

# ***The Study on the Elderly-Oriented Landscape Renovation of Micro Public Space in Old Residential Areas***

## ***——A Case Study in Shanghai Beigang No.1 Community***

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**Abstract:** China has stepped into an aging society, and the primary endowment pattern is home-based care for elderly people presently. Therefore, the public space of residential areas has become the site frequently visited by elderly residents. However, some old residential blocks waiting for renewal have some problems such as an outdoor environment of low quality, which necessitates elderly-oriented reconstruction. The present study focuses on the strategies and methods for elderly-oriented landscape renovation in the public space of old residential areas in terms of the study area within Beigang No. 1 Community. The project intends to understand the needs and preferences of elderly people through field research, then attempts to classify micro public space, plan activities, and consider detailed design to improve the quality of outdoor activities for the elderly and other people. The study hopes to provide inspirations and support for practitioners on renovation projects.

**Keywords:** landscape architecture, urban renewal, old residential area, elderly-oriented reconstruction, micro public space

## **1. Introduction**

China is experiencing significant urbanization, and urban renewal has become a crucial aspect of its future development. However, addressing historical legacies and current conflicts poses new challenges and opportunities for urban renewal efforts. One of the pressing challenges in China is the aging population, and adapting to the urban environment for elderly people becomes essential. Currently, China faces a serious aging population issue, with Shanghai being the first city to encounter this problem. By the end of 2015, approximately 30.2% of the Shanghai's household population was over 60 years old [1]. This proportion is predicted to reach 35.95% by 2035 [2]. As elderly individuals in China often prefer home care [3], residential communities can play a vital role in providing care and assistance for the elderly. Additionally, these communities evoke nostalgic memories for the elderly. Nevertheless, numerous old residential areas in Shanghai encounter common problems. The residents are predominantly elderly, and the outdated infrastructure fails to offer adequate humanized care and services. Therefore, there is an urgent need for urban renewal to address these issues. When implementing aging-in-place renovations, improving the outdoor environment of old residential areas

should be prioritized. A people-centered approach must guide these efforts to ensure that the elderly residents' needs are met.

In terms of basic information, the present study uses the experiences of residential area renovations domestically and internationally in recent years. Summarizing the actual problems that require solutions can help better understand the challenges faced in these projects. Therefore, this study summarizes relevant literature on the characteristics of the elderly, including their physiological, psychological, and behavioral aspects. This research explores the practical application of these theories through the lens of landscape design, aiming to create spaces that cater to the specific needs of the elderly population.

Renovating old neighborhoods is a complex and systematic undertaking, necessitating practical solutions. As each old residential area has unique challenges arising from diverse development processes and regional characteristics, a tailored approach is crucial. The present study is based on practical research and case studies. It prioritizes the renovation of old residential areas and recognizes its direct impact on the daily lives of the elderly population. Additionally, the study explores and summarizes the common patterns of landscape enhancement, providing a valuable reference for future endeavors related to the research and practice of renovating old residential areas.

## 2. Practical Survey

The research form was designed to comprehensively list the current problems (as shown in Table 1) and investigate the common issues prevalent in old residential areas. These problems are categorized into five areas: buildings and appendages, traffic and parking, amenities, landscape environment, and rainwater and sewage. Each of these aspects directly impacts the daily lives of the elderly residents, and enhancing the overall neighborhood environment can benefit all residents. Moreover, the form incorporates a survey that specifically examines the use of public spaces by elderly residents. This includes records and questionnaire interviews to assess the utilization of existing outdoor spaces and the types of outdoor activities within the neighborhood. As these public places are primarily utilized by elderly residents and young children under their care during working hours, the present research focuses on understanding the needs and preferences of these two groups of people.

