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South China University of Technology

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老旧社区公共空间适老化改造设计
——以广州市中兴社区为例

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Age-Friendly Renovation of Public Spaces in Old Urban Community：A Case Study of Zhongxing Community in Guangzhou

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摘要

在人口老龄化背景下，老旧社区公共空间在适老化供给与老年人行为需求之间存在存在显著错位，尤其是在空间使用效率、行为支持性及环境安全性等方面表现出结构不足，急需从行为空间耦合的视角开展系统性优化研究。本研究以广州市中兴社区为实证对象，针对公共空间存在低利用率、环境品质欠佳及设施配置不足等问题展开系统性适老化更新策略研究，以提升老旧社区公共空间的适老化水平。

本研究基于行为观察与空间评价相结合的方法，对交通型、社交型、商业前及服务附属四类公共空间进行实证分析，识别老年人行为活动特征及其与空间环境要素之间的耦合关系。在此基础上构建以行人基础设施、安全性、美学及环境质量为核心的评价框架，并提出针对性的适老化更新策略，实现系统化适老化改造。

同时通过国内外适老化更新案例的系统梳理与归纳总结不同空间类型下的关键设计要素，并将以转译为适用于高密度老旧社区的策略模型，以增强研究结论的可验证性与可推广性。在上述研究基础上，以中兴社区为对象，构建问题识别-策略匹配-空间转译的设计路径，形成总体更新框架及关键节点适老化设计方案，体现低成本渐进式适老化更新实践。

在研究方法上，将行为路径跟踪与空间环境量化评价相结合，构建行为—空间耦合的分析框架。在策略层面，基于多类型公共空间的差异特征，提出分类型、分要素的适老化更新体系。在实践层面，通过实证案例验证向具体空间设计的转译机制。以中兴社区为例，切实提升社区内老年人户外活动的安全性与舒适度，为高密度老旧社区公共空间适老化更新提供可操作的分析框架与设计方法，并对类似情境下空间优化具有一定的推广意义。

关键词：适老化改造；老旧社区；公共空间；行为观察；环境感知

Abstract

Against the background of population aging, a significant mismatch exists between the age-friendly provision of public spaces in old communities and the behavioral needs of elderly residents. This mismatch is particularly evident in terms of spatial use efficiency, behavioral support, and environmental safety, revealing structural deficiencies that urgently call for systematic optimization research from the perspective of behavior–space coupling. Taking Zhongxing Community in Guangzhou as an empirical case, this study conducts a systematic investigation into age-friendly renewal strategies in response to problems such as low public space utilization, poor environmental quality, and insufficient facility provision, with the aim of improving the age-friendliness of public spaces in old communities.

This study adopts a method that combines behavioral observation with spatial evaluation to conduct an empirical analysis of four types of public space—traffic spaces, social spaces, commercial forecourt spaces, and service-affiliated spaces—so as to identify the behavioral characteristics of elderly residents and the coupling relationship between their activities and spatial environmental factors. On this basis, an evaluation framework is constructed with pedestrian infrastructure, safety, aesthetics, and environmental quality as its core dimensions, and targeted age-friendly renewal strategies are proposed to achieve systematic age-friendly renovation.

At the same time, through a systematic review of domestic and international age-friendly renewal cases, this study summarizes the key design elements of different types of public space and translates them into a strategic model applicable to high-density old communities, thereby enhancing the verifiability and transferability of the research conclusions. Building on this research, and taking Zhongxing Community as the case site, the study develops a design path of problem identification–strategy matching–spatial translation, forming an overall renewal framework as well as age-friendly design schemes for key nodes, and demonstrating a low-cost and incremental practice of age-friendly renewal.

In terms of research methods, this study combines behavioral path tracking with the quantitative evaluation of the spatial environment to construct a behavior–space coupling analytical framework. At the strategic level, it proposes a type-based and element-based age-friendly renewal system according to the differentiated characteristics of multiple

categories of public space. At the practical level, it verifies the mechanism through which strategies are translated into specific spatial design by means of an empirical case. Taking Zhongxing Community as an example, the study effectively improves the safety and comfort of elderly residents' outdoor activities, provides an operable analytical framework and design method for the age-friendly renewal of public spaces in high-density old communities, and offers certain reference value for spatial optimization in similar contexts.

Key Words：Age-friendly renovation; Old communities; Public space; Behavioral observation; Environmental perception

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Chapter1 Introduction

1.1 Research Background And Research Question

1.1.1 Social Background

With the profound transformation of the global demographic structure, population ageing has evolved from a phenomenon primarily associated with developed countries into a common challenge for humanity in the twenty-first century. According to projections in the *World Population Prospects 2024* [注1] published by the United Nations, both the absolute size and the relative proportion of the older population in China will continue to grow, indicating that population ageing will remain a persistent issue in the country for the foreseeable future. As of the end of 2024, the population aged 60 and above in China had reached 310.31 million, accounting for 22.0% of the total population, while the population aged 65 and above totaled 220.23 million, representing 15.6%. In the same year, the old-age dependency ratio for the population aged 65 and above was 22.8%, and average life expectancy nationwide reached 79.0 years [注2]. By 2035, China's older population is projected to reach 420 million, accounting for 30.31% of the total population; by 2100, the number of older adults in China is expected to exceed that of the younger population (Fig. 1-1).

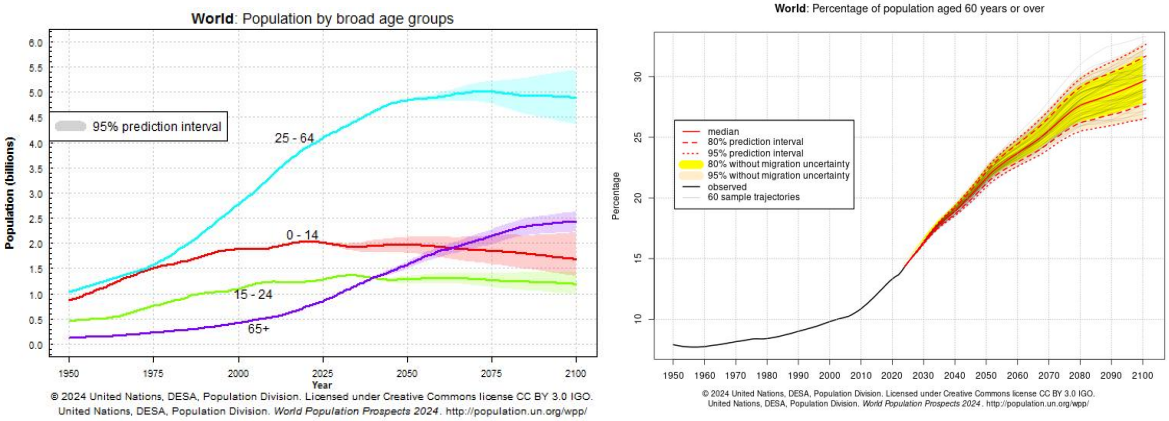


Figure1- 1Trends in the Future Elderly Population

Source:《World Population Prospects 2024》[注1]

As population ageing continues to intensify, issues of spatial adaptation at the

[1] 联合国经济和社会事务部人口司. 2024 世界人口展望[R]. 纽约: 联合国, 2024

[2] 民政部. 2024 年度国家老龄事业发展公报[R]. 北京: 民政部, 2025

community scale have gradually become a key entry point for responding to ageing-related challenges. However, compared with research on macro-level elderly care policies and facility provision, studies on the coupling mechanism between the behavioural patterns of older adults and the spatial environment in high-density old communities remain relatively limited, particularly with regard to empirically grounded pathways for spatial optimization[61].

According to the *Statistical Data on the Elderly Population and Ageing-related Services in Guangzhou in 2024* [注3], by the end of 2024, Guangzhou had a registered population of 10.7502 million, of whom 2.1292 million were aged 60 and above, accounting for 19.81% of the total. Although this proportion is slightly lower than the national average (22%), central districts such as Liwan, Yuexiu, and Haizhu have experienced a superposition of ageing and high urban density, resulting in greater pressure for age-friendly spatial adaptation. In terms of spatial distribution, Yuexiu, Haizhu, and Liwan had the largest registered older populations. Among residents aged 60 and above, 53.6% were aged 60–69, 32.2% were aged 70–79, and 14.2% were aged 80 and above.

Table1- 1 Basic Information on the Elderly Population by District in Guangzhou at the End of 2024 (Excerpt)

Region	Total Population (10,000 persons)	Above 60		Aged 65 and Above		Aged 80 and Above	
		Population (10,000 persons)	Proportion (%)	Population (10,000 persons)	Proportion (%)	Population (10,000 persons)	Proportion (%)
Guangzhou	1075.02	212.92	19.8	151.72	14.1	30.24	14.2
Liwan District	81.39	25.72	31.6	18.36	22.6	3.57	13.9
Yuexiu District	116.51	35.11	30.1	25.33	21.7	5.71	16.3
Haizhu District	111.58	32.83	29.4	23.73	21.3	4.91	14.9
Tianhe District	110.57	17.79	16.1	12.54	11.3	2.91	16.3

Source: Drawn by the Author

Against the backdrop of accelerating population aging, a large number of traditional communities in Guangzhou—particularly those built around the 1990s—generally suffer from

[3] 广州市民政局. 2024 年广州市老年人口和老龄事业统计数据[R]. 广州:广州市民政局, 2025

a systematic lack of age-friendly functions. The age-friendliness of the physical environment constitutes the fundamental basis for ensuring the safety and independent mobility of the elderly[6]. However, in Guangzhou's traditional residential neighbourhoods, the lack of barrier-free facilities remains a major constraint on older adults' daily mobility. In old urban areas dominated by multi-storey housing, the absence of elevators is one of the main barriers to ageing in place, particularly for the oldest-old and those with limited mobility. As a result, many older adults are largely confined indoors, which restricts their daily activities and undermines their health and community participation. Studies have shown that in Yuexiu District, which has the largest elderly population, only 4.4% of community elderly care service buildings are equipped with vertical elevators[1]. Beyond the shortcomings of the physical environment, community service facilities for daily care, health management, recreation, and social interaction are also inadequate in both quantity and quality. In the old urban core, where land is highly constrained, the construction and retrofitting of elderly care facilities are particularly difficult. Consequently, essential facilities such as day-care centres, senior canteens, community health service stations, rehabilitation centres, and elderly activity centres remain seriously insufficient[2].

Therefore, promoting age-friendly renovation in old communities and reconstructing an elderly-friendly living environment through interventions in public space and community services has become an urgent task for Guangzhou in addressing deepening population ageing and enhancing urban resilience and humanistic care. This indicates that population ageing in China has entered a stage marked by the combined pressures of demographic scale and population structure. Under this shift, spatial adaptation at the community level will become a critical weakness in responding to population ageing.

1.1.2 Policy Background

The year 2020 marked a critical turning point in the policy history of age-friendly renovation for old communities in China. Prior to this, relevant policies were scattered across different fields, including elderly care services, barrier-free environment construction, and the renewal of old residential neighbourhoods, lacking both systematic coordination and mandatory force. In 2020, with the issuance of the *Guiding Opinions of the General Office of*

the State Council on Comprehensively Advancing the Renovation of Old Urban Residential Communities , *the Guiding Opinions on Accelerating the Implementation of Home-based Age-friendly Renovation for the Elderly* , and *the Notice on Launching the Demonstration Program for National Elderly-friendly Communities*, national policy on age-friendly renovation entered a new stage characterized by intensive release and systematic development. In 2022, *the 14th Five-Year Plan for National Aging Development* incorporated "elderly-friendly communities" into the national policy framework for the first time, explicitly calling for "the implementation of age-friendly retrofitting of elderly residences, the improvement of community elderly care service facilities, and the upgrading of community environments and services to be age-friendly," and setting a target of establishing over 5,000 demonstrative elderly-friendly communities by 2025 [注4]. In 2023, *the Guiding Opinions of the Ministry of Housing and Urban-Rural Development and Other Departments on Promoting the Construction of Embedded Service Facilities* in Urban Communities promoted the compact and integrated inclusion of elderly care, childcare, community dining, household convenience, health services, and fitness facilities within communities — particularly in older residential areas — directly addressing the shortage of public service spaces. In September of the same year, *the Law of the People's Republic of China on Barrier-Free Environment Construction* mandated that "existing residential buildings, residential communities, and public spaces that do not meet the standards for barrier-free facilities shall undergo retrofitting," thereby legally obligating age-friendly (barrier-free) adaptation of older communities. In 2024, the Opinions on Developing the Silver Economy to Enhance the Welfare of Older Adults incorporated age-friendly retrofitting into the "silver economy" framework, encouraging social capital participation and promoting new models such as "property management + elderly care" and "internet + elderly care," providing broader market-oriented development opportunities and sustainable business logic for age-friendly retrofitting.

As a national central city and megacity, Guangzhou has actively responded to national directives by incorporating the development of elderly-friendly communities into the core agenda of urban renewal, with related policies formulated under the guidance of national

[4] 国务院. "十四五"国家老龄事业发展规划:国发〔2021〕40 号[R]. 北京:国务院, 2021

top-level policy design. In 2020, the Ministry of Civil Affairs, together with eight other central government departments, jointly issued *the Guiding Opinions on Accelerating the Implementation of Home-based Age-friendly Renovation for the Elderly*, provided a policy basis and practical guidance for the implementation of home-based age-friendly renovation across different regions.In 2022, the *14th Five-Year Plan for the Development of Ageing-related Services in Guangzhou* took the lead in proposing the goal of building a national model for elderly-friendly communities. It explicitly required that, by 2025, 1,000 age-friendly renovation projects in old residential neighbourhoods be completed, with a coverage rate of over 50%. To support this goal, Guangzhou established dedicated municipal funding and promoted a renovation mechanism led by the government, supported by social participation, and jointly governed by residents. At the same time, the city launched a pilot in Yuexiu District integrating embedded community elderly care service centres with age-friendly facilities, thereby exploring a micro-renewal approach and generating a policy innovation model.

Accordingly, research on the public spaces of residential communities in rapidly ageing areas, guided by the goal of spatial age-friendliness, not only responds to policy initiatives aimed at improving community age-friendliness, but also aligns with the broader objective of healthy ageing. As the older population continues to grow, age-friendly renovation that prioritizes the needs of older adults is of profound significance for improving the living environment and fostering elderly-friendly communities, while also offering a replicable Guangzhou model for other megacities confronting deep population ageing. In sum, China's age-friendly renovation strategy has gradually evolved from an early stage of fragmented guidance to a comprehensive governance phase characterized by systematic promotion, legal regulation, and market participation, with its core transformation lying in the shift from facility-oriented improvement to the integrated governance of space, services, and community environments.

Based on the above social context and policy background, three core contradictions can be identified in the current age-friendly renovation of old communities. First, the renovation targets are highly complex, and the spatial environment is fragmented, yet systematic guidance for spatial classification remains lacking. Second, renovation measures often remain

limited to the addition of facilities, without adequately responding to the spatial mechanisms underlying older adults' actual behavioural patterns. Third, public space renewal is typically engineering-oriented, with little attention to establishing an evaluation loop for behavioural outcomes.

Accordingly, this study addresses the following questions: (1) How do the behavioural patterns of older adults relate to the spatial structure of public space in high-density old communities? (2) In what respects do existing public spaces fail to support older adults' daily activities? (3) How can a behaviour-driven mapping framework linking behavioural characteristics, spatial elements, and renovation strategies be established to inform systematic decision-making for age-friendly spatial optimization?

1.2 Research Significance

1.2.1 Practical Significance

The practical significance of this study lies in advancing systematic age-friendly renovation to improve older adults' daily quality of life and spatial adaptability within the community, while offering an operational and replicable approach for Guangzhou and other Chinese megacities facing deep population ageing. More specifically, its value is reflected in three dimensions, each corresponding to a key challenge in the current renewal of old communities.

First, methodologically, this study establishes a quantitative approach to analysing behavioural and spatial elements, providing a data-based foundation for age-friendly renovation research. Conventional assessments have largely relied on subjective surveys or experience-based judgement, and therefore have limited capacity to capture the actual interaction between older adults and space[17]. This study integrates multiple data collection methods to develop a quantitative framework for analysing the behaviour–space relationship, thereby addressing the methodological limitation of existing age-friendly renovation research, which has relied primarily on subjective evaluation with limited behavioural evidence. Specifically, behavioural observation was used in the field survey to systematically record older adults' activity types, duration of stay, and movement trajectories in community public

spaces.

Second, strategically, this study develops a spatial renewal framework centred on key spatial elements. In response to the differing functions, use characteristics, and existing problems of public space types in old communities, it proposes targeted age-friendly renovation approaches. Based on fieldwork and behavioural analysis, the study identifies the physical environmental factors underpinning older adults' daily activities and builds a corresponding evaluation system and strategy set around five dimensions: accessibility, pedestrian infrastructure, aesthetics, environmental quality, and safety.

Third, in practice, this study proposes an implementable age-friendly renovation scheme for Zhongxing Community. By improving access to public space nodes, adding resting facilities, and enhancing the microenvironment, the proposed approach can create more opportunities for outdoor activity for older adults in old communities.

1.2.2 Theoretical Significance

At present, age-friendly renewal strategies in China are largely confined to the modification of individual spatial elements, such as adding barrier-free facilities or renovating activity rooms, with limited systematic or type-specific guidance. This has resulted in increasingly fragmented and homogenized renovation practices[78]. Based on an in-depth investigation of Zhongxing Community, this study develops a corresponding framework linking behavioural characteristics, spatial elements, and renovation strategies. This provides an effective basis for formulating context-specific strategies for age-friendly renovation in high-density traditional neighbourhoods.

Building on existing research on age-friendly renewal, this study proposes a classification framework using public space types as the basic unit of analysis. By combining behavioural observation, questionnaire surveys, and semi-structured interviews, it links behavioural data with the identification of spatial elements and develops a three-dimensional analytical model based on behavioural frequency, duration of stay, and the degree of deficiency in spatial elements. Multivariate association analysis is then used to identify key influencing factors, enabling spatial optimization to move from experience-based judgement to behaviour-based evidence and providing a quantitative analytical approach for age-friendly

renovation in high-density traditional communities.

1.3 Conceptual Definitions

1.3.1 Old Residential Communities

According to *the Guiding Opinions of the General Office of the State Council on Comprehensively Advancing the Renovation of Old Urban Residential Communities*, old urban residential communities are explicitly defined as "residential neighbourhoods in cities or county towns that were built relatively early, suffer from inadequate maintenance and management, have incomplete municipal infrastructure and community service facilities, and are in strong need of renovation[61]. Under current standards, the term generally refers to residential communities built before 2000, with relatively low construction standards and increasing incompatibility with contemporary social development in the course of urban transformation[14]. Subsequent policy interpretation by the Ministry of Housing and Urban-Rural Development further noted that such communities typically exhibit high building density, an ageing rate exceeding 30%, and fragmented public space, all of which create an urgent need for spatial renewal. Accordingly, in this study, old communities specifically refer to urban residential areas built before 2000 that are characterized by ageing spatial structures, insufficient public service facilities, and a relatively high degree of population ageing.

1.3.2 Public Space in Old Communities

Public space in old communities constitutes an important part of the urban public space system and mainly refers to outdoor spaces within old residential neighbourhoods, such as community entrances, semi-open courtyards, vacant spaces along roadsides, and open areas beneath residential buildings[19]. These spaces not only serve as places for residents' daily social interaction, leisure, and circulation, but also function as carriers of community memory and historical context[63]. In this study, public space in old communities refers primarily to an open spatial system that supports residents' daily social interaction, leisure, and movement, including outdoor open spaces and the spaces associated with public service facilities. For the purposes of this study, these spaces are further classified into four types according to their

functional attributes: social spaces, road spaces, commercial frontage spaces, and service-affiliated spaces.

Table1- 2 Characteristics of Community Public Space (Source: Reference[64])

Attributes	Specific Content	Theoretical Basis
Social Attributes	Emphasizes publicness and shared use; serves as a place for social interaction where community members can enter freely and use equally, distinguishing it from private spaces such as residences.	WHO Age-Friendly Cities Framework; Inclusive Design Theory
Functional Characteristics	Characterized by multifunctionality and accommodates the diverse daily needs of residents, including leisure, social interaction, health promotion, cultural activities, and services.	Findings from the I'DGO Project; Principles of Universal Design
Morphological Characteristics	Refers not only to outdoor open spaces (such as squares, green spaces, and pedestrian paths), but also to indoor public places (such as activity rooms and service centers) and public facilities (such as seating, signage, and lighting), thus forming an integrated three-dimensional spatial network linking indoor and outdoor environments.	Environmental Behavior Studies

1.3.3 Age-friendly renovation

According to the concept of age-friendly environments proposed in the World Health Organization's 2007 Age-friendly Cities initiative[82], age-friendly renovation refers to the structural modification and environmental optimization of housing and public space in old urban communities in order to remove physical barriers, reduce environmental complexity, and accommodate the decline in living capacity associated with older adults' physiological ageing[18].

In this study, age-friendly renovation refers primarily to the process of spatial renewal targeting community public space, aiming to improve the safety, accessibility, and comfort of older adults' daily activities through the optimization of spatial structure and environmental elements.

1.4 Research Object and Scope

1.4.1 Representativeness of Zhongxing Community

Zhongxing Community is located in Caihong Subdistrict, Liwan District, Guangzhou, and is one of the typical high-density old residential neighbourhoods in the city's central urban area. Its representativeness is reflected in several respects. First, in terms of demographic structure, the community shows a high degree of population ageing, with

residents aged 60 and above accounting for more than 35% of the population, significantly higher than the citywide average of 19.8%. Second, in terms of spatial form, the area is dominated by high-density housing and characterized by fragmented space. Third, in terms of physical conditions, barrier-free facilities are insufficient and the pedestrian system is discontinuous. Fourth, in terms of service provision, the community is equipped with a certain number of service facilities, but the spatial connections between them remain inadequate.

Therefore, Zhongxing Community is highly representative in terms of its ageing level, spatial form, facility deficiencies, and service conditions, and can serve as a typical case reflecting the key contradictions in age-friendly renovation of public space in high-density old communities in central Guangzhou. Accordingly, taking Zhongxing Community as the case study can not only provide a design basis for its own renewal, but also offer reference for age-friendly renovation in other old communities of a similar type.

1.4.2 Basic Information

This study takes Zhongxing Community and its surrounding area in Liwan District, Guangzhou, as the research site, with permanent residents aged 60 and above as the primary study population. This group was selected for two main reasons. First, in terms of demographic structure, Zhongxing Community is a typical old residential neighbourhood developed in the twentieth century, characterized by high building density, ageing public facilities, and lagging renewal. Its population structure shows a pronounced ageing trend, with the proportion of older adults significantly exceeding the citywide average. In such a highly aged community, older adults constitute the principal users of public space, and their needs should therefore serve as the core basis for spatial optimization. Second, older residents in this area have lived there for a long time and rely heavily on community public spaces and surrounding environments in their daily lives. Their behavioural patterns, spatial use habits, and environmental needs are therefore both typical and representative, and can effectively reflect the living conditions and age-friendly demands of older adults in high-density traditional communities.



Guangdong Province　　Guangzhou City　　Liwan District

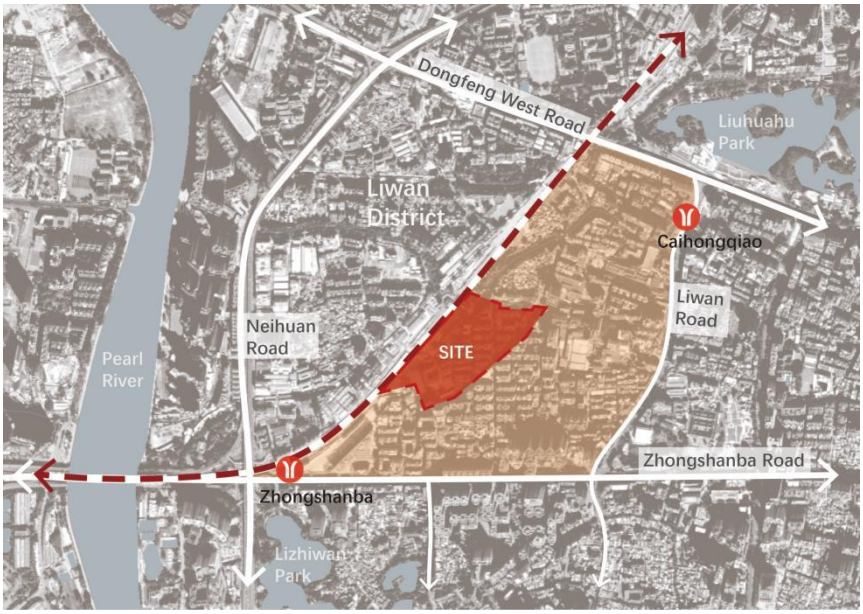


Figure1- 2 Location Map of Zhongxing Community (Source: Drawn by the Author)

In spatial terms, the study area covers approximately 8.67 hectares, with a total boundary length of about 1.53 kilometres. It is located within Caihong Subdistrict, Liwan District, and is enclosed by urban roads including Shiguili and Zhoumen South Road, as shown in Fig. 1-2. The area extends east to Liwan Road, along which the Caihong Subdistrict Community Service Centre is located; south to Zhongshan 8th Road, which accommodates several schools and a community hospital and forms the main functional zone of the southern part of the community; west to Tangqian New Street, covering areas where historic urban fabric and residential functions intersect, including the Nanan Paifang and Huancuiyuan residential neighbourhood; and north to Zhoumen Road and the roads surrounding the community health service centre. The area also includes multifunctional residential units such as Zhongxingyuan Community. Overall, the study area covers about 0.12 km^2 and is characterized by a clearly

defined street network, high building density, fragmented public space, and a lack of systematic age-friendly renovation, making it a typical example of old communities in the central urban area of Guangzhou.

Field survey and mapping confirmed that the defined study area is representative and can effectively support subsequent observation and analysis of older adults' behavioural characteristics. Its scale ensures the feasibility of the research while adequately covering the spatial elements required for older adults' daily lives. Accordingly, using this area as the study sample makes it possible to examine older adults' movement patterns and activity preferences within a bounded setting, while also allowing a comprehensive assessment of the extent to which existing public space supports the older population. This provides a solid empirical basis for subsequent age-friendly renovation strategies informed by environment–behaviour research.

1.5 Research Methodology and Framework

1.5.1 Research Method

This study adopts an integrated methodological framework combining qualitative and quantitative approaches. With behavioural data as its core, it links spatial analysis with design translation. Focusing on the interpretation of behaviour–space relationships and their translation into design strategies, the study employs the following methodological framework:

(1)Literature Research Method

A systematic review of the literature provides the foundation for this study. By collecting, reviewing, and synthesizing books, journal articles, and dissertations on environment–behaviour theory, community elderly care, age-friendly renovation, barrier-free design, public space renewal, and urban community renewal, this study develops the theoretical and methodological basis for the public space research in Chapter 2.

(2)Behavioural Observation and Path Tracking

Through field observation of public spaces in Zhongxing Community, Liwan District, Guangzhou, this study identified the activity spaces preferred by older adults and conducted behavioural observation and path tracking to examine their spatial preferences and activity

patterns[60]. Photographic records were then sorted and classified to document the current conditions of community public space and identify existing problems. The resulting data on older adults' spatial use provide the empirical basis for the analysis in Chapter 3.

(3)Interviews and Questionnaire Survey

During the field investigation, questionnaires were distributed to older residents living in the community in order to examine their needs for different types of public space, the existing age-related problems in the community environment, their satisfaction with current public spaces, and their expectations for future improvement. The survey generated subjective perceptual evaluation data, which correspond to the analysis in Section 3.3 of Chapter 3.

(4)Quantitative Analysis of Spatial Elements

Based on field investigation and behavioural data collection in Zhongxing Community, this study classifies and quantifies key spatial elements, including facility accessibility, pedestrian infrastructure, safety, aesthetics, and environmental quality. By integrating these data with questionnaire results, it examines the relationship between behavioural characteristics and spatial elements, thereby identifying the key factors that influence older adults' activity willingness and spatial use efficiency. This forms the basis of the analysis in Section 3.3 of Chapter 3 concerning the effects of environmental elements on behavioural characteristics.

(5)Case Study Method

By reviewing representative age-friendly design cases from China and abroad, this study summarizes specific approaches across five dimensions: facility accessibility, pedestrian infrastructure, safety, aesthetics, and environmental quality. This forms the basis of the case study analysis in Chapter 4. On this basis, it further distils transferable design strategies to inform the development of renovation strategies in Chapter 5 and the renovation of Zhongxing Community.

(6)Design Translation

Based on older adults' behavioural characteristics, identified spatial problems, and case study findings, this study takes Zhongxing Community in Guangzhou as the case and translates evaluation dimensions and strategic principles into specific design interventions, including master plan optimization, path organization, node renovation, and facility allocation.

This forms the core content of Chapters 5 and 6.

