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RESEARCH ON OUTDOOR LANDSCAPE DESIGN OF URBAN ELDERLY CARE CENTERS UNDER THE CONCEPT OF WELLNESS

Qualification work for obtaining a Master's degree

in specialty 022 Design

EPP 《Design of the architectural and landscape environment》

The qualification work contains the results of one's own research.

The use of ideas, results and texts of other authors must be referenced to the appropriate source. Signed by: Zhao Yuming 8EA9A46AB14A43D... Zhao Yuming（Justin）

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ABSTRACT

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Objective: The objective of this study is to develop a design scheme for an outdoor landscape of urban senior care centers, targeting elderly people based on health and wellness theory in order to explore the needs of senior people related to care services in an urban setting. Methods: Based on the principle of health and wellness and the theory of health and wellness landscapes, this study explores the key design points and design demands for this kind of project, and puts forward the guidelines of designing outdoor landscapes from the health and wellness perspective. With the analysis of the cases of designing classic health and wellness landscapes in both China and abroad, this study proposes design guidelines and corresponding design standard for this kind of design project, which include requirements about paving, vegetation, environmental relationship, and scale of facilities. Results: Based on this study, this study develops an overall design project for a senior care center. Conclusion: As a concrete application of the design theory of health and wellness in urban senior care centers, this study combines the design theory with environmental factors, and can provide a good reference for other similar design projects.

Keywords: Urban elderly care centers; health and wellness principles; landscape architecture; elderly residential facilities; environmental aesthetics

INTRODUCTION

Research relevance: As population aging becomes a worldwide challenge, more consideration should be paid to elderly care in cities. Wellness theory emphasizes physical, psychological and emotional wellbeing of seniors. Appropriate outdoor landscape design makes nature readily available, calms the worries of elderly people, encourages exercising and socializing. This makes life better for elderly and contributes to their healthy aging; therefore, the issue is highly relevant today.

Research objectives: Centering on the idea of elderly friendly wellness care, this research tries to maximize the functions and space layout design of landscape to create an ideal and comfortable environment for elderly wellness care, which can be a reference for elderly landscape planning in the urban area.

In order to accomplish the above purpose, the following research objectives will be established: 1. Review the theoretical base of wellness oriented design concepts and discuss the design principles and compliance criteria for the outdoor landscape of urban senior care centers. 2. Analyze the present situation with the outdoor landscape of urban senior care centers and determine the problems of age-friendliness and healthiness of the landscape design. 3. Create the system of outdoor landscape design for elderly care centers based on health and wellness, considering the physiological, psychological and social requirements of seniors. 4. In order to solve the landscape design problems, optimize the functional zoning, planting design and landscape facilities design of the outdoor space of the senior care center. 5. Elaborate the design approaches of the outdoor landscape of urban senior care centers according to the wellness design concepts, providing the reference material for such projects.

Object of the study – This study is concerned with the outdoor landscape environments in urban senior care facilities and their spatial configuration, facilities arrangement, and design features.

Theme of the research – The topic of this research is related to the wellness care paradigm, and it analyzes problems of outdoor landscape design for the elderly and seeks landscape design techniques that will suit the needs of seniors physically and psychologically.

Thesis structure and contents. The thesis is made up of the introduction, 5 chapters, conclusions and references (_20_ entries). The core part of the research amounts to 59 pages, the overall volume, including appendices, is 75 pages.

Significance of the study：For more information,1.3 Research Objectives and Significance.

Terrestrial scope of research；Methods of research：For more information, see 1.5 Research Objectives, Methods, and Technical Approach.

CHAPTER 1

INTRODUCTION AND RESEARCH BACKGROUND

1.1 Research Background

Population aging has emerged as an irrevocable and fundamental restructuring of society's structure across the world in the 21st century. Based on the statistics from the United Nations publication "World Population Prospects 2024," for the first time in history, the population aged 65 or above globally has surpassed that of the population below five years of age, and by 2050, one out of every six people across the globe will be at least aged 65 years old. This trend not only prevails in the early-adopting aging societies like Europe and Japan, but it is also quickly spreading to developing countries. Aging has exerted pressure not only on social welfare and health care systems but also transformed deeply into urban lifestyle, public space use and built environment ethic. The construction of built environment that fits well in an aging society has therefore become a central topic for the global urban design and development profession.

With regard to the China case study, the aging process has the following three unique features: "on a large scale, with great speed, and uneven development in various regions." According to the National Bureau of Statistics of China as of the end of 2023, the number of those aged 60 and above has amounted to nearly 300 million in China, which constitutes more than 21% of the country's total population; in this age bracket, the number of people aged 65 and above is roughly 217 million, which amounts to 15.4% of the total. It took just about 20 years for China to evolve from an age society characterized by light aging to a moderately old one; the respective period was 115 and 70 years for France and the USA, respectively. However, what is even more interesting, as per the forecast made by the China Population and Development Research Center, by 2035, the number of people aged 60 and above in China will exceed 400 million, which accounts for more than 30% of the total population of China, thus entering a seriously aged

society. At the same time, families keep getting smaller (the average household size being less than three people), and empty nest families are a common occurrence nowadays.

Aging population process is also accompanied by the transformation of societal paradigm on the "quality of life of older adults." Elderly care services have always been restricted by the "survival-oriented" thinking with a sole emphasis on medical service provision, assistance, and risk prevention. Within such thinking, when designing urban elderly care facilities, priority was given to the internal provision of medical service and housing while outdoor landscapes were not sufficiently considered due to their gerontological and healthy aspects. In the spatial structure of elderly care facilities, medicalization and enclosure are quite obvious: outdoor environments in many urban elderly care facilities—especially in renewed or enlarged facilities in dense old urban area—are characterized by limited size, limited functionality, and lack of design consideration, treating outdoor environment as an important platform for proactive health management. With two major changes taking place now—the increasing aging population and socialization of elderly care—it becomes highly relevant to look into the design strategies of outdoor environment capable of solving problems of land resources limitation and utilizing therapeutic potentials of landscape.

By the third decade of the 21st century, under the impetus of "Healthy China 2030" strategy and the "Active Aging" notion, there has been a profound change in urban elderly care models from "survival-oriented" to "wellness-oriented". The "wellness" concept has expanded from the previous "medical-elderly care integration" model, which is characterized by passive disease treatments, to emphasize health-related behavior, life-long management and integrated well-being in physical, psychological, social and spiritual aspects. Moreover, through "Functional Ability" framework put forward by World Health Organization, it can be understood that the essence of elderly well-being does not only lie in disease-free conditions, but more importantly in individual's ability to take part in valued activities. Applying this notion to spatial designs, the key point is that elderly care

spaces should not only be regarded as mere "containers" of safety, but rather as "wellness catalysts"—spaces in which elderly people can have their own activities, multisensorial experiences, social interaction and meaningful construction.

In this paradigm shift, the outdoor landscape becomes indispensable. Research around the world suggests that good quality health and wellness landscape featuring natural light, vegetation growth, seasons, and outdoor activity can decrease the chance of falling in the elderly population by 26%, increase the interaction frequency by 40%, and even relieve depression. How to change the outdoor environment from "closed green spaces" to "health-supporting systems" within the limited land resources of cities has become the most crucial issue for designers to confront an aging society.

1.2 Current Challenges in the Outdoor Environment of Senior Care Centers

Although models of elderly care have started to evolve from the "wellness-oriented" perspective, the creation of outdoor environment spaces for elderly care centers in China is still quite primitive, leading to a huge disparity between elderly care centers and the actual requirements of the elders. The major issues faced by these outdoor environments could be listed as follows.

The first reason is that there exists a “bottom-line mentality” that makes the design functionally oriented. For example, in most senior care facilities, the design of outdoor spaces is limited only to accessibility criteria. While safety features like ramps are already provided, the function of the spaces is only confined to accessibility and provision of resting places. Courtyards are simply designed to be hard surfaces like plazas or lawns with no zonation and facilities that promote physical activities. As a result, the number of physical activities like exercise, gardening, and social events of seniors are very rare. In other words, the positive function of “encouraging activity” has not been achieved in these spaces.

The second problem stems from the severe lack of psychological comfort. Current outdoor environments do not consider the emotional and psychological well-being of elderly people because of the following facts: no places for semi-

private relaxation, no landscape features that could provide nostalgia or familiarity, and no multisensory environment. In some care facilities, which forbid senior residents to garden and feed birds even for their own safety, it becomes more difficult for them to feel environment control and personal purpose of actions. The research on environmental psychology shows that such an environment may worsen feelings of depression and learned helplessness among elderly people.

Third, a "supervisory" spatial pattern could discourage autonomous behavior. In comparison to the internationally recognized principle of "Supportive Environment," there is no well-established "wellness landscape" system in the majority of outdoor settings in local old-age care centers that could stimulate autonomous behavior and encourage moderate risks and cognitive engagement; therefore, there is a pressing need for the development of new design approaches.

1.3 Research Objectives and Significance

The purpose of this research is to develop a systematic design framework of outdoor landscape design for urban elderly care facilities under the health and wellness paradigm. At present in China, the prevailing trends in elderly care landscape design include a bias towards “medical care over health and wellness” and “safety over experience”; as a result, outdoor spaces tend to become supplementary and limited courtyard-type spaces without a systematic design framework that can address the health management of elderly people. Based on the paradigm of "health and wellness," this study makes use of interdisciplinary knowledge, such as environmental psychology and geriatrics, to propose a systematic framework which includes design guidelines, design strategies, and the distribution of elements for health and wellness. The primary goal of this framework is to break the “bottom-line thinking” of barrier-free design and turn the outdoor spaces into “health and wellness supporting system rather than passive safety container.” This research contributes both theoretically and methodically to the design and planning of outdoor spaces in urban elderly care settings.

The significance of this study in the theoretical sense is to enrich the interdisciplinary research of environmental design, specifically in the disciplines of geriatric psychology and rehabilitative landscape design, while aiming at establishing the theoretical base for environmental design in dealing with the issues of aging society. From one perspective, through the introduction of concepts in environmental psychology, such as "stress reduction theory" and "attention restoration theory," into the analysis of elderly care landscape, the aim of this study is to explore the cognitive schemata and emotional connection of senior citizens toward the outdoors, thus filling in the theoretical gap that the existing studies lack, which only consider the physical accessibility but ignore the psychological accessibility. From another perspective, through the adaptation of the concept of "medical garden" and "healing courtyard" in the theory of rehabilitative landscape, the study is meant to explore the applicable limits and adaptability of the theory of health and wellness principles under limitations of space restriction, high intensity of use, and diversified demands.

Practical relevance of this research is seen in developing design solutions for outdoor landscapes of elderly care facilities such as nursing homes, community elderly care facilities and daycare centers situated in dense urban areas. This research develops new spatial configurations for wellness-oriented landscapes and provides a detailed method of their implementation considering safety and user-friendly aspects. Research results can be transformed into practical application tools in the form of design analysis reports and evaluation scales.

1.4 Current State of Research Domestically and Internationally

Globally, research into the living environment of older people started relatively early in developed nations; thus, theories were formed and practices were implemented.

In terms of welfare states, the Nordic example shows an example of an age-friendly strategy known as Aging in Place. The concept of welfare states includes “Aging in Place” that focuses on the idea of familiarity and comfort within the

housing environment. It encourages a compact community model, the main idea of which lies in the integration of facilities providing elderly care within the residential area itself.