The case of Beigang No.1 Community, situated in Fengxian District, Shanghai, and constructed in the late 1990s, serves as an important subject in the present study. Beigang No.1 Community shares several typical characteristics of old neighborhoods, including a shortage of public space resulting from the high concentration of residential buildings. This limitation significantly impacts the residents' ability to engage in outdoor activities. Therefore, renovating Beigang No.1 Community presents a challenging task, but the knowledge and insights gained from this case can be widely applied to other similar old neighborhoods facing comparable issues.

Table 1: Field research.

Category	Project
Buildings and Appendages	<p>Is there any water leakage or seepage on the roof?</p> <p>Is there any sign of aging of the buildings?</p> <p>Whether the materials and colors of the buildings are in harmony with the overall appearance of the surrounding area?</p> <p>Are there any risks such as detachment of cornices and downspouts?</p> <p>Is there any space for air-conditioning?</p> <p>Are there any unified emission pipes?</p> <p>Are there any plans for sealing balconies?</p> <p>Whether the entrance image of each unit is pleasing to the eye?</p> <p>Whether the entrance of buildings is equipped with barrier-free ramps and handrails?</p> <p>Whether the material of newspaper boxes at the entrance of the building is durable?</p> <p>Whether the access controls of doors are secure?</p> <p>Whether lighting facilities in the public area of the buildings meet the lighting requirements?</p> <p>Whether the public area of the buildings is a mess?</p> <p>Whether the buildings meet the conditions for installing elevators?</p>
Traffic and Parking	<p>Is there separation between cars at the entrance?</p> <p>Is there separation between driveways and sidewalks in the residential areas?</p> <p>Whether the width and turning radius of driveways meet the requirement for traffic and fire control?</p> <p>Is the number of parking spots meet the requirement?</p> <p>Whether underground parking garages are in use?</p> <p>Are parking spots fitted with charging devices?</p> <p>Whether barrier-free parking spots are provided?</p> <p>Are there any parking spots for non-motor vehicles?</p>
Amenities	<p>Are intelligent lockers provided?</p> <p>Are there sufficient facilities for residents to hang the washing?</p> <p>Are any waste sorting bins available?</p> <p>Are unified garbage stations provided?</p> <p>Whether street lamps meet the lighting requirements?</p> <p>Are there any complete guidance and sign systems?</p> <p>Whether vehicles are managed intelligently (intelligent</p>
Category	Project

Table 1: (continued).

	road gates, intelligent parking)? Are there any monitoring systems? Are there any drinking water equipment? Are there any environmentally-friendly recycling bins for old clothes? Are there any newspaper columns and bulletin boards?
Landscape environment	Whether the pedestrian walkways are perfect? Are the roads smooth and beautiful? Is the image of the entrance pleasing to the eye? Whether fences and guards meet the requirements? Are there sufficient green belts? Whether plants have adverse effects on the safety and health of residents out of doors? Do plants provide adequate light and ventilation and protect residents from sun and wind? Whether the residential areas have special cultural facilities? Are there sufficient and versatile venues for the elderly and children to carry out outdoor activities? Are there enough places to have a rest?
Rainwater and Sewage	Is there any overflow of sewage? Are roads waterlogged? Are green belts waterlogged? Are downspouts splashing sewage?

### 3. Selection of Site and Activity Planning

The master plan for the renovation of Beigang No.1 Community includes aspects such as reorganizing motor traffic and foot traffic, regularizing parking spaces, and reconstructing nonmotorized sheds. The primary focus of the renovation is to enhance the landscape in public spaces within the residential areas. According to Vikas Mehta's research, consistent social behaviors within the same group can foster an increased sense of community belonging [4]. People derive information and pleasure from such interactions, thereby leading to increased civic engagement [4]. The environment plays a crucial role in fostering and supporting consistent social behaviors. By identifying and utilizing small, underused spaces within residential areas, this study aims to develop places where residents can engage in consistent social behaviors. These spaces can create a good community atmosphere, thereby fostering a good culture. Given the limited public space in old residential areas, the need to avoid resource wastage through uncontrolled expansion, and the need to maximize the landscape effect through partial renovation, the strategy employed in this study is centered on the efficient use of micro spaces that aligns with the local conditions. By redesigning driveways and nonmotorized carports, five suitable sites for outdoor activities were identified in this study. Each site is carefully planned with different functions based on their location, scale, and lighting conditions. These spaces are categorized into three types: sun space, shady space, and inter-building space, all tailored to meet the physical and mental needs of the elderly residents, as indicated in the research form. For example,

some areas are designed for the elderly to engage with children while they play, fostering interaction and conversation, thus bringing vitality to the site.