1.5.2 Research Framework

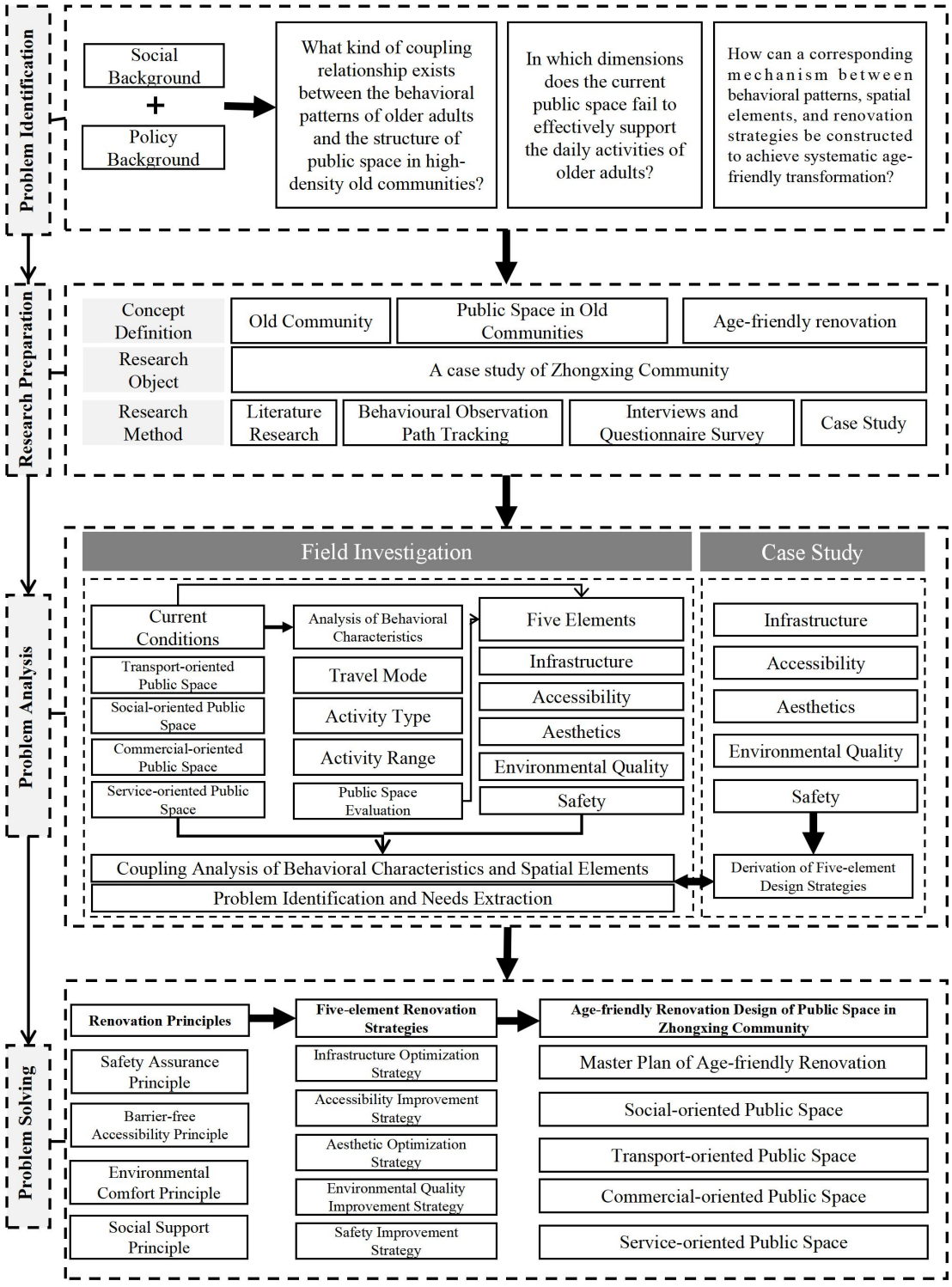


Figure1- 3 Research framework (Source: Drawn by the Author)

Chapter2 Existing Conditions of Public Space in Zhongxing Community

Community public space, including roads, squares, and green spaces, constitutes an indispensable setting for older adults' daily lives. It serves not only as the primary place for them to leave home and engage in physical activity, but also as a core domain for maintaining social ties, conducting emotional exchange, and obtaining psychological comfort[6]. Studies have shown that a safe, comfortable, convenient, and vibrant community public environment can significantly increase older adults' frequency of going out, promote their participation in social interaction, delay physical decline, and reduce the risks of loneliness and depression[7]. Conversely, public spaces characterized by physical barriers and a lack of human-centred design may intensify social isolation among older adults and seriously undermine their quality of life. Therefore, the essence of age-friendly renovation lies in applying person–environment fit theory to reshape physical space so that it better supports the abilities and needs of older adults[8].

2.1 Classification of Community Public Space Types

In terms of public space classification, Zhang Jianmin, based on older adults' physiological, psychological, and social needs, subdivided outdoor activity space into functional types such as outdoor activity centres, resting spaces, and walking spaces[9]. Li Jianhong, Hao Fei, and others classified urban public outdoor space into four functional categories—activity space, social space, resting space, and service space—based on older adults' physiological, psychological, and social needs. By aligning these categories with older adults' behavioural characteristics, their approach sought to achieve a close fit between spatial function and user experience[11]. Si Haitao, Li Chao, and others classified space types according to characteristics such as spatial form, functional use, patterns of use, user groups, and the surrounding urban functions and environment[14].

Existing studies suggest that behaviour-oriented classification is better suited to micro-scale analysis of behavioural patterns and movement trajectories, while morphology-oriented classification emphasizes the structural attributes of space. Since this

study is oriented toward renovation strategies, it requires operable spatial units for design intervention. A function-based classification is therefore adopted to improve the precision and implementability of subsequent strategies.

Table2- 1 Classification Approaches to Public Space Types in Existing Literature

Research Object	Basis for Classification	Specific Types of Public Space	Source
Elderly people living in collective settings	Physiological, psychological, social, and functional needs of elderly people	Outdoor activity centers; sitting and resting spaces; walking spaces; private spaces; gardening places	Zhang Jianmin (1997), Research on Outdoor Environments Suitable for Urban Elderly People[9]
Elderly people with a certain level of mobility	Analysis based on the physiological, psychological, and social needs of elderly people	Activity spaces; social spaces; resting spaces; service spaces	Li Jianhong, Hao Fei, Bai Xiaopeng (2011), Analysis of the Characteristics of Urban Public Outdoor Spaces Suitable for Elderly Activities [11]
Elderly people in residential outdoor environments, especially those with limited mobility	Physiological, psychological, and social needs of elderly people's outdoor activities	Activity areas; walking paths; small-scale communication spaces	Zhou Yanmin, Liu Jiayan (2013), Age-Friendly Design of Outdoor Environments in Residential Areas[12]
Micro public spaces in Hanyang District, Wuhan, serving residents' daily life needs	Urban functional environment surrounding micro public spaces and their main service groups	Community type; commercial type; traffic type; public recreation type; public service type	Dong Hexuan, Liu Qian, Wang Fang (2018), Embedding, Repair, and Participatory Planning: Research on Urban Micro Public Space Planning[13]
Micro public spaces in 55 communities of the old urban area of Tieling	Spatial form, function, and user groups	Spatial form: point-type micro public spaces; linear micro public spaces; planar micro public spaces	Si Haitao, Li Chao, Wang Yana (2019), Research on Age-Friendly Renewal Strategies for Community Micro Public Spaces in Old Urban Areas[14]
Elderly people aged 60 and above in existing residential areas in Dalian and have no physical activity limitations	Differences in elderly people's daily behaviors	Open public spaces; flexible boundary spaces; linear traffic spaces; diverse nodal spaces	Zhou Bo, Liu Shilei, Shen Wei (2020), Investigation on Age-Friendly Community Public Spaces Based on Behavioral Differences—A Case Study of Dalian[15]

Source: compiled by the author based on the literature

Based on the literature on the classification of community public space types, it is evident that public space in old communities can be categorized in different ways. Existing classification methods are mainly grounded in three analytical logics: function-oriented, behaviour-oriented, and morphology-oriented approaches. Each framework serves a specific research objective. Therefore, the appropriateness of a classification method depends on its fit with the research purpose, rather than on formal uniformity.

According to Mika M., Jelle C. V., Rachel H, a systematic review was conducted on studies published between 1996 and 2012, in which 31 articles meeting the inclusion criteria were selected from a total of 3,047 publications on physical activity. The review focused on older adults' subjective perceptions of the physical environment, and the extracted findings were synthesized through inductive content analysis to identify environmental factors associated with older adults' physical activity and group them according to research methods. The study provided a detailed account of the environmental factors that may influence older adults' physical activity behaviour, which were summarized into five major themes: pedestrian infrastructure, safety, facility accessibility, aesthetic characteristics, and environmental conditions[17].

Existing studies have largely focused on single dimensions, such as safety, accessibility, or specific user groups, yet within the context of community public space there remains a lack of an integrated evaluation framework that takes both spatial attributes and behavioural needs into account. Accordingly, this study builds on previous research by integrating a five-dimensional evaluation system: pedestrian infrastructure, safety, accessibility, aesthetics, and environmental quality, to support the subsequent empirical analysis.

Table2- 2 Classification of Public Space Types in Zhongxing Community (Source: Author)

Classification	Specific Content
Social-oriented Public Space	Community activity plazas, fitness activity spaces
Commercial-oriented Public Space	Public areas extending from street-facing shops, etc.
Transport-oriented Public Spaces	Entrance spaces, barrier-free road facilities,etc.
Service-oriented Public Spaces	Elderly Care Center, community health stations,etc.

This chapter takes Zhongxing Community in Liwan District, Guangzhou, as the research object and classifies the public space system of old communities into four categories:

social-oriented, commercial-oriented, transport-oriented, and service-oriented spaces[13]. Specifically, social-oriented spaces refer to open spaces that support older adults' daily social interaction; commercial-oriented spaces focus on the public areas in front of ground-floor shops within the community; transport-oriented spaces emphasize continuity in movement and spatial connection; and service-oriented spaces refer to embedded public spaces associated with facilities such as senior canteens, and barrier-free public toilets.

Based on this classification framework, and drawing on field investigation, the study uses five dimensions — infrastructure, safety, accessibility, aesthetics, and environmental quality — as evaluation indicators[17], to identify the existing problems in the age-friendly renovation of community public space. More specifically, the analysis examines whether transport-oriented spaces provide continuous ramps and adequate width, whether social-oriented spaces offer resting facilities with age-appropriate dimensions and proper anti-slip treatment, whether commercial-oriented spaces are equipped with entrance ramps, and whether service-oriented spaces reflect ageing-friendly principles in wayfinding signage, seating layout, and service counter height. By combining literature frequency analysis with expert interviews, this study screens and consolidates the evaluation indicators, ultimately forming five dimensions.

Table2- 3 Evaluation Indicators for Public Spaces in Zhongxing Community(Source: Reference[17])

Evaluation Element	**Specific Indicators**	**Measurement Method**
Infrastructure	Continuity, quality, slope, and curb conditions of sidewalks; separation between pedestrians and other non-motorized vehicles (such as bicycles)	Field measurement; observation
Safety	Crime-related safety (lighting, graffiti, liveliness and desolation); traffic-related safety (level differences, number of entrances and exits,	Observation
Accessibility	Accessibility of exercise opportunities (distance to fitness facilities, age appropriateness); accessibility of daily destinations (public transportation, bus stops, activity centers); accessibility of rest areas (benches, public	Walking analysis
Aesthetics	Surrounding buildings and streetscape; natural landscape (greenery, water features)	Questionnaire survey
Environmental Quality	Sunlight, air quality, ventilation effect	Questionnaire survey

Table2- 4 Comprehensive Grading of Public Spaces in Zhongxing Community (Source: Questionnaire survey)

Space Type	Infrastructure	Safety	Accessibility	Aesthetics	Environmental Quality	Comprehensive Grade (Full Score: 5.0)
Road System	1.0	2.0	3.0	2.0	3.0	Poor
Social Park	4.0	3.0	3.0	4.0	4.0	Moderate
Fitness Plaza	4.0	3.0	4.0	1.0	2.0	Relatively Poor
Public Space around Residential Buildings	2.0	2.0	3.0	2.0	2.0	Relatively Poor
Commercial-oriented Public Space	1.0	2.0	3.0	1.0	2.0	Poor
Service-oriented Public Spaces	3.0	4.0	4.0	3.0	4.0	Moderate

2.2 Existing Conditions of Transport-oriented Public Space

In this study, transport-oriented public space refers to the open spaces within the community and its connected external areas whose primary function is to support residents' daily mobility and to link residential buildings with transport nodes, markets, and other key destinations[12]. This includes internal community roads, sidewalks, pedestrian networks, community entrances and exits, and areas connected to external public transport. These spaces are not only the physical corridors through which older adults meet basic daily needs such as shopping, medical visits, and social interaction, but also important carriers that support their social participation and physical and mental well-being[40]. However, in a large number of existing communities in China, especially old communities built before the onset of rapid population ageing, the design of transport-oriented public space generally lacks adequate consideration of the specific needs of older adults[15]. Problems such as narrow roads, mixed pedestrian and vehicular traffic, inadequate barrier-free facilities, and insufficient resting spaces are widespread, greatly restricting older adults' mobility and increasing the risk of accidents such as falls. Therefore, the systematic age-friendly renovation of transport-oriented public space within communities has become an urgent requirement for actively responding to population ageing, advancing urban renewal, and fostering an elderly-friendly society.

2.2.1 Road and Pedestrian Systems

As essential public spaces for older adults' daily activities, community roads directly determine the feasibility and safety of their outdoor mobility[15]. In terms of infrastructure, field investigation revealed several deficiencies in the spatial organization of the community road system. Although continuous sidewalks are provided around the residential buildings, the sidewalk at the intersection of Zhoumen South Road and Zhoumen Street is only 98 cm wide, which falls below the requirement in the Code for Sidewalk Design that the passing width for two wheelchairs should exceed 1.8 m. In addition, the section of Shiluji between Xinhong Street and Zhoumen South Road lacks a sidewalk. Bicycle and e-bike parking areas are also not properly planned, and encroachment on pedestrian space was observed in front of the Liwan District Library.

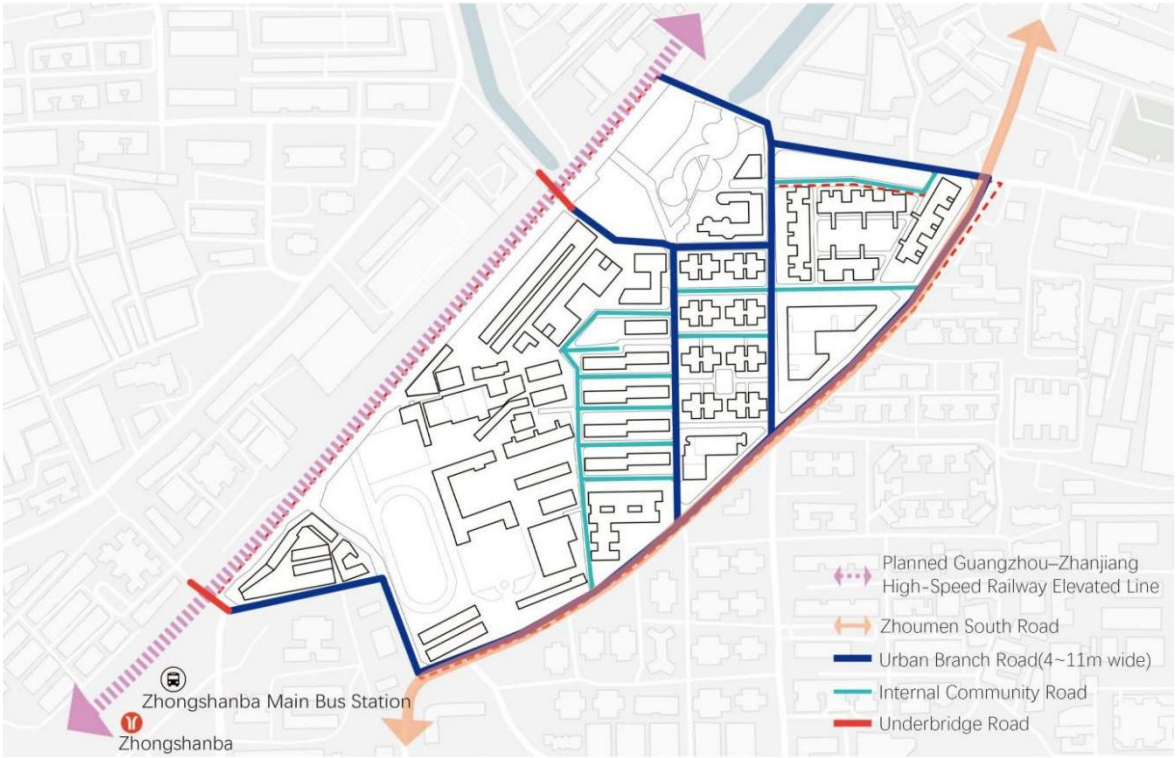


Figure2- 1Existing Road Conditions of Zhongxing Community (Source: Drawn by the Author)

In terms of safety, the community exhibits a typical open-layout pattern, with limited transition space or physical buffering between internal roads and adjacent urban arterial streets, while sidewalks remain discontinuous in some sections. As a result, the internal road system functions less as an independent residential circulation network than as an extension of the surrounding urban traffic system. Although the streets are relatively wide, their spatial organization is weak. Fast-moving traffic, broad carriageways, and the absence of pedestrian

refuge islands increase crossing difficulty and safety risks for older adults with reduced mobility, as shown in Fig. 2-2. Field observation further indicates that older pedestrians often need to pause or yield repeatedly when crossing. A weekday survey conducted from 8:00 to 8:15 a.m. recorded 34 motor vehicles and 52 non-motor vehicles passing through the area, together with 11 pedestrian – non-motor vehicle conflict events.



Figure2- 2 Three-Way Intersection of Shiluji and Zhoumen South Road (Source: Author)

In terms of accessibility, the nearby metro station and bus terminal can be reached from Zhoumen Community on foot within 850 m, or approximately 13 minutes, indicating a relatively convenient location. Although the planning layout shows a connection between the road system and the public transport hub, the Shiluji section lacks barrier-free details linking the bus stop to the interior of the community, such as gentle ramps, adequate resting seats, and clear, legible signage. These deficiencies may significantly reduce both the willingness and the practical ability of older adults to travel independently.

In terms of aesthetics, mature street trees provide shade along parts of the route; however, construction materials were found piled in front of Xiguan Foreign Language School on Zhoumen South Road, encroaching on the sidewalk and negatively affecting the visual order of the street environment. In terms of environmental quality, field visits conducted during hot weather in July and cold weather in January revealed that the section of Shiluji between Xinhong Street and Zhoumen South Road lacks any shading facilities and also contains a waste collection point along the route, both of which undermine the continuity and comfort of the walking experience. Observations further showed that older adults sometimes chose to cross to the opposite side of the street and then cross back in order to avoid this section.



Figure2- 3 Internal Roads of Zhongxing Community (Source: Author)

In terms of environmental quality, considerable differences can be observed across different sections of the road system in Zhongxing Community. Most internal roads are lined with vegetation and offer a relatively comfortable walking experience. However, the section of Shiluji between Xinhong Street and Zhoumen South Road lacks shading facilities, and a waste collection point is located along the route, both of which adversely affect older adults' continuous walking experience in hot or cold weather. Field observation further found that some older adults chose to detour to the opposite side of the street and then return to their original route in order to avoid direct sun exposure, unpleasant odours, or narrow passages, indicating that the existing environmental quality has already had a direct impact on their walking behaviour.

In summary, the road space in Zhongxing Community is characterized by several key problems: insufficient sidewalk continuity and width; disordered non-motor vehicle parking that encroaches on pedestrian space; blurred boundaries between community roads and surrounding streets; a lack of pedestrian crossing facilities; inadequate barrier-free connections; and poor walking environments along certain road sections.

2.2.2 Entrance and Exit Spaces

From the perspective of community boundaries and transitional entrance spaces, entrances and exits not only serve a transport connection function, but also act as important boundary nodes that influence territorial recognition, sense of security, and the efficiency of pedestrian transition[16]. Field investigation shows that the road layout of the community is characterized by a high degree of openness and lacks the transitional buffer space typically

provided by entrance and exit areas in enclosed residential compounds. As a result, community roads are physically connected to the surrounding urban road system in a seamless manner, forming three major external crossroads.

In terms of infrastructure, zebra crossings are provided at both entrances on the southern side of the community, but the eastern entrance lacks a sidewalk, as shown in Fig. 2-4.

In terms of safety, this intersection lacks the necessary curb-ramp design, resulting in an 8 cm level difference between the curb and the carriageway. For older adults who rely on wheelchairs or walking aids, this rigid height difference seriously affects smooth transition and often forces them to detour or depend on assistance when crossing, thereby increasing travel difficulty. In addition, the main entrance area is not equipped with traffic signals, speed-limit signs, convex mirrors, or other facilities that help regulate traffic order, resulting in visual blind spots during road crossing.



Figure2- 4 Main Entrance of Zhoumen Residential Area(Source: Author)

In terms of accessibility, the entrance spaces are relatively convenient, as older adults can choose the nearest entrance to reach key activity destinations such as the market, community park, and kindergarten. Only access to the bus stop and metro station requires a certain degree of detour. At the same time, resting facilities at the main entrances are concentrated on the southern side of the community, while roads along the western edge connecting to the city generally lack benches for rest.

In terms of aesthetics and environmental quality, the southern part of the community performs relatively better. By contrast, the entrance space of Zhongxingyuan Community, located at the northeastern corner of Zhongxing Community, has low daytime visibility, insufficient natural lighting, a visually cluttered commercial setting, and a generally poor

environmental condition.



Figure2- 5 Main Entrance of Zhongxingyuan Residential Area (Source: Author)

Residential unit entrances within the community have undergone phased age-friendly renovation through elevator installation. However, field investigation shows that the residential buildings near Zhoumen West Road have not yet been upgraded. Although the measured passage width is 1.18 m, facilities on both sides encroach on the circulation space, reducing the actual clear width to 0.97 m, which is below the 1.2 m minimum required by accessibility standards (Fig. 2-6). In addition, the entrance lacks barrier-free handrails. The side-hinged unit door occupies about 0.5 m of passage space when opened, making wheelchair access difficult for older adults travelling independently. The door width is only 70 cm, also below the minimum standard of 80 cm for accessible doors, meaning wheelchair users cannot pass through independently.



Figure2- 6 Coexistence of Missing Barrier-Free Facilities and Spatial Encroachment(Source: Author)

Field investigation of unit entrances shows that the actual circulation environment for older adults remains poor. Although some buildings have undergone elevator retrofitting, entrance spaces are frequently occupied by potted plants, bicycles, and domestic waste,

reducing the effective passage width to below the 1.2 m standard required for age-friendly renovation. This reflects both inadequate parking provision and weak spatial management, forcing older adults to pass in constrained ways such as turning sideways.

Barrier-free access is also compromised by the occupation of public space and the inappropriate placement of landscape enclosures. In some cases, planted boundaries block ramp entrances, while private appropriation of public space renders pedestrian passages ineffective. As a result, the ramps cannot provide effective support for older adults in adjacent units.

Overall, the entrance and exit spaces in Zhongxing Community exhibit age-related deficiencies across all five dimensions, including the lack of transitional space, inadequate barrier-free access, insufficient traffic safety facilities, a disordered environmental interface, and poor local lighting and ventilation conditions. These problems make entrance spaces a weak point in older adults' daily mobility and point to clear priorities for subsequent age-friendly renovation.

2.2.3 Public Transport Facility Spaces

Public transport facility spaces are key nodes supporting older adults' inter-community travel. Their accessibility, waiting comfort, and level of barrier-free connection directly affect older adults' willingness to travel and the efficiency with which they access public services[20]. Field investigation shows that the main activities older adults engage in within these spaces include accompanying grandchildren and waiting for public transport, with peak use occurring in the morning (7:00 – 8:30) and late afternoon (16:30 – 18:30).

In terms of infrastructure, public transport facilities around Zhongxing Community are equipped with a basic level of provision, yet their connection with the internal pedestrian system of the community remains inadequate. Dedicated pedestrian paths are provided at bus stops, and small traffic signals have been installed at the metro station and the bus exit to assist pedestrian movement.

In terms of safety, the main issue in public transport facility spaces lies not in the stations themselves, but in the connection process between the community and these transport nodes. Along Shiluji, sidewalks are insufficient in width and in some sections entirely absent,

making older adults prone to conflict with motor vehicles and non-motor vehicles when travelling to bus stops and metro stations, as shown in Fig. 2-7. This problem becomes particularly evident during morning and evening peak hours, when the overlap of accompanying grandchildren, waiting for transport, and daily commuting intensifies traffic interference in these spaces.



Figure2- 7 Shiluji Section with Missing Sidewalks and the Bus Waiting Area(Source: Author)

In terms of accessibility, older adults need approximately 13 minutes on foot to reach the nearest bus stop and metro station from the community’ s southern entrance. The required route, along Shiluji, is constrained by a narrow road section, with a carriageway of about 3.5 m, an effective pedestrian width of 80 cm in front of shops on the northern side, and only about 50 cm on the southern side. In addition, a 12 cm level difference and the absence of barrier-free sidewalks make the route crowded and difficult to navigate. Taking the Zhongshan 8th Road bus stop as an example, although the station is equipped with a simple shelter and seating, its scale is very limited and can accommodate only two to three older adults waiting or resting at a time, far from meeting their actual needs for public space.

In terms of aesthetics and environmental quality, the bus stop provides only a basic shelter and lacks greenery or other natural landscape elements. As a result, field investigation identified environmental problems such as excessive sun exposure and overheating in summer.

Overall, public transport facility spaces in Zhongxing Community are characterized by insufficient pedestrian infrastructure along connecting routes, limited safety during access, low actual accessibility of transport nodes, monotonous spatial quality, and inadequate waiting comfort. These problems constrain older adults’ use of public transport to extend their

daily activity range. Subsequent age-friendly renovation should therefore focus on two aspects: strengthening the continuous slow-traffic connection between the community and transport nodes, and improving the comfort of waiting spaces at the stations.

2.3 Existing Conditions of Social-oriented Public Space

Social-oriented public space provides important settings for older adults' rest, social interaction, light physical activity, and intergenerational engagement. Its spatial quality and facility suitability directly affect the frequency of older adults' daily social activities, their sense of community belonging, and their psychological well-being[47]. From the perspective of active ageing and elderly-friendly community development, high-quality social space serves not only as a physical setting for morning exercise, casual conversation, chess and card playing, and everyday rest, but also as an important arena for maintaining social ties, alleviating loneliness, and enhancing social participation[55]. Therefore, the systematic age-friendly renovation of community social-oriented public space constitutes a strategic measure for responding to population ageing, advancing the modernization of community governance, and implementing the concept of elderly-friendly cities. Focusing on the current conditions of social space in Zhongxing Community, this study aims to develop a preliminary checklist for age-friendly renovation oriented to older adults' needs through a five-dimensional analytical framework.

2.3.1 Social Park

As a relatively complete open social park in old communities, the community park usually accommodates multiple functions, including resting, walking, light exercise, and neighbourly interaction, and is therefore an important public space frequently used by older adults[11]. Existing studies have shown that resting facilities, green landscape, path continuity, and microclimatic conditions are important factors affecting older adults' stay and activity in park spaces[17], Older adults also tend to prefer spaces with high visibility and a greater presence of familiar people.

The social park along the Simayong waterfront on the northern side of Zhongxing Community is a linear public space developed as part of the waterfront ecological corridor.

Extending about 110 m and covering approximately 760 m^2 , the park is organized in a long and narrow layout. In terms of infrastructure, it includes walking paths and basic fitness facilities, but only a limited number of exercise devices are provided and none are specifically adapted for older adults. Resting facilities are also inadequate, with only a few simple stone benches arranged around tree planters. Overall, while the park provides basic opportunities for physical activity, its surface is dominated by hard paving.



Figure2- 8 Social Park(Source: Author)

In terms of safety, the park is an open space where stone bollards are used to prevent non-motor vehicles from entering. However, because a driving school and a car rental company on one side require vehicular access through the site, the park is effectively divided into two parts by an internal carriageway. The ground surface is paved with both hard and soft materials, but without level differences. The park is also within a five-minute walking distance from both Zhoumen Community and Zhongxingyuan Community.

In terms of accessibility, the park contains a small number of fitness facilities. However, field observation conducted over three consecutive days—two weekdays and one weekend day—during the period from 16:30 to 18:30 showed an average hourly use of only 4.2 persons, while the equipment vacancy rate reached 62%, indicating relatively low utilization. This low usage reflects a structural mismatch between spatial provision and the behavioural patterns of older adults.

In terms of aesthetics, the park benefits from the natural water body of Simayong, which helps form a relatively independent activity space and effectively separates it from external motor traffic. Compared with internal road intersections in the community, its basic safety environment is better and provides older adults with a certain degree of security during use.

In terms of environmental quality, the shaded areas in the park are overly concentrated, and there is a lack of open spaces where older adults can sit in the sun. Nevertheless, the microclimate is relatively comfortable and generally suitable for elderly activity. 。

Although the community social park in Zhongxing Community possesses a certain landscape foundation and basic conditions for activity, it still faces several problems, including the limited age-friendliness of fitness equipment, insufficient resting facilities, interference from passing motor vehicles, inadequate safety, and an incomplete wayfinding system. As a result, the continuity, comfort, and efficiency of mixed use within the space all remain in need of improvement.

2.3.2 Fitness Plaza

The fitness plaza is a nodal space within the community that most directly serves older adults' daily exercise, short stays, and neighbourly interaction[11]. Its facility types, accessibility, and support for staying have a significant influence on the frequency of use by older adults.



Figure2- 9 Fitness Plaza(Source: Author)

Zhongxing Community contains one outdoor fitness plaza, located within the open space enclosed by Buildings 27 and 29 and Buildings 31 and 33 of Zhoumen Community. As the only centrally provided public activity space within Zhoumen Community, its current condition still shows clear deficiencies in terms of age-friendly renovation.

In terms of infrastructure, the fitness plaza is equipped with only a limited range of exercise facilities, consisting mainly of basic upper-limb training and waist-twisting equipment, with no devices specifically adapted to the physiological characteristics of older adults. The resting system is also seriously inadequate, relying only on tree planters around

the buildings to provide informal and non-standard seating. In addition, a nearby barbershop has long used part of the fitness equipment for drying items, resulting in the underuse of exercise facilities. Field observation conducted over three consecutive days—two weekdays and one weekend day—from 17:30 to 19:30 recorded an average hourly use of only 2.3 persons, while the equipment vacancy rate reached 78%, indicating very low utilization.

In terms of safety, the fitness plaza is located within an internal space enclosed by residential buildings and is separated from surrounding vehicular roads by a certain level difference. This layout generally prevents direct intrusion by motor vehicles and provides relatively favourable baseline safety conditions, as shown in Fig. 2-9.

In terms of accessibility, the main entrance on the western side is obstructed by the disordered parking of electric bicycles, making access difficult. Internal roads within the community are not physically separated for pedestrians and vehicles, requiring older adults to cross flows of non-motor vehicles to reach the site. In addition, there is a level difference between the plaza and the surrounding roads, with a single right-angled step at the connecting point.

In terms of aesthetics, a flower bed is located in the centre of the site, and scattered plants cultivated by ground-floor residents around the edges contribute to a certain degree of everyday vitality. Overall, however, the landscape organization remains weak. The space lacks a coherent spatial interface and a clearly articulated sense of place, and has not developed into an attractive or recognizable public activity environment.

In terms of environmental quality, although the fitness plaza is situated within a residential enclosure and therefore benefits from a relatively quiet setting, its shading system is inadequate and the proportion of hard paving is high. In summer, measured surface temperatures on paved areas often exceed 40°C, resulting in excessive heat exposure and reducing older adults' comfort and duration of stay.