Japan has developed an advanced system of high-quality design, which is age-friendly in nature. Being the pioneer among Asian countries, which has entered the era of super-aging society, its design philosophy consists of three crucial aspects: overall design, refinement, and creating a sense of belonging. From the perspective of space design, it stresses functionality and circulation; from the perspective of design details, it considers very small things like rail height, floor material, signages, etc.; and from the perspective of psychology, it offers psychological comfort and place identity through courtyards.

America uses the theory of "Healing Garden" as one of the major theories. The researchers in America have taken the idea of restorative landscapes used by hospitals and expanded it to homes of older people. The idea of "Universally Restorative Gardens" is the result of this expansion of the concept of restorative landscape. This theory focuses on the sensory stimulation and garden activity to improve physical and psychological health of elderly.

There has been a shift in the Chinese elderly care service provision approach in terms of policy making from "institution as last resort" to "community and home care as the main approach with institutional care as a complement". With the recent progress in Healthy China 2030 program and the regionally based elderly care development plans, there has been a need in terms of policy making to build an age-friendly environment. At present, most research is confined to architecture and urban planning, but not much work has been done in the area of landscape in terms of environmental design.

The last two illustrations will be examined in-depth in the following section.

1.5 Research Objectives, Methods, and Technical Approach

Purpose of Research: The purpose of this research is to combine health and wellness ideas with the outdoor environment of elderly care institutions in urban

areas, and thus create a safe and accessible environment outdoors. Firstly, this research will explain the basic ideas of health and wellness ideas, and the value of their implementation in the landscape design of elderly care facilities. Secondly, it will examine the real outdoor environment needs of the elderly group and their physiological and psychological features. Additionally, this research will examine some representative examples in order to discover the strengths and weaknesses of the current outdoor environment of elderly care centers in urban areas.

The methods of research used are as follows:

Methods of conducting literature review: to systematically search for, analyze, and evaluate the existing literature.

Method of Experiment/Case Study Methodology: In an experimental setting, variables are fixed, and the subjects are manipulated to establish cause and effect.

An interdisciplinary research methodology is an approach that involves the use of theories, techniques, and instruments from multiple fields in order to overcome the shortcomings of a single disciplinary approach and create holistic answers or solutions, which makes it appropriate for solving complex problems faced by society, technology, and so forth.

Design practice method: Concentrate on design processes through taking tangible steps like prototyping, testing, and getting feedback from users to achieve validated design solutions, while at the same time validating and enhancing the theory.

Interviews / Questionnaires: Using both these techniques together can make use of the relative advantages of qualitative and quantitative approaches.

The technical methodology of this study is as follows:

The research follows the logical flow "theoretical construction—empirical research—strategy formulation—design validation" and the technical flow of the research is divided into five stages.

Phase one is the theoretical phase. In this phase, a literature review will be conducted where definitions of key concepts such as that of wellness and health, urban elderly care centers, and wellness and health landscapes will be obtained

through the integration of environmental psychology, rehabilitation landscape theory, and ergonomics for older adults.

The second stage entails design research. There will be two to three urban senior care facilities that are chosen as case studies, and a combination of methods, including POE, survey, and interviews, is utilized to collect information about behaviors, spatial satisfaction, and pain points of the elderly when using outdoor areas. It will enable the identification of four types of common problems: spatial design, detailing, management, and health and wellness service-related problems.

Phase three concerns the development of strategies. Based on theoretical insights and analysis of the problem, this phase formulates design strategies from four perspectives including design principles, layout, wellness environment components, and detailing.

The fourth step is that of design implementation phase. This step includes the selection of site for design proposal, analysis of the project, positioning of the concept, development of the master plan and finally making specialized designs for critical areas like landscaping, landscape elements and signages and presenting the design results using the tools like site plan and rendering.

Conclusions and future directions are included in the fifth section. This section includes the major conclusions of the study, limitations of the study, and future research directions.

Refer to Table 1.

CHAPTER 2

RELATED CONCEPTS AND THEORETICAL FOUNDATIONS

2.1 Conceptual Definition of Urban Elderly Care Centers

Elderly care centers in the urban setting form the main research object of the present work; the definition of this concept directly affects the boundaries of the study as well as applicability of the research methods. From a general point of view, elderly care center means a place where elderly people receive all kinds of services.

In detail, an urban elderly care center can be defined as the institution established in the urban construction area, making use of the existing public facility system and traffic network system of the urban area in order to deliver elderly care services in a centralized or integrated manner for the urban elderly residents. According to the service models and scale classifications, there exist three types of urban elderly care institutions: firstly, the large urban elderly care institutions, which possess their own site, accommodate 200–500 beds, and serve the whole urban area; secondly, the community-embedded elderly care centers, which function in the sub-districts or large residential areas, have a small scale (30–100 beds), and uphold the idea of "stay within the community without going out of the house"; and finally, day-care centers, which do not offer the accommodation but only deliver care service during the day time for semi-dysfunctional and healthy elderly people.

Here is an attempt to summarize the main distinctions between suburban villa-style senior living communities and urban senior living complexes. First of all, there are distinct differences in terms of location and land availability. The fact that suburban villa-style senior living communities have access to land allows them to develop into low-density areas where landscaped environments can be created, while urban senior living complexes usually represent high density

developments. Secondly, there is a distinction in terms of the relation of the developments to the surrounding urban environment. While suburban communities tend to demonstrate a closed and somewhat isolated spatial structure, urban senior living complexes interact with the surrounding area of neighborhoods and healthcare services.

Refer to Table 2.

2.2 Health and Wellness Concepts and Health and Wellness Landscapes

The concept of "health and well-being" has evolved into a composite concept recently in relation to the policy initiative of "Healthy China"; however, the meaning and implication of the term remain vague in scholarly research. It can be easily conflated with the idea of "integration of healthcare and elderly care."

"Integrated medical and elderly care" is defined as the combination of medical services with elderly care services, thus offering senior citizens continuous health services such as diagnosis and treatment, rehabilitation and nursing care, long-term care and end-of-life care. The central tenet in this concept is "treatment of diseases and elderly care when no disease exists," and essentially it remains a reactive health model that focuses on medical intervention as the principal means of practice. In terms of spatial layout, elderly care centers planned using this integrated concept display clear features of medicalization, with treatment rooms and rehabilitation halls abounding, while the outdoors remain subordinate in importance and function to serve merely as areas for "patients to take some fresh air."

The term "health and wellness" is viewed as a paradigm shift from "passive treatment" towards "proactive health." The modern definition of health provided by WHO has gone far beyond the simple concept of "absence of disease." It comprises three dimensions, which include physical, psychological, and social adaptation. The term "health and wellness" goes even farther in including all three mentioned dimensions and adding one more, which results in formation of the holistic view of health that integrates "physical, psychological, social, and spiritual

dimensions." First, physical health and wellness include the maintenance or improvement of bodily functions through moderate physical exercises, proper nutrition, and physiological cycles; second, psychological health and wellness presuppose positive emotional control, the maintenance of cognitive abilities and self-respect, along with prevention of depression, anxiety, and learned helplessness; third, social health and wellness imply establishment of interpersonal relations and social inclusion through intergenerational contacts and volunteer work; fourth, spiritual health and wellness comprise the process of forming the meaning of life, which includes the practices of nostalgia, cultural heritage, religion, and art enjoyment.

For the purpose of this research, it is intended to employ the health and wellness paradigm as the key value system in the hope of transcending the old "incident avoidance" philosophy and designing landscape spaces that can truly promote the vitality of the elderly population.

Health and Wellness Landscapes act as the primary means whereby the theories of health and wellness can be realized through the process of spatial design, while at the same time functioning as a major means by which environmental design can meet the problems of an aging population. The idea itself comes from Western theories of rehabilitation landscapes, yet has been broadened in meaning and interpretation.

Definition: Health and Wellness Landscapes are defined as outdoor spaces that are purposely created with the intent of fostering physical and psychological well-being of its occupants, prevention of disease and improvement of their quality of life. In contrast to healing landscapes that mostly concentrate on recovery from diseases, health and wellness landscapes address not only people with illnesses or physical disabilities, but also healthy people and people with sub-optimal health status. The functional purposes of these landscapes involve not only "treatment," but also maintenance and enhancement. In other words, they work in four dimensions simultaneously - physiological, psychological, social, and spiritual - to maintain the optimal health status.

Core Features: According to the research findings of domestic and international scholars, there are five core features of wellness landscapes. The first feature is rich sensation: With the inclusion of natural elements such as plants and water, these landscapes offer comprehensive sensory experience, which triggers the sensory systems of older adults and slows down their sensory decline. The second feature is participatory action: Different from the simple observation landscape where people can only observe from the far away, wellness landscape highlights the participatory experience. Examples are the planting beds and interactive installations, which allow older adults to get the feeling of success and self-efficacy through the participatory experiences. The third feature is social catalyst: Through the careful arrangement of spatial nodes such as circles, chess tables, and tea pavilion, these landscapes provide informal occasions for the encounters and conversations and stimulate social interactions of older adults and across generations. The fourth feature is appropriate challenge: Instead of being obsessed with absolute “accessibility” at the cost of smoothness and safety, wellness landscapes integrate the challenges to older adults’ physical ability into their landscapes in the context of security and control, including slopes, different texture walking paths, and steps with little height. The fifth feature is generation of meaning: By including nostalgic elements, cultural symbols, and life education, these landscapes help older adults discover meaning in life.

To conclude, health and well-being environments are more than just "planting trees and giving seats," as they represent a full-fledged environmental design process based on evidence-based design that seeks to attain holistic health effects and combines experiential aspects and feasibility. The further strategic actions and design approaches of this study will be underpinned by this definition and its essential features and needs.

2.3 Theoretical Underpinning

The first one is environmental psychology, which is a science that deals with the rules of interaction between people and their surrounding environment. This

theory will be the basis of theoretical grounding for studying behavioral patterns, psychological needs, and preferences of the elderly in outdoor environments in this research. Three basic concepts, which are personal space, territoriality, and environmental cognition, can give guidelines for landscape design for the elderly.

Definition of personal space is that it is a psychological area around an individual, which the individual prefers to keep free from intrusion by others without his/her consent. It is the requirements of older individuals with regards to personal space that stand out in their own way: On one side, owing to decrease in physical ability, older individuals become more vulnerable to "approach" that may pose some danger; on the other side, due to the continuous life inside an institution, it may result in continuous shrinkage of personal space, further making them helpless and depersonalized. Outdoor landscape design should take into account the "adjustable social distance" aspect of personal space requirement.

Territoriality can be defined as a psychological characteristic where an individual or group establishes ownership and identity towards a particular spatial area. Studies reveal that territoriality plays a very important role in elderly people who stay in the institutions as it gives them certainty, a feeling of safety and sense of accomplishment, hence, fighting against the state of "learned helplessness." However, in most existing care centers for the seniors, the outdoor spaces are completely open areas called "public lawns," without giving the elderly residents a sense of belonging, hence it becomes challenging for them to identify any particular area of the space as "my corner." The design solutions can be achieved through three different levels: first, personal domains (e.g., individual gardens outside every residential unit), second, group domains (e.g., outdoor platforms for every care unit on every floor, available only for the residents of that floor), and third, shared domains (e.g., shared garden plazas for all residents of the whole building). In this way, the elderly can also enjoy a psychological boundary system like their "home" in outdoor areas.