### 3.1. Sun Space

According to research, the amount of time that elderly individuals spend engaging in outdoor activities is significantly influenced by the weather [5]. Sunbathing and breathing fresh air have been found to have positive effects on the physical and mental health of older adults. In the presence of sufficient natural light, people are more likely to engage in outdoor activities such as playing chess and card games, enjoying sunbathing, and having conversations with others.

Site A is situated on the west side of the neighborhood committee and currently features broken concrete pavements and recreational and sports equipment. The northern and eastern sides of the site are adjacent to an open driveway without any enclosure. Additionally, a new pump house has been constructed to the south, which may be visually unappealing and could potentially generate noise (see Figure 1). The site benefits from abundant sunlight and is in close proximity to the neighborhood committee building. Given that the neighborhood committee organizes regular activities for the elderly, Site A becomes an ideal location for conducting outdoor activities (see Figure 1). To maximize its potential, the existing recreational facilities and equipment will be relocated to micro spaces more suitable for fitness and exercise activities.

The design in this study incorporates the concepts of community garden and autonomous landscape. The idea of a community garden promotes shared construction and sharing and has been gaining popularity in China in recent years. Experiments have indicated that fostering a sense of control and responsibility through community participation positively impacts the mental well-being of the elderly [6]. By introducing autonomous landscape elements, the study aims to motivate the elderly to actively participate in outdoor activities, encouraging them to engage in physical exercise and enriching their daily lives. Moreover, the inclusion of such features promotes intergenerational communication, fostering positive community relations. Given the limitation of insufficient public space in the old residential area, constructing community gardens may not be feasible. The approach employed in this study utilizes delicate fruit and vegetable planting boxes as “miniature” community garden equipment (see Figure 5). These planting boxes are placed flexibly and can be combined with other outdoor furniture, providing utility for residents. The design plan incorporates fruit and vegetable planting boxes to create an enclosed space. Additionally, bamboos dividers are used to separate this area from the pump house. The sidewalk, previously paved with pebbles, has been transformed into a hiking trail. The solitary golden laurel, a tall shrub, has been preserved in the design. Moreover, seating areas have been constructed around the trees, catering to the residents’ need to rest.



Figure 1: Micro space A (before and after renovation).

### 3.2. Shady Space

Considering the challenging weather conditions, such as the blazing sun and cold winds, it becomes essential to create comfortable outdoor spaces that are conducive to the elderly residents' health. Shaded and wind-resistant areas are ideal for sports venues to cater to the needs of elderly residents. Two shady areas, namely B and C, have been identified in Beigang No.1 Community. These areas are considered suitable for recreation, fitness, and games. Area B is characterized by its significant size and lush vegetation, with a canopy of cedars and camphor trees providing ample shade (see Figure 2). By preserving the tall trees and introducing ornamental flowering plants under the forest canopy, a sense of vertical hierarchy is established. Due to its enclosed nature and generous size, Site B serves as an ideal recreation facility for all age groups, where residents can participate in various outdoor activities. These activities range from children's games and jogging to table tennis, fruit and vegetable planting, and traditional Chinese opera performances (see Figure 2). Recognizing that the sensory system of the elderly may gradually decline with age, the design incorporates aromatic plants and stone paths to enrich their sensory experiences. The versatile nature of the site allows the elderly to engage in a variety of activities that suit their needs and preferences, thereby reducing their feelings of loneliness and fostering a sense of belonging. The unobstructed view of the site contributes to creating a lively atmosphere while ensuring that caregivers can easily monitor the elderly and children during their outdoor activities. Additionally, Site B offers somewhat private spaces, providing a convenient and tranquil setting for the elderly to rest and relax.