Overall, although the fitness plaza in Zhongxing Community benefits from a certain spatial foundation and a relatively safe internal location, it still suffers from inadequate barrier-free connection, limited age-appropriateness of equipment, insufficient resting facilities, weak environmental comfort, and low efficiency of space use.

2.3.3 Public Spaces around Residential Buildings

Public spaces around residential buildings, as the most everyday and neighbourhood-oriented micro-scale public spaces in old communities, often accommodate functions such as short stays, neighbourly interaction, and familiar social exchange. Their age-friendly quality directly affects the convenience and spontaneity of daily social activities[47].

In terms of infrastructure, Zhongxing Community has installed resting facilities and fitness equipment in scattered public spaces around residential buildings, but many of them remain underused due to inappropriate spatial planning. For example, some resting seats are placed directly at building entrances or along road edges, while certain fitness facilities are rendered unusable by the parking of non-motor vehicles.



Figure2- 10 Space around Residential Buildings(Source: Author)

In terms of safety, these spaces are not effectively separated from the surrounding areas and lack clearly defined territorial boundaries, resulting in the absence of observable use during the field investigation.

In terms of accessibility, the existing facilities are poorly arranged. During three consecutive days of observation—one weekday and two weekend days—these facilities were found to be almost entirely unused due to encroachment by non-motor vehicles, with the actual utilization rate close to zero. As a result, they fail to effectively meet older adults' needs for daily rest and light activity.

In terms of aesthetics, the overall spatial quality is poor. The spaces lack organization and fail to create a positive and welcoming community atmosphere, making them

unsupportive of older adults' social activities such as casual conversation.

In terms of environmental quality, both spaces are located adjacent to community roads and are therefore relatively noisy. Disordered parking of non-motor vehicles further reduces their usability. During the field investigation, the fitness corner on the right covered an area of 28 m^2 , of which 15 m^2 was occupied by non-motor vehicles, resulting in an occupation rate of 54% and a high degree of spatial idleness.

Therefore, the current public spaces around residential buildings in Zhongxing Community suffer from problems such as misplaced facilities, spatial encroachment, and weak environmental quality. These conditions make it difficult for older adults to form stable and safe patterns of staying and social interaction, and also leave the community's scattered public spaces in a long-term state of low efficiency or even disuse.

2.4 Existing Conditions of Commercial-oriented Public Space

Commercial-oriented public space refers to the transitional space between indoor commercial premises and community public space, and possesses multiple attributes, including consumer service, short stays, rest, and neighbourly interaction[46]. In old communities, such spaces are often closely integrated with residents' everyday lives through ground-floor commerce, and thus become important semi-public settings where older adults shop, pause, observe street activities, and engage in familiar social interaction[47]. This type of space therefore combines both commercial and social functions and exhibits a semi-public spatial character.

In Zhongxing Community, the ground floors of buildings in both Zhoumen Community and Zhongxingyuan Community are predominantly commercial, forming a typical mixed-use pattern of commercial frontage at ground level with housing above [52]. In parts of Zhoumen Dayuan, some ground-floor residents have also adapted their original dwelling units and enclosed semi-private courtyard spaces outside, reflecting a spontaneous form of spatial reuse. Within Zhoumen Community, ground-floor businesses mainly include barbershops and chess-and-card room, serving primarily older residents, while a community supermarket is located along the side facing the urban road. Field observation shows that residents often stop in front of the supermarket to rest and chat. Interviews suggest that, due to long-term

residence and strong familiarity among neighbours, these commercial frontages have gradually evolved into informal spaces for resting and social interaction. The frontage of Shop A is about 2.5 m wide, while the actual clear passage width is only 1 m.



Figure2- 11 Forecourt Space of Shops(Source: Author)

In terms of infrastructure, the pedestrian routes from residential buildings to ground-floor shops show clear discontinuities. Field observation of older adults' movement paths indicates that residents must cross internal vehicular roads to reach shop entrances, as no independent and continuous pedestrian system is provided. This is particularly problematic for older adults using wheelchairs or walking aids. The routes also lack clear wayfinding or differentiated paving, and mixed pedestrian – vehicular use is common. In addition, only two or three simple seats are provided, which is insufficient to support older adults' tendency to gather and converse.

In terms of safety, because most ground-floor shops are located inside the community, daily motor traffic is relatively low and traffic conflict is limited, providing older adults with a comparatively safe activity environment.

In terms of accessibility, the spaces in front of the shops have a strong everyday service function and support high-frequency activities such as grocery shopping, haircuts, playing cards, and chatting. Their basic usability is therefore relatively good. However, from the perspective of age-friendly renovation, most shopfront spaces still lack barrier-free access and provide only limited resting facilities, as shown in Fig. 2-11.

In terms of aesthetics, residents have spontaneously planted greenery on windowsills, in front of entrances, and within small courtyards. Although this enhances visual friendliness and everyday character to some extent, the lack of coordinated planning also increases spatial

crowding and visual disorder.

In terms of environmental quality, roadside planting helps buffer external traffic noise, making the area relatively quiet and suitable for short stays by older adults (Fig. 2-11). In the image on the right, the circular seating in front of the supermarket is located beneath a large-canopy tree, creating a naturally shaded resting node. However, such favourable micro-environments are only scattered points and lack systematic connection, so the overall environmental support remains weak.

Overall, although the spaces in front of commercial service facilities in Zhongxing Community have a certain foundation for everyday use, they still suffer from discontinuous pedestrian routes, insufficient pedestrian – vehicular separation, weak barrier-free support, fragmented spatial interfaces, and uneven environmental comfort, all of which limit older adults' sustained use of these spaces.

2.5 Existing Conditions of Service-oriented Public Space

Public service facilities in Zhongxing Community are relatively well provided. Important public institutions, including the Liwan District Library, the Health and Care Centre, and the Liwan District Center for Disease Control and Prevention, are concentrated in the core area of the community, forming a relatively dense cluster of service functions. These facilities not only perform basic functions such as cultural education, health care, and public health, but also generate entrance forecourts and courtyard spaces that serve as important places for older adults' daily waiting, short stays, and social interaction[80]. Although such service-oriented public spaces are supported by formal public service facilities and benefit from favourable locational accessibility and a basic level of use, they still exhibit clear shortcomings in terms of age-friendly renovation.

2.5.1 Public Spaces of Service Facilities

Field investigation shows that most existing public service facilities were built relatively early and have since undergone piecemeal renovation or later-stage adaptation. In terms of infrastructure, there is a small green space opposite the Elderly Care Center, but it contains only four seats. During weekday observations from 10:00 to 12:00 and from 16:30 to 18:30,

no residents were observed staying or using the space, indicating that it remains underused. A covered resting corridor is located on the northern side, but due to long-term disrepair, it is now largely occupied by construction materials.

In terms of safety, the forecourts of service facilities generally lack dedicated pedestrian areas. Walking routes are directly merged with vehicular space and lack physical separation. Informal parking is also common, particularly in front of the Elderly Care Center, where private cars occupy pedestrian circulation space.



Figure2- 12 Forecourt Space of Elderly Care Center(Source: Author)

In terms of accessibility, these public service facilities are all located in the central part of the community and are equipped with barrier-free ramps. However, age-friendly support in the forecourt spaces remains insufficient. Existing seating, shading, and wayfinding facilities are limited, leaving older adults without comfortable conditions for waiting, resting, or accompanying others, which reduces the actual accessibility of these facilities.

In terms of aesthetics, the spaces have a certain degree of openness and public character, but the overall landscape organization is relatively ordinary, and the spatial interface lacks both recognizability and visual affinity. In terms of environmental quality, the spaces are relatively quiet because they are located away from the main internal roads of the community. In addition, abundant planting within the community provides a comparatively comfortable outdoor environment for older adults.

Overall, although the forecourt spaces of public service facilities in Zhongxing Community benefit from a certain service foundation and locational advantage, they still suffer from poor pedestrian connection, insufficient staying facilities, and weak spatial identity. These problems reduce the efficiency and convenience with which older adults

access public service facilities, and also constrain their daily social interaction and community participation.

2.5.2 Accessible Toilet

As a basic service facility frequently relied upon by older adults, the Accessible Toilet directly affects the activity range and sense of security of older adults in public space through its level of accessibility, the clarity of wayfinding, and the quality of barrier-free entrance connection[12]. One public toilet is located on the western side of the community, adjacent to the Elderly Care Center (Fig. 2-13).



Figure2- 13 Accessible Toilet(Source: Author)

In terms of infrastructure, the toilet entrance is equipped with a barrier-free ramp in accordance with relevant standards, and its slope and width generally meet wheelchair access requirements. Although the facility maintains a basic level of connection with surrounding roads and activity nodes, the access route lacks continuous and clear guidance, and the overall recognizability remains low. As a result, older adults may have difficulty locating it promptly in unfamiliar situations or when urgent use is required.

In terms of safety, the facility is located adjacent to an internal community roadway, but because it is situated at the end of the road, the number of passing non-motor vehicles recorded during field investigation was zero. As a result, the risk of traffic conflict is relatively controllable, providing users with a certain degree of safety.

In terms of accessibility, the Accessible Toilet is located approximately 160 m on foot from the community social park. However, no toilet wayfinding system is provided within the community, and the facility is not located along older adults' main daily activity routes.

In terms of aesthetics, the forecourt space lacks landscape design. The original planted strip has been hardened into a cement surface, resulting in an abrupt connection with the road. As part of the community's public service system, the facility also lacks clear and user-friendly visual cues, making it difficult to achieve sufficient recognizability within the complex community environment.

In terms of environmental quality, the surrounding vegetation provides a certain potential for microclimatic regulation. However, a fixed community waste collection point is located immediately to the east of the facility, which has a significant negative impact on local environmental comfort.

Overall, although the Accessible Toilet in Zhongxing Community has a basic level of facility provision, it still suffers from insufficient wayfinding, unclear path connections, weak recognizability, and low actual accessibility. In particular, stronger integration with other age-friendly service facilities is still needed.

2.6 Summary

The systematic analysis of the four types of public space reveals several major issues. First, in transport-oriented spaces, the main problems lie in discontinuous pedestrian routes and insufficient control of level differences in barrier-free design, which lead to mixed pedestrian – vehicular movement and create safety risks for older adults. Second, social-oriented spaces are characterized by poor facility suitability and the absence of adequate resting systems; fitness equipment is often underused, while existing seating fails to support the gathering-oriented activities of older adults. Third, although commercial-oriented spaces exhibit a certain degree of spontaneous vitality, they lack effective pedestrian – vehicular separation and continuous, comfortable sheltered walkways. Fourth, service-oriented spaces show clear deficiencies in wayfinding systems and node connection. In particular, the forecourt space of the Elderly Care Center and the Accessible Toilet lack adequate guidance and direct linkage to older adults' high-frequency activity nodes, often requiring detours. These issues all point to a common contradiction: the current form of spatial provision fails to correspond to the behavioural characteristics of older adults. It is therefore necessary to further examine this issue from the perspective of behavioural

mechanisms, which will be empirically tested in the following chapter.

From a spatial perspective, Zhongxing Community shows clear deficiencies in traffic continuity, the provision of resting facilities, spatial organization, and the barrier-free system. However, observation of the physical environment alone is insufficient to reveal how these conditions actually affect older adults' behaviour. The next chapter therefore employs behavioural path tracking and questionnaire surveys to examine whether the spatial problems identified above directly constrain older adults' activity frequency and staying behaviour, and further develops a behaviour–space coupling model.

Chapter3 Analysis of Behavioural Activities in Zhongxing Community

The age-friendly renovation of public space in old communities should respond fully to the actual needs of older adults. It is therefore necessary to systematically identify their behavioural characteristics and spatial preferences in community public space through field investigation. Existing studies have shown a significant relationship between older adults' daily activities and the spatial environment, and that research methods combining behavioural observation, path tracking, and subjective evaluation can help reveal the degree of fit between public space provision and the actual needs of older adults [15][60]. Accordingly, this study combines behavioural observation with questionnaire surveys to investigate and analyse the daily activity paths, activity types, and patterns of space use among older residents in Zhongxing Community, Caihong Subdistrict, Liwan District, Guangzhou, with the aim of providing an empirical basis for subsequent age-friendly renovation strategies for community public space.

3.1 Survey Design and Methods

3.1.1 Survey Subjects and Age Stratification

Table3- 1 Age Classification of the Elderly Population (Source: Reference[12])

Type	Age Range	Description
Young-old	60–69 years	Relatively good physical functioning and strong activity ability
Middle-old	70–79 years	Physical functioning begins to decline, with higher requirements for environmental safety
Oldest-old	80 years and above	Weaker activity ability and greater dependence on barrier-free facilities

Article 2 of the Law of the People's Republic of China on the Protection of the Rights and Interests of the Elderly clearly stipulates that "older adults" refer to citizens aged 60 and above. In accordance with this law, citizens aged 60 and above are defined as older adults in China. In current policy practice, this population is often further divided into the young-old (60–69), the middle-old (70–79), and the oldest-old (80 and above), so as to support more

targeted renovation and design strategies.

3.1.2 Survey Content and Evaluation Framework

This study takes older adults living in Zhongxing Community as the survey population and adopts the evaluation framework established in Chapter 2, which consists of five environmental dimensions: accessibility, infrastructure, aesthetics, environmental quality, and safety [17]. The questionnaire employed a Likert scale for scoring, in which 1 indicates very poor, 2 poor, 3 average, 4 good, and 5 very good. The detailed questionnaire is provided in the Appendix. A total of 72 questionnaires were distributed in this survey, of which 59 were valid. On this basis, the study summarizes the behavioural characteristics of older adults and provides a preliminary analysis of their needs for the age-friendly renovation of public space in their residential community.

Based on Jan Gehl's theory of spatial behaviour [60], this study classifies the activities of older adults in community public space into three categories. The first is necessary activities, including routine tasks such as shopping, disposing of waste, and collecting deliveries. The second is spontaneous activities, such as walking, sunbathing, and leisure activities induced by environmental quality. The third is social activities, including chatting, accompanying younger generations, and playing chess or cards, all of which require interpersonal interaction.

A non-interventionist behavioural observation method was adopted. Observations were conducted from October to November 2025 over two typical sunny weekdays and two typical sunny weekend days. A total of 59 complete walking paths of older adults were recorded, including 22 young-old adults (60 – 69), 19 middle-old adults (70 – 79), and 18 oldest-old adults (80 and above). The sample comprised 30 men and 29 women. Stratified random observation was used to ensure representation across different age groups, and all 59 observed individuals were community residents in good physical condition at the time of the survey. The study systematically identified the various types of public space encountered in their daily activities (Fig. 3-1) and recorded, in tabulated form, the spatial nodes passed by each participant together with the corresponding behavioural activities (Table 3-2).

It should be noted that the 59 older adults refer to the number of observed individuals, the 59 valid questionnaires refer to the subjective evaluation sample, and the 68 valid activity

records refer to the number of behavioural records retained after screening repeated observations. These three figures therefore correspond to different levels of analysis.

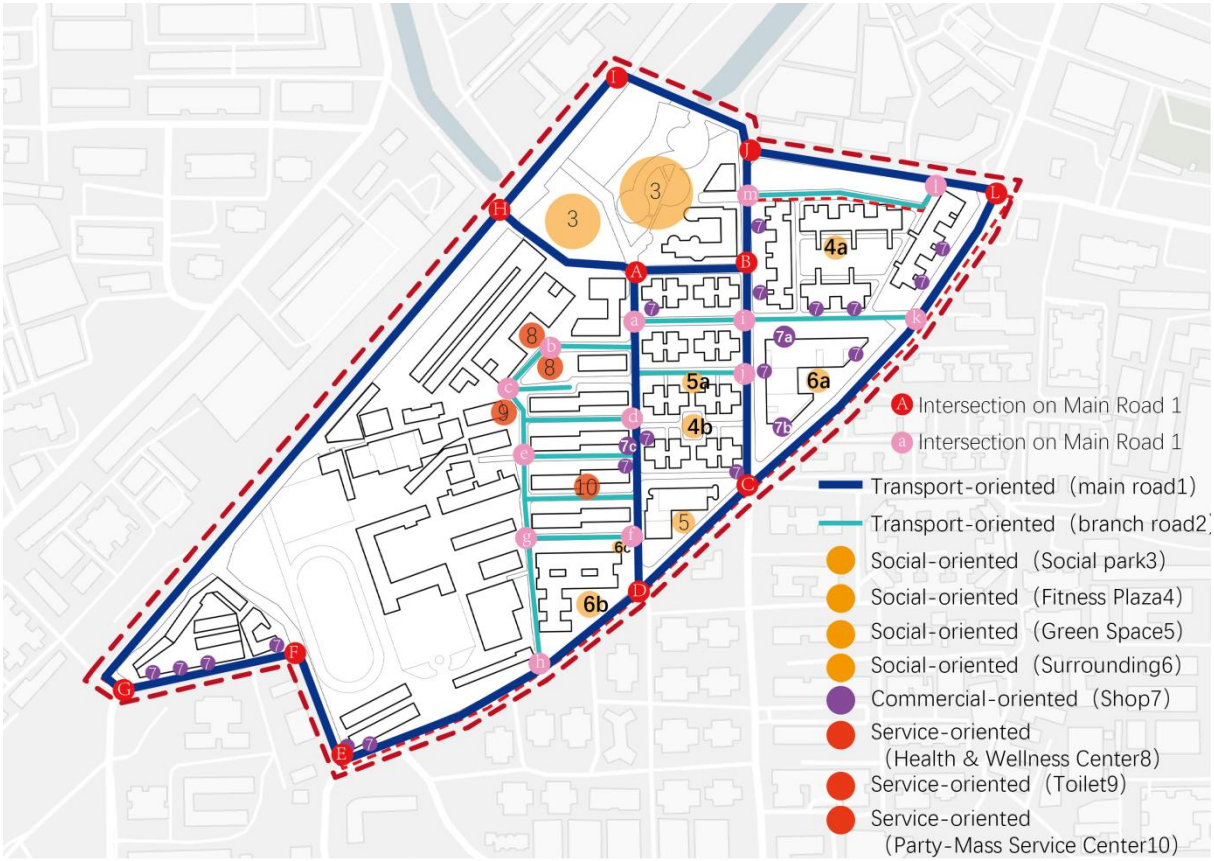


Figure3- 1 Distribution Map of Public Space Types (Source: Author)

3.1.3 Survey Methods

（1）Behavioural Observation

A non-interventionist behavioural observation method was employed. Each participant was tracked for two hours, with a randomly selected starting point and the end of observation defined either by the completion of the two-hour period or by the end of the participant's activity. As some participants were recorded more than once at different times, all observations were screened and consolidated, resulting in 68 valid behavioural records. The observation focused on documenting older adults' movement paths and principal activities within the two-hour period.

According to the *Global Age-friendly Cities: A Guide* issued by the World Health Organization (WHO)[82], older adults' daily activity space is generally concentrated within an 800 m radius from home, with core activities usually occurring within 500 m. Within this

range, activity spaces show a clear hierarchical distribution: spaces within 500 m are mainly associated with leisure activities, such as squares and green spaces, while spaces between 500 m and 800 m are more often related to destination-oriented activities, such as markets and supermarkets [20].

（2）Questionnaire Survey

This study used a structured questionnaire to assess older adults' perceptions of the public space environment in the community. The questionnaire adopted a five-point Likert scale and was designed on the basis of the five-dimensional analytical framework established in Chapter 2. Face-to-face interviews were conducted during peak periods of outdoor activity in frequently used spaces such as parks, squares, and open areas around residential buildings. The Likert scale is widely used in community environmental assessment and behavioural research because it enables respondents' subjective judgements of environmental quality to be converted into comparable ordinal data[59]. Each respondent was asked to rate the public spaces they used regularly on the basis of daily experience. To ensure the reliability of the questionnaire data, Cronbach's Alpha was used to test the internal consistency of the scale. In general, a Cronbach's Alpha value above 0.7 indicates acceptable reliability and provides a sound basis for subsequent statistical analysis.

（3）Path Tracking and Statistical Analysis

This study employed the Kruskal–Wallis H test, a non-parametric method suitable for multiple independent samples, using behaviour type as the grouping variable to examine differences in environmental ratings across behavioural groups. This method does not require the assumption of normal distribution and is well suited to small samples and Likert-scale data. It therefore provides a robust means of identifying which environmental dimensions significantly influence older adults' behavioural choices and of comparing their relative importance through effect size analysis.

In the statistical analysis, the Kruskal–Wallis H test was used to examine differences in ratings of environmental factors across different activity types. The H value reflects the overall degree of difference among groups: the larger the H value, the greater the between-group difference. The p value indicates whether the difference is statistically significant. In general, when $p < 0.05$, the ratings of a given environmental factor differ

significantly across behaviour types; when $p \geqslant 0.05$, the difference is not statistically significant. On this basis, the study combines H values and p values to analyse the relationship between environmental factors and behavioural characteristics at high-frequency activity nodes.

It should be noted that the 68 valid behavioural records were mainly used to analyse the overall characteristics of older adults' movement paths, activity types, and spatial preferences. By contrast, the 59 valid questionnaires were used primarily to evaluate the environmental quality of high-frequency activity nodes and to examine the influence of different environmental factors on behavioural characteristics. Because questionnaire respondents needed to correspond to users of specific activity nodes, the analysis in Section 3.3 concerning environmental ratings and behaviour matching is based on the sample of 59 older adults associated with these high-frequency nodes. In other words, the 68 behavioural records and the 59 valid questionnaires serve different analytical purposes in Chapter 3: the former are used to identify overall behavioural characteristics, while the latter are used to examine the relationship between behaviour and spatial evaluation factors.

3.2 Analysis of Older Adults' Behavioural Characteristics

Based on the results of behavioural observation and path recording, this study further summarizes the behavioural characteristics of older adults in Zhongxing Community from three aspects: travel mode, the distribution of behaviours across different types of public space, and activity range and spatial preference. Existing studies have shown that older adults' behaviour is influenced not only by individual factors such as age and physical condition, but also by the accessibility, safety, facility support, and environmental comfort of public space[20]. Therefore, a classified analysis of their behavioural characteristics helps to identify the key shortcomings of existing public space in terms of age-friendly support. Detailed records of older adults' activities are presented in Table 3-2, focusing on their behaviours in different types of public space within the study area and documenting their activity paths in accordance with Fig. 3-1.

Table3- 2 Record of Elderly Residents' Behaviors(Brief Table) (Source: Drawn by the Author)

No.	Path	Activity Information							
		Transport	Behavior	Social	Behavior	Commercial	Behavior	Service	Behavior
1	Node 6b–D–A–Node 3–A–a–b–Node 8–c–d–Node 7c–Node 4b–Node 7b–Node 6a	Main Roads 1 and 2	Cycling	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a, 6b)	Walking / Exercise / Sunbathing / Resting	Street-facing Shops (7b, 7c)	Accompanying Descendants / Shopping	Elderly Care Center (8)	Resting
2	Node 4a–k–L–J–Node 3–A–d–Node 7c–e–Node 8–a–j–Node 4b–Node 7b–Node 6a	Main Roads 1 and 2	Walking	Social Park (3) / Fitness Plaza (4b, 4a) / Space around Residential Buildings (6a)	Resting / Walking / Exercise / Chatting	Street-facing Shops (7b, 7c)	Accompanying Descendants / Shopping	Elderly Care Center (8)	Walking
3	Node 8–a–Node 3–A–B–j–Node 4b–Node 7b	Main Roads 1 and 2	Wheelchair Use	Social Park (3) / Fitness Plaza (4b)	Accompanying Descendants / Accompanying Descendants	Street-facing Shops (7b)	Walking	Elderly Care Center (8)	Sunbathing
4	Node 5b–D–Node 7c–Node 4b–d–Node 3–a–Node 8–Node 9–d–Node 7c–Node 7b–Node 6a–C–Node 6b	Main Roads 1 and 2	Walking	Social Park (3) / Fitness Plaza (4b) / Small Green Space (5b) / Space around Residential Buildings (6a, 6b)	Disposing of Garbage / Walking / Sunbathing / Resting	Street-facing Shops (7b, 7c)	Resting / Shopping	Elderly Care Center (8) / Public Toilet (9)	Resting / Using the Toilet
5	Node 4a–k–L–J–Node 3–A–d–Node 7c–e–Node 8–a–j–Node 4b–Node 7b–Node 6a	Main Roads 1 and 2	Walking	Social Park (3) / Fitness Plaza (4b, 4a) / Space around Residential Buildings (6a)	Resting / Walking / Exercise / Chatting	Street-facing Shops (7b, 7c)	Accompanying Descendants / Shopping	Elderly Care Center (8)	Walking

3.2.1Travel Characteristics of Older Adults

After reviewing the behavioural records presented in Table 3-2, this study analyses the travel modes of older adults and their frequencies in transport-oriented public space by public space type, as shown in Fig. 3-2. The results indicate that three main travel modes are observed in transport-oriented public space: walking, wheelchair use, and cycling. Among these, walking is the most frequent, with 47 recorded cases; wheelchair use occurs 12 times; and cycling is the least frequent, with 9 cases. Overall, walking remains the dominant mode of daily mobility among older adults in Zhongxing Community.

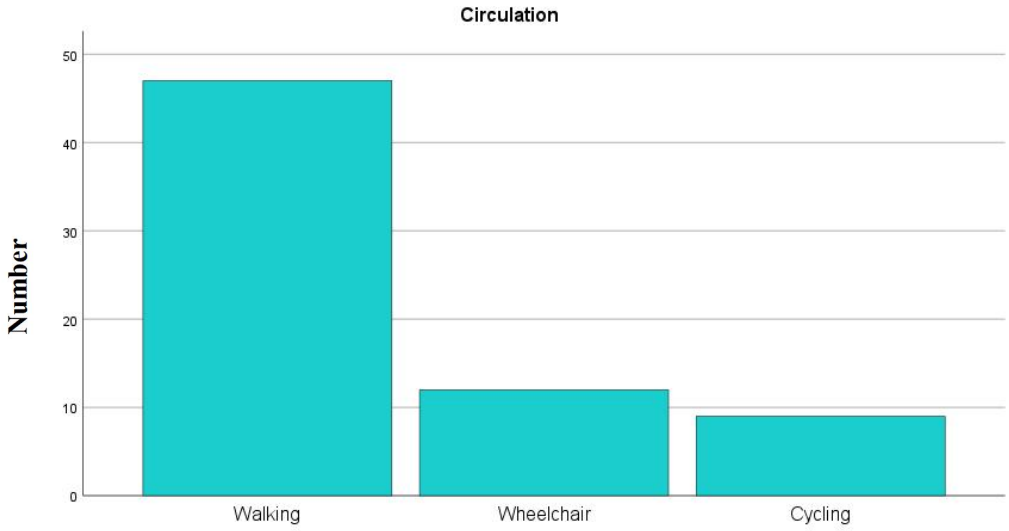


Figure3- 2 Behavior Statistics in Transport-oriented Public Spaces (Source: Author)

Of the 47 walking records, 45 could be assigned to the three age groups: 19 cases involved those aged 60 – 69, accounting for 42.2%; 22 involved those aged 70 – 79, accounting for 48.9%; and 4 involved those aged 80 and above, accounting for 8.9%. There were 5 wheelchair-use records, of which 3 involved the 60 – 69 age group (60.0%), 1 involved the 70 – 79 age group (20.0%), and 1 involved the 80-and-above age group (20.0%). There were 8 cycling records, of which 5 involved the 60 – 69 age group (62.5%), 3 involved the 70 – 79 age group (37.5%), and none involved the 80-and-above age group. Overall, among the 59 observed individuals, walking was concentrated mainly in the 60 – 79 age groups, cycling was more common among the young-old, and those aged 80 and above relied primarily on walking and wheelchair use.

This finding suggests that, at the community scale, older adults' daily activities depend

heavily on a continuous, safe, and convenient pedestrian system. Compared with younger age groups, older adults place greater emphasis on route legibility, surface evenness, traffic safety, and barrier-free support. Accordingly, sidewalk continuity, level-difference control, the provision of resting nodes, and pedestrian–vehicular separation all directly affect their willingness to travel and their activity range. The proportion of wheelchair use further indicates that some oldest-old adults and those with limited mobility rely strongly on barrier-free facilities. By contrast, cycling occurs less frequently, suggesting that it is not a primary mode of daily travel for older adults in the current community environment.

The travel mode characteristics of older adults in Zhongxing Community show that walking is the fundamental means by which they connect residential units with various public space nodes and carry out activities such as shopping, resting, walking, social interaction, and access to services. Therefore, the age-friendliness of transport-oriented public space largely determines the convenience and safety of their daily activities. Subsequent analysis of high-frequency activity nodes and spatial environmental factors should thus be grounded in a walking-oriented behavioural framework.

3.2.2 Behavioural Characteristics in Different Types of Public Space

Different types of public space, owing to their distinct functional attributes, environmental characteristics, and facility conditions, tend to correspond to different behavioural patterns among older adults. Existing studies suggest that spaces with a higher degree of openness and better support for staying are more likely to accommodate slow-paced activities such as resting and social interaction, whereas spaces with stronger transport or commercial functions more often support purposeful and transitional activities[11]. Accordingly, this study analyses behavioural frequency across three categories — social-oriented public space, commercial-oriented public space, and service-oriented public space—in order to identify the structural characteristics of older adults' activities in different spatial types.