Environmental cognition is a term used to describe how individuals gain, encode, store, retrieve, and decode knowledge of their spatial environment.

Cognitive deterioration is typical among older adults, especially when it comes to orientation and navigation. Ways to deal with this problem through design solutions involve ensuring clarity of paths, increasing landmark recognition, and developing a signage system suitable for older adults. Another solution involves the use of small indicators such as the orientation of the pavement, rhythmical plant arrangements, and olfactory hints.

Following that is the theory of landscape rehabilitation—a groundbreaking theory where environmental design and the health sciences meet—that gives scientific backing to the statement that "natural environments have the ability to facilitate the physical and psychological well-being of the elderly population." Among all of these theories, the theories of stress reduction by Ulrich and attention restoration by Kaplan stand out as the two pillars.

The Stress Reduction Theory (SRT) by Ulrich was developed in 1984 by the environmental psychologist from the United States of America, Roger S. Ulrich. According to this theory, natural landscape can reduce a person's physiological and psychological stress reactions quickly and efficiently. In a number of experiments conducted by Ulrich, people viewing natural landscapes, including green areas, bodies of water, plants, and so on, showed much lower muscle tension, skin conductivity, heart rate and blood pressure than those viewing urban architectural landscapes; simultaneously, their level of positive emotions increased considerably, while that of negative emotions decreased. The explanation of the process lies in human evolution: during long-term evolution, people became used to natural environment with "favorable survival conditions," namely access to water, vegetation and open spaces. This predisposition leads to automatic activation of the parasympathetic nervous system and inhibition of stress hormones production, which ensures physiological and psychological recovery of a person.

The implications of stress-reduction theory in the design of the outdoor landscape of elderly care facilities can be summarized into the following three factors: First, visual accessibility is important as it ensures that there is an opportunity for "passive contact" with nature on a regular basis. Second, the role of

water must not be overlooked, but at the same time, safety standards must also be maintained. Third, the spatial scale needs to be appropriate."

According to Kaplan, Attention Restoration Theory (ART) is a theory developed by Stephen Kaplan and Rachel Kaplan in 1989. The theory suggests that an environment having the following four features will be able to restore orientational attention effectively: Being Away (offers psychological escape from everyday concerns and stress); Extent (is rich enough to create a feeling that one is 'in another world'); Fascination (has components that automatically grab attention and don't need any voluntary efforts from people [e.g., ripples, light and shadow effects, small animals]); and Compatibility (matches personal interests).

ART application to elderly care landscape design leads to the following interventions. Firstly, the creation of “gazing points”: at critical points on the path, there should be designed fascinating views that are appropriate for extended gazing by elders, such as ornamental fish ponds or wavy strips of ornamental grass, which produce "soft attraction," which will help in cognitive recovery without demanding cognitive work. Secondly, the creation of psychological borders: by means of clumped planting, changing the level of terrain, or pergolas, "small worlds" can be created, which are separated from areas of activity and recreation, which will help in achieving "distancing" for elders. Thirdly, the provision of explicit support for activities: it is necessary to make sure that the width of the paths allows parallel walking of two people, and provides easy access of wheeled chair movement, while providing proper height of seating and handrails, corresponding to biomechanics of rising by older people.

Lastly, geriatric ergonomics is an area of research that considers the relationship between the physical size, physiological function, perceptual ability, and environment of elderly individuals. The science of geriatric ergonomics offers a quantitative base for this study to move from a “human body scale” to a “human scale.”

In terms of the effect of physiological factors in the elderly on design, one can highlight the following two aspects. The first one involves the loss of flexibility in

bending which makes the actions of "squatting" and "bending" difficult and dangerous. Design consequences include the following: the height of planting beds has to be raised to 60-75 cm (the knee clearance height for people who use wheelchairs is about 65 cm and the comfortable operating height for standing seniors is 75-85 cm); planting at ground level which will require bending for weed removal or squatting for picking fruits has to be excluded; the operating surface height of outdoor bins, benches, and water distribution valves has to remain in the range of 80-90 cm; there has to be enough clearance under these objects to make it possible for wheelchairs to access them easily; the discharge opening of the waste bin has to remain high enough to avoid the risk of losing balance by elderly people throwing their wastes while being bent. The other aspect is related to the loss of strength in hand grip and dexterity of fine motor skills. Design consequences include the following: the handrail diameter has to remain within 3.5-4.5 cm (railings of smaller diameter will not provide enough grip, and railings of larger diameter will be hard to grasp); the materials have to include wood with the lower thermal conductivity coefficient or metal with plastic coating; faucet activation has to use the design of long-handled faucet or sensor-controlled faucet rather than rotary or pinch faucets; the height of access control card reader and emergency call button has to remain within 90-110 cm with the button size not less than 2 cm and the pressing force not more than 3 N.

It is common for older people to experience sensory impairment in many senses, which makes a big difference in how they perceive outdoor spaces.

The design-based mitigation measures are as follows: Paving design—in case of unevenness of the ground, color or tactile contrasting must be applied (for example, yellow warning stripes); slope differences alone cannot ensure attraction of attention; the different types of pavings are to be marked by variations in colors, textures, and joints; in this way, a "tactile map" will be created to assist elderly visually impaired people with spatial orientation; high-gloss surface of stones and polished tiles should be avoided due to the possibility of glare reflection; Planting—the inability of the elderly people to distinguish yellow from blue should

lead to cautious approach to the application of single kind of yellow flowers or blue flowers as navigational guides; instead of that, plants with long-wavelength colors (red, orange, or white) should be used; the height of the branching point of the roadside tree should not be below 2.2 m to prevent low hanging branches that can interfere with the vision and movement of the elderly person; plants with thorns, sharp-edged leaves, and adhesive secretions should not be planted.

Hearing loss is normally represented by high-frequency hearing loss (for example, problems recognizing consonants, women's voice, and bird songs) and people are more sensitive to the masking effect of the background noise. The recommendations are as follows: at places where auditory information is needed (at intersections, the beginning and the end of stairways), different kinds of pavements may be used to give double feedback – tactile feedback by foot and auditory feedback due to the friction between the pavement and foot; the design of water elements should have low frequency elements included (waterfalls, springing water, and steamed water pools); and the background music and the system of alarms should not include pure high frequencies and their sound pressure level should exceed the background noise level on 6-10 dB.

In conclusion, ergonomics for the elderly population offers exact guidelines in the design of outdoor landscapes, whereby the approach moves from a general "human body model" to an "age-specific human body model." It is only by accounting for these small differences in physiology in the design process that we will achieve "user-friendly" environments.

Refer to table 3.

2.4 Guiding Principles of Health and Wellness Concepts for Outdoor Landscapes

Health and well-being philosophy acts as both value orientation and evaluation standards for designing the outdoor landscape of elderly care centers in urban areas. This research, based on the definition of key concepts and the theoretical background, has developed five basic dimensions: safety, stimulation,

social interaction, control, and aesthetics. The five basic dimensions form a logic chain of design from “basic protection” to “quality improvement.”

The first aspect is that of safety, including everything from physical to psychological safety.

Safety is the first prerequisite of elderly care landscape design, and it constitutes the basic requirement of designing all age-friendly spaces. Yet, the idea of well-being in elderly care goes one step further by extending the concept of safety from the realm of conventional safety, such as fall prevention and accident prevention, to psychological safety.

Physical safety is about providing direct protection of seniors from any physical harm. Physical safety of outdoor landscapes is ensured through the following means: Ground safety — surfaces used in paving must have non-slip surface, sudden elevation change must be avoided to make sure that the tip of the cane or walker does not get stuck; Facility safety — seating edges must be round, handrail fixtures cannot have any protruding screws, planting bed edge width must be 30 cm and more so that it would provide an opportunity to sit and not just serve decorative purposes, and railings are to be provided on the edges of all water features; Plant safety — toxic (oleander), thorny, allergenic, and fruits with huge size and very hard surface (like mango) are prohibited in the whole territory. Emergency access to evacuation routes must always be maintained and sufficient space for wheelchair rotation must be provided on either the end or turns of each route.

The notion of psychological safety is a great evolution of the term "safety" in the context of healthy aging, as it concerns the condition where elderly people do not experience any unpleasant feelings, such as fear, when being outdoors. In particular, the provision of psychological safety requires taking into account the following points: lighting during the night should not provide shadows in order to ensure the absence of social exposure, preventing the elderly from being exposed to the eyes of other people or windows located over them; existence of the clear exit route—the presence of the clear exit route in each area to allow elderly people

to leave unnoticed when they want to. It is important to note that the idea of psychological safety presupposes providing protection of life and health with the focus on ensuring dignity and independence of the elderly.

Following that is the stimulatory component, intended to address sensory deprivation and cognitive degeneration in elderly individuals.

The principle of stimulation is based on the concept of proactive action taken to counteract any functional decline of the senses or cognitive abilities among older people. Living in institutions for a prolonged period of time, exposure to repetitive environmental stimuli, and lack of outdoor activities can easily bring older individuals into the state of “sensory deprivation,” where they experience reduced responses, indifference in emotional state, and impaired perception of time. This, in turn, results in faster degradation of cognitive abilities. Hence, wellness landscapes must function as “sensory gyms,” using different environmental stimuli to stimulate the senses and cognitive abilities of older individuals.

The multi-channel synergy of the stimuli is the primary technique of the stimulation principle. Stimulation of a single channel (for example, only visual stimuli) will inevitably cause adaptation and fatigue; however, multi-channel synergistic stimulation may generate a "superadditive effect." The outdoor spaces of senior care facilities must incorporate the following sensory stimuli: visual stimulation—keeping the visual system working using elements like seasonal changes in vegetation, colors, and shadow play; auditory stimulation—using natural sounds like fountains and wind chimes but avoiding any noise pollution; olfactory stimulation—using fragrant plants such as rosemary and generating distinct "olfactory signatures" of each place to assist seniors in orientation and emotional regulation while avoiding allergies; tactile stimulation—providing touch walls from various materials (stone, wood) and encouraging seniors to use their sense of touch to perceive textures; gustatory stimulation—generating edible landscapes such as herb gardens where seniors may taste what they have cultivated.

Cognitive Stimulation constitutes a high level application of the principle of stimulation and consists of the training and upkeep of cognitive functions such as attentiveness, memory, and executive functions of elderly people. Design strategies involve: Memory cues – integration of local nostalgic elements (for example, Chinese landscape stones) to trigger autobiographical memories and encourage story-telling amongst the elderly population; Way finding activity - creation of path systems of medium difficulty level (for example, maze gardens with circular pathways) allowing elderly people to engage in spatial exploration and problem solving games within the safety boundaries, guaranteeing that all paths lead to the safe exit point for avoiding anxiety due to the fear of getting lost; Gamified interaction – combining the use of digital cognitive training tools (for instance, touch-sensitive reaction light wall game) along with traditional puzzles. It is very important to remember that the essence of the principle of stimulation is "moderation" – the excessive stimulation can be a source of anxiety and fatigue, while inadequate amount of stimulation will not provide any training. It is important that the design provides different levels of intensity of stimulation allowing elderly people to choose their level of involvement independently.

The next one would be the social aspect, which is intended to relieve loneliness among the elderly.

The social factor is one of the main tools in the fight against social isolation and loneliness which are the major obstacles to the healthy aging of the population. According to numerous studies on epidemiology, the negative impacts of social isolation and loneliness, which include increased risks of mortality from any cause, might even be more harmful than obesity and physical inactivity. Thus, health and wellness environments should act as a "social catalyst," providing people with opportunities for informal social interactions and community involvement.

