spicebush to get some fresh taste.

Figure 61: Spaces along the path (Ren)

Continuing along this path, another picnic table is sited under a magnolia tree. A knowledge board will guide the users to look at the west side, where the gorgeous Champion gingko tree comes into view. Here, users who make the effort to explore the site more will learn about the history of the Center and the rich natural treasures on the property. This area also facilitates the most interactions with nature by surrounding the users with abundant different natural views.

Feature 4 – Stormwater Management Measures

In my proposed design, stormwater is collected by a bioswale, which is connected to a rain garden (Figure 62). Overflow is directed to the east, following the topography. Although the proposed design increased 653 square feet of impervious area by adding paths and functional spaces, the required depth of stormwater treatment is still 1.8 inches. The surface area of the proposed bioswale and rain garden is 3,784 square feet, accounting for 11.6% of the whole catchment area. According to calculations, rainfall captured and treated by the practice can be as much as 1.02 inches, which does not achieve the "Woods in Good Condition" but achieves the one-inch minimum level of compliance required by Maryland State (*Maryland Stormwater Management Guidelines*, 2010).

Figure 62: Front entrance stormwater solution (Ren)

5.2 Father Anthony Memorial Garden – Restoration with Your Own Choice

The redesigned back courtyard (Figure 64) is renamed Father Anthony Memorial Garden to honor his devotion to the community. This healing garden serves all user groups, including residents living at the Center, staff members working here, and friends or family members of the residents and short-term rehabilitation patients. Entering the password, the door will open automatically for users to pass through the smooth threshold and immerse themselves in a beautiful garden with fresh air, birds singing, butterflies dancing, and

Figure 63: Top view of the back courtyard - before (Ren)

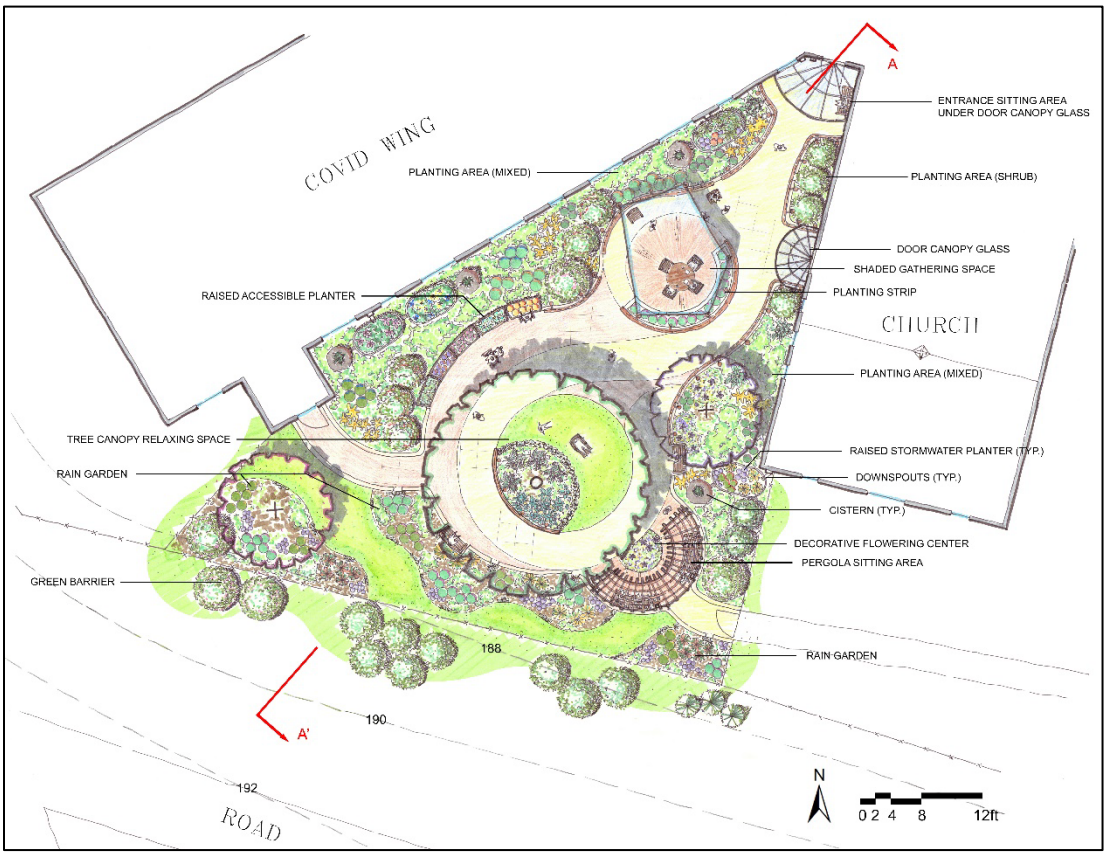


Figure 64: Site plan of the back courtyard - after (Ren)

flowers blooming. Here, users can move along the pathway for exercise, enjoy a meal with others, or take a rest by themselves. They can also pick up tools to enjoy gardening. Enough shade structures and rain shelters ensure users' comfort, even during extreme weather. The design allows users to bathe in the sun as well. The proposed design features benefit both users and their surrounding ecological environment. Below, the functions of the courtyard are demonstrated in detail.

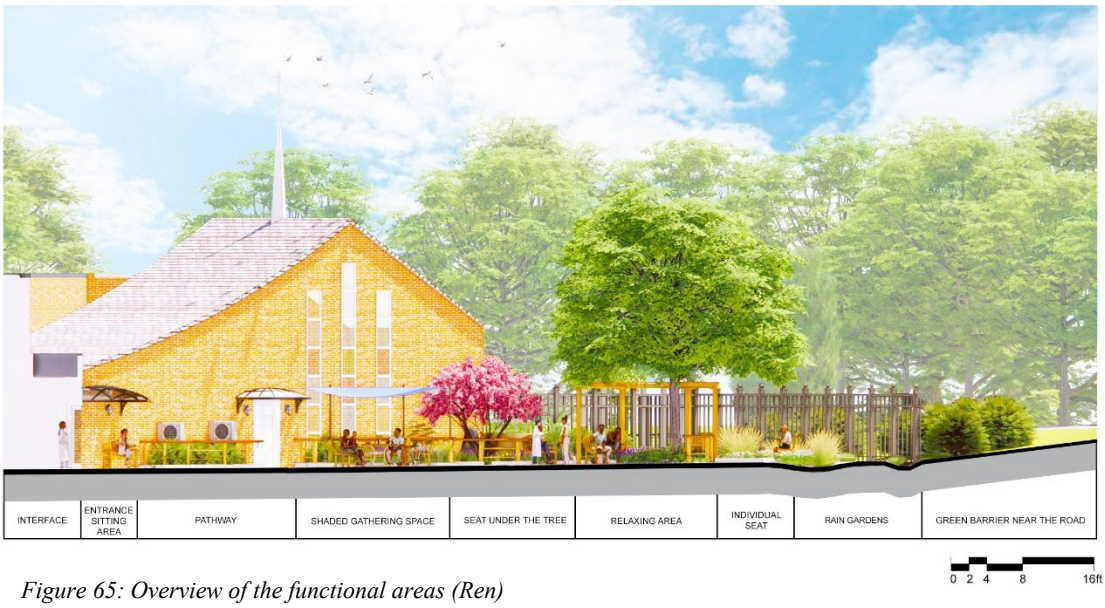


Figure 65: Overview of the functional areas (Ren)