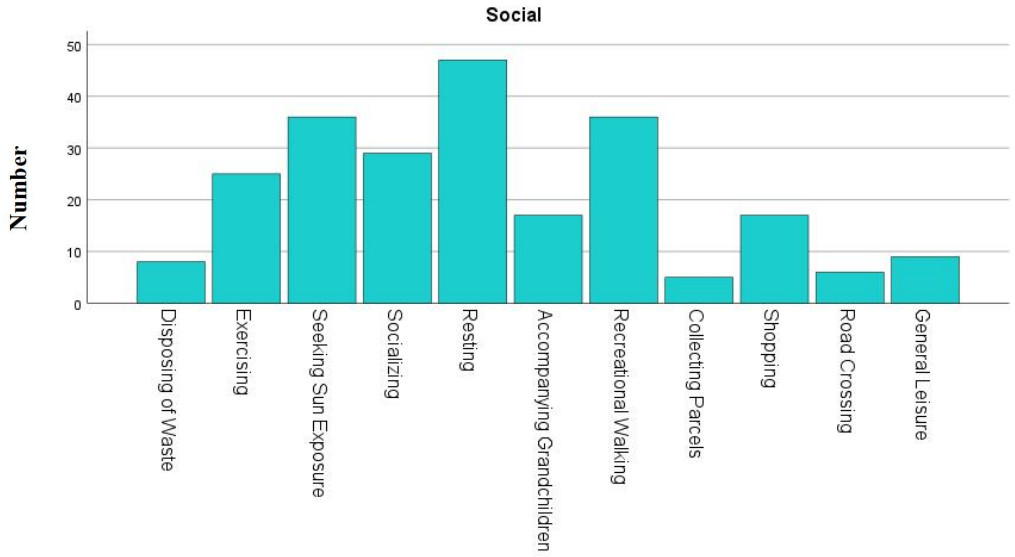


Figure3- 3 Behavior Statistics in Social-oriented Public Spaces (Source: Author)

Figure 3-3 shows the frequency distribution of older adults' behaviours observed in social-oriented public space. Among them, resting was the most frequent activity, indicating that this type of space serves primarily as a place for staying and relaxation. Leisure walking and sunbathing also occurred frequently, reflecting older adults' preference for comfortable environments and sunlight exposure. Social interaction was likewise common, suggesting that such spaces provide favourable conditions for interpersonal communication..

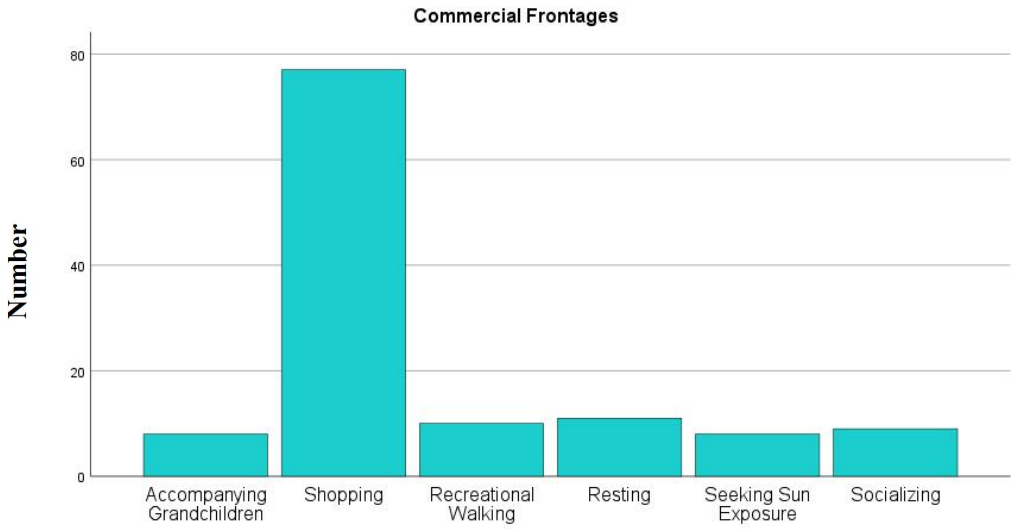


Figure3- 4 Behavior Statistics in Commercial-oriented Public Spaces (Source: Author)

Figure 3-4 shows the frequency distribution of older adults' behaviours observed in commercial-oriented public space. Among them, shopping was the most frequent activity,

with 77 recorded cases, indicating that this type of space primarily serves older adults' daily consumption needs. By contrast, activities such as leisure walking, resting, sunbathing, and social interaction occurred much less frequently, each at around 10 cases. This suggests that, although these spaces have some potential to support rest and social interaction, their dominant function remains commercial service and task-oriented activity. Overall, commercial-oriented public space exhibits a clear functional orientation, with older users mainly entering these spaces to complete shopping tasks, staying only briefly, and engaging in relatively few non-purposeful activities.

Figure 3-5 shows that walking and toilet use were the most frequent behaviours in service-oriented public space, indicating that this type of space serves both circulation and basic daily service functions. The occurrence of resting further suggests that older adults often require short stays while completing tasks or passing through. Overall, service-oriented public space displays a multifunctional character: it is not only a node for daily services, but also a potential setting for rest and social interaction.

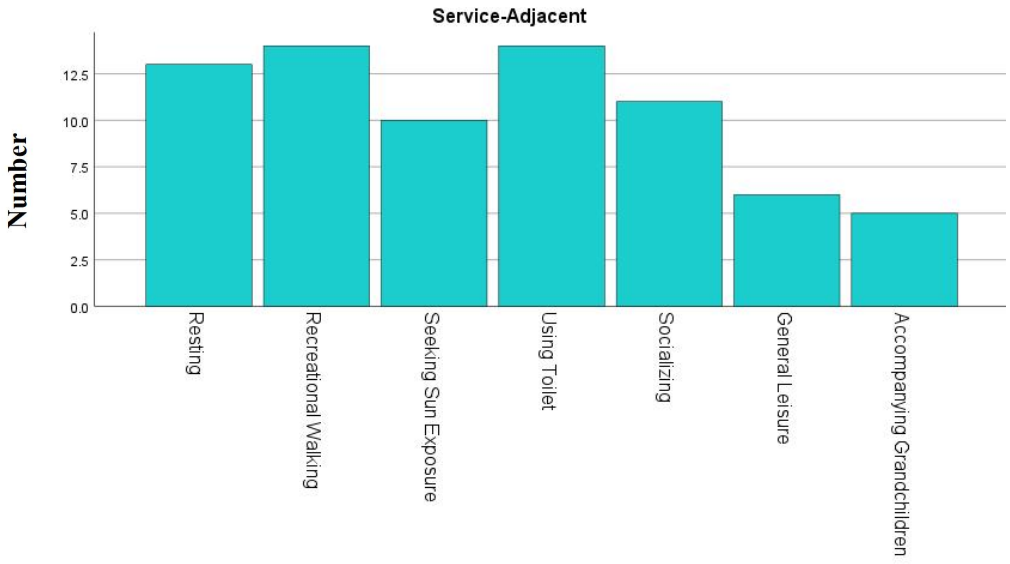


Figure3- 5 Behavior Statistics in Service-oriented Public Spaces (Source: Author)

A comparative analysis of behavioural differences across the three spatial types shows that older adults' use of space in Zhongxing Community is not random, but closely related to the functional orientation and environmental support of different types of public space. Social-oriented public space primarily supports staying, relaxation, and social interaction; commercial-oriented public space is more closely associated with daily services and necessary

activities; and service-oriented public space reflects the composite use characteristics of everyday service nodes. These findings suggest that the age-friendly renovation of public space in old communities should not adopt a uniform approach, but should instead be differentiated according to spatial type and guided by behavioural characteristics.

From a comparative perspective, different types of public space show clear differences in the composition of activities, duration of stay, and purposes of use among older adults. Transport-oriented public space mainly accommodates functional activities such as passing through, accompanying others, and waiting for transport, with short stays and strong destination-oriented use. Social-oriented public space, by contrast, is more likely to support staying activities such as resting, chatting, exercising, and accompanying grandchildren. It therefore has a stronger social character and more diverse activity patterns, and constitutes an important setting for older adults' everyday public life. Commercial-oriented public space combines consumer and social functions, with behaviours mainly centred on shopping, pausing, observing, and interacting with acquaintances; length of stay is moderate, and the spaces exhibit a strong everyday-life character. Service-oriented public space is more closely associated with waiting, handling errands, and short rests. Although its activity types are relatively stable, it places higher demands on accessibility, staying facilities, and spatial recognizability. Overall, the four types of public space show a clear shift in behavioural mechanisms from movement-oriented to stay-oriented use, and from functional to social activities. This further indicates that older adults' public-space activities are not evenly distributed, but are closely shaped by spatial type, environmental support, and everyday needs.

3.2.3 Activity Range and Spatial Preferences of Older Adults

Older adults' activity range and spatial preferences can directly reflect whether the community public space system matches their everyday needs. Existing studies suggest that older adults' high-frequency activities are usually concentrated within walking distance of their homes, with leisure and social spaces within 500 m being particularly important, while spaces at greater distances are more often associated with shopping, transport connection, and the use of service facilities[56]. On this basis, this study analyses the superimposed results of

behavioural paths to identify the main activity radius, high-frequency routes, and preferred nodes of older adults in Zhongxing Community, thereby assessing the degree of fit between the existing provision of public space and older adults' activity needs.



Figure3- 6 Elderly Residents' Behavioral Paths (Source: Author)

The superimposed behavioural paths indicate that older adults' daily activities in Zhongxing Community show a clear pattern of short-distance concentration, with high-frequency activity nodes mainly distributed within walking distance of their residential units. Drawing on existing studies suggesting that older adults' activity space is primarily concentrated in the near-home environment, and combining this with the observed behavioural paths in Zhongxing Community, this study finds that older adults' activity space displays a certain hierarchical structure. Overall, the north–south road running through the community constitutes the main high-frequency route. During movement, older adults tend to choose walking environments that are relatively direct, spatially continuous, rich in adjacent public space types, and free of significant level differences.

In terms of spatial preference, the path-tracking results show that older adults tend to choose public spaces with continuous walking routes, clear boundaries, adequate resting facilities, and relatively comfortable environments. Spaces with seating, shade, pedestrian paths, or areas suitable for short stays are more likely to attract older adults to stop, rest, and interact. Spaces near everyday destinations such as markets, shops, service facilities, or the community social park are also used more frequently because they combine movement with daily use. By contrast, spaces with narrow roads, damaged paving, obvious level differences,

limited shade and seating, and mixed pedestrian–vehicular movement are less likely to support staying behaviour, and are mainly used as passing routes. This suggests that older adults' spatial preferences are shaped not only by distance, but also by the level of environmental support provided by the space.

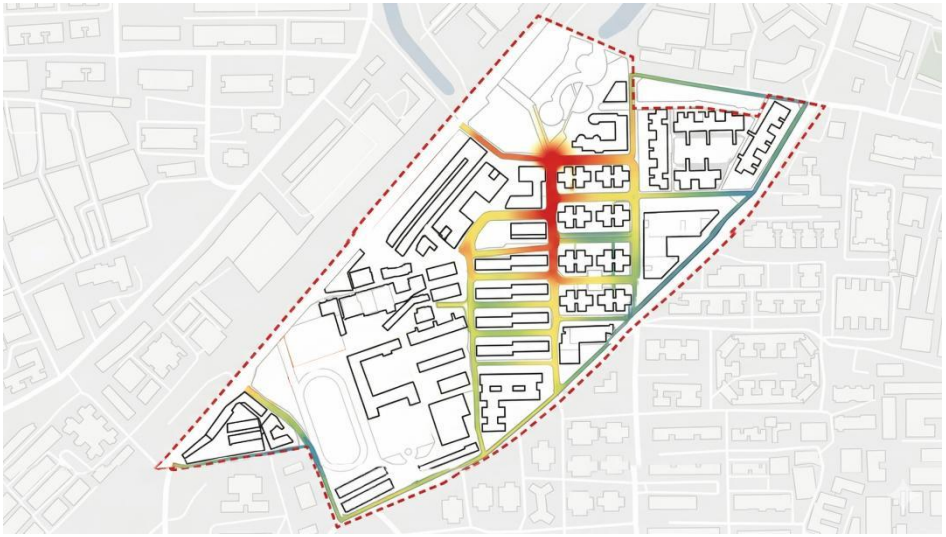


Figure3- 7 Heat Map of Elderly Residents' Behavioral Activities (Source: Author)

From the relationship between behavioural paths and node selection, older adults' activities in Zhongxing Community show a stepwise pattern extending from residential units to public spaces around residential buildings and then to high-frequency activity nodes. The spaces around residential buildings mainly support short-distance stays and neighbourly interaction, while the community social park and fitness plaza accommodate walking, exercise, and social activities. The spaces in front of street-facing shops and those associated with the Elderly Care Center further support daily needs such as shopping, resting, and access to services. This layered activity structure suggests that the community public space system is not composed of isolated nodes, but forms a continuous activity network connected by older adults' daily walking paths.

The superimposed behavioural paths also show that although older adults' overall activity radius in Zhongxing Community is relatively limited, the frequency of space use is high, and the demands on route safety, node accessibility, staying comfort, and functional mix are particularly evident. This further indicates that age-friendly renovation in old communities should not focus only on adding facilities at individual nodes, but should instead create a continuous public space system based on older adults' actual activity range and path

preferences. These findings also provide an important basis for the subsequent evaluation of high-frequency activity nodes and the development of renovation strategies.

3.3 Environmental Evaluation of High-frequency Activity Nodes

To further identify the specific influence of environmental factors on older adults' behaviour, this study selects public space nodes with relatively high arrival frequency and activity intensity as key objects of analysis, based on path superimposition and behavioural frequency statistics. By matching behavioural records with environmental ratings at corresponding nodes and applying non-parametric statistical tests to examine the distribution of different environmental factors across behaviour types, it becomes possible to identify more precisely which environmental dimensions exert a stronger influence on older adults' behavioural choices [59]. On this basis, the study identifies high-frequency activity nodes in Zhongxing Community and conducts an environmental evaluation of these nodes.

After reviewing the behavioural paths recorded in Table 3-2, this study identifies five high-frequency activity nodes: the community social park (Node 3), the fitness plaza (Node 4b), public spaces around residential buildings (Node 6a), the Elderly Care Center (Node 8), and the commercial-oriented public space in front of street-facing shops (Node 7b). Based on these nodes, 59 samples of older adults were further selected whose activity paths passed through the above high-frequency nodes and for whom corresponding environmental evaluation questionnaire data were available. Together with the 59 valid questionnaires, the study compiled rating data for environmental factors at different nodes, including accessibility, infrastructure, safety, aesthetics, and environmental quality. Descriptive statistics and non-parametric tests were then conducted in SPSS to analyse the relationship between environmental factors and older adults' behavioural characteristics.

3.3.1 Identification of High-number Activity Nodes

The superimposed behavioural paths, node arrival frequencies, and the behavioural records in Table 3-2 show that older adults' activities in Zhongxing Community are not evenly distributed, but are clearly concentrated at a limited number of public space nodes that combine accessibility, staying capacity, and functional mix. Among these, the community

social park (Node 3), the fitness plaza (Node 4b), public spaces around residential buildings (Node 6a), the Elderly Care Center (Node 8), and the commercial-oriented public space in front of street-facing shops (Node 7b) were repeatedly selected and together form the high-frequency activity node system of older adults' daily lives. These five node types correspond respectively to social interaction, exercise, near-home staying, access to public services, and everyday consumption. They therefore reflect the main behavioural patterns and environmental preferences of older adults' use of public space in Zhongxing Community, and were selected as the key objects for subsequent evaluation.

（1）Social-oriented Public Space: Community Social Park (Node 3)

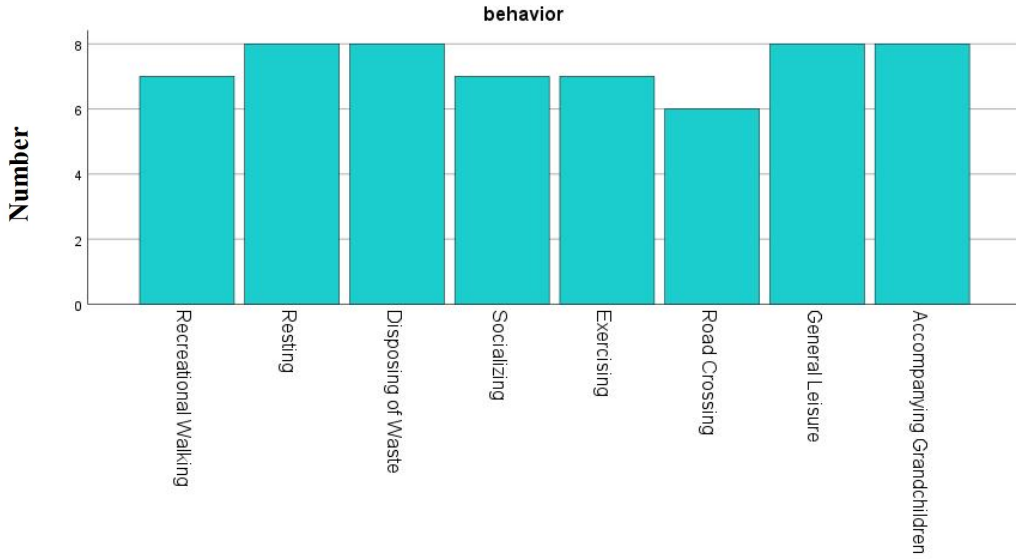


Figure3- 8 Behavior Statistics of the Social Park (Source: Author)

The first node is the community social park (Node 3), which was selected 66 times in Table 3-2 and thus represents the node with the highest number of recorded visits. Based on older adults' behavioural characteristics at this node, the table was reorganized to record information such as age, behaviour, and spatial evaluation. The results are presented in Table3- 3, Statistical Results for Social Park (Appendix) .

After statistical analysis, this study summarized the key information on the categories and number of behaviours recorded at this node. Figure 3-7 shows the distribution of different behaviours observed among older adults in this public space. Among them, resting, disposing of waste, leisure activities, and accompanying younger generations show the highest numbers, indicating that these activities occur most frequently in this setting. Walking, chatting, and

exercise also appear relatively often, reflecting the presence of light physical activity and interpersonal interaction in this space. Overall, this node accommodates rest, daily tasks, and social activities, serving not only as a place for staying and relaxation, but also as a setting for meeting basic everyday needs.

Table 3-4 presents the distribution of mean ranks for different behaviour types across each environmental dimension.

Table3- 4 Social Park - Kruskal-Wallis Test (Source: Author)

Factors	Behavior	N	Mean Rank
infrastructure	Recreational Walking	7	44.57
	Resting	8	24.44
	Disposing of Waste	8	36.25
	Socializing	7	17.57
	Exercising	7	17.57
	Road Crossing	6	52.33
	General Leisure	8	24.44
	Accompanying Grandchildren	8	27.13
	Total	59	
safe	Recreational Walking	7	38.36
	Resting	8	21.75
	Disposing of Waste	8	27.00
	Socializing	7	23.93
	Exercising	7	41.36
	Road Crossing	6	13.25
	General Leisure	8	33.63
	Accompanying Grandchildren	8	38.25
	Total	59	
accessibility	Recreational Walking	7	42.71
	Resting	8	17.44
	Disposing of Waste	8	40.88
	Socializing	7	26.93
	Exercising	7	44.86
	Road Crossing	6	36.67
	General Leisure	8	17.63
	Accompanying Grandchildren	8	17.63
	Total	59	
aesthetic	Recreational Walking	7	37.93
	Resting	8	35.13
	Disposing of Waste	8	12.06
	Socializing	7	34.93

Table3- 4 Social Park - Kruskal-Wallis Test (Continued)

Factors	Behavior	N	Mean Rank
aesthetic	Exercising	7	22.07
	Road Crossing	6	24.50
	General Leisure	8	27.38
	Accompanying Grandchildren	8	45.25
	Total	59	
environment	Recreational Walking	7	31.86
	Resting	8	36.38
	Disposing of Waste	8	15.00
	Socializing	7	37.07
	Exercising	7	32.07
	Road Crossing	6	14.08
	General Leisure	8	34.56
	Accompanying Grandchildren	8	36.38
	Total	59	

The results show that, within the infrastructure dimension, crossing the street has the highest mean rank at 52.33, indicating that this behaviour tends to occur in areas with relatively well-developed infrastructure, such as intersections equipped with traffic signals, barrier-free ramps, or clear signage. This suggests that older adults are more likely to cross roads at locations where facilities provide stronger support, rather than at arbitrary points along the street. Walking has a mean rank of 44.57, indicating that the path system, barrier-free facilities, and lighting at this node play an important role in supporting this activity. By contrast, behaviours such as chatting, exercise, and resting have relatively lower mean ranks within this dimension, suggesting that they are less dependent on circulation-related facilities such as paths, paving, and barrier-free design, and may be influenced more by other factors, such as social habits, activity routines, or spatial accessibility. It is also worth noting that disposing of waste has a mean rank of 36.25, which is at a moderate level, indicating that the location and number of waste bins affect its occurrence to some extent. Overall, the Kruskal–Wallis test indicates that movement-related behaviours are significantly more dependent on infrastructure than stationary or social behaviours.

Overall, in the community social park, the influence of different environmental dimensions on older adults' behaviour shows clear variation by activity type. Active and

task-oriented behaviours, such as exercise, walking, and disposing of waste, depend more strongly on infrastructure, accessibility, and safety. By contrast, stationary and affective behaviours, such as resting, social interaction, and accompanying younger generations, are more closely related to environmental quality and aesthetics. Their occurrence is shaped not only by physical facilities, but also by social relationships and spatial atmosphere.

（2）Social-oriented Public Space: Fitness Plaza (Node 4b)

The second node is the fitness plaza (Node 4b), which was selected 66 times in Table 3-2 and, together with the community social park, represents the node with the highest number of recorded visits. Based on older adults' behavioural characteristics at this node, the table was reorganized to record information such as age, behaviour, and spatial evaluation. The results are presented in Table3- 5, Statistical Results for Fitness Plaza (Appendix).

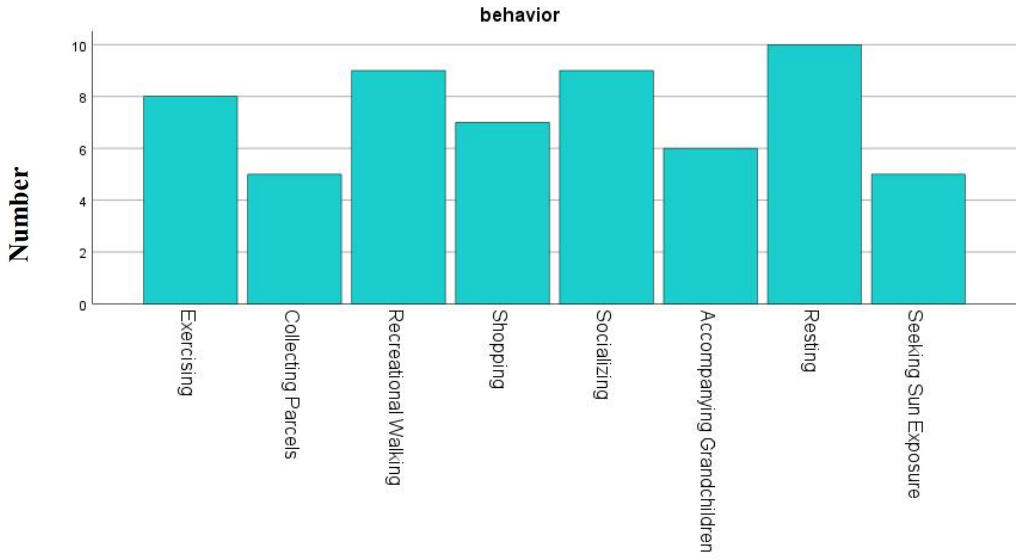


Figure3- 9 Behavior Statistics of the Fitness Plaza (Source: Author)

The fitness plaza is located within Zhoumen Community and is one of the few open spaces in the community with a relatively clear activity function. It is also an important node that older adults frequently pass through and stop at in their daily movement paths. Behavioural observation shows that this node mainly accommodates walking, exercise, resting, chatting, and collecting deliveries, with exercise, short stays, and passing-through activities being the most prominent. The space is selected frequently mainly because it is located within the enclosure of residential buildings and is therefore close to older adults' everyday living spaces, making it easy to reach at low cost. At the same time, as one of the

few concentrated activity spaces in the community, it partly meets older adults' needs for daily physical activity and neighbourly interaction.

However, in terms of spatial support, the fitness plaza shows a relatively low level of age-friendly renovation. The existing exercise equipment is limited in type, resting facilities are clearly insufficient, and there is a level difference between the site and the surrounding roads. In addition, older adults must pass through vehicular space to reach the plaza. These conditions weaken its performance as an elderly-friendly activity node. Therefore, although the fitness plaza is used frequently, this pattern reflects more a form of constrained or passive use under limited conditions. The tension between its environmental shortcomings and older adults' behavioural needs is particularly evident, making it a suitable object for subsequent evaluation.

Table3- 6 Fitness plaza - Kruskal-Wallis Test (Source: Author)

Factors	Behavior	N	Mean Rank
infrastructure	Exercising	8	47.06
	Collecting Parcels	5	15.30
	Recreational Walking	9	44.00
	Shopping	7	25.93
	Socializing	9	23.00
	Accompanying Grandchildren	6	38.25
	Resting	10	19.95
	Seeking Sun Exposure	5	20.70
	Total	59	
safe	Exercising	8	46.75
	Collecting Parcels	5	7.00
	Recreational Walking	9	30.78
	Shopping	7	11.14
	Socializing	9	35.00
	Accompanying Grandchildren	6	34.08
	Resting	10	29.90
	Seeking Sun Exposure	5	37.50
	Total	59	
accessibility	Exercising	8	27.75
	Collecting Parcels	5	24.90
	Recreational Walking	9	31.17
	Shopping	7	33.86
	Socializing	9	26.17
	Accompanying Grandchildren	6	37.25

Table3- 6 Fitness plaza - Kruskal-Wallis Test (Continued)

Factors	Behavior	N	Mean Rank
accessibility	Resting	10	32.25
	Seeking Sun Exposure	5	24.90
	Total	59	
aesthetic	Exercising	8	35.50
	Collecting Parcels	5	13.70
	Recreational Walking	9	33.00
	Shopping	7	18.79
	Socializing	9	28.67
	Accompanying Grandchildren	6	35.83
	Resting	10	33.75
	Seeking Sun Exposure	5	35.70
	Total	59	
environment	Exercising	8	32.44
	Collecting Parcels	5	29.60
	Recreational Walking	9	34.67
	Shopping	7	20.64
	Socializing	9	28.33
	Accompanying Grandchildren	6	31.50
	Resting	10	32.45
	Seeking Sun Exposure	5	27.50
	Total	59	

From the perspective of the relationship between space and environmental factors, the fitness plaza, as a social-oriented node for exercise, walking, and short stays, depends strongly on safety and infrastructure. Active behaviours such as exercise and walking require level and slip-resistant paving, clearly defined activity boundaries, and pedestrian spaces with minimal interference. By contrast, supportive behaviours such as collecting deliveries or short stays before and after shopping are more sensitive to route continuity, edge conditions for staying, and entrance connection. This node therefore reflects a typical pattern: the greater the physical intensity and bodily involvement of a behaviour, the more it depends on safe, continuous, and age-friendly infrastructural support. This also suggests that renovation of the fitness plaza should focus primarily on safety details, the organization of exercise areas, and the improvement of pedestrian interfaces, rather than on visual enhancement alone.

（3）Social-oriented Public Space: Public Spaces around Residential Buildings (Node 6a)

he third node is public spaces around residential buildings, which was selected 64 times

in Table 3-2. Based on older adults' behavioural characteristics at this node, the table was reorganized to record information such as age, behaviour, and spatial evaluation. The results are presented in Table3- 7, Statistical Results for Public Spaces around Residential Buildings (Appendix).

Public spaces around residential buildings refer mainly to micro-scale public spaces distributed in front of and behind residential buildings and near dwelling-unit entrances. Although these spaces are relatively small in scale and fragmented in form, they appear frequently in older adults' daily lives and are among the public spaces closest to residential units. Behavioural records show that the main activities at this node include resting, chatting, sunbathing, short-distance walking, and staying to observe, with low-intensity, short-duration, and high-number activities being the most common. The high level of use is largely due to the clear near-home convenience of these spaces, which allows older adults to reach them without walking long distances. They are therefore especially suitable for residents with weaker physical capacity and a smaller activity range who need short stays and familiar social interaction.

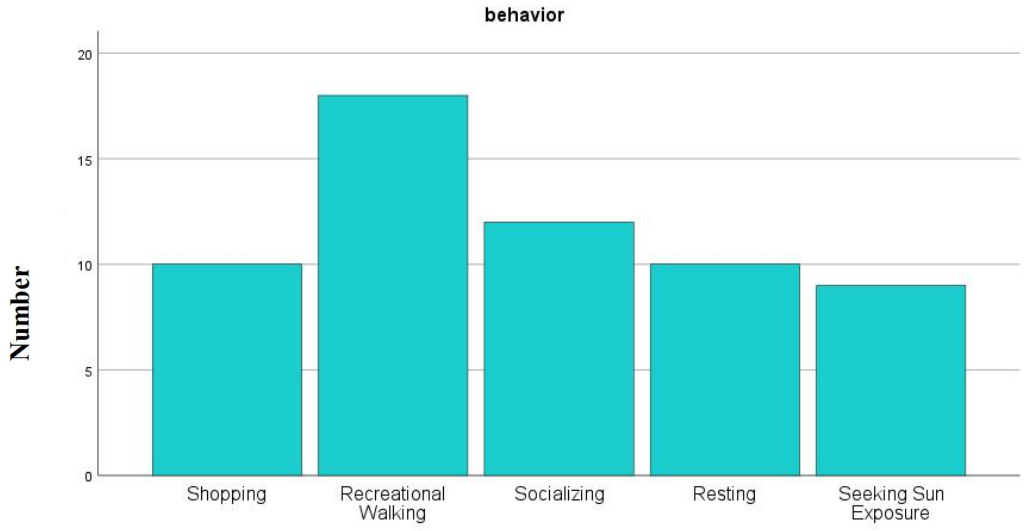


Figure3- 10 Behavior Statistics of Public Space around Residential Buildings (Source: Author)

However, the public character and activity support of these spaces are generally weak. Problems such as encroachment by non-motor vehicles, unclear boundaries, insufficient lighting, underused facilities, and poor landscape order are common. As a result, although these spaces are the closest to older adults' homes, they have not been fully transformed into

high-quality settings for staying and social interaction. Therefore, public spaces around residential buildings, as the micro-scale nodes closest to older adults' everyday lives in Zhongxing Community, are highly representative in reflecting near-home activity needs, neighbourly interaction, and the age-friendly challenges of in-between residential spaces.

From the perspective of the relationship between space and environmental factors, public spaces around residential buildings mainly accommodate low-intensity and near-home activities such as resting, chatting, sunbathing, and accompanying younger generations. The needs of these activities are not centred on large-scale or fully equipped facilities, but rather on small-scale environments that are easy to stay in, easy to recognize, and easy to use with confidence. In this context, aesthetics relates to the cleanliness of the spatial interface, the layering of planting, and the overall sense of place; infrastructure and safety relate to whether everyday movement is smooth and whether there are problems such as spatial encroachment or unclear boundaries; and accessibility reflects whether seating, resting areas, and small activity facilities can be conveniently reached and used. This suggests that the core issue of these spaces lies not simply in insufficient area, but in the lack of an effective match between micro-scale environmental quality and the needs of neighbourly interaction.