Creating spatial designs that encourage informal interactions is the core of the social design concepts. Studies show that most of the social interactions among seniors are not because of formal invitations or organized social events, but as a result of informal interactions during their everyday routine. The designers must,

therefore, create an environment where such interactions can take place: firstly, ensure optimal pathways by converging the main pathways leading to high-use zones such as residential zones and activity rooms, increasing chances for meeting seniors; secondly, provide resting points allowing seniors to stop and initiate discussions whenever they want; thirdly, change the seating pattern to one that allows face-to-face interaction without causing visual barrier by designing them in L-shape, C-shape or closed shape; and fourthly, create a “third place” by making use of the relevant theory to create an outdoors space resembling “community lounge,” having comfortable seats and low threshold activities for seniors.

Intergenerational interaction promotion and creation of a sense of community belonging are two major expansions of the sociality principle. While the main purpose of senior care centers in cities is to provide services for seniors, the spatial isolation from the neighboring neighborhoods results in very few intergenerational communication opportunities. Some of the approaches are: integration with childcare services – under favorable site conditions, the senior care center can be located adjacent to a community kindergarten, using a fence for the creation of an "intergenerational garden", which will allow the elderly people to watch children playing and participate in low-intensity interactions; according to the research data, such intergenerational communication can help to decrease depression symptoms and increase the sense of social importance in the elderly people; community-oriented interface design – installing transparent fencing and landscape seating at the street frontage to encourage people who live nearby to stop and rest there, thus overcoming the "isolated island" feeling about the senior care center; and volunteer activities zones – reserving the spaces for conducting the gardening assistance, walking and conversation by community volunteers, as well as installing the appropriate signage and facilities for volunteers' services. The creation of a sense of community belonging involves the domain-specific design – as was stated before, thanks to the hierarchical domain structure (individual domain -> small group domain -> center-wide public domain), the elderly people are able to feel responsible towards their "floor garden" or "unit courtyard".

Controllability comes next. It gives older people the right to choose and have a sense of control over their actions.

Controllability is one such principle that acts as a main point of difference between the Health & Wellness Design approach and the conventional "care-based" Design approach. From the Health & Wellness point of view, the principle of controllability states the maximization of the freedom of choice available to the elderly in order to make them the true owners of their space.

Adjustment of environmental elements becomes a direct means of ensuring controllability. This can be achieved by making sure that the design does not fix all the environmental aspects but instead gives room for adjustment to allow the elderly set their own preferences.

Conclusion It should be mentioned that these four values - safety, stimulation, sociality and controllability – complement each other and become increasingly related: safety acts as the basic protection; stimulation helps to maintain perceptual activity; sociality contributes to emotional communication; and controllability provides dignity and independence. The four values combined act as the value-based structure of outdoor landscape design in the cities' nursing homes from the viewpoint of health and wellness philosophy.

Aesthetics is another feature that seeks to give elderly persons a pleasing experience through their senses for the good of their physical and psychological wellbeing.

Aesthetic aspect is a crucial part of landscape design. Regarding physiological well-being, there is enough evidence-based research proving the benefits of aesthetically pleasing design. According to the "Report on Health Impacts of Elderly Care Environments" of the American Academy of Environmental Medicine in 2024, the elderly who live in the landscapes which demonstrate visually appealing qualities, pleasant colors and aesthetically beautiful look have a 18% lower level of cortisone in the blood, a 22% decrease in blood pressure variability, and 14% lower rate of common cold and infections among others. As opposed to the rigidly designed, not multi-functional plazas which lack aesthetic

appeal, the proper wellness landscapes can influence the work of parasympathetic nervous system of elderly people through simultaneous stimulation of the visual, auditory and olfactory senses, helping them to keep their physiological rhythms steady. For example, the sophisticated game of shadows and light provided by the layers of plants can stimulate the activity in the visual cortex of elderly people, which can help to slow down the process of the development of degenerative diseases such as macular degeneration. Also, the combination of the white noise produced by the elements of nature such as water and phytoncides from the plants will help to improve the sleep of the elderly people by 40 minutes per day. This non-medicinal physiological therapy is one of the most important impacts of the aesthetic design on health and well-being, making it a vital core of the elderly care landscape design.

On the grounds of health and well-being, "aesthetics" is not limited to traditional visual aesthetics; on the contrary, it involves creating an overall sensory landscape system, which includes all the five senses, in accordance with the perceptual characteristics and emotional memories of the elderly. The perception ability of older people is usually affected in various ways by the aging process, and the sensory abilities of older adults are different from those of younger adults, including vision, hearing, olfaction, and other senses. Traditional landscape design might fail to provide proper sensory experience for the elderly. As a result, the rule of aesthetics is to create designs that are fully adapted to the sensory characteristics of the target group—such as a balanced color palette, peaceful natural soundscape, comfortable plants—to provide multi-sense experiences for elderly individuals, enabling them to relieve emotional stress and get physically and mentally relaxed. Besides, aesthetics design could incorporate the culture and modern-day memories of the target region by using cultural elements that are associated with the elderly population. In this way, it would bring out the memories and emotional connection and create pleasure and sense of belonging among the elderly in the landscape environment.

CHAPTER 3

CURRENT STATUS SURVEY AND ANALYSIS OF OUTDOOR LANDSCAPING AT URBAN SENIOR CARE CENTERS

3.1 Research Subjects and Study Design

In order to have a better understanding of the present design standards, usage conditions and problems of the outdoor landscapes of elderly care centers in cities, this research will choose two typical cases, one is from China and the other one is foreign cases, for comparison. The domestic case chosen here is Taikang Home·Ouyuan, while the foreign case is the Healing Garden in Allegheny Valley Hospital in America, which will be analyzed in detail. The former case can be regarded as China's pioneer practice on how to incorporate local culture and aged-friendly design into quality health and wellness communities, while the latter case can be seen as the mature use of the Western rehabilitation landscape theory in the medical and aged care environment.

3.2 Exemplary Domestic Case Study: Taikang Home · Ouyuan

Taikang Home · Ouyuan is located on the shore of the Sanyang Wetland in the Ouhai District of Wenzhou, Zhejiang Province. To the north, there is the Sanyang Wetland Ecological Park—the city's "lungs," spanning an area of 10.67 km²—and to the south, it borders the Wenzhou University Town, separated from it only by a single street that leads to the First Affiliated Hospital of Wenzhou Medical University. Such a geographical location gives it an inherent advantage in terms of combining the resources of education, medicine, and ecology. The project has a construction area of about 80,000 m². The planning process started in 2020 in the spring, and the facility began operations in 2024, housing approximately 1,000 homes.

It should be noted that this particular development represents the quality wellness community among those designed and established nationwide by Taikang

Insurance Group and defined as an innovative senior living community that combines the medical element with the humanistic aspect of ecology. Thus, Ouyuan won the Excellence Award in the category of Healthcare at German Architecture Awards in 2025 due to its remarkable architecture and appropriate age-based planning of the space. Moreover, it became a finalist of the World Architecture Festival in the categories of "Completed Buildings - Municipal & Community" and "Completed Buildings - Health".

The fundamental theme of the design by Ouyuan lies in the deep reflection and reinterpretation of local culture in Wenzhou. Taking the regional cultural image of "Oujiang Fishing Boats" as its source of inspiration, the design team came up with the basic idea of "Water Village Ark". Architectural representation of this cultural re-evaluation comes in the form of "repeated overlapping boat canopy with an arch motif". The heart of the community, which is known as "Bailing Home" longevity lounge, uses an arch construction that reminds people of the wupeng boat, becoming a visual symbol of the whole complex. The architectural language used by the design team in designing the wupeng boat is inspired by the literary description in "The Wupeng Boat" by Zhou Zuoren.

In particular, the employment of cultural symbols goes beyond simple "decoration" and serves to create the space experience. The huge glass roof over the Four Seasons Flower Hall creates a feeling of natural sunlight inside the building, allowing the elderly to feel the changes in the seasons and light-shadow effects inside the building. The arch ceiling of the porch at the southern entrance, combined with a barrier-free covered walkway, becomes a complete complex that cleverly solves the problem associated with rainfalls in Wenzhou city. Such a "readable design" with cultural symbols becomes a means by which the elderly can find cultural references in the unknown place.

As for its architectural arrangement, Ouyuan makes use of the "beaded chain" concept. The site on which the design is located is placed on an east-west aligned and boat shaped island, creating a spatial environment that is in the form of

"Möbius strip," connecting the three main functional spaces of residences, life and care.

The wellness concept in Ouyuan can be described through three aspects. The first one is "invisible design": Ouyuan incorporates barrier-free design in architectural forms. For example, the covered walkway serves as the medium of expression for the aesthetic characteristic of Jiangnan water-town, and at the same time, as the tool that facilitates accessibility for people using wheelchairs, offering rain and sunshine shelter; the shape of the arched roof portico represents the symbolic element of a boat cover while meeting the requirements for wheelchairs maneuverability and pedestrian traffic. Second aspect of design is the hierarchy of social spaces that starts from semi-private spaces and ends with the public ones—the presence of the special outdoor platforms for each care unit on each floor creates a feeling of belonging in small social groups. Finally, integration of nature and architecture – design focuses on "permeating and blending landscapes through movement" – the semi-open arched portico corridor at the entrance of the building blurs the border between inside and outside spaces, allowing the wetlands landscape to come into the building; rooftop observation deck functioning as a "mast" not only offers the opportunity to enjoy the views of the park, but also as a "lighthouse marker" of the activities of elderly residents.

Refer to Picture 1.

3.3 Best International Practices:The Healing Garden at Allegany Valley Hospital

This healing garden is found in Harrison, United States, specifically at Allegheny Valley Hospital, beside the hospital’s main entrance along Carle Avenue and occupies about 5,000 square feet (about 465 square meters). This garden will take three months to build, and it is projected to open in spring 2025. It is sponsored by Allegheny Valley Medical Center Trust Fund, the Shob family, and others.

While Ouyuan is an extensive facility for older adults, the healing garden at hand falls into the category of “hospital-associated rehabilitation garden” for use by the inpatients, outpatients, staff and local community members. Jeff Carlson, who serves as the hospital’s chief operating officer, has emphasized that this area has been designed to help people “temporarily disconnect from their normal schedule and interact with nature while remaining mentally healthy.” This “open to all” approach represents a new trend in rehabilitation landscapes, moving from “patient-specific” to “community-oriented.”

The healing garden design follows the essential principles of the theories of stress reduction according to Ulrich and attention restoration according to Kaplan. The garden is quite small in terms of area (less than 500 sq.m.), but it has functional zones that are defined clearly and sensory diversity.

Regarding the spatial planning, the garden consists of the following components: first, the entrance pergola area, which is the visual focal point as well as the entrance marker of the garden and at the same time provides a shelter from sun and rain for relaxation; second, the central pedestrian route with a hard surface for wheelchair users, which constitutes a circular route about 100 meters long and assists in the rehabilitation process through training of gradual walking; third, several areas with seating, located under shaded trees, near the flowerbeds and in the pergola, satisfying various requirements, like meditating alone; fourth, the ceremonial place with a flagpole and a memorial plaque, commemorating the dedication of Dr. David Shob, who has been working in the hospital for a long time.