Function 1 – Hierarchical Spaces for Users

Compared to the existing courtyard (Figure 63), which lacks hierarchies, the new design makes full use of the

Figure 66: View from the entrance - before (Ren)

triangular-shaped area and turns it into a garden with multiple spaces (Figure 65) to accommodate users' needs.

Figure 67: View from the entrance - after (Ren)

The sitting area under the door canopy (Figure 67) acts as a lookout station for staff members to supervise residents, and also provides seating for users who do not want to travel for too long. The path is equipped with handrails that enable people

Figure 68 – Shaded gathering space (Ren)

who are not steady on their feet to venture into the garden safely. A tensile structure provides shade for a circular space shaped by the planting areas on both sides (Figure 68). The spiral pattern draws people into the center, where users can engage in a series of inspiring conversations with others around the table or have an enjoyable

Figure 69 – Gathering space at night (Ren)

dining time. The space is also big enough for others who are not active speakers to stay away from the center to be listeners or enjoy nature around the space. At night, the space is decorated by string lights (Figure 69). Surrounding areas are also lit by lamps, making the garden safe and beautiful.

Passing through this active gathering space, users will enter an area with a more open view (Figure 71). The first feature that leaps into sight is a large lawn under the existing

Figure 70 – Southeast corner – before (Ren)

linden tree, semi-surrounding a tree pit garden. Here, users can sit or lie down, immersing themselves in the breeze blowing and birds chirping. To the east of the

Figure 71 – Southeast corner resting space – after (Ren)

lawn is a secondary gathering space. Compared to the active one, this space forms a lower level of involvement. Long benches allow the users to sit by themselves or with their close ones. The space under the pergola also provides users with opportunities to occasionally communicate with others in the lawn area.

In addition to the gathering spaces, benches (Figure 73) are located along the path to offer chances for users to be observers, refreshing their minds by experiencing the sense of being

Figure 72 – View from south to north – before (Ren)

away and self-reflection. Taking advantage of the various distances created by the path, users can choose where to sit to maximize their comfort.

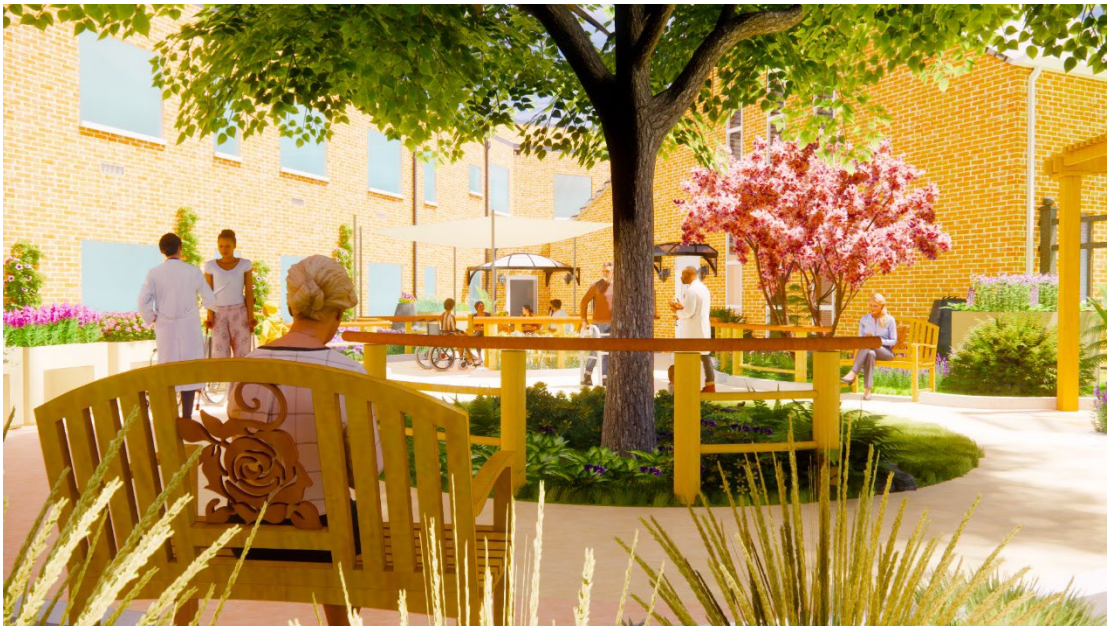


Figure 73 – View from bench located on the south – after (Ren)

In addition to the defined spaces, the paved area (Figure 74) has the potential to accommodate more functional usages, including large-scale activities such as celebrations and staff meetings.

Figure 74 – Curvilinear warm-colored paved surface (Ren)

Function 2 – Therapeutic Effect Extension

While the physical therapeutic time of the Center is lower than average, the designed courtyard extends the therapeutic effects to the outdoor space for all users. The curvilinear pattern running through the whole design creates a sense of flow, encouraging movement that benefits users physically and psychologically. The surroundings with bright colors, harmonious shapes, interesting things to touch, melodic sounds, and pleasing smells create a rich environment for the users' restoration. Different seating spaces along the path let the users take a rest if needed.

Figure 75 – Raised accessible planters (Ren)

A series of raised accessible planters (Figure 75) have been added along the west side of the path. They can be used for horticultural therapy or just gardening to further increase users' interaction with nature. Gardening together helps promote users' life qualities by improving their cognitions, alleviating boredom, and encouraging socialization. Planting, harvesting, and sharing also give users a sense of achievement and belonging.