Table3- 8 Public Space around Residential Building - Kruskal-Wallis Test (Source: Author)

Factors	behavior	N	Mean Rank
infrastructure	Shopping	10	19.15
	Recreational Walking	18	18.39
	Socializing	12	42.46
	Resting	10	41.55
	Seeking Sun Exposure	9	35.83
	Total	59	
safe	Shopping	10	19.85
	Recreational Walking	18	17.28
	Socializing	12	41.58
	Resting	10	42.15
	Seeking Sun Exposure	9	37.78
	Total	59	
accessibility	Shopping	10	41.75
	Recreational Walking	18	26.97
	Socializing	12	26.08
	Resting	10	27.80
	Seeking Sun Exposure	9	30.67

Table3- 8 Public Space around Residential Building - Kruskal-Wallis Test (Continued)

Factors	behavior	N	Mean Rank
accessibility	Total	59	
aesthetic	Shopping	10	18.40
	Recreational Walking	18	32.86
	Socializing	12	31.13
	Resting	10	31.50
	Seeking Sun Exposure	9	34.00
	Total	59	
environment	Shopping	10	27.75
	Recreational Walking	18	25.58
	Socializing	12	30.33
	Resting	10	41.75
	Seeking Sun Exposure	9	27.83
	Total	59	

(4)Service-oriented Public Space: Elderly Care Center (Node 8)

The fourth node is the Elderly Care Center , which was selected 63 times in Table 3-2. Based on older adults' behavioural characteristics at this node, the table was reorganized to record information such as age, behaviour, and spatial evaluation. The results are presented in Table3- 9, Statistical Results for the Elderly Care Center (Appendix).

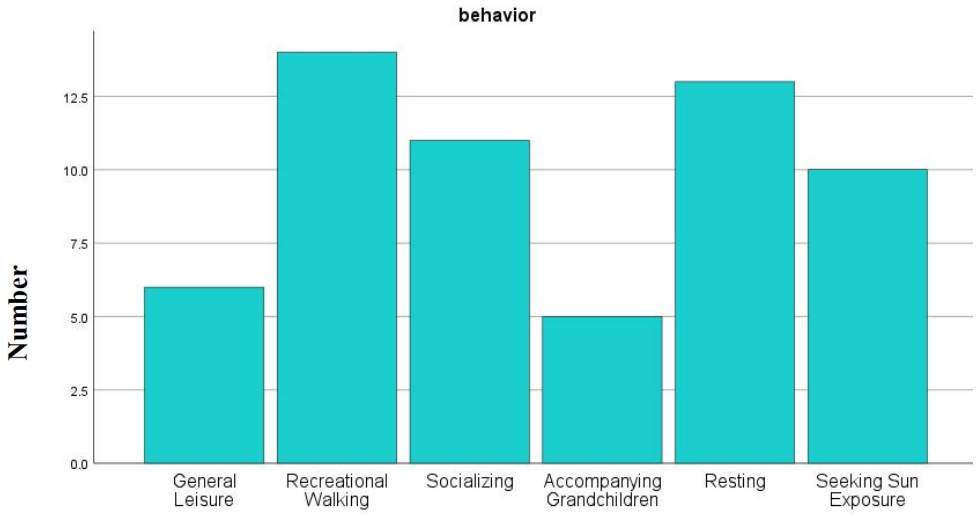


Figure3- 11 Behavior Statistics of the Elderly Care Center (Source: Author)

The Elderly Care Center and its associated public space constitute an important service-oriented node in Zhongxing Community and are also among the more frequently used service spaces in the behavioural path records of older adults. Behavioural observation shows that the main activities at this node include walking, resting, sunbathing, chatting, and visiting

related service facilities, reflecting a combination of service access and staying-based social use. On the one hand, the Elderly Care Center itself attracts older adults because of its service function. On the other hand, it is located in a relatively central part of the community and maintains a certain spatial connection with surrounding residential areas and other activity nodes. As a result, it shows both a relatively high rate of passage and a relatively high rate of stay in older adults' daily activity paths.

However, the current quality of the associated space does not fully match its service function. The organization of the forecourt pedestrian space is unclear, and problems such as vehicular encroachment and insufficient resting facilities can still be observed. In addition, the adjacent green space and covered corridor remain underused. As a result, although this node has a relatively strong functional foundation, it has not been fully transformed into a high-quality public activity space for older adults. The Elderly Care Center therefore clearly reflects a typical problem of service-oriented public space: a relatively complete service base but insufficient spatial support.

Table3- 10 Elderly Care Center - Kruskal-Wallis Test (Source: Author)

Factors	Behavior	N	Mean Rank
infrastructure	General Leisure	6	18.00
	Recreational Walking	14	35.07
	Socializing	11	19.82
	Accompanying Grandchildren	5	16.70
	Resting	13	35.88
	Seeking Sun Exposure	10	40.30
	Total	59	
safe	General Leisure	6	40.50
	Recreational Walking	14	19.61
	Socializing	11	20.68
	Accompanying Grandchildren	5	28.80
	Resting	13	37.54
	Seeking Sun Exposure	10	39.30
	Total	59	
accessibility	General Leisure	6	43.67
	Recreational Walking	14	37.64
	Socializing	11	23.86
	Accompanying Grandchildren	5	33.20
	Resting	13	23.92

Table3- 10 Elderly Care Center - Kruskal-Wallis Test (Continued)

Factors	Behavior	N	Mean Rank
accessibility	Seeking Sun Exposure	10	24.15
	Total	59	
aesthetic	General Leisure	6	10.33
	Recreational Walking	14	19.64
	Socializing	11	31.59
	Accompanying Grandchildren	5	38.70
	Resting	13	38.85
	Seeking Sun Exposure	10	38.70
	Total	59	
environment	General Leisure	6	21.67
	Recreational Walking	14	33.36
	Socializing	11	24.82
	Accompanying Grandchildren	5	23.40
	Resting	13	33.62
	Seeking Sun Exposure	10	34.60
	Total	59	

From the perspective of the relationship between space and environmental factors, the Elderly Care Center, as a service-oriented node, mainly supports activities such as sunbathing, resting, chatting, waiting, and accessing service facilities. Its spatial demand therefore shows a clear service-connection character. In this context, infrastructure relates to the continuity between entrances, corridors, waiting areas, and surrounding roads; safety relates to basic support such as level-difference treatment, wheelchair access, night lighting, and node recognizability. The fact that accessibility is not significant suggests that the node is already relatively easy to reach in locational terms. What actually shapes behavioural differences is whether older adults can stay, move through, and transfer safely, smoothly, and with dignity after arrival. This indicates that renovation of this type of space should prioritize entrance transitions, ramps, staying facilities, and wayfinding systems, rather than focusing only on surface-level landscape improvement.

（5）Commercial-oriented Public Space: Street-facing Shops (Node 7b)

The fifth node is the street-facing shops, which was selected 65 times. Based on older adults' behavioural characteristics at this node, the table was reorganized to record information such as age, behaviour, and spatial evaluation. The results are presented in Table3- 11, Statistical Results for the Public Space in Front of Street-facing Shops

(Appendix).

The public space in front of the street-facing shops is located at the junction between the interior of the community and the street-side commercial frontage, and is one of the high-number nodes most closely associated with older adults' daily consumption activities in Zhongxing Community. According to the behavioural records, the main activities observed at this node include shopping, short stays, walking, resting, and accompanying younger generations, with shopping being the most prominent. This node is repeatedly selected mainly because of its strong role in everyday services and its close connection with older adults' necessary activities, such as buying groceries, shopping, and collecting goods. At the same time, the space in front of the shops also has a social character: some older adults stay briefly after making purchases to chat or observe street activities, making it an important node that combines both functional and everyday-life attributes.

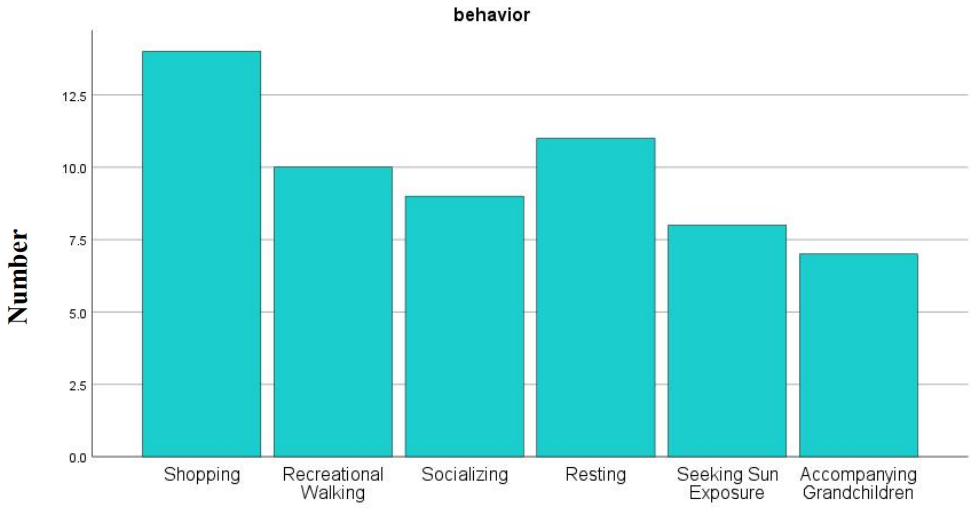


Figure3- 12 Behavior Statistics of Street-facing Commercial Forecourt Space (Source: Author)

However, this commercial-oriented public space also shows several prominent age-friendly problems, including mixed pedestrian–vehicular movement, insufficient clear passage width, inadequate resting facilities, poor barrier-free entrance connection, and unclear spatial boundaries. These conditions directly affect older adults' safety and comfort during shopping and staying.For this reason, the public space in front of the street-facing shops clearly reflects the tensions within commercial-oriented public space in terms of traffic order, staying support, and functional mix, and therefore has strong analytical value.

Table3- 12 Street-facing Shops - Kruskal-Wallis Test (Source: Author)

Factors	behavior	N	Mean Rank
infrastructure	Shopping	14	33.43
	Recreational Walking	10	13.30
	Socializing	9	37.83
	Resting	11	38.91
	Seeking Sun Exposure	8	35.94
	Accompanying Grandchildren	7	16.14
	Total	59	
safe	Shopping	14	32.54
	Recreational Walking	10	14.40
	Socializing	9	39.17
	Resting	11	38.86
	Seeking Sun Exposure	8	36.63
	Accompanying Grandchildren	7	13.93
	Total	59	
accessibility	Shopping	14	38.07
	Recreational Walking	10	12.70
	Socializing	9	31.33
	Resting	11	33.59
	Seeking Sun Exposure	8	34.38
	Accompanying Grandchildren	7	26.21
	Total	59	
aesthetic	Shopping	14	20.89
	Recreational Walking	10	34.05
	Socializing	9	35.28
	Resting	11	37.41
	Seeking Sun Exposure	8	32.94
	Accompanying Grandchildren	7	20.64
	Total	59	
environment	Shopping	14	24.07
	Recreational Walking	10	35.00
	Socializing	9	37.89
	Resting	11	33.09
	Seeking Sun Exposure	8	36.69
	Accompanying Grandchildren	7	12.07
	Total	59	

Across the five high-number nodes identified above, older adults' behaviours include not only necessary activities such as shopping, toilet use, and collecting deliveries, but also spontaneous activities such as walking, resting, and sunbathing, as well as social activities

such as chatting and accompanying younger generations. This demonstrates a clear degree of behavioural complexity. Because these nodes differ in location, function, and spatial environment, they attract different combinations of activities and also reflect both older adults' actual preferences and the practical constraints they encounter in using public space in Zhongxing Community. On this basis, the next section further combines environmental perception ratings to analyse how different environmental factors influence different types of behaviour, so as to identify the most critical spatial problems and optimization priorities for age-friendly renovation at each node.

3.3.2 Analysis of the Effects of Different Environmental Factors on Behaviour

Building on the identification of high-number activity nodes, this study further applies the Kruskal–Wallis H test to compare differences in ratings of accessibility, infrastructure, aesthetics, environmental quality, and safety across different behaviour types. Since the environmental rating data are derived from a Likert scale and the sample size at each node is relatively limited, a non-parametric method suitable for comparing ordinal data across multiple independent groups is more appropriate[59]. By jointly examining significance levels and mean ranks, the study identifies the key environmental factors that show stronger behavioural differentiation across different nodes.

In selecting the test method, it should be noted that the dependent variable, behaviour, is a nominal categorical variable, including categories such as walking, resting, disposing of waste, and social interaction. Its coding is used only to distinguish category identity; the numerical labels themselves (1, 2, 3, etc.) do not carry quantitative meaning or ordinal structure. It therefore does not meet the measurement requirements for correlation analysis. Pearson correlation requires variables to be continuous and approximately normally distributed, while Spearman rank correlation still requires variables to possess an interpretable ordered structure.

For this reason, this study adopts the Kruskal–Wallis H test, a non-parametric method suitable for multiple independent samples, using behaviour type as the grouping variable to examine differences in the distribution of environmental ratings across behavioural groups. This method does not rely on the assumption of normality and is well suited to small samples

and Likert-scale data. It therefore provides a more appropriate basis for identifying which environmental dimensions significantly influence older adults' behavioural choices, while effect-size comparison can further indicate their relative importance. When the test result is significant ($p < 0.05$), it indicates that the corresponding environmental dimension exerts differentiated effects on different behaviour types; the direction of this effect can then be interpreted further in combination with mean-rank values. The results are shown in the table below.

(1)Social-oriented Public Space: Community Social Park (Node 3)

From a design perspective, the infrastructure dimension of the community social park ($H = 29.606$, $p < .001$) shows strong discriminatory power across behaviour types and therefore indicates considerable potential for targeted intervention. A further examination of mean ranks shows that social interaction/chatting and exercise are both significantly below the overall level, suggesting that these activities often occur in areas where infrastructural conditions are relatively weak and may be constrained by problems such as insufficient resting facilities, damaged paving, or discontinuous paths. By contrast, walking (44.57) and crossing the street (52.33) show particularly high mean ranks, indicating that these movement-related behaviours depend strongly on continuous, safe, and barrier-free circulation systems and supporting facilities.

Table3- 13 Social Park - Kruskal-Wallis Test Statisticsa,b (Source: Author)

	infrastructure	safe	available	aesthetic	environment
Kruskal-Wallis H	29.606	17.315	28.409	23.506	16.725
df	7	7	7	7	7
Asymp. Sig.	<.001	.015	<.001	.001	.019

a. Kruskal Wallis Test

b. Grouping Variable: behavior

Therefore, the design of the community social park should prioritize intervention in spaces associated with social interaction and exercise. Basic supporting facilities should also be added in areas where these activities occur frequently, so as to improve overall inclusiveness and accessibility. More broadly, community renewal should give priority to establishing a safe, continuous, and barrier-free pedestrian network to support older adults' daily mobility. In particular, seamless connections should be formed between residential

entrances, public service nodes, and park pathways, ensuring that older adults can move independently and with confidence.

(2)Social-oriented Public Space: Fitness Plaza (Node 4b)

Based on the data in Tables 3-17 and 3-5, infrastructure ($H = 28.152$, $p < .001$) and safety ($H = 30.266$, $p < .001$) in the fitness plaza show the strongest discriminatory power across behaviour types, indicating that they have a significant influence on behavioural choice among older adults. The mean-rank results further show that active behaviours such as exercise, walking, and shopping are concentrated in areas with better infrastructure and higher perceived safety, whereas more static behaviours such as accompanying younger generations and resting tend to occur in areas with more ordinary conditions or weaker environmental support. 结

The distribution of mean ranks further shows that exercise has a particularly high mean rank in the infrastructure dimension (47.06), far exceeding that of other behaviour types. This indicates that older adults' engagement in systematic physical activity depends strongly on hardware support such as the variety and layout of age-friendly fitness equipment, slip-resistant paving, and assistive handrails. Meanwhile, walking (44.57) and crossing the street (52.33) show very high mean ranks in the safety dimension, further confirming that movement-related behaviours are closely associated with continuous, barrier-free, and well-lit pedestrian routes. Notably, social interaction (17.57) and resting (19.33) have relatively low mean ranks in both the infrastructure and safety dimensions, suggesting that these activities often occur in marginal areas with limited facilities, insufficient seating, damaged paving, or obstructed sightlines.

Table3- 14 Fitnee plaza - Kruskal-Wallis Test Statisticsa,b (Source: Author)

	infrastructure	safe	available	aesthetic	environment
Kruskal-Wallis H	28.152	30.266	4.032	12.599	4.414
df	7	7	7	7	7
Asymp. Sig.	<.001	<.001	.776	.083	.731

a. Kruskal Wallis Test

b. Grouping Variable: behavior

Therefore, renovation of the fitness plaza should prioritize improvements in both infrastructure and safety, especially through the provision of age-friendly exercise equipment,

shaded resting facilities, and barrier-free paths in areas where exercise and social activities are most active. At the same time, exercise zones and public circulation routes should be more clearly differentiated, using variations in paving material or colour for visual guidance. Safety perception can be further enhanced by improving lighting, surface evenness, and visual openness, thereby promoting a better match between spatial organization and behavioural needs.

(3)Social-oriented Public Space: Public Spaces around Residential Buildings (Node 6a)

Based on the data in Tables 3-6 and 3-15, aesthetics ($H = 25.692$, $p < .001$), infrastructure ($H = 19.096$, $p = 0.002$), and safety ($H = 18.343$, $p = 0.003$) show the strongest discriminatory power across behaviour types in public spaces around residential buildings, which are highly proximate and frequently used micro-scale public spaces. This indicates that visual quality, facility support, and perceived safety are the core factors shaping older adults' everyday behavioural choices in such spaces. By contrast, environmental quality ($H = 6.024$, $p = 0.304$) does not reach statistical significance, suggesting that ecological factors such as thermal comfort or air quality have a more limited effect on behavioural differences in these semi-enclosed or small-scale outdoor spaces.

Table3- 15 Public Space around Residential Buildings - Kruskal-Wallis Test Statisticsa,b (Source: Author)

	infrastructure	safe	available	aesthetic	environment
Kruskal-Wallis H	19.096	18.343	13.663	25.692	6.024
df	5	5	5	5	5
Asymp. Sig.	.002	.003	.018	<.001	.304

a. Kruskal Wallis Test

b. Grouping Variable: behavior

The mean-rank results further show that sunbathing has the highest mean rank in the aesthetics dimension (48.22), well above the other behaviour types, indicating that older adults strongly prefer resting corners with pleasant views, coordinated colours, and surrounding greenery. Exercise has a mean rank of 47.06 in the infrastructure dimension, suggesting a strong dependence on age-friendly fitness equipment, level ground, and supportive handrails. Social interaction has a mean rank of 35.00 in the safety dimension, indicating that good lighting, open sightlines, and barrier-free layouts are important conditions for communication. By contrast, more static behaviours such as resting and accompanying

younger generations generally show lower mean ranks across the dimensions and tend to occur in marginal areas with weaker facilities.

Therefore, the renovation of public spaces around residential buildings should treat aesthetics as an important means of guiding behaviour. Spatial recognizability can be enhanced through planting design, material texture, and the form of shading structures, thereby increasing older adults' willingness to stay. At the same time, age-friendly infrastructure should be systematically improved by providing slip-resistant paving, continuous handrails, multifunctional seating, and appropriate fitness equipment in high-use areas. Potential hazards caused by level differences and visual obstruction should also be reduced in order to strengthen older adults' sense of control and confidence in using the space.

(4)Service-oriented Public Space: Elderly Care Center (Node 8)

Table3- 16 Elderly Care Center - Kruskal-Wallis Test Statisticsa,b (Source: Author)

	infrastructure	safe	available	aesthetic	environment
Kruskal-Wallis H	27.041	29.794	8.169	6.931	7.708
df	4	4	4	4	4
Asymp. Sig.	<.001	<.001	.086	.140	.103

a. Kruskal Wallis Test

b. Grouping Variable: behavior

The mean-rank results further show that sunbathing has a particularly high mean rank in the infrastructure dimension (40.30), suggesting that this activity depends heavily on shading facilities, seating provision, and level ground. Walking has a mean rank of 19.61 in the safety dimension, indicating a certain dependence on route continuity, lighting conditions, and obstacle control. Social interaction has a mean rank of 20.68 in the same dimension, suggesting that older adults are more likely to interact in spaces with good lighting and open sightlines.

Therefore, the forecourt space of the Elderly Care Center should prioritize the improvement of age-friendly infrastructure. For high-number behaviours such as sunbathing and resting, shaded benches and similar facilities should be added to improve usability. At the same time, level differences and obstacles should be reduced, and clear signage should be provided, especially at entrances, corridor corners, and other key points, in order to strengthen safety perception and support independent mobility among older adults. Since general leisure

activities are currently concentrated in areas with weak facilities, the spatial quality of these areas can be further improved through modest landscape interventions such as planting beds.

(5) Commercial-oriented Public Space: Street-facing Shops (Node 7b)

Based on the data in Tables 3-17 and 3-12, in the public space in front of street-facing shops, which combines commercial service and public interaction, infrastructure, safety, accessibility, and environmental quality all reach statistical significance. This indicates that older adults' behavioural choices in this type of space are shaped by the combined influence of multiple environmental factors. By contrast, aesthetics shows a relatively weaker effect, suggesting that the use of this space remains primarily oriented toward practical needs.

Table3- 17 Street-facing Shops - Kruskal-Wallis Test Statistics[a,b] (Source: Author)

	infrastructure	safe	available	aesthetic	environment
Kruskal-Wallis H	23.312	25.100	17.376	11.633	17.145
df	5	5	5	5	5
Asymp. Sig.	<.001	<.001	.004	.040	.004

a. Kruskal Wallis Test

b. Grouping Variable: behavior

The mean-rank results further show that shopping has a particularly high mean rank in the infrastructure dimension (33.43), indicating that this activity depends strongly on clear entrances, barrier-free access, and slip-resistant ground surfaces. Social interaction has a mean rank of 39.17 in the safety dimension, suggesting that older adults prefer to interact in areas with good lighting and fewer safety risks. Resting also shows relatively high mean ranks in both infrastructure (38.91) and safety (33.59), indicating a clear demand for this activity, while also suggesting that the current lack of dedicated resting facilities.

In subsequent renovation, priority should be given to improving the age-friendly configuration of the public space associated with commercial services. Slip-resistant paving and ramp access should be provided at shop entrances to enhance safety and convenience. At the same time, sufficient pedestrian width should be reserved in front of the shops to reduce pedestrian–vehicular conflict, and facilities such as seating and shading structures should be added at key nodes to better support older adults' resting and everyday activity needs.

3.4 Main Problems and Design Implications

The analysis of older adults' behavioural characteristics and the environmental evaluation

of high-number activity nodes show that the current problems of public space in Zhongxing Community do not stem from the absence of individual facilities alone, but from a systematic mismatch between spatial provision and older adults' behavioural needs. Older adults' daily activities are generally characterized by short distance, high number, slow pace, and functional complexity. Their spatial choices depend strongly on walkability, safety, support for staying, and environmental comfort. However, the existing public space system still shows clear shortcomings in continuous pedestrian connection, pedestrian–vehicular separation, barrier-free linkage, resting facilities, and wayfinding. As a result, some spaces, although already in use, cannot continuously support older adults' diverse activity needs.

From the perspective of spatial type, the main problems of social-oriented public space lie in insufficient facility suitability, weak support for staying, and unclear separation between active and quiet areas, making it difficult to meet older adults' combined needs for rest, social interaction, and light physical activity. In transport-oriented public space, the core contradiction lies in discontinuous pedestrian routes, constrained road dimensions, and inadequate safety protection, which directly affect the convenience of older adults' daily mobility. Although commercial-oriented public space has strong everyday vitality, its age-friendliness is still limited by mixed pedestrian–vehicular movement, insufficient staying space, and unclear spatial boundaries. Service-oriented public space, by contrast, is mainly constrained by weak accessibility and recognizability, which prevents existing service resources from being effectively transformed into a daily support network for older adults.

Based on these findings, this study suggests that age-friendly renovation of public space in old communities should proceed at three levels. First, taking older adults' high-number behavioural paths as the basis, priority should be given to improving the internal pedestrian system of the community and strengthening continuous, safe, and barrier-free connections between major nodes. Second, with high-number activity nodes as the focus, resting facilities should be added, functional organization improved, and environmental comfort enhanced according to different space types, so as to create more inclusive spaces for staying and social interaction. Third, based on the behaviour–space coupling relationship, a design logic should be established that links problem identification, environmental evaluation, and strategy translation, so that spatial intervention can respond more directly to older adults' everyday

behavioural patterns and actual needs. In this sense, the analysis in Chapter 3 not only verifies the problems identified in Chapter 2, but also provides a clear basis for the strategy development in Chapter 5 and the design practice in Chapter 6.

Chapter4 Case Study Analysis

4.1 Case Study Method and Analytical Framework

From the perspective of environment – behaviour studies, this research conducts a systematic review of representative practices in the age-friendly renovation of old communities[55]. Based on the five-factor analytical framework[17]: accessibility, infrastructure, aesthetics, environmental quality, and safety—the study classifies and analyses four types of public space under each dimension: social-oriented public space, commercial-oriented public space, transport-oriented public space, and service-oriented public space. Cases were selected according to three criteria: completed implementation, a clear age-friendly focus, and sufficient documentation, while also ensuring representativeness.

This study adopts content analysis, using spatial intervention measures as the basic coding unit to examine case texts and drawings item by item. To improve consistency, double coding was carried out by two researchers. A total of 370 design measures were extracted from 20 domestic and international age-friendly renovation cases. Repeated strategies across cases, such as adding seating or shading facilities, were then grouped and consolidated. Following a two-dimensional classification logic based on functional attributes and spatial carriers, these design measures were further categorized [61]. This classification provides the basis for subsequent statistical analysis of different space types and design factors.

It should be noted that, due to limitations in the number of cases and the geographical scope of the sample, the occurrence number of each design measure in this study does not carry strict statistical significance. These values are used only to identify general trends in strategy use, rather than to infer their effectiveness or relative merit.

By summarizing high-number design measures, this chapter provides both experiential reference and empirical support for the strategy development in Chapter 5.

4.2 Accessibility Factor

The accessibility factor can be further divided into several dimensions, including access to opportunities for physical activity, access to everyday destinations, access to transport

systems, and access to resting areas such as seating and public toilets[58]. Among these, resting areas mainly address older adults' basic physiological and social needs during walking. Typical design measures include fixed seating, shading structures, slip-resistant paving, and clearly defined spatial boundaries, all intended to provide safe, comfortable, and identifiable places for short stays[41]. By contrast, everyday destinations are usually more function-oriented, with a more formal spatial layout and relatively larger scale[54].

This study evaluates the accessibility of community public facilities from a multidimensional perspective and establishes a detailed framework consisting of four dimensions: spatial connectivity, travel distance, route continuity, and barrier-free completeness [15]. The specific criteria are as follows:

(1) Spatial connectivity refers to whether the community has formed a systematic, continuous, and uninterrupted pedestrian network that enables older adults to move safely and smoothly from residential units to various service facilities.

(2) Travel distance is assessed in relation to frequently used activity facilities, such as seating, fitness equipment, community green space, and service centres. According to their straight-line or walking distance from residential units, accessibility is classified as follows: ≤300 m indicates high accessibility, meeting the requirement of a “five-minute living circle”; 300–800 m indicates moderate accessibility; and >800 m indicates low accessibility.

(3) Route continuity examines whether walking routes are disrupted by physical barriers, such as steps without ramps or dead-end paths, by significant level differences without gentle slopes, or by interference from motor vehicles and on-street parking, all of which may affect the smoothness and safety of walking.

(4) Barrier-free completeness evaluates whether routes and the areas around facilities fully meet the basic mobility needs of older adults and wheelchair users, including but not limited to level and slip-resistant surfaces, passage widths of at least 1.2 m, sufficient turning radius, the absence of level barriers or the provision of compliant ramps, and continuous handrails.

Drawing on studies of accessibility evaluation in elderly-friendly communities as well as domestic research on pedestrian accessibility, this study classifies facility accessibility into four dimensions: spatial connectivity, travel distance, route continuity, and barrier-free

completeness, and applies a comprehensive grading method. A case is classified as having high accessibility when it satisfies three or more of the four indicators, moderate accessibility when it satisfies two indicators, and low accessibility when it satisfies one or none. This method takes into account both objective spatial characteristics and the actual experience of older adults, and helps to identify more precisely the key shortcomings in age-friendly renovation at the community scale.

4.2.1 Statistical Summary of Relevant Cases

This study summarizes the age-friendly renovation measures related to the accessibility factor identified in the selected cases, as shown in Table 4-1 (Appendix).

Table4- 1 Accessibility — Statistical Summary of Case Strategies (Brief Table, Source：Reference[42])

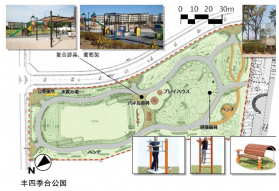
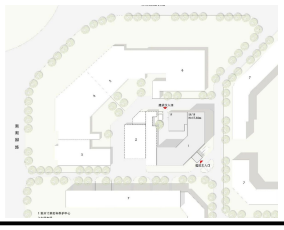
Case Studies		Social-oriented Space	Commercial-oriented Space	Transport-oriented Space	Service-oriented Space
Toyoshikidai Community, Kashiwa City, Chiba Prefecture, Japan		Greenery + fitness equipment. According to the above accessibility evaluation criteria	Gray space formed by long eaves + small plaza + greenery. According to the above accessibility evaluation criteria	Grid-pattern vehicular roads. According to the above accessibility evaluation criteria	Gray space equipped with a full range of services. According to the above accessibility evaluation criteria,
Yui no Mori Tama-daira Senior Apartment, Tokyo, Japan		Greenery + wooden platform + resting seats. High accessibility to daily destinations and rest areas.	Gray space formed by long eaves + small plaza + greenery. High accessibility to rest areas.	Cul-de-sac vehicular roads. this is judged as having relatively low transport accessibility.	Gray space formed by long eaves. this is judged as having high accessibility to rest areas.
De Benring Intergenerational Co-housing Apartment Gelderland, the Netherlands		Themed garden. High accessibility to rest areas.	Small planting garden + gym. High accessibility to daily destinations and exercise areas.	Cul-de-sac vehicular roads. Relatively low transport accessibility.	Garden pathway. High accessibility to daily destinations and exercise opportunities.