Planting is reflective of the design theme of "stimulation through five senses" and "appreciation of seasons," where a large number of lilies have been planted to form a sea of flowering lilies during summers along with perennial herbaceous plants for forming a structure of plant community. Speaking to Rosemary Musolino, who is the assistant to the vice chairperson at the hospital, she said: "Here, there will be large areas of flowering lilies that will give everybody a place where they can sit down, take a cup of coffee and relax."

All the choices made in designing this healing garden have an evident evidentiary base. In the process of planning, the hospital noted that there was one major problem with its existing outside facilities—patients and their relatives had to "walk along the sidewalk and then walk back" because there were no places where they could make a pause for any purpose. The creation of the healing garden has dramatically changed this state of affairs—patients, with the company of health care specialists, can now enjoy the sun, breathe in the smells of the flowers and hear the sound of the water (though there is no water yet, one can hear the wind, chirping of the birds and sound of the leaves); relatives can use the garden for relaxation during breaks between visits; and the health care professionals can also relax a little in the garden.

Most importantly, however, this garden gives extra importance to “community integration.” It does not cater only to the patients of the hospital, but it is open to the people who reside in the neighboring areas. The report highlights that some of the people living in the neighborhood, carrying babies in their strollers, have voluntarily accessed the garden and seated themselves under the pavilions. In this way, the “de-walled” approach eliminates the psychological barrier between the medical facility and the community.

Refer to Picture 2.

3.4 Case Comparison and Implications

The comparisons of Ouyuan Healing Garden and Allegni Healing Garden not only show their similarities and differences but also provide multiple perspectives into the outdoor landscape design of senior care centers in urban areas.

On the level of common theme, both examples serve to illustrate “contextual response based on culture or environment.” Ouyuan is based on the culture of fishing in the Ou River area of Wenzhou, while Allegni Garden represents “the development of the hospital community and its healing power of the environment.”

With regards to their corresponding design models, the Ouyuan model embodies the "large-scale comprehensive wellness community" approach, whereas

the Allegni Garden model becomes the typical case study for "small-scale ancillary rehabilitation garden" model. The former focuses more on the use of the power of cultural symbolisms and the sense of community belonging, whereas the latter concentrates more on the scientific approach of design and the practicality of its maintenance and management. Both models have their respective appropriate application situations: when it comes to newly built large-scale elderly care centers, the Ouyuan model will provide the way of "cultural empowerment," whereas the Allegni Garden model with the compact wellness approach will give some inspirations to the urban elderly care centers and day-care centers with insufficient land resources.

CHAPTER 4

OUTDOOR LANDSCAPE DESIGN STRATEGIES FOR URBAN SENIOR CARE CENTERS UNDER THE HEALTH AND WELLNESS CONCEPT

4.1 Distillation of Design Principles

Based on the systematic literature review of health and wellness theories mentioned above and the case study of two typical projects Taikang Home · Ouyuan and Allegni Valley Hospital Healing Garden, the three basic principles in landscape design for urban elder care facilities are summarized by this research. Not only do these three principles act as a value bridge between the theory of health and wellness and its actual implementation in landscape design, but they can also lay the basic foundation for further spatial organization and element selection.

The first is the principle of age-friendly design. This principle stipulates that outdoor landscapes should not only cater to elderly people who are active but also be friendly to semi-dependent and other users as well as to the family members who visit the residents as well as community members. Age-friendly design is based on the principle of universal design which means that a particular place can be used by different generations with different abilities in terms of age and mobility. In this context, this involves the following: a system of paths which would accommodate wheelchairs and pedestrians; seats that would cater to a variety of activities including contemplation for one person, conversations between two persons and group discussions; signages that will be helpful for navigating the landscape for elderly people with different levels of cognitive abilities; and activity facilities with various degrees of intensity. Age-friendly design has a profound philosophy in that it breaks the metaphor that "elderly care facility is an isolated island for seniors".

Second, the concept of multisensory stimulation. It derives from the rehabilitation landscape theory's investigation into the process through which

natural environments heal; it stresses that a combination of the activity of all the five senses is required to maintain the senses and mental sharpness of seniors. Among the measures to be taken are: the inclusion of seasonal variation in the planting of various plants to create ever-changing views; the creation of soothing sounds of nature using water elements and wind chimes; the selection of aromatic plants in certain areas to create "olfactory signatures"; and providing edible landscape features to foster the active use of senses of touch and taste. The main goal of multisensory stimulation is to fight the problem of "sensory deprivation" of the elderly, turning the outdoor spaces into "sensory gyms."

Thirdly, there is the principle of supportive environment. This principle stands as a reflection on and transcending of the old concept of “absolute safety” design philosophy. The theory of supportive environment suggests that the perfect aging-friendly environment should not strive for the zero risk level, but rather within the limits of safety and controllability it should give appropriate challenges and chances for autonomous choice. These are expressed in the following ways: provision of movable seats so that older people could have the possibility to organize their own social circle; provision of “personal gardening plots” or planting beds giving older people the chance to make decisions about gardening activity; and, finally, provision of some part of gravel pavement or sloping terrain, which should be made under the condition of appropriate signs and safety measures in order to satisfy older people’s need for moderate changes of elevation level and to help them to preserve their balance and strength of lower limbs. The basic moral principle of a supportive environment is “striving for the dynamic balance between safety and autonomy”, which enables older people to become “masters of the environment” rather than “protected individuals.”

The above principles work in synergy and become increasingly cumulative in nature: age-friendly design lays down the basic framework of inclusiveness, multi-sensorial stimulation takes care of the underlying fundamentals of well-being, and a supportive environment adds an ethical dimension of dignity to the design. These three principles together form the basis of evaluation of future designs.

4.2 Spatial Layout Strategy

Space arrangement acts as the structure of the design for health and well-being landscapes, which is the basis that influences how functional, convenient, and feasible the outdoor environment becomes. Considering the features of urban nursing homes, such as scarcity of space, multiple purposes, and varying demographic groups, this research offers practical measures from three important perspectives: zoning, circulation, and interface designs.

The first one is zonal planning, which focuses on the spatial organization of the layout according to the functions performed.

The first aim of zonal planning lies in creating a spatial gradient consistent with the abilities of senior people. Elderly care landscapes usually use a “one size fits all” design strategy; thus, they try to fulfill the requirements of all the elderly people in one space; however, the results of such an attempt do not match the needs of anyone. Zonal planning according to the principles of health and wellness provides a “tailored approach”, which means dividing the outdoors into several functionally different zones depending on the abilities of elderly people.

Vertical zoning using the functional capacity status of the elderly. Depending on the functional capacity status of the elderly, which varies from healthy and active to severely disable, outdoor spaces can be classified into three levels. The first level is the independent activity zone that is meant for healthy or mildly disable elderly and provides facilities like the fitness trail, the gardening space, and the Tai Chi plaza, which demand much physical activity and balance ability. The second level is the partially assisted activity zone that caters to the needs of partially disable people requiring canes, walking aids, or even wheelchairs; the flooring should be entirely free from barriers, flat, and no elevation differences. The facilities at this level will mainly include seating exercise equipment, tactile garden, and water feature platform – activities that are low in intensity and safe.

Zoning by function according to types of activities. Besides zoning by the capacity of the activities, zoning by the functions according to different types of activities is also necessary. Specifically, there is: a dynamic activity zone—

reserved for active activities that require much energy such as doing sports and exercise, and it is placed in peripheral parts of the site so as not to disturb other zones; a static relaxation zone—with furniture, pavilions, reading corner and other facilities for leisure activities like chatting and observing, and it is located in places with plenty of sunlight, great views, and partial enclosure; and a transitional buffer zone—that is created by clumping of the plants, landscape walls, and changes in the level of the site to create a transition between the two zones without creating an abrupt separation of functions. There is no physical separation between these zones; on the contrary, “soft zoning” is done through paving changes, plant clumping, and changes in scale.

Flow organization is next, which means the configuration of the circular flow path in relation to the trigger points.

The structure of a circulation pathway will affect the ease of access, safety, and willingness to explore the outside environment for elderly people. For health and well-being designs, it is important that this type of circulation pathway should not only be able to facilitate assistive devices like wheelchairs or walkers but also, by careful arrangement of nodes, will "direct" elderly people to go outside."

Circulation system that ensures barrier-free circular flow. With increasing age, the sense of direction of elderly people deteriorates, and the complicated layout of the walking route with many T-intersections, crossroads, and blind alley streets may cause disorientation and unease. The current paper will implement a circular layout of the circulation system as the key design of the outdoor pathways. Advantages of the circular layout are as follows: the ability of an elderly person to go back to the point where he/she started irrespective of the initial direction; the opportunity of quick inspection of the whole facility by the caregiver during one trip on the circular route; and the ability of easy combination of circular routes with entrances/exits from buildings, thus combining several buildings into one system. The surface paving of the path should be continuous, flat, and slip-resistant; transition from one functional zone to another should be marked through color or texture difference rather than elevation difference. Concerning the slope

regulation, the longitudinal slope of the main circular route should not exceed 1:20, and the localized difficult sections should not have a slope greater than 1:12.

Proper arrangement of "trigger points" along the path. A merely circular path may not be sufficient enough to motivate elderly individuals to participate actively in physical activity; thus, it becomes imperative to arrange dense groupings of "trigger points," which are spatial points that can inspire behaviors like stopping, along the path. Such trigger points need to be spaced in relation to the stamina of elderly people: it is found through research that people above 70 years of age can walk up to 50–80 meters continuously without taking any break. As a result, rest areas or resting nodes have to be arranged every 30–50 meters along the circular path. Types of trigger points have to be diversified: while some have to be "active trigger points" (e.g., exercise machines), others should be "passive trigger points" (e.g., seats). Such trigger points need to be connected through "visual corridors" in order to ensure "visual continuity"—i.e., allowing an elderly individual standing at one node to vaguely perceive the shape of the other node.

Clearness and hierarchy of destinations. The loop route must not be meaningless walking "for walking sake," but it should be connected with clearly defined purposes. Destinations may be grouped into three levels of hierarchy: primary destinations (attractive elements of the entire park, such as tea pavilions and community vegetable gardens), located at important nodes on the loop, marked with high recognition and frequent use; secondary destinations (specialized thematic nodes for definite zones), intended for serving specific groups of interest; and tertiary destinations (micro-nodes, such as corner seats), located along the loop, and giving instant reason for staying in places. This destination hierarchy converts the "stroll" activity from mere physical exercise into exciting adventure.

Lastly, the treatment of the interface and the background setting:

This is because an urban elder care facility is located in a high density development, and as such, the outdoor areas of this building cannot escape being impacted by some urban factors like roads, nearby buildings, and business activity. The "selective approach" is what forms the basis of the design for this interface.

Making use of landscapes around for greater integration within the community. Not all urban interfaces serve as negative elements. For example, if an eldercare facility is next to a park or community plaza, then it needs to adopt strategies for integrating its landscape. These include: making orientation of the major visual points (dining rooms) face a pleasant landscape; adopting transparent fences such as wrought iron, glass, or steel cable fencing at the interface point rather than a solid wall so that the outdoor landscape becomes part of the indoor space; and, where possible, creating access points to the park or community plaza to allow elders to take part in community activities. The basic logic behind this strategy is to overcome the isolated island phenomenon within eldercare facilities; by achieving connectivity both visually and through movement, seniors will realize "there is a bigger world outside" within the boundaries of safety.