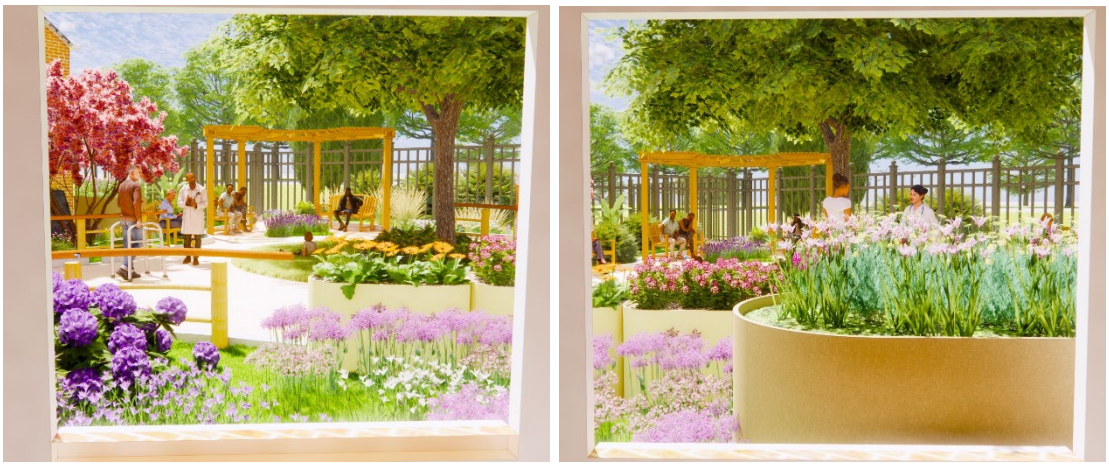


Figure 76 – Views from the COVID wing (Ren)

In addition to users spending time in the garden, indoor users benefit from the design as well. Adjacent to the COVID wing, the garden helps indoor residents by creating beautiful views of nature (Figure 76). For residents not able to get outdoors, these views can be especially beneficial. In the meantime, the planting area near the windows acts as a barrier to offer privacy for users. It prevents outdoor users from getting too close to the windows and the indoor residents from viewing the outdoor users closely.

Another group of users who benefit from the design are the passers-by (Figure 78) on the roadside south of the courtyard. A well-designed courtyard can make their way back home or to work more pleasant, spreading the therapeutic effects of nature to an even wider extent. To avoid the feeling of being watched by passers-by, shrubs are planted outside the renewed fence to block the views towards the bench and the gathering space

Figure 77 – View from the roadside – before (Ren)

close to the fence. The shrubs also corresponding to Jay Appleton's (1975) Prospect-Refuge Theory, which has been widely used in design to create a sense of security by providing the users the capacity to observe without being seen.

Figure 78 – View from the roadside – after (Ren)

Function 3 – Ecological Values

1. Plant Palette

To take full advantage of nature's therapeutic effects, one of the most important components of nature – plants – was carefully selected (Figure 79) according to their ability to provide seasonal interest, sensory experiences, and wildlife value (Table 5). Most of the proposed plants bloom beautifully. Different blooming times ensure that users experience pleasant views and fragrances from early spring to late summer. In autumn, the courtyard is decorated with colorful leaves and fruits. Persistent fruits such as red chokeberries and winterberries will last through

winter to continuously add color to the site and attract wildlife. Evergreen shrubs such as boxwoods and pines shape the space and provide year-round interest.

To maximize the sensory experiences, most of the plants are not only beautiful but also fragrant and edible. The nonedible plants are also limited to be only

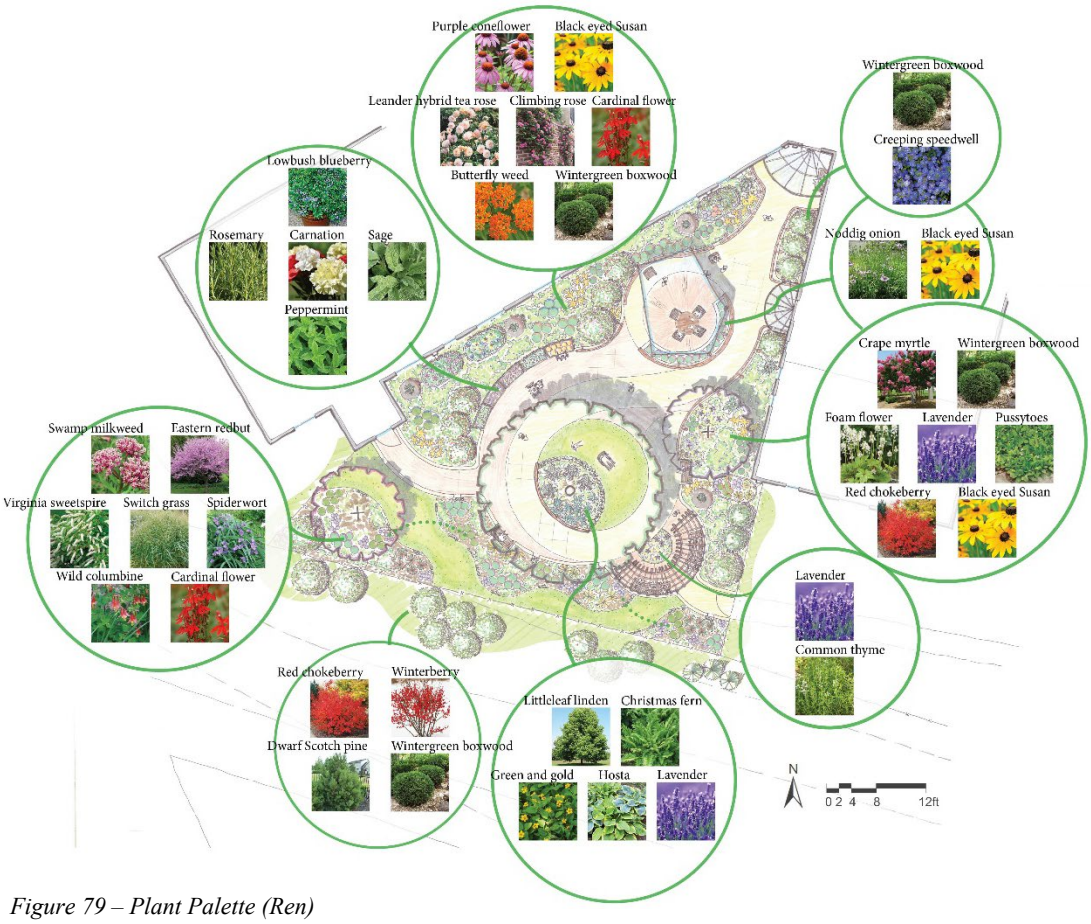


Figure 79 – Plant Palette (Ren)

mild-toxic. Plants that may spread widely if planted are grown in pots or raised planters, such as rosemary, sage, peppermint, and lowshrub blueberry. To avoid injury caused by touch, the only two plant species with thorns or prickles are planted out of reach: winterberries are located outside the fence and climbing roses are fixed to the wall, far from the edge of the planting beds. To serve people who are afraid of