Table4- 1 Accessibility — Statistical Summary of Case Strategies(Continued)

Case Studies		Social-oriented Space	Commercial-oriented Space	Transport-oriented Space	Service-oriented Space
Yinheyuan Elderly Care Station, Dashilar Subdistrict, Beijing, China	 	Rooftop platform + rooftop greenery. High accessibility to daily destinations and rest areas.	Gray space formed by a large canopy. High accessibility to rest areas.	Cul-de-sac vehicular roads. Relatively low transport accessibility.	Rooftop platform and semi-indoor space (indoor conservatory). High accessibility to rest areas and daily destinations.
Shoukai Cuncao Wangjing Elderly Care Center, Beijing, China	 	Rooftop platform + rooftop greenery. High accessibility to daily destinations and rest areas.	Greenery + waiting space. High accessibility to rest areas.	Loop vehicular road. Moderately high transport accessibility.	Large indoor space. High accessibility to rest areas and daily destinations.

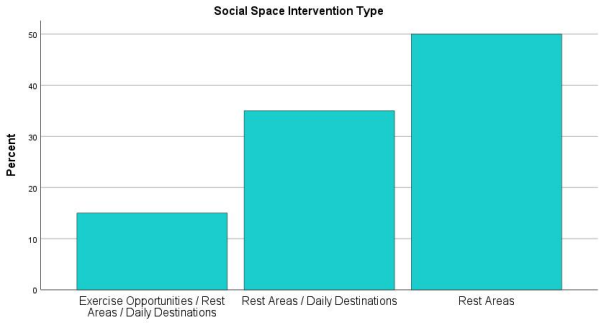


Figure4- 1 Social-oriented Spaces-Accessibility

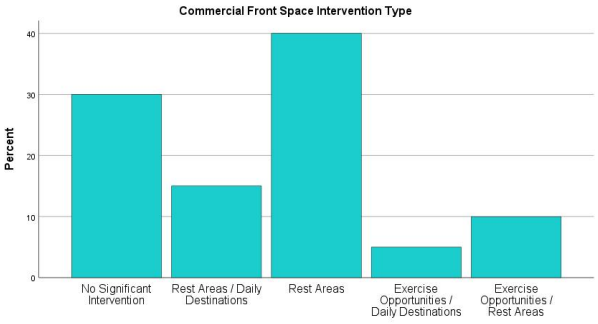


Figure4- 2 Commercial-oriented Spaces-Accessibility

Source: Author

In social-oriented public space, many age-friendly strategies focus on providing temporary places for rest through the addition of leisure facilities and greening, so as to meet older adults' needs for short stays and social interaction.

In commercial-oriented public space, a relatively large number of strategies focus on the accessibility of rest areas, indicating that such spaces have become important nodes for older adults' staying and social interaction in commercial settings, as shown in Fig. 4-2.

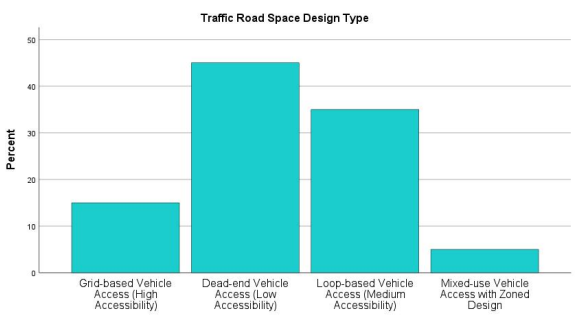


Figure4- 3 Transport-oriented Spaces-Accessibility

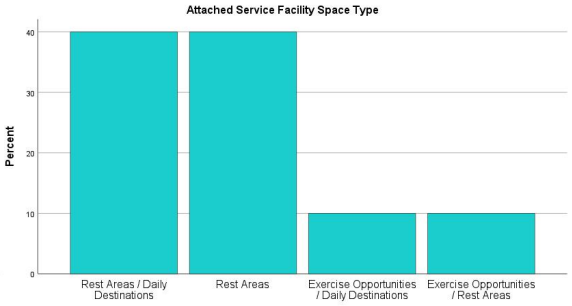


Figure4- 4 Service--oriented Spaces-Accessibility

Source: Author

In transport-oriented public space, cul-de-sac vehicular roads effectively limit through traffic, reduce vehicle speed and noise disturbance, and thereby improve pedestrian safety and environmental comfort, making them particularly suitable for residential communities with a high proportion of older adults. Loop road systems, by contrast, maintain basic vehicular access while also allowing efficient circulation, balancing operational efficiency and convenience of movement, and are more suitable for communities with relatively ample road space.

In service-oriented public space, rest areas/everyday destinations and rest areas have become the core spaces for older adults' staying, social interaction, and daily activities in community service environments. By contrast, designs related to opportunities for physical activity/everyday destinations and opportunities for physical activity/rest areas are often constrained by limited site size and functional singularity, making them less capable of meeting older adults' needs for multifunctional and comfortable public space. This may partly explain their relatively limited application in practice.

In summary, accessibility shows different design orientations across different types of public space: social-oriented public space emphasizes convenient access to nodes for staying and social interaction; commercial-oriented public space focuses on the integration of resting areas with everyday consumption settings; transport-oriented public space prioritizes continuous and safe circulation; and service-oriented public space highlights efficient connections between resting areas and service destinations. Their shared objective is to create a convenient, continuous, and sustainably usable public space system that responds to the daily activity patterns of older adults.

4.2.2 Typical Case: Yui no Mori Tamadaira Senior Apartment

Yui no Mori Tamadaira Senior Apartment is located at 3-1-6 Tamadaira, Hino City, Tokyo, Japan, and was officially opened in October 2011 as a comprehensive senior housing project. The development consists of three parts: senior apartments, a communal dining hall, and a small-scale multifunctional care facility. The total floor area is approximately 3,718 m^2, of which 3,260 m^2 is allocated to the residential component. The project provides 63 dwelling units together with 7 short-term care beds. Based on the renewal of an existing building, the project reorganized space and integrated multiple functions to create a comprehensive living environment that combines residence, care, and support for daily activities. Its improvement in accessibility does not rely on the addition of individual facilities alone, but on the overall integration of the pedestrian system, service nodes, and barrier-free facilities to form a spatial system suitable for continuous use by older adults.

In terms of spatial connectivity, the project transformed the original relatively enclosed unit-based layout into an open external-corridor organization. By adding external corridors and an elevator system, it significantly strengthened the connections among residential units, communal activity spaces, and service facilities. The external corridor functions not only as a circulation route, but also as a semi-open transitional space linking the senior apartments, communal dining hall, and small-scale multifunctional facility into a continuous living network. In this way, different functional units are no longer isolated from one another, but are connected through a composite spatial interface that supports walking, staying, and social interaction.

In terms of travel distance, the project integrates multiple high-frequency functions within the same residential environment, allowing older adults to complete activities such as dining, short stays, social interaction, and basic care within a relatively short walking distance. In particular, the inclusion of the communal dining hall and the multifunctional facility reduces the spatial distance required to access daily services. By shortening the actual distance between service facilities and residential spaces, the project improves older adults' access to high-frequency daily destinations.



Figure4- 5 Schematic Diagram of Renovation Content

Source:Reference[42]

In terms of barrier-free completeness, the most critical intervention in this case is the addition of an elevator system and the replacement of the original enclosed stair-based circulation with open external corridors, fundamentally improving the problem of inconvenient vertical movement in the existing building. For older adults, especially those with reduced mobility, the combination of elevators and open corridors enhances both vertical and horizontal accessibility. At the same time, the project also upgraded the facade, envelope materials, waterproofing, and thermal insulation systems, which improved the overall safety and environmental stability of the building and provided long-term support for the operation of the barrier-free system.

The most important accessibility strategy of this case lies in strengthening spatial connectivity, shortening service distance, optimizing continuous walking routes, and improving barrier-free facilities, thereby creating a composite living environment that older adults can reach easily and use continuously.



Figure4- 6 Social-oriented Space and Commercial-oriented Space

Source:Reference[42]

In social-oriented public space, the case mainly creates everyday interaction nodes through a combination of greening, wooden platforms, and seating furniture, as shown in Fig.

4-5. Relying on planting and timber surfaces, the space provides a warm and comfortable atmosphere, while fixed seating creates a clearly defined place for rest. Located at the site core or at pedestrian intersections, it has relatively high accessibility and supports informal communication and everyday staying among older adults.

In commercial-oriented public space, the design adopts a composite approach of gray space formed by extended eaves, a small plaza, and greening, as shown in Fig. 4-6. The semi-open gray space under the eaves provides shade and shelter from rain, while also increasing spatial inclusiveness and the willingness to stay. Together with the small plaza and surrounding planting, it further improves environmental quality and visual comfort. Although this space is not primarily intended for commercial profit, its accessibility and pleasant atmosphere make it an important place for residents' gathering and interaction, with strong social potential.

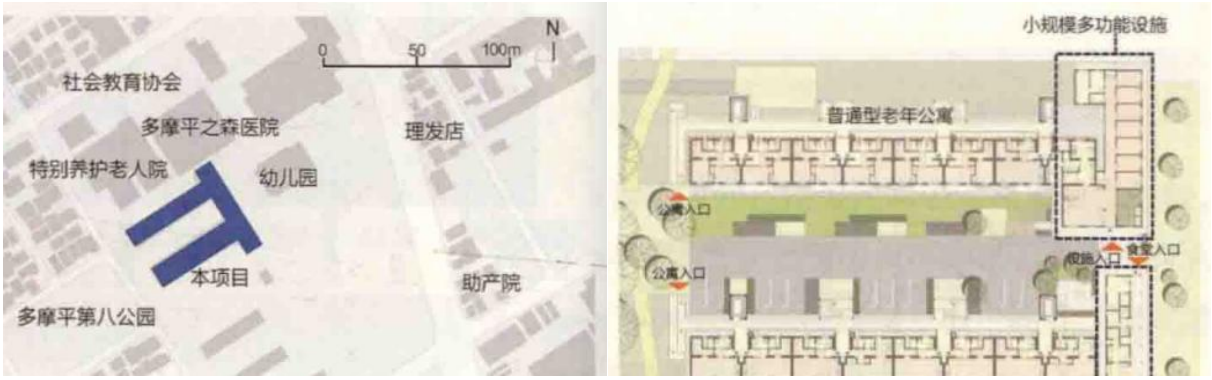


Figure4- 7 Transport-oriented Space and Service-oriented Space

Source:Reference[42]

In transport-oriented public space, the main strategy is the use of dead-end vehicle access, as shown in Fig. 4-7. The cul-de-sac layout effectively reduces through traffic and improves pedestrian safety. At the same time, the extended eaves along the building facade create a continuous gray space that provides shelter for pedestrians and strengthens spatial continuity and order. Although overall traffic accessibility to other areas is relatively limited, the space is still able to meet older adults' basic needs for safe local movement.

In service-oriented public space, the more accessible design also takes the form of gray space formed by extended eaves, a small plaza, and greening. Located adjacent to the small-scale multifunctional facility (Fig. 4-6), this space combines transitional and resting

functions. The semi-outdoor area created by the eaves not only improves the microclimate, but also provides convenient temporary stopping points for older adults, achieving an effective integration of service function and spatial experience.

4.3 Infrastructure Factor

The infrastructure factor can be further divided into dimensions such as the spatial composition of walking areas and the physical characteristics of sidewalks [51]. Among these, the spatial composition of walking areas mainly concerns path layout, functional zoning, and the organizational relationship between walking routes and other spatial elements, such as planting, building interfaces, and resting facilities. The physical characteristics of sidewalks, by contrast, include specific attributes such as paving materials, width, level-difference treatment, barrier-free design, and boundary definition, all of which jointly influence older adults' walking safety and comfort.

4.3.1 Statistical Summary of Relevant Cases

This study summarizes the age-friendly renovation measures related to the infrastructure factor identified in the selected cases, as shown in Table 4-2 (Appendix).

Table4- 2 Infrastructure — Statistical Summary of Case Strategies(Brief Table, Source：Author)

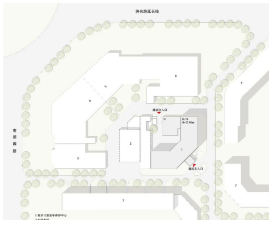
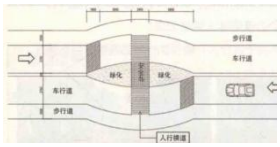
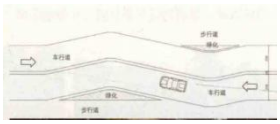
Case Studies		Social-oriented Space	Commercial-oriented Space	Transport-oriented Space	Service-oriented Space
Shoukai Cuncao Wangjing Elderly Care Center, Beijing, China	 	Wooden platform + greenery + unified wood tones	Greenery	Linear pedestrian walkway, with greenery used to divide the road	Wood tones + white (interior)

Table4- 2 Infrastructure — Statistical Summary of Case Strategies(Continued)

Case Studies		Social-oriented Space	Commercial-oriented Space	Transport-oriented Space	Service-oriented Space
Nandan Neighborhood Center, Shanghai, China	 	Greenery + unified wood tones	Greenery + broad visual field	Linear pedestrian walkway	Wood tones + white + green (interior)
Yuexiang Community Canteen, Jiangchuan Road Community, Shanghai, China	 	Wooden platform + greenery + unified wood tones	Red brick facade + greenery	Linear pedestrian walkway, with greenery used to divide the road	Red brick facade + greenery
Age-Friendly Safe Zone Renovation Project, Singapore	 	Greenery	Greenery	Eye-shaped and serpentine vehicular roads	Greenery

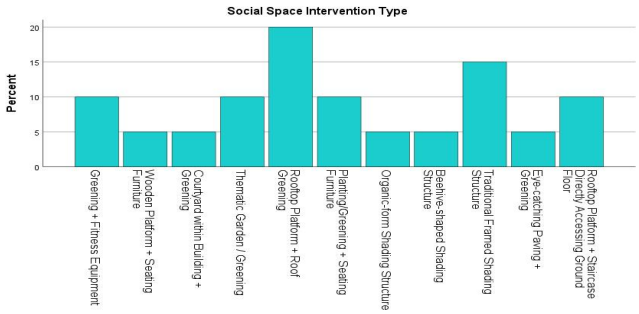


Figure4- 8 Social-oriented Spaces-Infrastructure

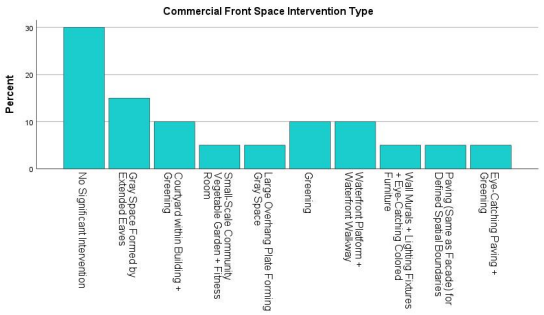


Figure4- 9 Commercial-oriented Spaces-Infrastructure

Source: Author

In social-oriented public space, one of the most representative age-friendly strategies within this factor is the combination of a rooftop platform and roof greening, as shown in Fig. 4-8. By transforming roof space into an accessible public platform and integrating vegetation, this approach not only improves environmental comfort and visual quality, but also provides older adults with a safe, quiet, and relatively private place for social interaction. In addition,

some projects have attempted to combine ecological functions with leisure activities in order to create multifunctional spaces. For example, the introduction of age-friendly fitness equipment, themed planting beds, or seating can enhance both spatial attractiveness and frequency of use.

In commercial-oriented public space, gray space formed by extended eaves creates a semi-open transitional area through cantilevered building structures, as shown in Fig. 4-9. This is a common passive spatial strategy, as it provides shade and shelter while maintaining convenient circulation. In addition, measures such as greening, courtyard within building + greening, and waterfront platform + waterfront walkway indicate that some projects have begun to improve environmental quality through planting design and the optimization of spatial interfaces.

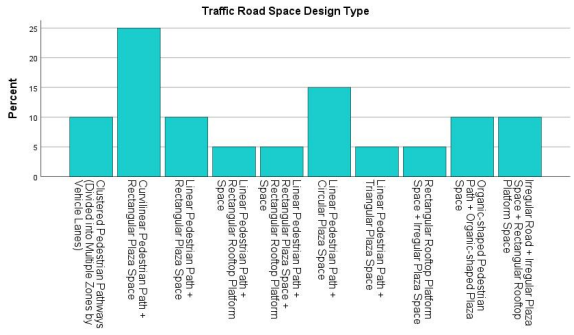


Figure4- 10 Transport-oriented Spaces-Infrastructure

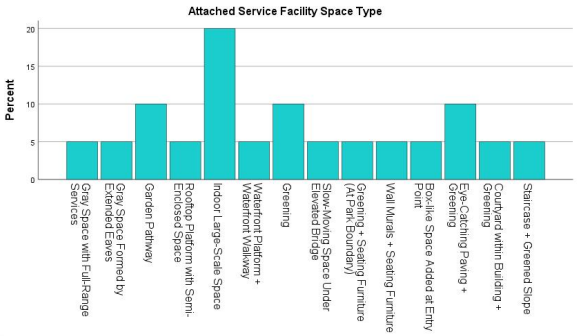


Figure4- 11 Service--oriented Spaces -Infrastructure

Source: Author

Source: AuthorIn transport-oriented public space, a common strategy is the combination of a curvilinear pedestrian path and rectangular plaza space, as shown in Fig. 4-10. By integrating soft curving paths with regular plaza space, this design not only enhances visual guidance and spatial interest, but also provides stable stopping points, helping to reduce walking fatigue among older adults and encourage social interaction.

In service-oriented public space, indoor large-scale space is usually located within buildings or semi-enclosed areas, as shown in Fig. 4-11. By providing a spacious, sheltered, and safe environment, it supports older adults' use of service facilities. Its widespread application may be explained by its advantages in coping with adverse weather, ensuring safe movement, and integrating multiple service functions, especially in high-density urban renewal projects

4.3.2 Typical Case: Renovation of the Triangular Site in Qinghe Sunshine Community

Qinghe Sunshine Community is located in Qinghe Subdistrict, Haidian District, Beijing, and represents a micro-renewal project in a typical old suburban mixed-use community. The triangular site was originally an underused leftover space within the community and had long been characterized by fragmented land, outdated facilities, single-function use, and poor environmental quality. As a result, it was unable to meet residents' daily needs for staying, movement, and social interaction, especially those of older adults. To improve the community public environment and increase the efficiency of space use, the site was renovated through an age-friendly renovation approach based on micro-renewal.



Figure4- 12 Renovated Site Plan and Social-oriented Space

Source:Reference[42][43]

From the perspective of infrastructure, the renovation strategy mainly includes four aspects. First, an activity space was opened up by clearing shrubs, retaining existing mature trees, and improving paving materials, thereby transforming the previously enclosed and disordered site into an open space for residents' daily activities. Second, a separation belt was added along the edge of the site, where recycled tyres were arranged as soft barriers to distinguish vehicular and pedestrian areas and improve pedestrian safety. Third, the range of spatial functions was enriched through the introduction of a sun pavilion, resting seats, and fitness equipment to meet the diverse needs of residents of different age groups. Fourth, a civilized use agreement sign, creative display panels, and resident-painted gable-wall art were introduced to encourage participation and strengthen community identity.

In social-oriented public space, this case mainly adopts a combination of beehive-shaped

shading structures and greening, as shown in Fig. 4-12. The beehive-shaped structure not only provides effective shade, but also enhances the visual appeal and spatial interest of the site through its distinctive geometric form, creating a social setting that is both functional and expressive. Together with surrounding planting, it further improves microclimatic comfort and offers residents a semi-open place suitable for staying and interaction, thereby encouraging neighbourly contact and social exchange.



Figure4- 13 Transport-oriented Space and Service-oriented Space

Source:Reference[42]

In transport-oriented public space, the design is mainly organized around a linear pedestrian path and circular plaza space, as shown in Fig. 4-13. The linear path is simple and efficient, facilitating convenient movement, while the circular plaza acts as a nodal space for organizing pedestrian flow and providing resting points. Within a limited site area, this layout achieves an orderly spatial structure while balancing circulation efficiency and activity needs.

In service-oriented public space, the main spatial strategy is a combination of wall murals and seating furniture. Thematic murals on the facades of residential buildings enhance the visual identity and playful character of the children's play area, creating a friendly and lively community atmosphere. At the same time, seating provides convenient places of rest for both older adults and children.

4.4 Aesthetics Factor

The aesthetics factor encompasses multiple dimensions related to the visual qualities of space, including building facade form, streetscape composition, and natural landscape elements[63]. More specifically, it involves building materials, colours, and architectural details, as well as the continuity of street interfaces, planting design, and public art. It also

includes the overall environmental image created by natural features such as water bodies, and vegetation. Together, these elements shape the aesthetic quality of public space and have a significant influence on older adults' spatial preferences and willingness to use it[54].

4.4.1 Statistical Summary of Relevant Cases

Table4- 3 Aesthetics — Statistical Summary of Case Strategies(Brief Table, Source：Author)

Case Studies		Social-oriented Space	Commercial-oriented Space	Transport-oriented Space	Service-oriented Space
Age-Friendly Park Development Strategies of AARP, United States		Symmetrical concentric circular plan pattern shaped by greenery	Red brick facade + greenery	Linear and circular walkways	Green paint (ground surface)
Renovation of the Triangular Site, Beijing, China		Honeycomb-shaped shading structure	No significant strategy identified	Curved walkway, with greenery used to divide the road	Wall murals
Environmental Renovation in Jinsong Subdistrict, Beijing, China		Traditional frame-shaped shading structure	Gray brick-textured paving	Organic walkway	Metal frame + glass curtain wall
Environmental Renovation in Jiangchuan Street, Shanghai		Red and white paint (ground surface)	Red and white paint (ground surface)	Organic walkway	Red and white paint (ground surface)

In social-oriented public space, age-friendly strategies related to aesthetics show that the

combination of wooden platform + greening + unified wood-toned finish creates a stable resting surface through timber decking, softens the environment with planting, and produces a warm and natural spatial atmosphere through a consistent wood tone. Other measures, such as wood-toned paving + greening, red brick facade, and greening + expansive viewshed, reflect designers' exploration of material choice, spatial layout, and visual expression. For example, irregular forms such as organic-form shading structures and beehive-shaped shading structures emphasize formal innovation and spatial interest, while circular tree pits + circular ground patterns introduce geometric order and strengthen the sense of place.

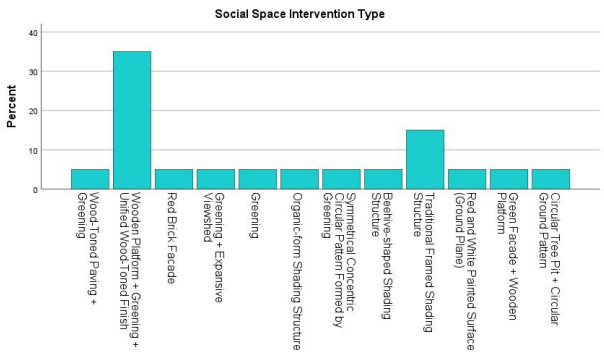


Figure4- 14 Social-oriented Spaces-Aesthetics

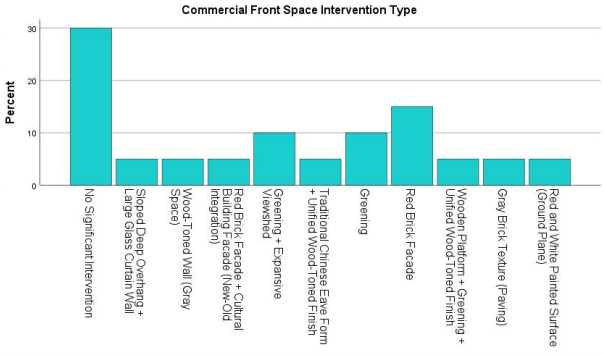


Figure4- 15 Commercial-oriented Spaces--Aesthetics

Source: Author

In commercial-oriented public space, the red brick facade is one of the most representative aesthetic strategies, as shown in Fig. 4-15. It has strong visual recognizability and cultural symbolism, and is often used to express local character or historical continuity, thereby strengthening the cultural identity of the space. In addition, greening + expansive viewshed and greening show that the introduction of natural elements is also an important aesthetic approach. Planting softens hard edges and, together with open views, improves spatial openness and psychological comfort.

In transport-oriented public space, the strategy of a curvilinear pedestrian path with greening used to define segments, as shown in Fig. 4-16 reduces the mechanical character of traffic through soft path geometry, while vegetation acts as both a visual and spatial divider, creating a layered and rhythmically structured walking experience. Organic-shaped pedestrian paths and irregular road forms following topographic contours reflect respect for natural textures and site conditions, and are especially adaptable and visually expressive in hillside settings or historic neighbourhoods.

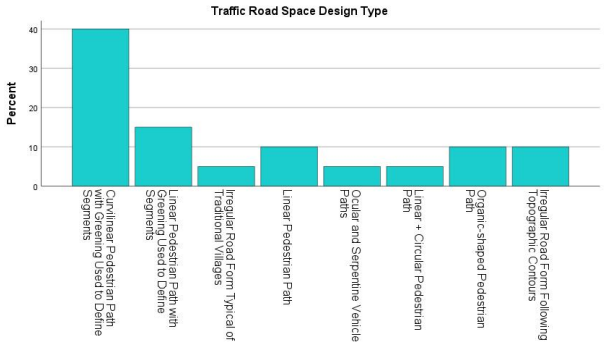


Figure4- 16 Transport-oriented Spaces-Aesthetics

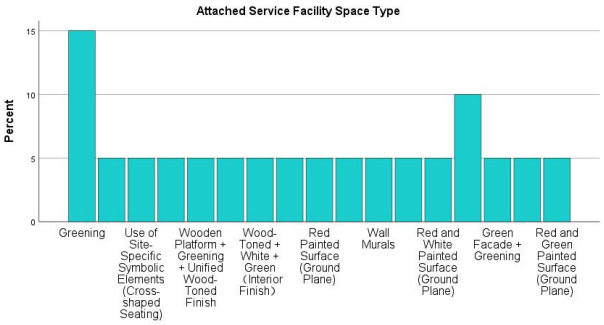


Figure4- 17 Service--oriented Spaces-Aesthetics

Source: Author

In service-oriented public space, greening appears most frequently among the age-friendly strategies related to aesthetics, as shown in Fig. 4-17. By introducing vegetation, this approach softens hard edges and improves ecological perception and visual comfort. In spaces used by older adults, it can also help reduce psychological stress and strengthen the sense of place. Red and white geometric blocks create a clear spatial rhythm and a modern atmosphere through simple geometric forms and strong colour contrast.

4.4.2 Typical Case: St. Joseph Senior Housing and Care Facility

St. Joseph Senior Housing and Care Facility adopts a four-storey courtyard layout, with a church attached on the northern side. The overall spatial structure is complete and carries a strong historical, cultural, and religious atmosphere. Before renovation, although the building remained structurally sound, its functions were outdated and could no longer meet contemporary needs for age-friendly living and care. It also lacked barrier-free facilities, communal activity spaces, and professional care support, making it difficult to accommodate the diverse living and social needs of the oldest-old and those with reduced mobility.

The core strategy of the renovation was to achieve both functional transformation and spatial continuity. On the one hand, the former convent building was converted into senior apartments, providing 29 independent residential units. On the other hand, a new 7,500 m^2 nursing home was added on the northern side of the site, containing 92 care rooms to meet the needs of older adults with different health conditions. In addition, the outdoor environment was systematically restructured through the creation of public spaces such as a central plaza and an outer walking path, strengthening walkability and spatial openness while improving

overall environmental quality and user experience. The total floor area of the project is 11,600 m^2 , including 4,600 m^2 for the senior apartments and 7,500 m^2 for the nursing home. Both parts are four-storey structures designed with full consideration of barrier-free access and age-friendly use, as shown in Fig. 4-18.

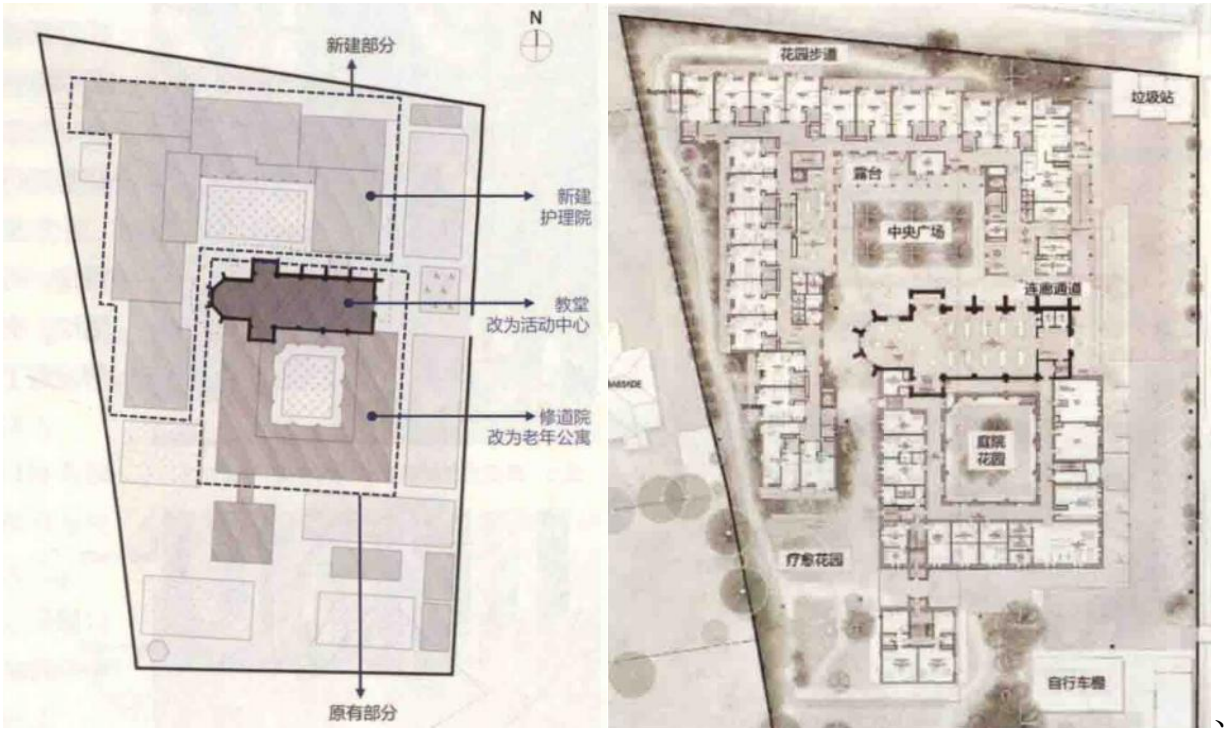


Figure4- 18 Renovation Master Plan

Source:Reference[42]

In social-oriented public space, this case mainly adopts a combination of red brick facade and greening. The red brick material continues the historical texture of the former convent building and gives the space a solemn yet warm visual character. Together with surrounding planting, it creates an environment that is both open and intimate, forming a semi-outdoor setting suitable for older adults' staying and social interaction, as shown in Fig. 4-19.