Strategies for mitigating air pollution and noise. Where there are interfaces close to high sources of noise pollution such as highways, elevated bridges, and railroads, multi-layered approaches of noise reduction must be adopted. The outer layer involves construction of physical barriers like walls or plant barriers like coral trees, privet, and arborvitae that act as reflectors of noise pollution. The middle layer entails a mixture of tree, shrub, and grass planting areas, where there is an elevation layer inside. This can be used as a backrest for wheelchair users and provides further noise reduction. Total removal of noise from urban areas is not necessary since there is need for a certain degree of "background noise" to mask the noises in the courtyard.

Visual Obstruction and the Establishment of Psychological Boundaries. Senior care centers in the city often come across visual intrusion in the form of overlooking from nearby tall residential buildings or “peering” from neighboring commercial areas, which may lead to psychological insecurity among the elderly residents. Measures taken include: providing visual obstruction with height varying between 1.8 to 2.2 meters on the peripheral boundary, ideally with the use of perforated grilles (spacing not exceeding 5 cm) together with climbing plants (such as wisteria, trumpet creeper or ivy) which will successfully block visual intrusion

but at the same time retain some level of transparency and avoid giving the impression of “prison-like enclosure”; and at the interface with surrounding residential building designing “rooftop greening” or “vertical gardens,” thus making an effort to transform negative visual relationship into positive landscape partnership—so that the people in the neighboring residential building see a green wall instead of a cold barrier. Psychological boundaries have to be set as well: through the use of different paving patterns, low landscape walls and planting beds, “threshold effect” can be achieved at the entrance to the center so as to inform the users that they are entering a new space; but exclusionary devices, such as locked iron gate and “No Entry” sign should be avoided.

4.3 Health and Wellness Environment Design Strategies

The health and wellness environmental components are used as the “operational interface” that facilitates the transfer of theoretical principles of health and wellness into practical landscape applications; they form the basic medium that helps the elderly experience the outdoor landscape on a regular basis. The current research will distinguish four principal dimensions of the health and wellness environmental components: the five-senses garden, the horticultural carrier therapy, the exercise rehabilitation trail, and the social catalytic component. These four dimensions are linked and supportive of each other, thus forming the health and wellness functional system of the outdoor landscape.

Strategy 1: Use design features that trigger the five senses.

The Five-Senses Garden is the most unique type of space in the realm of wellness environments. Its value comes from stimulating the sensory system of the elderly through various stimuli involving all five senses, which in turn delays the aging process and at the same time provides an opportunity for emotional and cognitive conditioning. It is important for design to be based on the principles of "zoning, seasonal aesthetics, and safety and nontoxicity."

The design of the visual stimulus is the first component of the five-sensory garden. The eyes of seniors react well to contrasts, saturated colors, and light and

shadow effects. The planting should be done on the principle of "flowers in three seasons and color in all four." For example, in spring, pink and white flowers such as cherry trees can be used for creating a joyful atmosphere. In summer, red or purple-flowered plants such as crape myrtle will create visual accents. In autumn, red maples or other deciduous trees with bright leaves will form the warm color scheme. And in winter, plants with characteristic stems and fruits will be used together with green background trees. Mirrors with water and light and shadow effects from the openwork pergola are also good tools for stimulating the eyes.

Auditory stimulus designs need to create an acoustical environment that is based on “natural soundscape as the main element complemented with the artificial soundscape.” Natural soundscape consists of: water soundscapes – water sounds like waterfalls, gushing springs, and dripping water, where elderly people tend to perceive better the low-frequency sound waves of the waterfall, and the gushing spring provides the dual effect of sight and sound; plant soundscapes – the sounds generated by areas of ornamental grasses rustling under a light breeze, and the sound of the collision between branches and trunks of certain species of bamboo; artificial soundscapes may include low-frequency background music played in relaxation zones (high-frequency sounds only excluded), as well as placing bamboo wind chimes in the chosen location, provided that the volume level and the playing time are controlled.

The design which integrates smell, touch, and taste aspects is what characterizes a "Five-Sensory Garden" from a normal garden. The design for the fragrance aspect should be done using the "fragrance pathway" concept: where the gardenias should be planted at the entry point to greet people through their strong smell; the sides of the pathway should have moderate smelling species such as lavender; and near the seating area, one can plant the species that are mildly smelling and that are not disturbing when people are talking like snowdrops. One should avoid planting species that produce much pollen or those whose smell is very strong as they might cause allergies and dizziness. The gustatory design will

involve incorporating the edible landscapes by adding fruits and vegetable species that can be eaten immediately like strawberries.

It is safe to say that gardening therapy marks an important transition point in the realm of health and wellness landscapes, whereby there is a change from merely observing to engaging actively. The therapeutic element behind gardening is in the fact that gardening allows one to exercise both physically and mentally while giving one a purpose in life.

Facilities that would help support horticultural therapy also need careful thought. They include the following: A tool storage cabinet – located near the edge of the garden, 90-100cm tall, with partitions inside for storage of lightweight long-handled tools (such as lightweight aluminum shovels and long-handled rakes); it is preferred that the cabinet have a sliding flat-door design rather than the more cumbersome hinged top-door design; a workbench – located between planting beds, with a counter surface that is 80-85cm high, including an integral sink and a retractable faucet to make it easy for the older adults to wash fruit/vegetables/tools; a covered pavilion – located near the garden, for use during their resting period or socialization, with provision for seating, drinking water, and emergency first-aid kits; and finally, a composting area – located in the downwind corner of the garden, with compost bins and earthworm towers, providing opportunities for the older adults to get involved in the cycle of “from soil to soil”.

Strategy 2: Make exercise rehabilitation a part of daily activities, using physical exercise for good health.

Regular physical activity is a key intervention strategy for sustaining physical functionality among seniors, for fall prevention, and for delaying disability onset. Yet within conventional elderly care facilities, the creation of "fitness areas" tends to separate physical activity from day-to-day life, making it necessary for seniors to "go to exercise specifically," an approach that poses significant barriers to participation. Within an approach to exercise rehabilitation from the standpoint of health and wellness, physical activity is meant to be "integrated into routine activities," allowing seniors to do their exercises "unconsciously."

The multi-level walking path program provides the basis for carrying out "dissolution-based rehabilitation." Walking paths are divided into three types depending on differences in exercise level and balancing needs. Type 1 walking paths are easy-to-use round paths with smooth, even, and non-slip surfaces such as porous concrete or fine asphalt pavement that can accommodate any elderly person to perform their basic aerobic walking exercises. Type 2 walking paths are more difficult walking paths with a combination of different textures (smooth stones and fine gravel) and curves aimed at developing balancing skills for those elderly people who have some walking skills. Type 3 walking paths are the most difficult walking paths located in the rehabilitation garden and including low incline slopes with hard and soft textures; these paths should be used with caregiver assistance.

In the walking route, “exercise micro-nodes” combine walking with particular exercises designed for rehabilitation purposes. Several “micro-nodes” can be constructed at every 50–80 meters distance, each fitted with different facilities for exercise. The main idea behind the construction of these “micro-nodes” is that of “low barrier to entry,” since they do not need any special clothes, prior reservation, or expert advice.

Strategy 3: Create social environments that encourage social interaction among the elderly.

Social events are the bedrock on which the psychological wellbeing and social wellbeing of seniors depend. From the perspective of health and wellness programs, the main idea behind creating social catalytic environments is not just to “organize activities,” but to design the environment in such a way that it facilitates informal interaction where seniors can “meet each other, stop for a moment and talk.”

The geometry of seating arrangements constitutes the micro-level basis of socially facilitated activities. Extensive observations reveal that among older adults, there exists a significant correlation between the frequency of outdoor social activities and the geometry of seating areas, but not with the number of seats. The least favorable geometry of seats is a queue-style one. On the other

hand, the most favorable ones include curved or enclosed geometries, such as those with U-shaped or semicircular seats, where the angle in the middle is fixed at 90°-120°, enabling people to easily turn their heads; and corner-shaped L-seating area among two seating areas, thus creating a semi-private environment for engaging activities with opportunities to withdraw. Distance between seats is no less important: it is recommended to arrange single seats with center-to-center distances between 80-100 cm and with the backrests being inclined backwards by 100-110° in order to maintain horizontal eye contact while relaxing.

Third Place is crucial to the development of a place out of merely a facility in social catalytic space. Third Place comes from the urban sociological term, meaning a social gathering place other than the first place (home) and second place (work). It has such features as neutrality (availability for everyone), low thresholds (ability to stay there without having to consume something), dialogue as an essential activity, and creating a community feeling by regulars. In the outdoor space of the senior care center, such spaces may be pavilions, tea lounges, or greenhouse flower rooms. Important factors for the design of such a "third place" would be: Free tea services for the sake of eliminating any monetary barriers; comfortable chairs and fixed chess tables as mediators for dialogue; displaying of a daily activity board ("Today we will taste jasmine tea") in order to raise an expectation; and giving regular patrons of this space an opportunity to claim their own corner (being responsible for setting up tables and chairs or taking care of plants), thus feeling themselves parts of the community of this space. The importance of third place does not lie in luxuriousness of its facilities, but in creating a ritual in the place of "fixed times, fixed faces, and fixed activities."

The spatial interface design for intergenerational communication and community integration acts as a strategic approach towards expanding the social catalytic spaces. Spatial segregation of the urban senior facilities from the community environment is the major factor responsible for the problem of intergenerational isolation. Some of the design approaches include: designing “visual gardens” along the edge of the community by providing transparent fence

with seats on either side so that people in the senior center and the community members can see each other across the fence through waving gesture; and designing “shared garden spaces” by making part of the garden space accessible for reservation by the local parents and children where children can come and plant flowers with the seniors and harvest crops during designated weekly sessions. In this way, not only are the needs of natural learning for the children fulfilled, but seniors also get the feeling of being socially included, needed and respected. The importance of intergenerational communication is not limited to overcoming loneliness among the seniors, but also sending out the right message about aging in the society.

4.4 Detailed Facility Strategy

Details and facilities become the crucial connection between a "strategic blueprint" and physical construction in turning the health and wellness landscape design into reality, thereby affecting the actual well-being of the elderly residents. In this research work, we will discuss the parameters for such a design in four main areas: paving, landscaping, lighting, and plant placement.

Pavement is one of the most immediate mediums for elderly people in engaging outdoor spaces, and the performance qualities will directly influence walking safety and spatial quality. The first design requirement for paving is that it has slip resistance. As for the paving surfaces in senior care facilities for outdoor usage, the coefficient of slip resistance in the wet conditions should be equal to no less than 0.6, and permeable concrete is suggested for use. As for the issue of surface flatness, where there are elevation differences more than 0.5 cm, chamfering or grading are to be performed; expansion joints should be no more than 1.5 cm wide, and joint materials are supposed to be at the same level with paving. The paving color and texture should perform as an orientation medium: continuous light beige paving should be used on the main routes of circulation, light gray should be used for branch routes; on important nodes (seating areas, fitness equipment), color blocks of warm tones or directional signage should be

integrated into the paving pattern. The texture of the pavement should change distinctly between the zones of different functionality through tactile signals.