Table 5: Detailed information about the selected plants (Ren)

Common Name	Scientific Name	Classification	Seasonal Interests	Sensory Experiences	Wildlife Value	Hardiness Zone
Crape myrtle	*Lagerstroemia Indica*	Small deciduous tree	Mid-May to September blooming	Sight, touch	Birds, pollinators	7-10
Eastern redbud	*Cercis canadensis*	Small deciduous tree	March to May blooming	Sight, smell, taste, touch	Birds, pollinators	4-9
Littleleaf linden	*Tilia cordata*	Deciduous tree	May to July blooming; beautiful fall color	Sight, touch, smell, taste, sound	Birds, pollinators	4-7
Leander hybrid tea rose	*Rosa* 'Leander'	Deciduous shrub	Spring to fall blooming	Sight, touch, smell	Pollinators	5-11
Wintergreen boxwood	*Buxus sinica var. insularis* 'Wintergreen'	Evergreen shrub	Evergreen	Sight, touch	-	5-8
Purple coneflower	*Echinacea angustifolia*	Perennial	July to September blooming; interesting form afterwards	Sight, smell, touch	Hummingbirds, pollinators	5-8
Black eyed Susan	*Rudbeckia hirta*	Perennial	June to September blooming; interesting form afterwards	Sight, smell, touch	Birds, pollinators	3-10
Climbing rose	*Rosa setigera*	Perennial climber	Early summer to fall blooming	Sight, smell, taste	Birds, pollinators	5-9
Cardinal flower	*Lobelia cardinalis*	Perennial	July to September	Sight, touch	Hummingbirds, butterflies, moths	2-9
Butterfly weed	*Asclepias tuberosa*	Perennial	June to August blooming	Sight, touch, smell	Pollinators	3-9
Creeping speedwell	*Veronica filiformis*	Perennial	April to July blooming; remains evergreen	Sight, taste	Pollinators	4-9
Nodding onion	*Allium cernuum*	Perennial	Early to mid-summer blooming	Sight, touch, smell, taste	Pollinators, ground squirrels	4-8
Foam flower	*Tiarella*	Perennial	Spring blooming	Sight	Birds, pollinators	4-9
Lavender	*Lavandula*	Perennial herb	Summer blooming	Sight, touch, smell, taste	Hummingbirds, pollinators	5a-9a
Pussytoes	*Antennaria plantaginifolia*	Perennial	April to June Blooming	Sight, touch, taste	Pollinators	6-9
Red chokeberry	*Aronia arbutifolia*	Deciduous shrub	Spring blooming; red fruits persist into winter; beautiful fall color	Sight, touch, taste, smell	Mammals, birds, pollinators	4-9
Common thyme	*Thymus vulgaris*	Perennial	Evergreen	Sight, touch, taste, smell	Pollinators	3-11
Christmas fern	*Polystichum acrostichoides*	Perennial	Evergreen	Sight, touch	Birds	3-9
Green and gold	*Chrysogonum virginianum*	Perennial	March to June blooming	Sight	Pollinators	5-9
Hosta	*Hosta*	Perennial	Beautiful leaf	Sight, touch	Hummingbirds, beneficial bugs	3-9
Winterberry	*Ilex verticillata*	Deciduous shrub	Berry persistence	Sight	Mammals, birds, pollinators	3-9
Dwarf Scotch pine	*Pinus sylvestris* 'Glauca Nana'	Evergreen shrub	Evergreen	Sight, touch	Mammals, birds, pollinators	3-7
Swamp milkweed	*Asclepias incarnata*	Perennial	July to August blooming	Sight, touch, smell	Pollinators	3a-8b
Virginia sweetspire	*Itea virginica*	Deciduous shrub	May to June blooming	Sight, touch, smell	Birds, pollinators	6-9
Switch grass	*Panicum virgatum*	Perennial	Interesting looking	Sight, touch	Mammal, birds	5-9
Wild columbine	*Aquilegia canadensis*	Perennial	Mid-spring to early summer blooming	Sight, touch, smell, taste	Birds, pollinators	3-8
Spiderwort	*Tradescantia*	Perennial	Mid-spring to early summer blooming	Sight, touch, taste	Pollinators	4-9
Lowbush blueberry	*Vaccinium angustifolium*	Deciduous shrub	Spring blooming; blueberries	Sight, touch, taste, smell	Birds, pollinators	2-8
Rosemary	*Salvia rosmarinus*	Perennial herb	Spring to summer blooming; evergreen	Sight, touch, taste, smell	Hummingbirds, pollinators	7-10
Carnation	*Dianthus caryophyllus*	Perennial	Summer blooming	Sight, touch, taste, smell	Moths, butterflies	6-9
Sage	*Salvia officinalis*	Perennial herb	Evergreen; early summer blooming	Sight, touch, taste, smell	Pollinators	5-8
Peppermint	*Mentha × piperita*	Perennial herb	June to September blooming	Sight, touch, taste, smell	Pollinators	5-10

bees, almost all flowers are low in height. Shrubs that are relatively tall and attract

bees are located far from the main seating areas.

Because most of the plants have high wildlife value, the courtyard will form a healthy ecosystem, benefiting the environment and reducing the need to pollinate manually. In addition, after replacing the current dense fence with more attractive permeable metal fence, some small wildlife such as rabbits and squirrels will show up occasionally, improving users' experience of "soft fascination."

Plants associated with Virgin Mary are also included. The most important symbolic plant is the rose. In addition to climbing roses, Leander hybrid tea roses, which do not have prickles, are used. Other plants, such as carnation (represents Mary's love of God); sage (Mary's shawl); rosemary (Mary's nosegay); and thyme (the Virgin's humility) can also be found in the garden.

2. Stormwater Management

A significant problem faced by the existing courtyard is the untreated stormwater, which damages the asphalt surface gradually and causes potential danger with puddles and iced surfaces.