In commercial-oriented public space, the design uses red brick facade + cultural building facade to create a dialogue between history and modernity. The original red brick walls of the convent were retained and restored, while the newly added nursing home introduces a contemporary architectural language, producing an organic integration of old and new materials and styles. This facade strategy of coexistence between old and new not only respects the historical context of the site, but also meets contemporary functional needs,

thereby enhancing the cultural expression and visual layering of the space (Fig. 4-20).



Figure4- 19 Social-oriented Space and Commercial-oriented Space

Source:Reference[42]

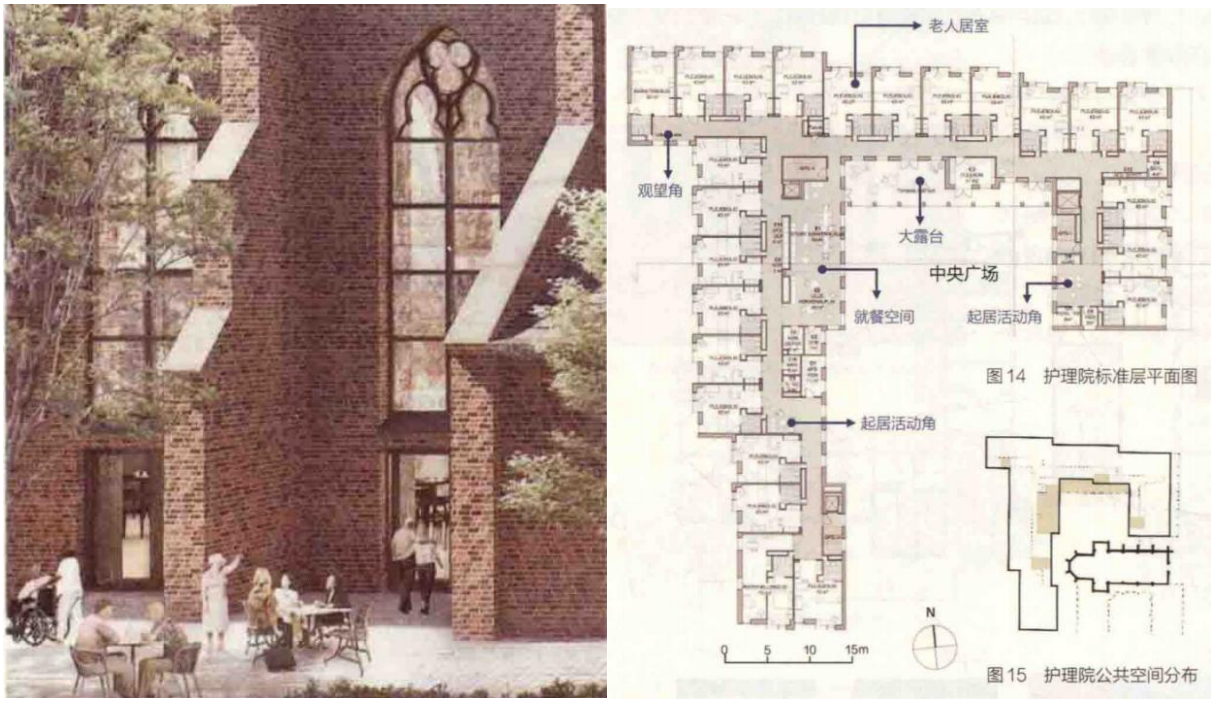


Figure4- 20 Commercial-oriented space

Source:Reference[42]

In transport-oriented public space, this case adopts a layout based on a curvilinear pedestrian path with greening used to define segments. The walking route is organized through soft curves, breaking the monotony of conventional linear circulation and guiding users to move slowly through the landscape, thereby enhancing spatial interest and rhythm. This strategy reflects a strong concern for older adults' slow-mobility needs.

In service-oriented public space, the main spatial strategy is the use of site-specific symbolic elements. Religious symbols are thoughtfully transformed into public facilities,

most notably through cross-shaped seating used as spatial nodes, as shown in Fig. 4-21, providing older adults with places to rest.



Figure4- 21 Transport-oriented Space

Source:Reference[42]

4.5 Environmental Quality Factor

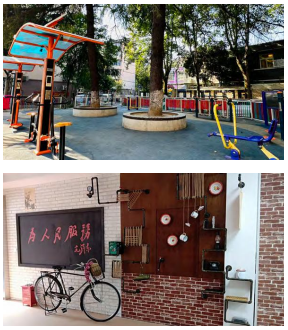
The environmental quality factor mainly includes dimensions such as lighting conditions, air quality, ventilation, and roadside greening. Among these, lighting conditions involve both natural daylight and artificial lighting; air quality concerns the freshness and cleanliness of the air; ventilation refers to the effectiveness of air circulation; and roadside greening not only affects microclimatic regulation and noise reduction, but also forms an important part of the visual landscape. Together, these elements shape the overall environmental quality of public space and have a significant influence on older adults' daily activities and physical and mental well-being.

4.5.1 Statistical Summary of Relevant Cases

Based on the case study statistics, improvements in environmental quality are mainly reflected in daylight optimization, ventilation enhancement, greening, and microclimate regulation, with different spatial types showing distinct priorities. Among them, social-oriented spaces and service-oriented spaces place greater emphasis on introducing natural light through courtyards, light wells, and atrium spaces, while also improving air quality and spatial atmosphere through planting design, so as to enhance older adults’ comfort during staying and social interaction.Overall, these cases generally regard greening, shading, ventilation, and sunlight access as key means of improving environmental quality, reflecting a

shared emphasis in age-friendly spatial design on the integration of natural elements and environmental comfort.

Table4- 4 Environmental Quality — Statistical Summary of Case Strategies(Brief Table, Source：Author)

Case Studies		Social-oriented Space	Commercial-oriented Space	Transport-oriented Space	Service-oriented Space
Aubec Nursing Home, Normandy, France		Use of rooftop platforms to obtain sufficient sunlight	-	Lawns, shrubs, and trees arranged on both sides	Use of atrium space to obtain sufficient sunlight
Mirku Nursing Home, France		Use of rooftop platforms to obtain sufficient sunlight	-	Lawns, shrubs, and trees arranged on both sides	Use of atrium space to obtain sufficient sunlight
Age-Friendly Renovation of Guangsha Xinyuan Area A, Changsha, China		Shading structures to improve microclimatic comfort	-	Lawns, shrubs, and trees arranged on both sides	Greenery to improve air quality
Age-Friendly Renovation of Courtyard No. 11, Beijing, China		Shading structures to improve microclimatic comfort	-	Lawns, shrubs, and trees arranged on one side	Greenery to improve air quality
Age-Friendly Renovation of Hemu Xincun Old Residential Community, Hangzhou, China		Greenery to improve air quality	Gray space with good ventilation	Lawns, shrubs, and trees arranged on both sides	Greenery to improve air quality

In social-oriented public space, age-friendly strategies related to environmental quality include greening to improve air quality, which introduces planting systems to absorb dust, reduce harmful gases, and release oxygen, thereby improving local air quality. Roof platforms for daylight access reflect a strong concern for natural lighting. By creating open platforms on rooftops, this strategy not only expands public activity space, but also takes advantage of elevated positions to secure longer periods of sunlight, especially in areas with dense low-rise buildings. While improving visual comfort, it can also help regulate indoor temperature and humidity, thereby indirectly enhancing thermal conditions. In addition, shading structures for improved microclimatic comfort reduce solar radiation and surface temperature, effectively mitigating summer heat and glare and creating a more comfortable outdoor environment for staying. This approach is commonly used in open areas such as plazas and courtyards, and is an important support for encouraging outdoor activity among older adults.

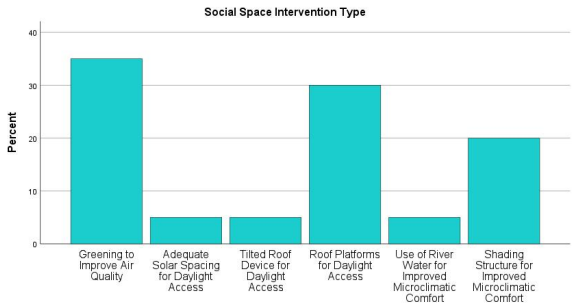


Figure4- 22 Social-oriented Spaces-Environment

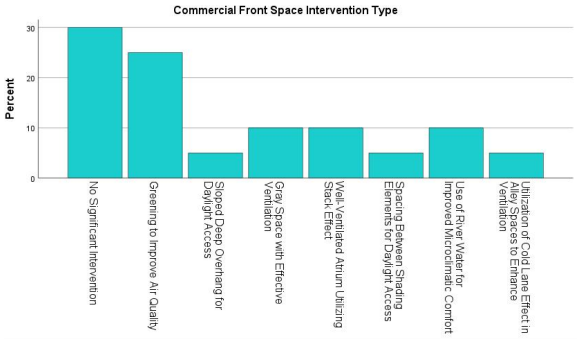


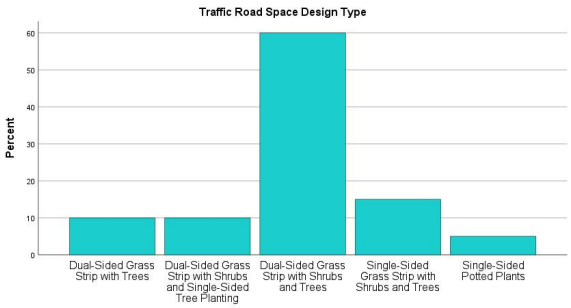
Figure4- 23 Commercial-oriented Spaces-Environment

Source: Author

In commercial-oriented public space, especially in high-density commercial districts, greening not only improves the microenvironment, but also enhances the attractiveness and accessibility of the space, as shown in Fig. 4-23. In addition, both gray space with effective ventilation and a well-ventilated atrium utilizing stack effect emphasize the control of airflow through spatial form. The former uses semi-open interfaces to guide cross-ventilation, while the latter strengthens natural ventilation through the chimney effect created by thermal pressure differences. These strategies are particularly important in hot seasons, as they help reduce perceived temperature and mitigate the urban heat-island effect.

In transport-oriented public space, the dominant greening strategy is the use of grass, shrubs, and trees arranged on both sides of the road, as shown in Fig. 4-24. By establishing a

complete vertical planting structure—with groundcover at the lower level, shrubs forming a middle green buffer, and trees providing upper-level shade — this approach effectively improves both the ecological performance and the landscape quality of road space. Its advantages are twofold: it can reduce surface heat radiation and absorb vehicle-related pollutants, while also improving the visual environment through a continuous green interface, thereby enhancing pedestrians' sense of safety and spatial belonging. This makes it especially suitable for community roads frequently used by older adults.



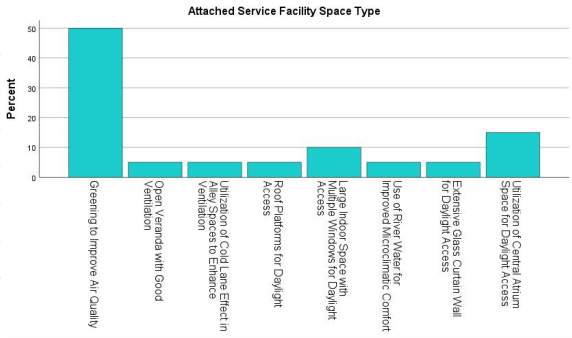


Figure4- 24 Transport-oriented Spaces-Aesthetics Figure4- 25 Service--oriented Spaces-Aesthetics

Source: Author

In service-oriented public space, the age-friendly strategies related to environmental quality, as shown in Fig. 4-25 highlight the role of the atrium as a vertically open interior space that brings natural light into deeper parts of the building and promotes air circulation, thereby creating a more favourable thermal environment. This strategy is particularly common in multi-storey service facilities, where it improves both visual comfort and spatial openness. In addition, enlarging window openings and optimizing orientation can maximize daylighting performance, especially in functional spaces that require higher illumination, such as activity rooms and reading areas for older adults.

4.5.2 Typical Case: EHPAD de Millevaches

EHPAD de Millevaches emphasizes integration with the local topography and natural landscape, seeking to create an elderly care environment that combines functionality, comfort, and a sense of belonging while respecting the rural context.

In terms of spatial organization, the nursing home adopts a two-level layout. The ground floor contains offices, staff rest areas, and public reception spaces, all of which share the same

level as the external garden. The upper floor accommodates 40 residential units, communal living rooms, and consultation rooms. This vertical zoning strategy not only ensures a rational functional division, but also supports the independence and privacy of older adults' activity spaces. The rooms are connected only by entrance halls and corridors, while the remaining areas are surrounded by the natural environment, creating a strong sense of enclosure by nature within private space. In addition, the use of colourful terraces as a wayfinding system not only guides older adults' movement through the building, but also enhances spatial recognizability and visual interest, as shown in Fig. 4-26.

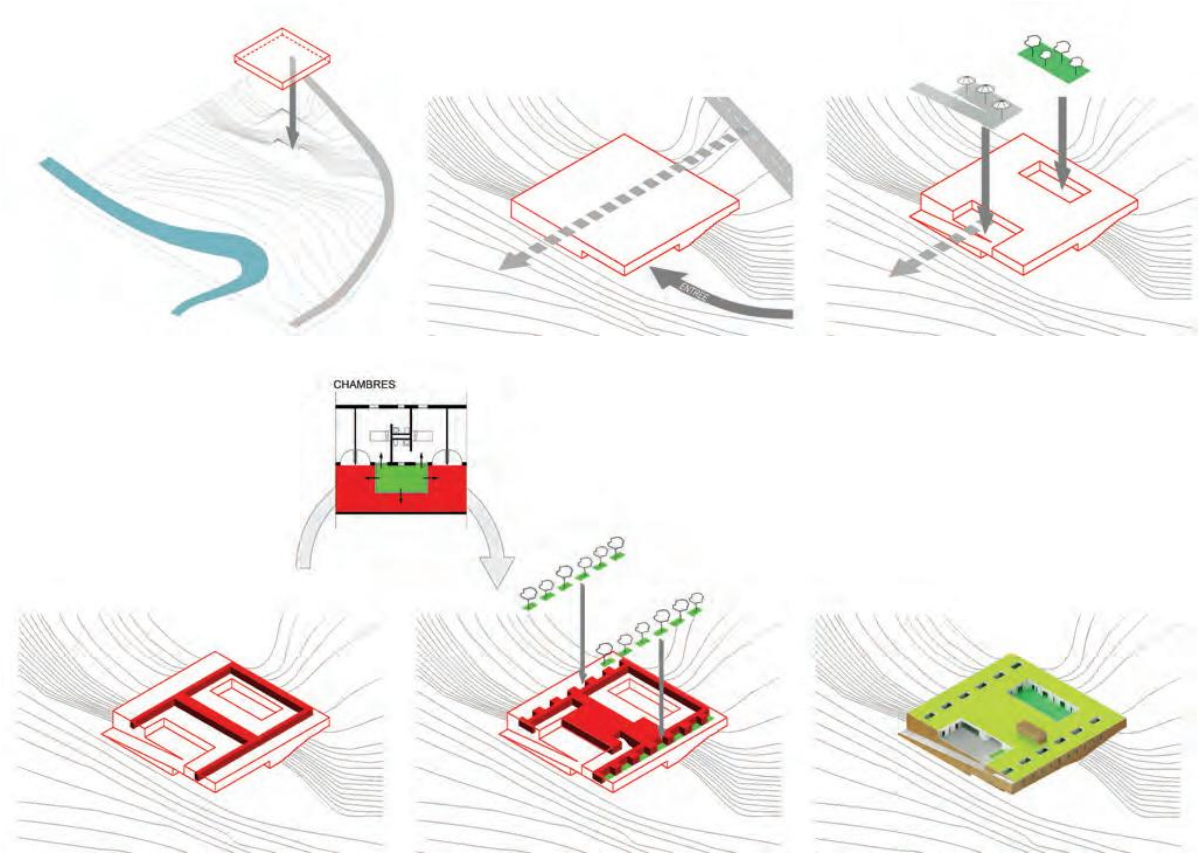


Figure4- 26 Design Diagram

Source:Reference[44]

In social-oriented public space, this case mainly expands space through the vertical use of a rooftop platform. This not only avoids functional conflict and visual obstruction at ground level, but also maximizes natural daylight. Combined with timber paving, low enclosures, and planting, the rooftop platform creates an open, bright, and semi-outdoor environment with strong potential for gathering, as shown in Fig. 4-27.



Figure4- 27 rooftop platform

Source:Reference[44]

In transport-oriented public space, the design systematically arranges a multilayer green belt of grass, shrubs, and trees on both sides of the road. This composite green corridor not only physically separates vehicular lanes from pedestrian space, reducing traffic disturbance and safety risks, but also forms a continuous and soft green interface visually, strengthening both spatial order and ecological quality. At the same time, seasonal change and biodiversity enrich users' sensory experience, as shown in Fig. 4-28).



Figure4- 28 multilayer green belt

Source:Reference[44]

In service-oriented public space, the case makes effective use of a central atrium for daylight access. As the main open space within the building, the atrium introduces natural light through roof glazing and promotes air circulation, significantly improving the indoor microclimate. Service spaces arranged around the atrium, such as the dining room and consultation rooms, therefore benefit from good daylight and ventilation.

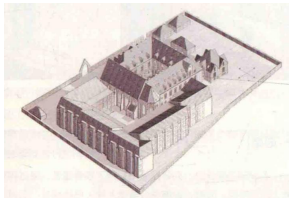
4.6 Safety Factor

The safety factor can be divided into two dimensions: crime prevention and traffic safety.

The former mainly involves aspects such as the level of daily maintenance, the quality of night lighting, and visual openness, all of which jointly influence the likelihood of potential criminal behaviour. The latter focuses on the organization of pedestrian and vehicular circulation, the number and arrangement of building entrances, the degree of congestion along walking routes, and circulation efficiency, with the aim of reducing traffic conflict and ensuring safe movement and mobility for older adults and other vulnerable groups.

4.6.1 Statistical Summary of Relevant Cases

Table4- 5 Safety — Statistical Summary of Case Strategies(Brief Table, Source：Author)

Case Studies		Social-oriented Space	Commercial-oriented Space	Transport-oriented Space	Service-oriented Space
Toyoshikida Community, Kashiwa City, Chiba Prefecture, Japan	 	Clear sightlines	Large-area glass curtain wall provides sufficient light and a sense of activity at night	Greenery is used to separate vehicular roads and pedestrian areas, thereby achieving pedestrian–vehicle separation	Greenery is used to separate vehicular roads and pedestrian areas, thereby achieving pedestrian–vehicle separation
St. Joseph Senior Apartments and Nursing Home, Copenhagen, Denmark	 	Timber paving is used to separate vehicular roads and pedestrian areas, thereby achieving pedestrian–vehicle separation	Deep gray space achieves pedestrian–vehicle separation	Pedestrian areas are concentrated in the building courtyard, thereby achieving pedestrian–vehicle separation	Greenery is used to separate vehicular roads and pedestrian areas, thereby achieving pedestrian–vehicle separation
Intergenerational Co-housing Apartment, Gelderland, Netherlands	 	Clear sightlines	Clear sightlines reduce the potential for crime	Pedestrian areas are concentrated in the building courtyard, thereby achieving pedestrian–vehicle separation	Greenery is used to separate vehicular roads and pedestrian areas, thereby achieving pedestrian–vehicle separation

In social-oriented public space, age-friendly strategies related to safety (Fig. 4-29) often separate older adults' everyday activity space from ground-level traffic by raising it to the

rooftop level, thereby reducing the risks of vehicle intrusion, collision, and noise disturbance. At the same time, planting is used as a soft buffer to achieve pedestrian – vehicular separation while also improving ecological quality and psychological comfort. Green belts can absorb noise, reduce visual blind spots, and guide pedestrian movement visually, thereby increasing route predictability and the sense of safety. This approach is particularly suitable for community plazas and neighbourhood gardens in high-density residential areas.

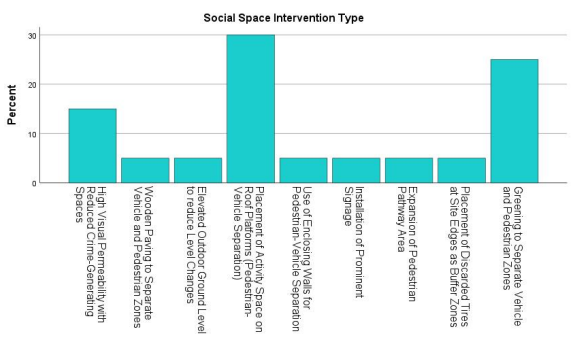


Figure4- 29 Social-oriented Public Spaces-safety

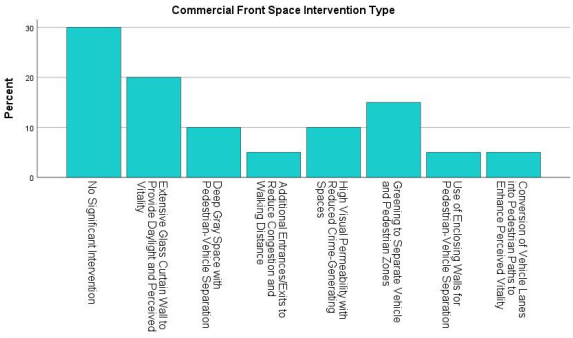


Figure4- 30 Commercial-oriented Public Spaces-safety

Source: Author

In commercial-oriented public space, age-friendly safety strategies (Fig. 4-30) often introduce transitional semi-open spaces, such as areas under eaves or corridors, to buffer direct conflict between pedestrian and vehicular flows.

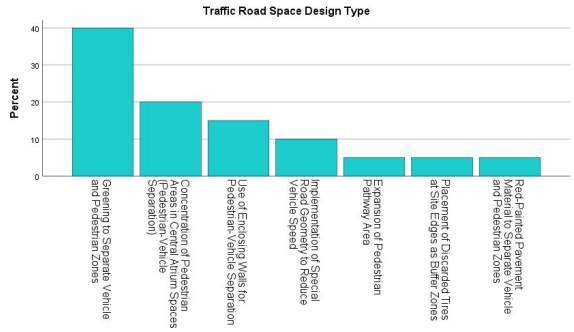


Figure4- 31 Transport-oriented Spaces-safety

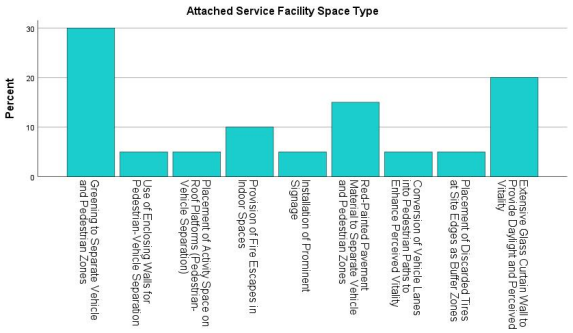


Figure4- 32 Service-oriented Spaces-safety

Source: Author

In transport-oriented public space, the most frequent age-friendly strategy related to safety is greening to separate vehicle and pedestrian zones (Fig. 4-31), suggesting that this approach is particularly well suited to road and circulation spaces. In addition, some projects concentrate pedestrian movement within building interiors or semi-enclosed courtyards, thereby forming relatively independent walking networks and avoiding direct conflict with

ground-level traffic. Such courtyard spaces usually provide good enclosure and lighting conditions, which also help improve safety for use at night.

In service-oriented public space, age-friendly safety strategies (Fig. 4-32) often strengthen security by increasing visual continuity between interior and exterior spaces through transparent building interfaces. Glass curtain walls introduce abundant daylight, improve lighting conditions, and create an open, bright, and active atmosphere, thereby enhancing both pedestrians' sense of safety and their willingness to stay. In addition, red-painted pavement material to separate vehicle and pedestrian zones uses colour to reinforce functional zoning and provides strong visual guidance. This allows pedestrian–vehicular separation to be achieved without adding hard barriers, making it especially suitable for places where ground space is limited but traffic order still needs to be clearly defined, such as entrances to underground car parks or areas around community activity centres.

4.6.2 Typical Case: Environmental Renovation in Jinsong Subdistrict, Beijing

Jinsong Second Community, located in Chaoyang District, Beijing, is a typical old residential neighbourhood first developed in 1978. It has a total floor area of approximately 120,000 m^2 , and older adults account for 39.6% of the population, making it a high-density community with a pronounced ageing profile. Before renovation, the community faced multiple structural problems. First, barrier-free design was seriously lacking. Entrances to public service facilities were not equipped with ramps or handrails, and most multi-storey residential buildings had no elevators, making movement difficult for wheelchair users and older residents. In addition, roads within the community had level differences and uneven paving, increasing the risk of falls. Second, infrastructure was inadequate. There was insufficient space for non-motor vehicle parking, and electric bicycles and bicycles were parked in a disorderly manner. Flammable items were also piled up in some building corridors, which not only obstructed circulation but also posed fire safety hazards. Third, the quality of public activity spaces was poor. Existing activity grounds had damaged surfaces and outdated facilities, lacked functional support, and were used infrequently, making them unable to meet residents' needs for social interaction, especially those of older adults.



Figure4- 33 Aerial View of the Scheme

Source: Beijing Municipal Commission of Planning and Natural Resources

In response to these problems, the renovation focused on establishing a spatial system of one street, two gardens, two cores, and multiple nodes, with the aim of systematically improving both environmental quality and service capacity within the community. The one street refers to Jinsong West Street, where basic service facilities—including the entrance gate, barbershop, fresh-food supermarket, breakfast shop, leisure corridor, and public toilet—were upgraded to strengthen service functions and everyday convenience. The two gardens refer to the central park (Jiasong Park) and the residential courtyard garden, where paving was renewed and activity facilities were added to enhance landscape quality and user experience. The two cores are the community residents' committee and the property service centre, where the renovation focused on building refurbishment and the improvement of barrier-free facilities in order to strengthen public service capacity. The multiple nodes include micro-renewal measures such as a new signage system, improved road paving, upgraded supporting service facilities, and bicycle sheds, thereby achieving environmental improvement at the scale of the entire community.



Figure4- 34 Social-oriented Space and Transport-oriented Space

Source: Beijing Municipal Commission of Planning and Natural Resources



Figure4- 35Commercial-oriented Space and Service-oriented Space

Source: Beijing Municipal Commission of Planning and Natural Resources

In both social-oriented public space and transport-oriented public space, this case mainly adopts the strategy of greening to separate vehicle and pedestrian zones. Continuous planting belts provide both physical separation and visual buffering, effectively achieving pedestrian–vehicular separation. This approach not only significantly reduces traffic interference and potential safety risks for pedestrians, but also improves ecological performance and landscape continuity through the layered use of trees, shrubs, and ground cover, thereby creating a more pleasant pedestrian environment, shown as Fig. 4-34.

In commercial-oriented public space and service-oriented public space, this case adopts the use of an extensive glass curtain wall. During the day, this transparent interface introduces abundant natural light and helps reduce energy consumption. At night, interior lighting is

transmitted outward, creating a bright and visually permeable effect that enhances perceived brightness and spatial liveliness. This not only strengthens users' sense of psychological safety, which is particularly meaningful for vulnerable groups such as older adults, but also increases the vitality and recognizability of the street frontage, thereby encouraging informal social interaction, shown as Fig. 4-35.

4.7 Summary of Case Studies

Based on a systematic review of the selected cases, this study classifies and summarizes the collected spatial design measures according to the five-factor analytical framework (see Table 4-6 in Appendix 4). To identify both the commonalities and differences in safety-oriented intervention strategies across different types of public space, the design measures are ranked by number of occurrence from high to low and then compared vertically by public space type. This method makes it possible not only to identify the strategies most commonly adopted in each type of space, but also to reveal the structural differences in environmental safety orientation among spaces with different functions, thereby providing empirical support and a theoretical basis for subsequent spatial optimization and design.

4.7.1 Design Implications for Social-oriented Public Space

As the core setting for residents' daily interaction and leisure, social-oriented public space is generally designed to promote interpersonal communication and strengthen community belonging.

In terms of accessibility, areas with higher accessibility are usually temporary resting spaces or rest areas with clear functional purposes. The former include facilities such as park benches and small seats for short stays, while the latter include resting nodes that support community gatherings and neighbourhood activities.

In terms of infrastructure, cases with relatively ample site conditions often adopt greening-based strategies, such as themed gardens, planting areas, and shaded walking paths, using natural elements to create a pleasant atmosphere and increase spatial affinity and willingness to stay. In more constrained sites, pedestrian activity spaces are more often relocated to rooftop platforms, making use of vertical space together with planting and stair

connections to achieve three-dimensional spatial use.

In terms of aesthetics, design often relies on natural materials and ecological elements. Common approaches include the use of wood-toned materials on facades or platform structures to integrate architecture with the natural environment. Planting is also treated in a more artistic way, for example through symmetrical patterns and colour coordination, to enhance visual quality.

In terms of environmental quality, greening is one of the most important means of improving the microclimate. Most cases increase vegetation coverage to improve air quality and regulate temperature and humidity. This approach not only has clear ecological benefits, but is also relatively low in cost and sustainable. In addition, the widespread use of rooftop platforms provides older adults with better access to sunlight, which may benefit physical and mental health. Shading structures are also commonly used to improve local thermal comfort, especially during hot summer periods, by reducing perceived temperature and extending the usable time of outdoor space.