The design of the furniture elements such as seating and handrails must provide an optimum balance of accessibility of elderly people, aesthetics and maintenance requirements. Seating is the most widely used element in outdoor furniture. The seat should have the height from 45 to 48 cm (comfortable height at which the elderly person could stand up from a sitting position). Seats with lower heights (less than 40 cm) may cause problems with rising up, while seats with higher ones (above 55 cm) can prevent the feet from being on the ground. Seat depth – 45 to 50 cm, backrest height – 35 to 40 cm, slightly inclined backward – 100 to 110 degrees. As for the seat surface, the materials recommended are weather resistant wood and wood imitation plastic steel construction. In the former case, the wood provides a pleasant feeling of warmth but it must be painted and maintained. The latter is more durable but absorbs the heat during summer significantly and removable fabric cushions could be placed on the seat surface. The preferable material is plastic-coated aluminum alloy resembling wood-grain or solid wood. Metal pipes cannot be used due to the risk of freezing hands in winter and burning in summer. In cities with frequent rains and hot summers shading and rain shelter are especially required. Such elements should include a wooden frame along with transparent PC panels with the light transmittance from 40% to 60% to avoid total darkness caused by light blocking.

Outdoor nighttime lighting plays an essential part in providing the necessary safety and maximizing the duration of use of outdoor areas in retirement facilities; however, it has often been disregarded because of the high costs or other reasons. The requirements of healthy aging dictate that lighting must be considered an important design feature, equivalent to the daylight lighting. In terms of illuminance requirements, the average value of illuminance at the main entrance area and in the major pathways should not be below 30 lux (as per the requirements for the elderly care facilities in the *Code for Building Lighting Design*). The illuminance in critical areas such as the beginnings and ends of

stairs, transition on ramps, seating spots, and emergency calls points shall be increased to 50-100 lux, with the uniformity ratio of the lighting (ratio of minimum illuminance value to average illuminance value) being no lower than 0.4; this will avoid any problems related to the discomfort and possible dangers associated with non-uniform illumination. Glare control is a key strategy to preserve the vision of elderly people. The lighting fixtures must be recessed or anti-glare gridded LED lamps with the beam angle of 30° to 60°; the usage of exposed lamps or the lamps emitting light downward (downlights) is absolutely forbidden. All of the lighting fixtures shall be pointed down, onto the floor or walls, in order to prevent any direct exposure of the light source to the line of sight of the elderly people (their lens scatters the light more, hence they are more sensitive to the direct light). As for the pathway lighting, the use of courtyard lamps low-profile (the height of 60-80 cm) or the embedded linear fixtures (built into baseboards or handrails) is advised; the light source shall point sideways or downward in order to clearly show the elevation changes without any glare effect. Nighttime pathway lighting may be done via continuous light strips (LED strips along the pathway edges or embedded linear fixtures) to clearly indicate the path shape, which will help the visually impaired to walk safely. At the beginnings and ends of stairs and ramps and at the turning spots the contrasting color lighting (for example, warm white pavement with blue side lighting) should be used in order to improve the visualization of the elevation changes.

Plants are the sole living landscape elements; their plant layout is required to achieve four major goals: sensory stimulation, functional, safe and non-toxicity, and reduced maintenance expenses. Sensory stimulation and seasonal variations represent the major manifestations of the wellness value of plants. We suggest applying the following planting scheme based on "flowers in three seasons and scenery in four seasons": in spring plant cherry blossom and others for creating a sea of flowers effect; in summer use crape myrtle and others for creating visual accents and attracting butterflies; in autumn use red maple and other deciduous trees for creating a warm color palette; and in winter apply southern bamboo, red

maple, and evergreen conifers for creating visual accents. In the case of aromatic plants, zonal planting scheme is to be used: for the entrance plant strongly aromatic species (osmanthus for example) as an "welcoming fragrance"; for the pathways plant moderately aromatic species (lavender for example) to create a path of smell; and for the seats use lightly aromatic plants (snowflake lily for example) for creating an odor background without disturbing conversation. For the tactile plants choose those species with specific leaf surface (fuzzy water fern and leathery magnolia for example) and install "touch guidance signs".

Absolute rules concerning safety and non-toxicity must govern the choice of plants for eldercare establishments. The plants that are categorically forbidden for planting in this context are: toxic species – Narcissus, Sea Mango, Nandina, Dendrobium, and Acacia; thorny species – Ilex (having hard thorns on the edges of leaves), roses and Chinese roses (with thorny stems and trunk) and cactus; and allergenic plants – Ambrosia (having allergenic pollen) and Toxicodendron (its sap can induce dermatitis). Moreover, the large fruits of plants, such as mango and grapefruit, can hurt elderly people as they fall off from trees above the paths and seats.

It is especially important to take into consideration convenience of maintenance in case of urban elderly care centers which operate on conditions of understaffing. Attention should be paid to selection of native plants and adapted ones with low needs for watering and fertilization, resistance to pests and diseases, and less pruning needs. Areas of lawns must be carefully regulated, and lawns must be substituted by ground cover plants. The system of irrigation must use drop or micro sprinklers, and control valves of different zones must be installed to carry out zone-specific irrigation performed by maintenance personnel without flood irrigation. To make the process of pruning less frequent, it is necessary to select for street planting only those trees which have a high branching point more than 2.2 meters (goldenrain tree).

CHAPTER 5

DESIGN PRACTICE

5.1 Project Overview

The project is located in the suburban part of a historically famous city in the Yangtze River Delta area in China, in a polygon-shaped plot of land located to the southeast of the main urban center of the city. The site is bounded by an important urban arterial street from the eastern side, is connected to a riverside landscape channel about 30 meters wide from the southern side, and has urban ecological greenways proposed to be developed from the western and northern sides. The choice of site location follows the concept of "close to the city but not in the city," which allows the site to avoid the limitations of limited space and noise pollution that come with fully integrating into an existing dense old urban area, while still having easy access to the core medical facilities of the city (Grade A tertiary hospital within a driving distance of 15 minutes) and transportation points (metro station within walking distance).

The site is located on the alluvial plain of the Yangtze River Delta, characterized by an average elevation between 4.2 m and 6.8 m above sea level and having a gentle slope that gradually inclines toward the northwest while gradually declining towards the southeast. This gentle slope offers the advantage of providing an ideal condition for the application of the barrier-free concept, which makes it possible to create a leveled pathway in the whole garden site without conducting major earth moving works. The site still retains a few remaining industrial structures of the low-rise type and some paved ground surfaces, and the soil conditions are ideal with the presence of a surface soil layer of about 80 to 120 cm.

As for the surrounding environment, the project site is located in an emerging residential area in the city. There are several newly developed residential areas within a distance of two kilometers from the site location, one secondary general

hospital, two community healthcare centers, and one seniors' university in the neighborhood. The percentage of the elderly people out of the total number of the permanent residents in this area is around 22%, which is higher than that in the city on average. The urban ecological green corridor planned along the north and west side of the site is under development, and in the future, it will link many community parks into one green traffic system.

In terms of the climate features, it should be noted that the project area belongs to the East Asian monsoon climate zone with four seasons, coexistence of rainfalls and hot weather, the annual average temperature of about 15.5 °C, the winter average temperature of 3 °C to 8 °C with the maximum low temperatures of about -5 °C, and the summer average temperature of 26 °C to 30 °C. Precipitation reaches 1,100–1,300 mm with the rainy period lasting from June to July and comprising about 30% of the entire annual precipitation, which places certain demands on rain-proof construction of outdoor activities areas. The prevailing wind direction is northwest in winter and southeast in summer with the annual average wind speed of about 3.2 m/s. The relative humidity level is also quite high and equals to about 78% annually; while the weather in spring and autumn periods is comfortable, the winter period is quite humid and cold requiring the creation of microclimate for protection from the cold and wind in the landscape design. Thus, the climatic conditions of the area are favorable for the elderly residents since there are no sharp changes in temperature (neither too cold winters nor too hot summers) and the annual sunshine period equals to approximately 1,950 hours.

5.2 Design Positioning

The positioning of design for this project is: -a medium sized community which offers ongoing care service, which is based on outdoor landscape system, taking into consideration the core concept of health & wellness along with the characteristics of the ecological landscape of Jiangnan region. The above-mentioned positioning may be taken in three different perspectives.

From the perspective of function positioning, this project is expected to fulfill the daily outdoor wellness requirements of around 50 to 150 seniors. This outdoor environment is intended to become the “active health care support system” – providing not just walking and resting facilities, but also incorporating various composite functions, such as horticulture, sensory experience, physical therapy and social facilitation. Thus, it becomes an integral part of the health care regime of the seniors. From the aspect of functional configuration, this project has “availability 24/7” as its key principle, which means that it should be available all year round and all the time of the day.

Regarding cultural context, the project is deeply inspired by the cultural background of Jiangnan located in the Yangtze River Delta Region, transforming regional culture—such as "memory of water town", "garden culture", and "the culture of husbandry and study"—into spatial language. Instead of pursuing an exact "retro imitation" of traditional Jiangnan gardens, the design uses modern landscape designing methods—with characteristics of clear composition, current materials, and age-appropriate scale—to recontextualize the cultural symbols. Meanwhile, typical Jiangnan plants are employed as ground covering; for example, bamboo forests are planted to represent and redefine Jiangnan identity so that the elderly can "listen to the wind blowing from the woods," and feel the unique atmosphere and cultural spirit of Jiangnan. In this way, the elderly can gain a sense of security and belonging in a "familiar environment," not in "an entirely alien modernist environment."

As far as ecological location is concerned, the design follows the philosophy of “less intervention, more perception” – maintaining the natural shore profile of the river channel while introducing waterfront walkways and viewing platforms using a “minimalist” design approach. In the case of the park site, a “sponge city” design technique (permeable paving, rain garden, and depression green space) is adopted in order to counteract the excessive rainfall of the Yangtze River Delta area.

5.3 Design Theme and Overall Planning and Design

The theme of design of the current project is "Design of an Urban Senior Care Center based on the Concept of Health and Wellness" where "circular" is used as the spatial prototype of the whole pathway design. The combination of "circularity" and "zoning" can create a double experience of "activity" and "stillness". The "Five Sensory Healing Ring" enables the seniors to walk around, explore and find things to do; meanwhile, "the Memory Water Landscape" gives seniors a place to pause, contemplate, meditate and recall things in the past. It is a comprehensive and holistic health and wellness landscape system from "activity" and "stillness" at all times.

The areas below have been extensively planned for design consideration as the main points of concentration: first, the elderly housing area, which will comprise the residences along with their respective cafes and health centers. The needs of elderly people in terms of their day-to-day activities, diet, and physical health will be incorporated into the design of this area in order to ensure that the site layout caters to the needs of elderly people; secondly, the parking and entrance area along with the security gate house; thirdly, the elderly fitness plaza, which will lie next to the entrance area. The facilities at this plaza will consist of suitable fitness facilities for the elderly people, along with a flat and vast piece of land which will act as the activity area.

Close by is the senior citizens' recreational plaza and the entertainment center, which has a small waterfall pool surrounded by landscaping for seniors to relax in, discuss matters in stone chairs, play chess or simply read a book while enjoying their tea in the seats in the glassed corridor. The senior citizens’ recreational plaza also abuts yet another social space; in this lower level social space, the seniors can hold discussions in the seating area and enjoy the surroundings.