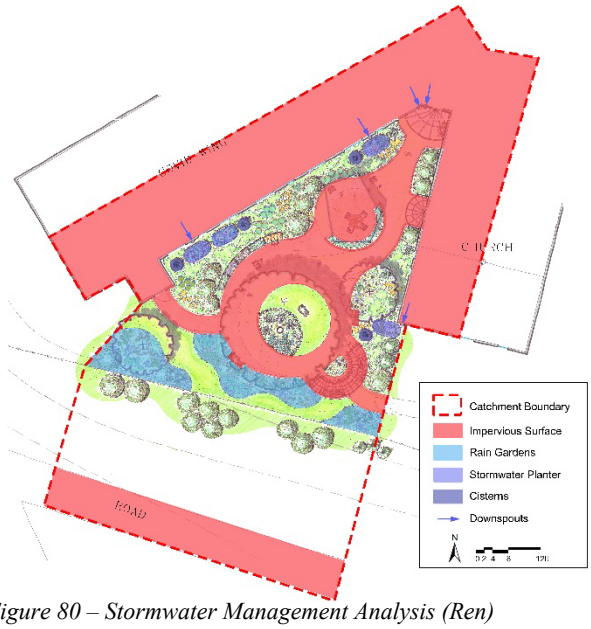


Figure 80 – Stormwater Management Analysis (Ren)

The proposed design (Figure 80) adds 1,835 square feet of permeable areas to the courtyard. The impervious surface now accounts for about 40% of the courtyard (or 54.7% of the whole catchment area). Compared to about 90 % impervious area (or 73.5 % of the whole catchment) before, the design significantly increases the stormwater management performance provided by the courtyard. To achieve the "Woods in Good Condition", 2.0-inch of stormwater needs to be captured and treated, which is 0.2 inch less than before. The total amount of stormwater that needs to be captured and treated changes from 1271.08 cubic feet to 882.11 cubic feet. Rain gardens on the south side of the courtyard have a total area of 487 square feet. With a 6-inch depth, they can capture and treat 535.7 cubic feet runoff, accounting for 60.7% of the required amount. Because the roof area (except for the north part of the church that drains to the paved surface) that drains to the vegetated spaces from downspouts accounts for 45.8% of the whole catchment area, the rain gardens are able to capture and treat all 2.0-inch runoff from the road and the impervious surface of the courtyard. If the permeable surface is enlarged by using decomposed granite, the stormwater management performance can be even higher. To maximize the treatment and collection of the stormwater from the roof, four planter box raingardens (Figure 81) are located under the downspouts. They are

Figure 81 – Planter box raingarden (https://inhabitat.com/)

connected to four cisterns with a total surface area of 100 sq ft to collect and reuse the filtered stormwater from the roofs for irrigation.

5.3 Furniture Design and Selection

Furniture Design – Red Rose Seats

To add aesthetics and comforts to the whole site as well as celebrate the Villa Rosa culture, I designed red rose seats. The overall design conforms to ergonomics principle, meeting the needs of comfort to the greatest extent. The longitudinal wooden pieces and the hollow red rose shape in the middle together form the chair back. Waterproof wood material (teak or white oak) is weather resistant and able to

Figure 82 – Red Rose bench regular version (Ren)

keep a relatively constant temperature through the whole year. Compared to the existing metal furniture's industrial look, the customized seats are more harmonious with the surrounding environment, creating a sense of harmony and belonging. Figure 80 shows the 42" wide bench that can accommodate two users. In order to match various circumstances, I customized different sizes and patterns (Figure 83) with the same red rose theme.

Figure 83 – Red Rose seats more versions (Ren)

Furniture Selection – Accessible Planter

Most accessible planters are rectangular and do not work well with the curvilinear design pattern. Thus, after carefully searching online, I selected ADA raised garden beds designed by Green Circle Garden Ltd. (Figure 84). The planters are easily arranged along the curved path, are made of HDPE plastic so they are also weather resistant and stronger than those made of other materials and require less maintenance.

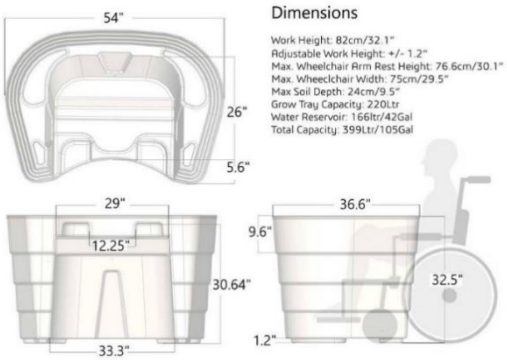


Figure 84 – Green Circle Garden planter concept (https://greencirclegarden.com/)

Figure 85 – Modeled planters based on concept (Ren)

Chapter 6: Discussion

6.0 Reflection

In this thesis, I developed a design framework based on the literature review, thorough site inventory and analysis, and GATE survey to guide outdoor space design for the Villa Rosa Nursing and Rehabilitation Center. The design principles reflect the biophilia hypothesis, Attention Restoration Theory, Stress Reduction Theory, theories of design for older adults, and the hierarchy of involvement. The design provides safe, enjoyable, and inspiring outdoor spaces for different user groups of the Center and the surrounding community. With 'soft fascination' created by the designed unthreatening environment, a sense of 'being away' by immersion in nature, and extent and compatibility provided by rich natural features and hierarchical functional spaces, the proposal maximizes nature's healing effects. In addition, the design solves the existing stormwater problems by incorporating green infrastructure. Therefore, it achieves the goal of "care for all": people and environment.

This MLA thesis allowed me the opportunity to work under different scales. When designing for the front entrance, I learned how to improve circulation for the whole site, form a harmonious design pattern to enhance connection to each functional area, and consider the broader site context. The design for the back courtyard enabled me to focus on details, pay attention to dimensions, take advantage of the confined space, and create rich sensory experiences for the users. I had the opportunity to work on furniture design, which was a new experience.

6.1 Limitations

Because of the COVID-19 pandemic, I was not able to fully conduct my proposed survey. I designed a survey for the Center's nursing assistants to gain more specific information about staff and residents' experiences of and opinions about the back courtyard. I printed out the questionnaire on A4 paper and published it as a Qualtrics survey. However, because of the challenging situation caused by the pandemic and staff members' busy schedule, the number of responses was too few to support any constructive findings. In addition, the indoor transition area to the courtyard, which has significant design importance according to Rodiek (2009), is next to the COVID wing and was preferred to be free from furniture to prevent gathering. Thus, I only suggested some decorations for the floor (Figure 86). The temporary closure of the COVID wing also limited the opportunity for me to conduct further research such as looking out to the courtyard from the building.

Figure 86 – Rose pattern ground stickers and some fresh flowers help to define and decorate the interior (Ren)

6.2 Conclusion and Future Directions

This thesis was a great experience for me to learn research methods and evidence-based design approaches. The literature review process helped me to understand the importance of nature's healing effects, which is one of the landscape architectural topics I am interested in the most. In addition, I learned the method of conducting pre-occupancy evaluation. With my design and future work, I hope to continue working on filling the gap between theory and practice. By sharing the

design with the Center, I hope it can be constructed and a post-occupancy assessment can be done one year after construction. As for funds and maintenance plans, the Chesapeake Bay Foundation and community cleanup are potential promising solutions. I plan to keep working on these two topics to make the design more practical.