Figure 2: Micro space B (before and after renovation).

Site C is a green space situated between residential buildings and a nonmotorized carport. The green space is currently closed and the vegetation is poorly managed, resulting in its underutilization (see Figure 3). The design plan involves demolishing the original nonmotorized carport and relocating it to the north side. To ensure fire safety, a safe distance is maintained between the carport and residential buildings. The south side involves a combination of vehicle parking spots and landscape space. The new arrangement of the carport follows a folding line, allowing for the creation of a small and independent space where various activities can take place. The existing trees at the edge of the green space are preserved to separate the parking spots from the driveway, promoting safety. Site A, with ample lighting and natural shading from numerous trees, is well-suited for recreational and sports activities. The original recreational and sports equipment from Site A is relocated to Site C.



Figure 3: Micro space C (before and after renovation).

### 3.3. Inter-building Space

In consideration of the need for a quiet living environment for ordinary residents, recreational and entertainment activities near residential buildings should primarily consist of peaceful activities. Preliminary research showed that on the west side of the district, there is a regular gathering place near the residential buildings where elderly residents engage in chess and card games (see Figure 4). Through these continuous social behaviors, elderly people have gradually developed attachments to their community. This sense of attachment fosters a realization of their own value, leading to a strengthened sense of identity and emotional bond among the community residents [7]. Respecting the long-established habit of gathering for chess and card games, the renovation plans should be carried out while considering the improvement of the outdoor environment. In winter, the stone tables and chairs are not comfortable, and the simple pavement fails to effectively divide driveways from the activity area. In the designs for micro spaces D and E, the position of the original carport has been altered to create a larger space. The pocket-shaped micro space serves as an effective separator between sidewalks and driveways. To create a “public meeting room” setting, tables and chairs crafted from suitable materials are introduced and wind-blocking walls are incorporated. This thoughtfully designed space provides a comfortable environment for residents to engage in activities such as chess, card games, chatting, and reading newspapers (see Figure 4).



Figure 4: Micro spaces D and E (before and after renovation).



## **4. Details of the Design**

### **4.1. Surfacing of the Roads**

When considering the surfacing of the roads in Beigang No.1 Community, the comfort and safety needs of the elderly residents are prioritized because the elderly may face mobility challenges, walking slowly and heavily relying on aids such as crutches and wheelchairs. To accommodate their needs, the road surface should be smooth and nonslip. In addition, small-size materials and numerous cracks on the roads can cause inconvenience for the residents. Therefore, the concept of a sponge city has been adopted in the design plan proposed in this study. For the roads in Beigang No.1 Community, the selected surface material is permeable asphalt in various colors or permeable ceramic tiles with appropriate sizes.

### **4.2. Cornerless Design of Facilities**

To ensure the safety of children and elderly residents, sharp edges and potential hazards should be avoided in the design. The edges of leisure facilities should be cut or rounded to ensure safety of elderly residents in their daily life.

### **4.3. Design for Barrier-free Facilities**

#### **4.3.1. Seat Height and Armrests**

It is essential to consider different height requirements for various age groups when designing seating areas. Ergonomics plays a crucial role in determining the appropriate seat height for different users. For adults, the chair height should be within the range of 400–440 mm. However, this height may not be suitable for young children. According to research, the chair height for children between the ages of 4 and 17 in China should fall within the range of 270–520 mm [8]. In response, leisure facilities specially designed for children have been incorporated in the design proposed in this study. As depicted in Figure 5 (left), the ring-shaped tree boxes are available in two sizes: high and short. In addition, to address the needs of the elderly, the seats are equipped with armrests. These armrests are set at a height of  $230\pm 20$  mm from the chair surface.