Moving farther to the right, there is the lakeside relaxation area, which provides opportunities for senior citizens to take walks along the lakeshore, allowing themselves to get into the rejuvenating atmosphere created by the waters of the lake. They can watch the fish there or look at the lake without engaging in

any activities; thus, their free time will never become dull or boring. To the right of the lake is the Five-Sense Healing Garden where the elderly can enjoy colors and subtle smells of various plants. Situated near the shore of the lake, walks in this garden come with the sound of water and wind, as well as with the feeling of touching flowers while picking them. Open layout gives an impression of space, whereas winding paths make the process of walking longer and enrich the sensory experience of visiting the garden.

At the bottom of the center of the lake is a calming and relaxing zone surrounded by bamboo which provides both privacy due to its density but allows breathing at the same time. This zone is also accompanied by a small fish pond with small waterfalls on each side of it to add water elements and create a calming and relaxing environment. Here elderly people can have a relatively private and independent place where other zones take care of their socialization requirements while this zone takes care of their need for privacy allowing them to have peace of mind and relaxation. On the right-hand side of this calming zone are walking and ascending zones, horticultural planting zones and fruit and vegetable picking zones providing exercise opportunities for elderly people. On top of the walking and ascending zones is a small pavilion which also caters to the emotional requirement of ascending for elderly people.

The horticultural planting zone gives an average-sized piece of land to the elderly individuals where they can grow plants based on their choice. It broadens their scope of activities and allows them to feel more free, thereby relieving them from the constraining factor of being under constant surveillance in the senior citizens' care facility. The picking area is close to the peaceful recuperation area; activities in the picking area enable the elderly residents who are at rest in the peaceful area to have a sense of private space without feeling too calm and hence getting lonely. The combination of these two areas creates an environment that is peaceful but not desolate.

CONCLUSIONS AND OUTLOOK

This design aims at providing an outdoor landscape design concept that is designed for urban senior care centers, which specifically caters to the needs of older people based on the theory of health and wellness. It thoroughly analyzes the particular requirements of elderly individuals from the point of view of modern urban settings, and further discusses in detail the basic principles of health and wellness, and how it extends and applies in the field of landscape design, especially health and wellness landscape.

This study combines theories drawn from the realm of health and wellness landscapes, such as Ulrich's Stress Reduction Theory (SRT), to examine how the experience of natural landscape environment is able to significantly lower the level of psychological stress and physiological stress experienced by older people. It also includes Kaplan's Attention Restoration Theory (ART), which seeks to illustrate how the presence of particular characteristics in natural environments can assist older people in restoring their orientational attention and relieve mental fatigue. From the above theories, the following study will present design considerations and design criteria along with overall principles of outdoor landscape design in line with health and wellness concepts.

At the same time, with comparative and detailed analyses of the classic cases of health and wellness landscape design both domestically and abroad, this paper has summarized universal design principles and created a series of design strategies. These principles consider in details such requirements as the selection of paving materials, their anti-slip property and comfortability; the ecological issues, seasonal changes and the sensory effects produced by the arrangement of vegetation; the space relationship among landscapes, buildings and the urban context; and the size, material and barrier-free design requirements for different rest and activity facilities. With the above foundation laid out, this study combines the theoretical investigation with the design practice, and develops a design proposal of the landscape of an urban senior health and wellness center. The above landscape design practice gives an example of how landscape is designed

according to the principles of health and wellness. Through the natural fusion of the advanced theories of design and the actual environment of the site, this paper intends to give a good reference for other urban senior care landscape design projects and add richness to the innovative expression of health and wellness theories in the environmental design field.

There are also some limitations in the study. For example, in the requirements investigation stage, there is not enough diversity in the target group and also the number of elderly people involved is quite small. This fact can limit the effectiveness of requirements investigation to some extent. In addition, there is no long-term follow-up in the research and, therefore, there is a lack of longitudinal research in the study. It means that we have not been able to analyze the sustainability of the impact of landscape intervention during different seasons and years for the health of elderly people.

Moving a bit further into the future, the application of the latest digital technologies to create a health and wellness monitoring system and the construction of efficacy evaluation models with respect to physiological and psychological criteria will help further expand and enhance the application field of the health and wellness concepts, particularly within the framework of the practice of urban elderly care centers. The adoption of this concept will not only allow for timely and accurate health and wellness monitoring of senior citizens as well as customized reaction, but also, by accumulating and analyzing data, make it possible to move health and wellness practices from experience-based to science-based ones.

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APPENDIX A

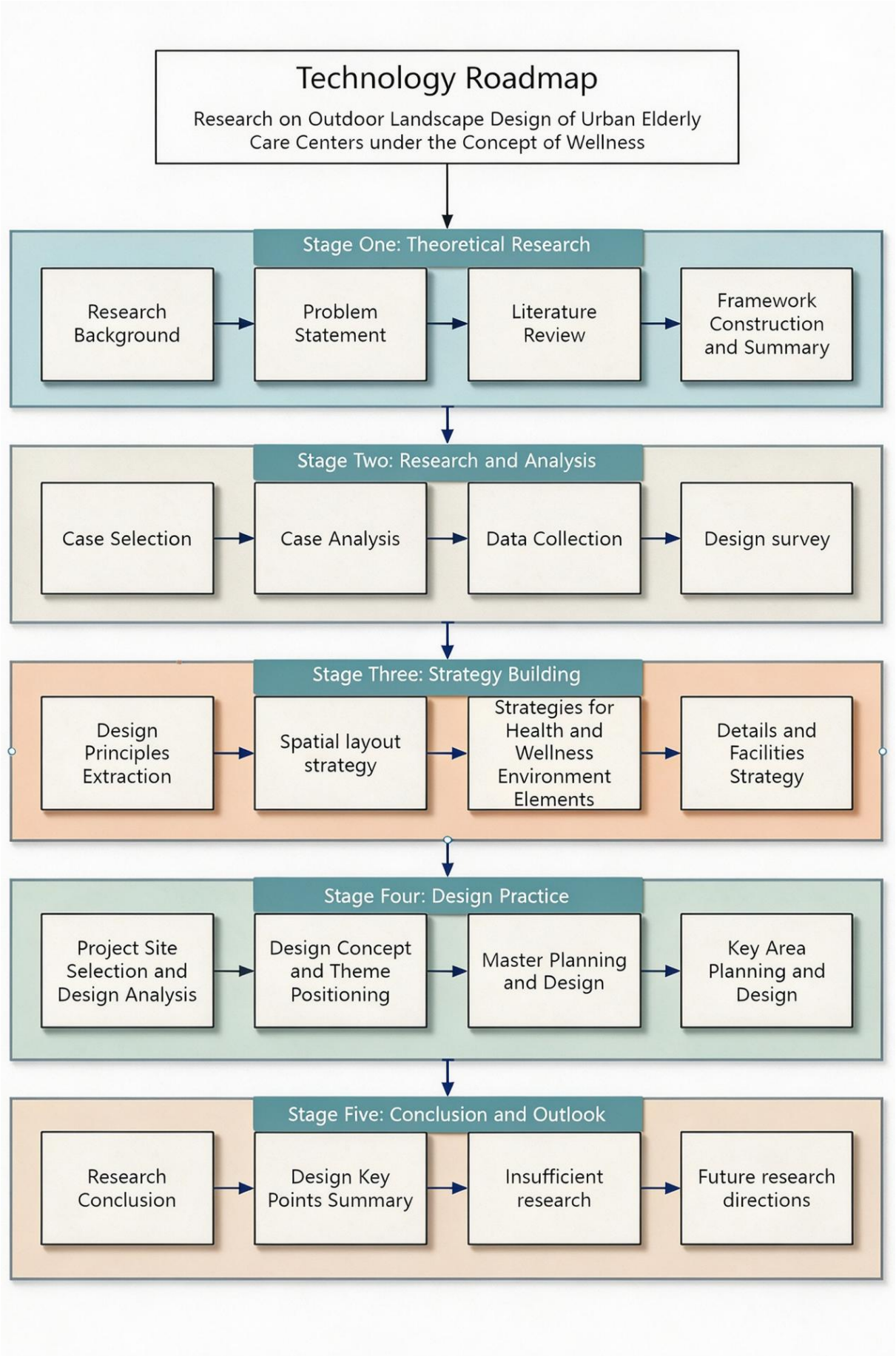


Table1

Differences between urban senior care centers and suburban villa-style communities			
Definition: An urban elderly care center refers to an institution located within urban construction land, leveraging existing urban public service facilities and transportation networks, and providing centralized or embedded elderly care services for the urban elderly population.			
urban senior care centers	suburban villa-style communities	urban	suburban
The density of urban senior care centers is relatively higher than that of suburban senior care villas.	Suburban villa-style senior living communities benefit from relatively ample land availability, enabling the implementation of low-density, garden-style landscape design.		
Urban senior care centers will foster positive interactions with surrounding communities and healthcare facilities, striking a balance between "openness" and "privacy," as well as between "safety" and "social integration."	The relatively enclosed and self-contained spatial configuration of suburban communities		

Table 2

Relevant theoretical foundations			
environmental metaphysics, environmental psychology： The science that investigates the laws governing the interaction between humans and their physical environment provides a foundational theoretical framework for this study to understand the behavioral patterns, psychological needs, and environmental preferences of older adults in outdoor spaces.			
Personal Space	**definition：** It refers to the psychological personal space of an individual—the area around them that they are unwilling to allow others to intrude upon without permission.	**keyword：** Decline in bodily functions. Reduction of personal space.	**Adjustable social distancing**
Territoriality	**definition：** It refers to the psychological tendency of an individual or a group to develop a sense of ownership, a sense of control, and a sense of identity toward a specific spatial area.	**keyword：** learned helplessness. Unassigned.	**predictability. sense of security. efficacy.**
Environmental Cognition	**definition：** It refers to the process by which an individual acquires, encodes, stores, recalls, and decodes information about the spatial environment.	**keyword：** Cognitive decline	**Clarity of path structure. Landmark recognizability. Age-friendly signage system.**
Landscape Rehabilitation Theory： This theory represents a significant theoretical achievement at the intersection of environmental design and health science, providing a scientific foundation and design rationale for understanding how the natural environment can promote the physical and mental well-being of older adults.			
Stress Reduction Theory	**Key takeaway:** Exposure to natural landscapes can rapidly and effectively alleviate an individual's physiological and psychological stress responses.	Proposed in 1984 by the American environmental psychologist Roger S. Ulrich.	
Attention Restoration Theory	**Key takeaway:** This theory posits that an environment possessing the following four characteristics can effectively restore directed attention: Being Away; Extent; Fascination; and Compatibility.	Proposed in 1989 by Stephen Kaplan and Rachel Kaplan.	
Ergonomics Theory	**Key takeaway:** A discipline that studies the matching relationships between the physical dimensions, physiological functions, and perceptual capabilities of older adults and their spatial environments.	It provides a quantitative foundation for transitioning from the "human body scale" to the "human nature scale" across diverse research domains.	

Table 3

01 Domestic Case

Taikang Community · Ouyuan

Locate and Picture







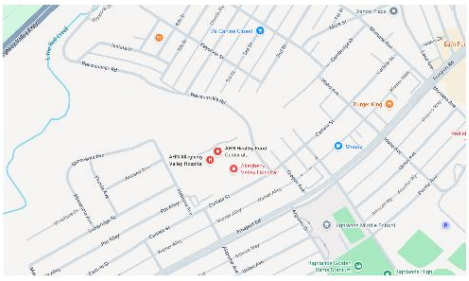


Picture 1

02 Overseas Case

Allegheny Valley Hospital Healing Garden

Locate and Picture









Picture 2

APPENDIX Б Project Proposal





