Appendices A – GATE Survey

HEALTHCARE GARDEN EVALUATION TOOLKIT

GARDEN ASSESSMENT TOOL FOR EVALUATORS

INSTRUCTIONS — PLEASE READ BEFORE YOU BEGIN

STEP 1: ESTABLISH CONSENSUS
There should always be at least two evaluators. Evaluators must agree on the 1) Garden boundaries 2) Main doorway 3) Primary pathway.

STEP 2: WALK THROUGH THE GARDEN BEFORE YOU START
Think of the garden from the point of view of a frail patient. Walk through the entire garden, test the furniture, look at the area from different positions – including wheelchair and child height. Ask yourself, "How well does this garden support the needs of patients, visitors, and staff?"

STEP 3: EVALUATE THE GARDEN
For each statement on the next five pages, check the box that best represents your level of agreement. If you are unsure or if the statement is not applicable (N/A), check the last box. Note: It is better to check "Not sure or N/A" than to make a guess! A tape measure will be useful for some of the items.

STEP 4: RETURN THE FORMS
Return by mail to Naomi Sachs, 800 Gilchrist Avenue, College Station, TX 77840 or scan and email to nsachs@tamu.edu.
Questions or concerns? Email nsachs@tamu.edu or call (845) 264-2026.

GENERAL QUESTIONS

01	Your name:		
02	Your role/profession (landscape architect, nurse, etc.):		
03	Date:	Time:	AM or PM (circle one)
04	Weather (sunny, cloudy, windy, etc.):	Temp (°F or warm, cool, etc.):	
05	Name of facility and location (city, state):		
06	Name of garden (if it is named):		
07	Type of facility or patients served:		
08	Location and type of garden (e.g., front entry, central coutyard, rooftop, etc.):		
09	Are there other gardens and/or outdoor sitting areas at the facility?	YES	NO
	If YES, please list:		

OVERALL RATING

NOT RESTORATIVE AT ALL → COMPLETELY RESTORATIVE

* On a scale of 1-10, how would you rate the **overall restorativeness** of this garden? *"Restorative" = Able to restore a person's strength, health, or well-being.*	1	2	3	4	5	6	7	8	9	10

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GARDEN ASSESSMENT TOOL FOR EVALUATORS

For each item, **check the box that best represents your level of agreement.** If you are unsure or if the statement is not applicable (N/A), check the last box.

ACCESS & VISIBILITY 1

VISUAL ACCESS TO THE GARDEN		STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE	NOT SURE OR N/A
01	Garden is **visible from main public indoor areas** (entry lobby, major hallway, etc.).					
02	Garden is **visible from indoor areas that involve waiting** (waiting rooms, labs, pharmacy, etc.).					
03	Garden is **visible from floors above** (from offices, patient rooms, etc. on upper floors).					
04	**Entrance to the garden is easy to find.**					
05	**Doors to the garden are glass or have a window in or next to them.**					
06	**Garden looks appealing/inviting from indoors.**					
07	There is **signage TO the garden from indoors** (in lobby, waiting areas, elevator, etc.).					
08	There is **signage for the garden ON OR NEXT TO garden doors.**					
09	**Information about the garden** is available (through pamphlets, signage, website, etc.).					

PHYSICAL ACCESS TO THE GARDEN		STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE	NOT SURE OR N/A
10A	Garden is **open 24 hours** a day, 7 days a week.	YES			NO	
10B	If garden is NOT open 24/7, what hours and days is it open?					
11	Doors to the garden from at least one entry are **automatic and easy to use.**					
12	Any **non-automatic doors are easy to operate** (are not too heavy, don't close too quickly).					
13	Doorway **thresholds are flat and smooth** (for a wheelchair or an IV pole to cross easily).					
14	The **space just outside the main doorway* is covered/roofed** (providing protection from rain, sun, etc.).					
15	The space just outside the main doorway has **seating for at least two people and space for at least one wheelchair.**					
16	A **"destination" feature draws people into the garden** (seating area, water feature, special tree or plantings, etc.).					
17	A **restroom in the facility is near a garden entry** (about 50 feet).					
18	Garden has an **emergency phone** that connects with the hospital front desk or security.					

** Remember to make sure all evaluators agree on what is the "main doorway."*

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SENSE OF "BEING AWAY" 2

SENSE OF "BEING AWAY"		STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE	NOT SURE OR N/A
01	People can find a **desirable sense of enclosure** in the garden.					
02	People can find **privacy in at least one part** of the garden.					
03	People in the garden **cannot look into adjacent private indoor areas** (patient rooms, treatment/consultation rooms).					
04	Garden has at least one **fully covered (roofed) area** (porch, gazebo, etc.).					
05	At least one **seating area is protected from climatic/weather extremes** (with wind shields, patio heaters, overhead fans, etc.).					
AESTHETICS & MAINTENANCE		**STRONGLY AGREE**	**SOMEWHAT AGREE**	**SOMEWHAT DISAGREE**	**STRONGLY DISAGREE**	**NOT SURE OR N/A**
06	Garden has some features that provide a **rich, multi-sensory experience** (things to do, look at, touch, smell, hear, etc.).					
07	Garden is **free from unpleasant sounds** (air conditioners, traffic, loading docks).					
08	Garden is **free from bad odors** (trash, vehicle exhaust, cooking smells).					
09	Plants **hide or soften unsightly views** (of fences, walls, equipment, etc.).					
10	Garden is **free from trash** (paper, cigarette butts, cans, etc.).					
11	Garden has at least one **trash can.**					
12	There is a **shed or other place to store tools** in the garden.					