#### **4.3.2. Fruit and Vegetable Planting Boxes**

When designing the height of the fruit and vegetable planting boxes for horticultural therapy, the specific needs of elderly individuals using wheelchairs should be considered. The space beneath the boxes should be designed to accommodate both legs comfortably, allowing elderly individuals to engage in gardening activities (see Figure 5). Reaching high potted plants can help build the strength of the elderly individuals' arms. Some planting boxes can be designed at a lower height to cater to children's needs. The selection of ornamental herbaceous plants in the boxes adds visual appeal. Furthermore, incorporating poles within the planting boxes allows for the use of trailing vines to climb and grow.



Figure 5: Left: seats are around a tree with armrests of different heights. Right: fruit and vegetable planting boxes have different types and heights.

#### 4.4. Area Recognition

**Color:** In the residential area of Beigang No.1 Community, the selection of landscape color is guided with the aim to create a strong visual impact. Soft colors are chosen to create a warm atmosphere. Simple modifications are made to the paving materials and colors to enhance the region's visual recognition.

**Lighting:** It is important to strike a balance between providing adequate visibility and avoiding discomfort caused by excessive or weak lighting [9]. Therefore, lighting should be gentle and warm, creating a pleasant and relaxed atmosphere. Continuous lighting is essential in areas where residents need to navigate at night, such as corners and barriers. Lamps placed within reach should always use low voltages for the convenience and safety of residents.

**Signs:** A comprehensive sign system is essential to enhance the daily lives of the elderly residents in Beigang No.1 Community. Signage should be placed at turning points and easily noticeable locations to provide clear guidance and directions. To accommodate the convenience of individuals who may have to stoop or use a wheelchair, signs should be positioned at a lower height, preferably below 1500 mm. The patterns should be straightforward and easily recognizable, enabling the elderly to understand the information quickly.

#### 5. Conclusion

With China's aging population and the preference for home care among elderly individuals, research on elderly-oriented renovation for old residential areas becomes a significant aspect of urban renewal. By proposing the renovation plan for the Beigang No. 1 Community residential area in Shanghai's Fengxian District, the present research explores general strategies and methods for enhancing the public activity space in these complexes. Designers should adapt and address specific issues in each project based on the local conditions of the sites.

#### References

- [1] old-age scientific research center of Shanghai. (2016). In *Shanghai in 2015 elderly population and aging monitoring statistics*. Retrieved from <http://www.shrca.org.cn/5764.html>, 2016-3-30.
- [2] Xu, R. (2020). Comparison and response of aging trends between Shanghai and Chengdu. *Macroeconomic Management*, 06, 68-77.
- [3] Shanghai municipal statistics bureau. (2016). 2015 statistical bulletin of national economy and social development. Retrieved from <https://tjj.sh.gov.cn/tjgb/20160228/0014-287258.html>.
- [4] Vikas Mehta. (2013). *The Street: A Quintessential Social Public Space*. London: Routledge.
- [5] Zhao, Z., & Gong, R. (2016). Optimal aging outdoor public space of older community research – a case study of Beijing songyuli community. *60 Years of Planning: Achievements and Challenges: Proceedings of Annual National Planning Conference 2016* (pp.301-316). China Architecture & Building Press.

- [6] Sun, J. (2019). *Exploration of age-appropriate landscape design-Thinking based on social psychology control experiment*. *Modern Horticulture*, 44(16), 78-79.
- [7] Yao, K., Lu, J., & Zhang, H. (2022). *Research on renewal strategies of suitable aging landscapes in high-rise residential districts in the post-epidemic era*. *Architecture & Culture*, 02, 235-236.
- [8] Shenzhen Association of Ergonomic Application. (2017). *Ergonomic seat six standard*. Retrieved from <https://www.doc88.com/p-9913543790689.html>.
- [9] Liu, W., Yang, C., & Chen, Z. (2001). *Luminous environment in living room for the elderly*. *China Illuminating Engineering Journal*, 12(3), 14-17.