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NATURE ENGAGEMENT 3

PLANTINGS	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE	NOT SURE OR N/A
01 **More than half of the garden surface areas are planted** (not paved).					
02 Garden has a **rich variety of plants** (combination of trees, shrubs, perennials; variety of species; etc.).					
03 Garden has **plants at multiple heights** (on the ground, raised beds, hedges, vines, trees, etc.).					
04 Garden has **plants that stimulate the senses** (sight, smell, touch, sound, taste).					
05 Some plants are **intriguing, provide "fascination"** (intricate flowers, unusual growth pattern, movement, etc.).					
06 Planting provides **year-round interest** (always something to see, such as flowers, leaves, berries, bark, evergreens, etc.).					
07 Some plants provide **bright colors** in at least one time/season of the year (with flowers, leaves, berries, bark, etc.).					
08 **Planting BEDS look well-maintained** (well-weeded, no large "bare spots," etc.).					
09 **PLANTS look well-maintained and healthy** (vibrant, well-pruned, etc.).					
10 **Plants are sturdy** enough to tolerate extreme weather, people picking flowers and leaves, etc.					
OTHER NATURAL FEATURES	**STRONGLY AGREE**	**SOMEWHAT AGREE**	**SOMEWHAT DISAGREE**	**STRONGLY DISAGREE**	**NOT SURE OR N/A**
11 **Plants provide food and/or habitat** for birds, butterflies and other desirable wildlife.					
12A Garden has at least one **water feature.** If NO, skip the next five questions.	YES			NO	
12B If YES, describe water feature briefly:					
13 Water feature looks **clean and well-maintained.**					
14 Water feature design and location **minimizes slipping hazards.**					
15 Water feature has **minimal splash** (spray from splashing can carry harmful bacteria).					
16 **Sound** from water feature is **pleasant and soothing.**					
17 Some **seating is available near** the water feature (within 15 feet).					

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WALKING & ACTIVITIES 4

PRIMARY WALKWAY (PATH OR PAVED THOROUGHFARE)	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE	NOT SURE OR N/A
01 Primary walkway is **relatively flat** (not too steep).					
02 Primary walkway **does not have steps or steep ramps.**					
03 Primary walkway is **smooth but non-skid, even when wet.**					
04 Primary walkway is **at least six feet wide** or, if narrower, has frequent passing areas.					
05 Primary walkway has a **curb or raised edges** (to keep wheelchairs, strollers, walkers, canes, etc. on walkway).					
06 Primary walkway has **seating approximately every 30 feet.**					
ALL PAVED AREAS (WALKWAYS AND PATIOS)	**STRONGLY AGREE**	**SOMEWHAT AGREE**	**SOMEWHAT DISAGREE**	**STRONGLY DISAGREE**	**NOT SURE OR N/A**
07 **Gaps or cracks in paving** (walkways and patios) **are narrow** enough for a wheelchair, stroller, or IV pole to cross smoothly.					
08 Paving **does not create glare** (is tinted concrete, colored stone, brick, etc.).					
09 Paved areas are **clear of debris and other obstacles** (twigs, leaves, hoses, etc.).					
10 **Trees/plants along walkways** and other paved areas **do not drop** a lot of leaves, twigs, seeds or fruits.					
LIGHTING, WAYFINDING, & AMENITIES	**STRONGLY AGREE**	**SOMEWHAT AGREE**	**SOMEWHAT DISAGREE**	**STRONGLY DISAGREE**	**NOT SURE OR N/A**
11 There are **landmarks and/or signage in the garden to help people navigate their way through** (and back to the entrance).					
12 **A drinking fountain** is in or near the garden.					
13 Garden has **lighting for night usage.** If NO, skip the next two questions.	YES			NO	
14 If garden has lighting: **Walkways are evenly lit.**					
15 If garden has lighting: **Lighting does not shine into patient rooms.**					
VARIETY & ACTIVITIES	**STRONGLY AGREE**	**SOMEWHAT AGREE**	**SOMEWHAT DISAGREE**	**STRONGLY DISAGREE**	**NOT SURE OR N/A**
16 Garden has **more than one walkway,** with a variety of routes, lengths, and destinations.					
17 At least one **secondary walkway offers increasing levels of difficulty** (with paving material, steepness, steps, etc.).					
18 Garden has **spaces/features for therapists (PT, OT, HT) to work with patients** (handrails, variety of walking surfaces, steps, etc.).					
19 Garden is **safe for children** (e.g., physically enclosed; easily viewed from nearby seating areas; plantings and other features are not harmful).					

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PLACES TO REST 5

SEATING AVAILABILITY & TYPE	STRONGLY AGREE	SOMEWHAT AGREE	SOMEWHAT DISAGREE	STRONGLY DISAGREE	NOT SURE OR N/A
01 The garden offers **many places to sit.**					
02 People can choose a **variety of types** of seating (benches, chairs, etc.).					
03 **Movable seating** is available (light enough to move but sturdy enough to prevent tipping).					
04 At least **50% of the seating in the garden has backs and arms** (so that people can easily get up and down).					
05 There is a **place where someone could lie down** for a rest (chaise longue, bench, lawn).					
PRIVATE OR SOCIAL					
06 Garden has **separate areas for activities and socializing,** compared with **contemplation/quiet conversation.**					
07 Garden provides a place where **3 or more people can sit together.**					
08 Some seating areas **allow people to interact with passers-by.**					
09 Garden provides **semi-private seating for one or two people.**					
10 Some seating makes it **possible to watch others from a distance.**					
AESTHETICS & SUN					
11 There is a **choice of seating in sun or shade** throughout most of the day.					
12 Seating **does not produce glare** (is not metal, white, etc.).					
13 Seating material **does not get too hot or too cold.**					
14 Seating, tables, and other furniture look **well-maintained.**					
15 Some seating has **attractive or interesting views.**					
TABLES					
16 **Garden has at least one table.** If NO, skip the next four questions.	YES			NO	
17 Some **seats have tables next to them.**					
18 There is at least one table **large enough for four or more people.**					
19 There is at least one **table that can accommodate people in wheelchairs or scooters.**					
20 **Tables do not tip** (for example, when people use as leverage to sit down and get up).					

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Appendices B – Polit Survey for the Nursing Assistants at the Villa Rosa Nursing and Rehabilitation Center

Landscape Architecture
DEPARTMENT OF PLANT SCIENCE AND LANDSCAPE ARCHITECTURE

Pilot Survey for the Nursing Assistants at the Villa Rosa Nursing and Rehabilitation Center

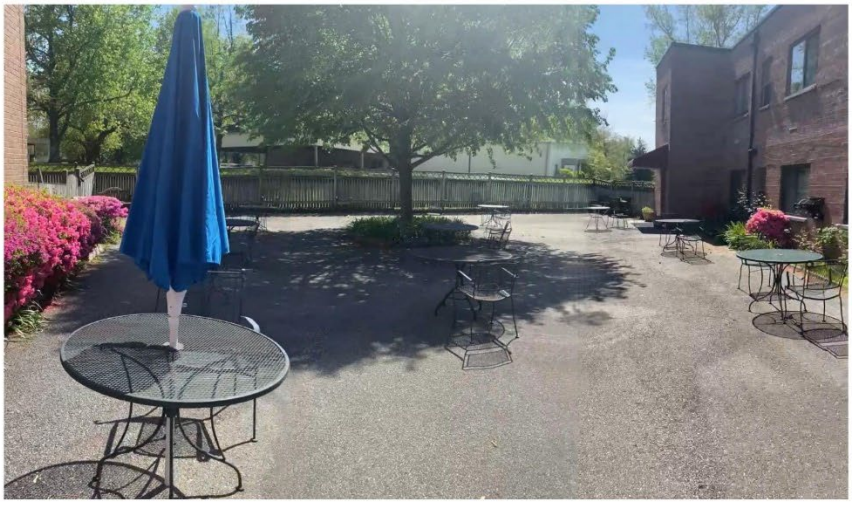
Introduction:

My name is Xiaojin Ren, and I am a Master's student of Landscape Architecture at the University of Maryland. For my design thesis project, I intend to use evidence-based design principles (conducting site inventory and analysis, incorporating existing theories about nature's healing effects and senior care facility designs) to design a therapeutic garden for the Villa Rosa Nursing and Rehabilitation Center ("the Center") in Mitchellville, MD. I intend to augment the existing outdoor area by adding a higher level of safety, accessibility, usability, and restorative effects.

The area I will be designing is a courtyard with some flowering shrubs, a tree, a few benches, and several patio tables and chairs (see photo below). **In this survey, the area will be called "the Courtyard."**

This survey is anonymous, and it will take about 5-10 minutes to complete. If you have any questions or concerns, please contact me at rxj22119@umd.edu or Mr. Barry Grofic at Barry.Grofic@fundltc.com

Thank you very much for taking this survey!



"The Courtyard"

About the Survey:

This survey contains three sections. **Section 1** asks questions about **you as a staff member** of the Villa Rosa Nursing and Rehabilitation Center ("the Center"). **Please answer the questions *from your personal point of view*. Section 2** asks questions about the **residents** of the Villa Rosa Nursing and Rehabilitation Center. **Please answer *from the residents' point of view*. Section 3** asks two optional open-ended questions.

Section 1: In this section, please answer the questions about the Courtyard for YOURSELF as a staff member.

- **How often do you visit the Courtyard in good weather?**
  - Always (every day that I work at the Center)
  - Often (most days that I work at the Center)
  - Sometimes (about once a *week*)
  - Rarely (about once a *month*)
  - I never visit the Courtyard
- **What time of the day are you most likely to use the Courtyard?**
  - Early morning (before 9 am)
  - Morning (9 am – 12 pm)
  - Early afternoon (12 pm – 3 pm)
  - Late afternoon (3 pm – 5 pm)
  - Evening (5 pm – 8 pm)
  - Night (after 8 pm)
  - I do not use the Courtyard
- **Overall, how inviting would you say the Courtyard is** (inviting = looks like a nice place to spend time)**?**
  - Very inviting
  - Somewhat inviting
  - Neither inviting nor uninviting
  - Not very inviting
  - Not at all inviting
- **From YOUR point of view and while looking at the provided photo or looking at the Courtyard, how would you rate the following features in the Courtyard?** Even if you do not use the Courtyard, I would still appreciate your feedback! For each feature, please check the box that best describes how you feel. In the last column, you can add information such as why you like or do not like a certain feature, or how you think it might be improved.

	Excellent	Very good	Good	Fair	Poor	Comments
Comfort of seating (chairs and benches)						
Amount of seating						
Attractiveness of seating						
Plantings in the Courtyard (trees, shrubs, other plants)						
Views through the windows into the Courtyard (views from inside)						
Ease of *getting into* the Courtyard from indoors						
Ease of *moving around* in the Courtyard						
Amount of shade available						
Lights/lighting						
Fence around the Courtyard						
Other, please specify						

- **What do you usually do in the Courtyard?** (Select all that apply)
  - I do not use the Courtyard
  - Take a short break
  - Exercise, including walking
  - Have a meal, a snack, or a cup of coffee/tea
  - Spend time by myself
  - Spend time with co-workers
  - Staff meetings
  - Spend time with residents
  - Others, please specify_____
- **Are there any other outdoor spaces at the Villa Rosa Nursing and Rehabilitation Center where you like to spend time?** Yes/No. If yes, please say where and why you like it (you can write in more than one space):

  _____

- **From YOUR point of view and while looking at the photo or looking at the Courtyard, how would you rate the following features in the Courtyard? For each feature, the response scale ranges from 0, which means "Not at all," to 10, which means "Totally."** Even if you do not use the Courtyard, I would still appreciate your feedback! In the last column, you can add information such as why you like or do not like a certain feature, or how you think it might be improved.

	0	1	2	3	4	5	6	7	8	9	10	Comments
This place lets me forget my everyday responsibilities, feel relaxed, and lose myself in my own thoughts												
This is a fascinating place that keeps my curiosity alive and stops me from getting bored												
This is a place where activities and things are orderly and well organized												
This place is another world, where I can move around at ease												
I feel comfortable here because it's easy to find your way around this place												

Section 2: In this section, please answer the questions from the point of view of the RESIDENTS.

- **What activities do you usually see residents doing in the Courtyard?**
  - Short break (for fresh air, change of scenery, etc.)
  - Exercise, including walking
  - Therapy (physical or occupational therapy, talk therapy)
  - Mealtime (breakfast, lunch, dinner, snacks)
  - Group activities such as exercise, games, barbecue
  - Visiting with family or friends who are not residents at the Center
  - Others, please specify_____

- **From a RESIDENT'S point of view and while looking at the provided photo or looking at the Courtyard, how would you rate the following features in the Courtyard?** Even if you do not use the Courtyard, I would still appreciate your feedback! For each feature, please check the box that best describes how you think RESIDENTS feel. In the last column, you can add information, again from a resident's point of view.

	Excellent	Very good	Good	Fair	Poor	Comments
Comfort of seating (chairs and benches)						
Amount of seating						
Attractiveness of seating						
Plantings in the Courtyard (trees, shrubs, other plants)						
Views through the windows into the Courtyard (views from inside)						
Ease of *getting into* the Courtyard from indoors						
Ease of *moving around* in the Courtyard						
Amount of shade available						
Lights/lighting						
Fence around the Courtyard						
Other, please specify						

- **Are there any other outdoor spaces at the Villa Rosa Nursing and Rehabilitation Center where residents like to spend time?** Yes/No. If yes, please say where and why you think residents like it.
- **Do you think residents should be allowed to use the Courtyard without a staff member being present?** Yes/No.

Section 3 (optional): In your own words, please answer the following two optional questions.

- **In what ways does going outside affect RESIDENTS at nursing homes?**

- **Please describe one of your best experiences in a garden** (a garden such as at your own home or a family or friend. Can be now or a memory from the past)**.**

Thank you very much for taking this survey!

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