In terms of safety, the most common strategy is to achieve pedestrian – vehicular separation through greening. In park design, for example, pedestrian areas are often arranged in the inner core, while vehicular routes are placed along the edge. Continuous planting is then used around the walking area to create both physical separation and visual buffering, thereby reducing traffic disturbance and potential safety risks for pedestrians.

4.7.2 Design Implications for Commercial-oriented Public Space

As an important transitional interface connecting urban space and commercial buildings, commercial-oriented public space is generally designed with the core aims of improving accessibility, enhancing commercial attractiveness, and optimizing user experience.

In terms of accessibility, some cases attract older adults by introducing clear activity functions. For example, plazas in front of fitness facilities often include simple exercise equipment or slow-walking paths, which not only meet older adults' daily exercise needs, but also increase vitality and frequency of use.

In terms of infrastructure, a common strategy is to integrate design with the gray space beneath building eaves. Such spaces provide shelter from sun, wind, and rain, and buffer

pedestrian flow. They therefore offer comfortable places for short stays while also extending the usable range of the commercial frontage and enhancing commercial value. Many cases also improve the walking experience through natural landscape elements, such as planting, water features, and waterfront walkways, thereby creating pedestrian environments with ecological quality and a stronger sense of connection to nature.

In terms of aesthetics, the design of commercial-oriented public space generally emphasizes the integration of natural character and cultural identity. For example, features such as waterfront platforms not only improve the microclimate, but also enrich visual layering.

In terms of environmental quality, most cases improve thermal and humidity conditions and reduce dust by increasing vegetation coverage. Some cases also add extended eaves to provide shading and guide airflow, or introduce enclosing walls to form narrow passageways that use pressure differences to strengthen the cooling effect of air movement, thereby reducing perceived temperature and improving summer thermal comfort.

In terms of safety, a relatively common strategy is the use of extensive glass curtain walls. Highly transparent building interfaces improve night-time lighting and reduce visual blind spots. At the same time, the reflective qualities of glass under artificial lighting can further enhance older adults' psychological sense of safety.

4.7.3 Design Implications for Transport-oriented Public Space

As the main circulation network within the urban fabric, transport-oriented public space is designed to balance the operational efficiency of motor traffic with the safety needs of cyclists and pedestrians.

In terms of accessibility, areas with higher accessibility often adopt cul-de-sac or looped layouts. By limiting through traffic and reducing conflict points, these layouts provide older adults with safer and more continuous walking environments.

In terms of infrastructure, a common strategy is to organize space through the combination of curvilinear pedestrian paths and rectangular plaza areas. Curvilinear paths extend walking distance and introduce gentle changes in direction, which can naturally slow movement. They are also often combined with planting, water features, and other natural

landscape elements to create a more pleasant walking experience, which can positively support older adults' physical and mental well-being.

In terms of aesthetics, planting can be used to define road form. Through curvilinear, linear, or organic road layouts combined with hedges, street trees, and lawns, the design can achieve both natural spatial transition and visual improvement.

In terms of environmental quality, grass, shrubs, and trees arranged along both sides of the road form a layered green buffer. This not only helps purify the air, but also provides shade and cooling, significantly improving thermal comfort in summer.

In terms of safety, one of the most common strategies is to achieve pedestrian – vehicular separation through planting. In addition, many cases adopt a spatial layout that places pedestrian circulation inside the site and vehicular routes along the outer edge. This internal-pedestrian, external-vehicle structure allows pedestrian – vehicular separation to be realized directly through spatial organization.

4.7.4 Design Implications for Service-oriented Public Space

As spaces closely associated with specific service facilities, such as nursing homes, community health centres, and rehabilitation institutions, service-oriented public space is generally designed to improve service accessibility, enhance user comfort, and support physical and psychological well-being.

In terms of accessibility, highly accessible areas are often organized as rest spaces with clear functional purposes, such as gray spaces integrated with elderly-care services. These spaces not only serve transitional and staying functions, but are often incorporated into the service system itself and become an important part of the service process.

In terms of infrastructure, some cases combine care functions with large indoor communal spaces, shifting older adults' walking routes from outdoor to indoor environments in order to improve both the accessibility and continuity of service use.

In terms of aesthetics, the design of this type of space shows considerable diversity. The most common strategy is to organize space through greening, using trees, shrubs, and groundcover to form layered landscape interfaces and create a calm and natural visual environment.

In terms of environmental quality, greening is also widely used to improve air quality. By increasing vegetation coverage, these strategies help purify the air. In enclosed building environments in particular, planting can effectively improve indoor environmental conditions.

In terms of safety, a relatively common strategy is to achieve pedestrian – vehicular separation through greening. Continuous planted buffers are arranged between vehicular routes and pedestrian areas, providing both physical separation and ecological as well as visual benefits.。

Chapter5 Age-Friendly Renovation Strategies

Building on the previous analysis of public space through field investigation, older adults' behavioural activities, and case studies, this chapter further translates the research from problem identification to strategy generation. Chapters 2 and 3 reveal the practical problems of different types of public space in Zhongxing Community in terms of spatial provision and behavioural support, while Chapter 4 extracts transferable age-friendly design approaches from representative cases. On this basis, this chapter first proposes the overall objectives and principles of age-friendly renovation for public space in old communities, and then develops renovation strategies across five dimensions — accessibility, infrastructure, aesthetics, environmental quality, and safety — thereby providing the theoretical basis and methodological support for the overall renovation and key-node design in Chapter 6.

5.1 Objectives of Renovation

The field investigation in Chapter 2 shows that different types of public space in Zhongxing Community generally suffer from discontinuous pedestrian connections, imbalanced facility provision, unstable environmental quality, and fragmented spatial support systems. Chapter 3 further indicates that older adults' daily activities are characterized by short distance, high number, slow pace, and functional complexity, and that their spatial choices depend strongly on safety, accessibility, support for staying, and environmental comfort. Chapter 4, through case studies, demonstrates that age-friendly renovation of public space in old communities should not rely solely on the addition of individual facilities, but should instead achieve overall improvement through spatial system optimization and coordinated intervention across multiple factors. On this basis, the objective of age-friendly renovation for public space in Zhongxing Community can be summarized as follows: under the premise of ensuring safe mobility for older adults, to improve the accessibility, comfort, multifunctional use, and level of social support of community public space, and to build a daily activity space system that responds to older adults' actual behavioural patterns.

(1)Establish a continuous, barrier-free, and safe circulation network

In response to the problems identified in the field investigation, including disordered

parking of non-motor vehicles, insufficient effective sidewalk width, and the absence of crossing facilities, the primary objective is to eliminate mobility-related safety risks. Particular attention should be given to regulating encroachment in areas such as street-facing shopfronts and internal residential roads, ensuring a minimum clear sidewalk width of 1.8 m. Curb ramps, slip-resistant paving, night lighting, and clear signage should be improved to create continuous, safe, and barrier-free pedestrian routes linking residential entrances with key destinations such as the community social park, market, and Elderly Care Center, thereby meeting the basic mobility needs of wheelchair users and those using walking aids.

(2)Create a comfortable resting environment that supports both physical and psychological well-being

In response to problems such as traffic noise, insufficient shade, and excessive summer heat in street-side spaces, overall environmental quality should be improved through planting, material selection, and facility provision. In high-use resting areas, trees, or sound barriers should be added to reduce traffic disturbance. Permeable, light-coloured, and slip-resistant paving materials should be used to moderate surface temperature. Seating should be combined with sheltered corridors or movable shading devices to create outdoor staying environments that can be used throughout the year and in different weather conditions.

(3)Support multi-level and inclusive social interaction

In response to older adults' composite social needs, such as resting, chatting, and accompanying younger generations, spaces that encourage interaction should be introduced into the community social park, fitness plaza, and open areas around residential buildings. Examples include grouped seating, intergenerational activity corners, and small notice boards. Existing informal gathering points should also be retained and improved in order to increase the use and social value of public space.

(4)Safeguard older adults' right to use space independently

A flexible, inclusive, and multifunctional mode of space use should be adopted, allowing the same space to support different activities at different times while maintaining its core function. Through modular facilities and clear behavioural guidance, older adults should be given greater freedom to use space according to their own needs and preferences, thereby reflecting a people-oriented approach to renovation.

In summary, this study focuses on the problems revealed through older adults' actual daily behavioural paths, and promotes the age-friendly renovation of public space in Zhongxing Community through problem-oriented intervention strategies.

5.2 Evaluation Framework for Age-friendly Design

Based on the field investigation of public space in Chapter 2, the analysis of older adults' behavioural activities in Chapter 3, and the case study findings in Chapter 4, this study further develops an evaluation framework for the age-friendly design of public space in old communities. To improve the operability of the subsequent master plan and node design, the study reorganizes the earlier five-factor analytical framework at the level of design implementation and translates it into five design-control dimensions. Through secondary indicators, a corresponding relationship among problems, strategies, and spatial interventions is established, so as to strengthen the systematic nature and practical applicability of the subsequent master plan and node design[53]. To enhance the systematic and operational quality of the renovation strategies, this study also establishes a comprehensive evaluative logic for the age-friendly renovation of public space in old communities. This framework can serve both as an analytical tool for identifying and diagnosing existing problems in the early stage and as a basis for assessing design proposals and evaluating outcomes in the later stage. 。

In terms of weighting, this study adopts a hierarchical weighting method based on the sensitivity of older adults' behavioural activities to different environmental factors identified in the earlier empirical analysis. Among the five dimensions, walkability is assigned the highest weight, 30%, because it directly determines whether older adults can reach different activity nodes safely, continuously, and independently, and is therefore the primary condition affecting both activity frequency and activity range. The remaining dimensions are weighted as follows: barrier-free design 25%, safety 20%, environmental comfort 15%, functional facilities 10%, and material safety 10%. This weighting structure reflects the reality that older adults' daily activities are primarily walking-based, while also taking into account the combined importance of comfort, facility support, and spatial safety. In Chapter 6, this evaluation framework is used as a design-checking tool to verify the effectiveness of the proposed interventions.

Table5- 1 Age-Friendly Design Evaluation System(Source: Drawn by the Author)

Primary Indicator	Secondary Indicator	Corresponding Problem	Design Strategy	Design Implementation
Functional Facilities	Seating Density	Insufficient seating and weak support for staying and social interaction	Add modular seating, enclosed seating, and segmented resting nodes	Space around Residential Buildings; Social Park
	Adaptability of Fitness Facilities	Fitness equipment is outdated, limited in type, and mismatched with the physical conditions of elderly residents	Optimize the provision of low-intensity fitness equipment and update it in line with health and wellness activity needs	Fitness Plaza; Social Park
	Convenience of Service Facilities	Weak connections to service facilities such as public toilets and the Elderly Care Center, with insufficient support for staying	Strengthen connections among service nodes and provide health waiting spaces and auxiliary resting facilities	Affiliated Space of the Elderly Care Center; Areas around Accessible Toilets
	Functional Integration of Social Facilities	Lack of facilities suitable for chatting, accompanying descendants, and intergenerational interaction	Introduce communication nodes, intergenerational interaction corners, and multifunctional activity facilities	Social Park; Space around Residential Buildings; Commercial-oriented Space
Walkability	Path Continuity	Pedestrian routes are interrupted, and continuous connections between nodes are lacking	Construct a continuous pedestrian circulation system linking nodes with a high number of activities	Overall pedestrian circulation network in the master plan; looped walkway in the Social Park
	Path Width	Some passages are narrow, and pedestrian space is occupied	Widen pedestrian interfaces and remove clutter and illegally parked non-motorized vehicles	Transport-oriented Space; Commercial-oriented Space; Space around Residential Buildings
	Pedestrian–Vehicle Separation	Serious pedestrian–vehicle mixing and frequent traffic conflicts	Introduce pedestrian boundaries, guiding lines for pedestrian circulation, and pedestrian–vehicle separation measures	Commercial-oriented Space; community roads; main entrances and exits
	Friendliness of Staying	Lack of intermediate resting points along walking routes	Arrange segmented resting nodes and shaded stopping points	Social Park; Commercial-oriented Space

Primary Indicator	Secondary Indicator	Corresponding Problem	Design Strategy	Design Implementation
Barrier-free Accessibility	Treatment of Level Differences	Steps, level differences, and the absence of ramps affect circulation	Provide gentle slopes, zero-level transitions, and continuous ramps	Community roads; forecourt of the Elderly Care Center; entrance to the Social Park
	Surface Safety	Uneven and slippery paving increases the risk of falling	Use slip-resistant, level, and continuous paving materials	Fitness Plaza; Social Park; community roads
	Wayfinding Recognition	Unclear routes and weak recognizability of service nodes	Provide a clear wayfinding system, colored guiding lines, and node signage	Affiliated Space of the Elderly Care Center; overall path system in the master plan; areas around Accessible Toilets
	Entrance Friendliness	Inconvenient access to residential and service facility entrances	Optimize transitional entrance spaces and add handrails and gentle slopes	Entrances of residential units; entrance of the Elderly Care Center; main community entrances
Environment -al Comfort	Shading Conditions	Strong sun exposure and poor thermal comfort	Increase tree shade, pergolas, and shading facilities	Social Park; Fitness Plaza
	Hierarchy of Greenery	Monotonous landscape and insufficient spatial attractiveness	Enrich the hierarchy of greenery through shrubs, modular flower boxes, and similar elements	Social Park; Affiliated Space of the Elderly Care Center; Space around Residential Buildings
	Sense of Place and Recognizability	Cluttered interfaces and lack of a sense of place	Enhance recognizability through landscape interface renewal, painted surfaces, and small landscape installations	Commercial-oriented Space; Space around Residential Buildings; Social Park
Material Safety	Slip Resistance	Slippery ground surfaces pose a risk of falling	Use slip-resistant paving and permeable materials	Fitness Plaza; community roads; Social Park
	Comfort	Excessive use of hard materials results in poor staying experience	Improve tactile comfort through flexible paving, timber materials, or composite materials	Fitness Plaza; Social Park; Space around Residential Buildings
	Durability and Maintenance	Old communities have limited maintenance capacity, and facilities are easily worn or damaged	Select durable, easy-to-maintain, and replaceable modular materials	Public spaces throughout the community

5.3 Renovation Principles

5.3.1 Safety Assurance Principle

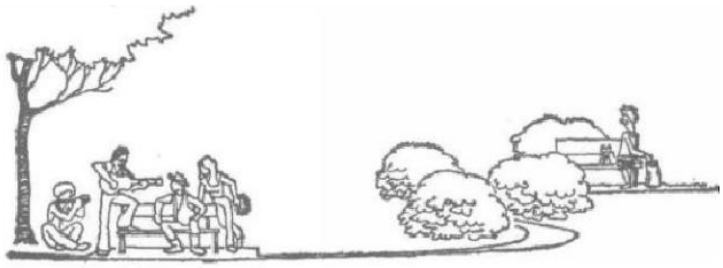


Figure5- 1 Public Space with Clear Sightlines

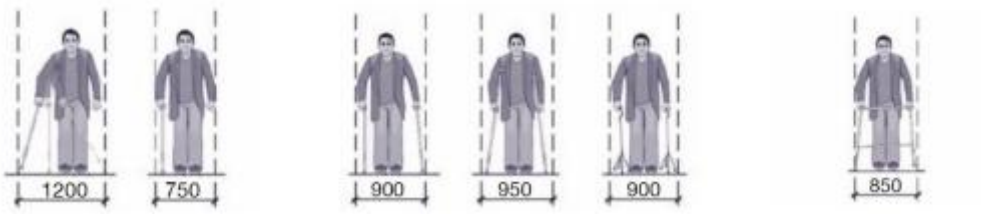
Source:Reference[22]

Field investigation in Zhongxing Community shows that community roads and nodal spaces generally suffer from mixed pedestrian – vehicular movement, damaged paving, discontinuous treatment of level differences, and insufficient night lighting. These factors directly increase the risk of falls and conflicts for older adults during walking, staying, and road crossing. Therefore, public space must ensure the safety of older adults' activities. By eliminating physical hazards, strengthening risk warning, and improving emergency response capacity, it should provide a safe public environment for older adults[55]. Physical separation should be introduced between major activity routes and vehicular roads to reduce pedestrian – vehicular conflict. Planters, low walls, hedges, or guardrails may be used to form a 1.0 – 1.5 m buffer zone, which can both prevent the random intrusion of non-motor vehicles and enhance older adults' sense of safety. At intersections, speed bumps, warning signs, convex mirrors, and reflective night-time markings should be added to reduce vehicle speed and improve crossing safety. At the same time, blind spots within public space should be eliminated by controlling shrub height and avoiding the obstruction of sightlines at intersections, corners, and around seating areas.

Resting and activity areas should avoid isolated, enclosed, or visually obstructed corners, and should instead be located in places that are sheltered from wind, receive sunlight, and offer open views. Night-time illumination should be no lower than 15 lux, with particular attention given to path turning points, entrances, and areas around public toilets, so as to eliminate lighting blind spots and prevent night-time falls or disorientation. Therefore, in

design practice, spatial separation between pedestrians and vehicles should be achieved through continuous planted buffer zones of 1.0 – 1.5 m, differentiated paving, and careful control of level differences.

5.3.2 Accessibility Principle



1) Older adults using a single cane 2) operating a wheelchair with both hands 3)using a walker

Figure5- 2 Elderly Pedestrian Scale

Source:Reference[19]

The principle of barrier-free accessibility emphasizes that older adults should be able to reach and use public spaces and their facilities independently, conveniently, and without obstruction. The behavioural analysis in Chapter 3 shows that older adults' daily activities in Zhongxing Community depend strongly on the pedestrian system, with most activities concentrated within 500 m of their homes. The continuity and convenience of routes between high-number activity nodes directly influence both the frequency of going out and spatial choice. However, the existing environment still suffers from problems such as insufficient clear passage width, discontinuous ramps, significant level differences, and the lack of a wayfinding system, all of which weaken the independent mobility of older adults, especially the oldest-old and those using assistive devices. Therefore, the principle of barrier-free accessibility means not only removing physical barriers, but also establishing a continuous support system in terms of route organization, node connection, linkage to service facilities, and wayfinding. Large-font, high-contrast signage should be provided to assist older adults with declining cognitive ability in navigating space. In addition, common ground-level hazards such as damaged or encroached pavements should be comprehensively inspected, and paving should be kept level, continuous, and slip-resistant. Priority should be given to flexible anti-slip materials such as permeable pavers or rubber granules, especially in areas prone to slipping, including ramps, steps, and entrances to public toilets, so as to reduce the risk of

falls in rainy or snowy weather and improve walking stability.

5.3.3 Environmental Comfort Principle

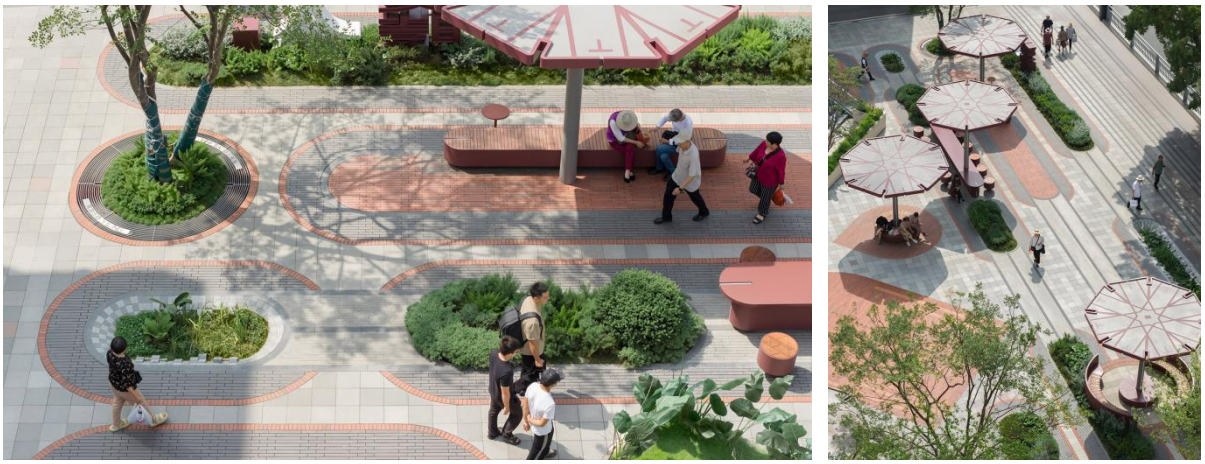


Figure5- 3 Community Street Corner

Source: HID Landscape

Older adults seek not only physical exercise in outdoor spaces, but also relaxation and environmental pleasure. In Zhongxing Community, however, some spaces suffer from excessive sun exposure, insufficient resting facilities, uneven distribution of shaded planting, and disordered spatial interfaces. As a result, although these spaces remain accessible, they often fail to generate stable attraction for everyday use. Public space should therefore improve physical environmental quality in order to support longer stays and enhance the quality of daily outdoor life. Tree shade, covered corridors, or movable sunshades should be introduced to create semi-outdoor spaces that are cool in summer and sheltered in winter, so as to support longer periods of sitting, sunbathing, reading, and similar activities. In small spaces such as front-of-building open areas and narrow gaps between buildings, compact comfort-oriented strategies can be adopted. For example, vertical green walls may be used to reduce heat radiation and noise; light-coloured permeable paving can help reduce surface temperature; and small planter-seating combinations can be inserted into corners to beautify the environment while also creating shaded resting points. Such small-scale interventions are particularly suitable for the oldest-old and physically frail older adults who need comfortable outdoor spaces close to home.

In addition to physical facilities, visual and acoustic conditions are also important components of comfort. Public space should be kept tidy and orderly, avoiding clutter and

visual disorder. Soft elements such as hedges and planting beds can be used to reduce traffic noise from adjacent streets. At the same time, a moderate degree of visual openness should be maintained between neighbouring areas, so that older adults can enjoy a sense of calm while still perceiving the everyday life of the community, thereby gaining psychological security and a sense of belonging. Therefore, in design practice, the continuity of the wayfinding system should be improved, shaded resting facilities should be added, and barrier-free ramps and entrance transition spaces should be optimized, so as to strengthen efficient connections between service nodes and enhance the convenience of access, staying, and use for older adults.

5.3.4 Social Support Principle

The principle of social support emphasizes that public space should not only meet the needs of movement and staying, but also provide older adults with opportunities for interaction, observation, and participation in community life[47]. The behavioural analysis in Chapter 3 shows that chatting, accompanying younger generations, short gatherings, and interaction with acquaintances are important components of older adults' use of public space in Zhongxing Community. This indicates that, for older adults, public space has not only physical use value, but also an important social-support function in maintaining social ties and reducing loneliness. However, although some existing spaces have a certain degree of openness, their limited facility organization, lack of communication nodes, blurred spatial boundaries, and insufficient staying conditions make it difficult to form stable social settings.



Figure5- 4 A Site Accommodating Multiple Modes of Use

Source: Constructing an All-weather Urban Habitat in Shanghai Tianlin Park, VIA Landscape

Public space should therefore support, stimulate, and sustain older adults' everyday social interaction through spatial design, thereby strengthening community belonging. At natural gathering points such as areas in front of residential buildings, street corners, and path

intersections, grouped seating can be arranged to form semi-enclosed settings for face-to-face or side-by-side interaction, encouraging informal conversation. At the same time, chess tables, community gardens, intergenerational play installations, and other public facilities can be introduced to provide different groups of older adults with shared topics and media for interaction. Therefore, in design practice, supportive environments for older adults' interaction, observation, and participation in community life should be created through semi-enclosed communication interfaces, the addition of social facilities, and stronger spatial organization of natural gathering points.

5.4 Five-factor Renovation Strategies for Public Space in Zhongxing Community

5.4.1 Renovation Strategies for the Accessibility Factor

The accessibility renovation strategy mainly addresses the insufficient connections among high-number activity nodes, the scattered distribution of service facilities, and the discontinuity of the resting-support system in Zhongxing Community. The behavioural path analysis in Chapter 3 shows that older adults' daily activities are concentrated in a limited number of high-number nodes, including the community social park, fitness plaza, Elderly Care Center, the public space in front of street-facing shops, and public spaces around residential buildings. However, these nodes are not linked by continuous and convenient pedestrian routes. As a result, although certain public service facilities objectively exist, they have not been effectively transformed into spatial resources that older adults can use continuously in daily life.

At the level of accessibility, renovation should therefore focus on two aspects: strengthening node connections and bringing service support closer to daily routes. On the one hand, slow-traffic routes should connect high-number nodes such as the community social park, Elderly Care Center, Accessible Toilet, and commercial-oriented public space, thereby improving continuous access among service facilities. On the other hand, resting facilities, health-support waiting spaces, and short-stay nodes should be added along major walking routes to reduce the physical burden of continuous walking for older adults. In this way,

originally scattered service facilities can be reorganized into a daily activity network with sustained support capacity.

(1)Establish a Hierarchical Social Space System

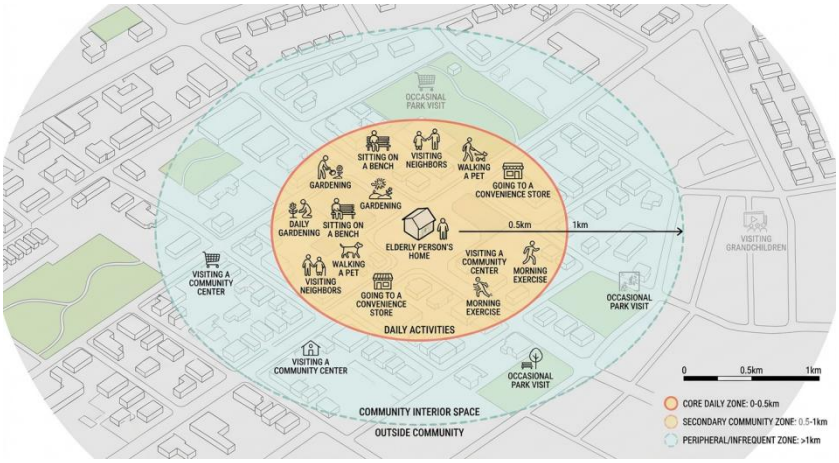


Figure5- 5 Daily Activity Range of Elderly Residents

Source: Drawn by the Author

Studies have shown that older adults' daily activity space is strongly home-centred. Most activities are concentrated within 0.5 km of home, while activity intensity declines within the 0.5 – 1 km range inside the community, and only a small number of leisure activities take place outside the community[34]. Therefore, a rational distribution of public space within the community can effectively improve space utilization while also providing greater convenience for older residents.

On this basis, and in response to differences in older adults' physical capacity, activity intensity, and social preferences, social space can be divided into three levels according to scale and function. Central group activity areas should be located in the community social park and serve collective activities such as square dancing and tai chi. These spaces should be equipped with slip-resistant and durable paving, low-impact age-friendly fitness equipment, and storage facilities for activity equipment, while grouped seats with backrests should be arranged around the edges to attract non-participants to stop and watch. Neighbourhood-scale micro-gathering nodes should be distributed in small spaces between residential buildings and in public spaces around residential buildings (5 – 15 m^2). Through compact interventions such as vertical green walls, planter-seating combinations, and small planting boxes, these spaces can provide nearby and convenient settings for low-intensity interaction among the

oldest-old and those with limited mobility. Linear communication zones for quiet observation should be arranged along major walking routes, with continuous seating and open sightlines, in order to support activities such as sunbathing and casual conversation.

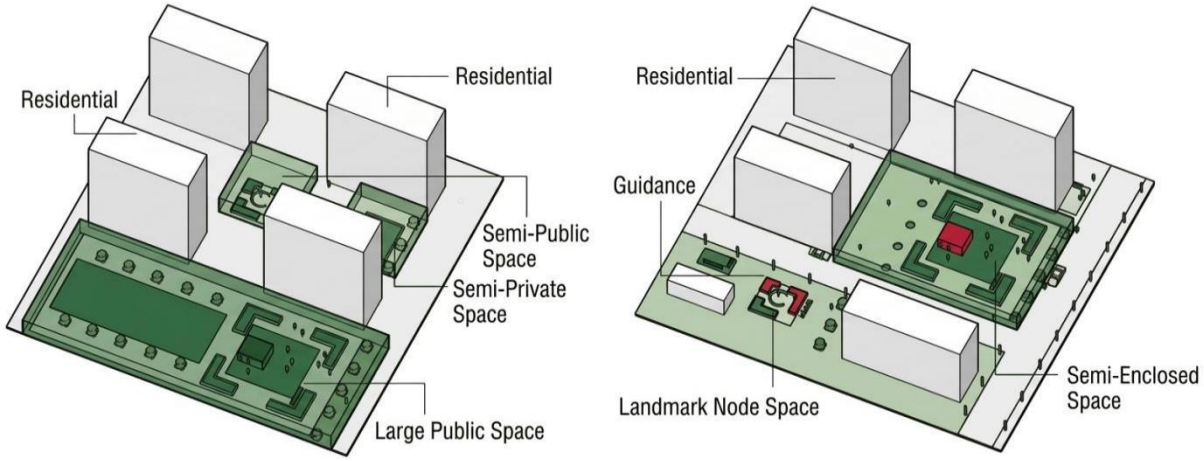


Figure5- 6 Hierarchical Social Space System

Source: Drawn by the Author

(2) Organize Active and Quiet Zones

In social-oriented public space, where the aim is to promote interaction and strengthen community belonging, the rational organization of active and quiet zones is a key design strategy for improving efficiency of use, reducing behavioural conflict, and supporting the coexistence of diverse user groups. Based on the observation and analysis of older adults' behavioural patterns, active behaviours mainly include walking, exercise, and accompanying grandchildren, all of which involve a certain degree of movement or physical intensity. Quiet behaviours, by contrast, include sitting, chatting, sunbathing, and informal watching or caregiving, which are generally low in intensity and involve longer periods of stay. These two categories show clear differences in spatial demand: active zones require route continuity, circulation safety, and a certain degree of openness, whereas quiet zones place greater emphasis on privacy, visual comfort, and a pleasant microclimate. Flexible separation can therefore be achieved through both natural and artificial spatial interfaces.

To achieve this, the following strategies for organizing active and quiet zones are recommended. First, physical separation and visual openness should be balanced in the spatial layout. Soft boundary elements such as planting belts, low walls, planter edges, level changes, or variations in paving material can be used to create moderate separation between active and

quiet zones, thereby reducing movement-related disturbance (Fig. 5-7). At the same time, visual openness should be maintained so that users in quiet zones can perceive their surroundings and feel secure, which is especially important for older adults caring for grandchildren. Where site conditions permit, an outer loop path with an inner resting garden layout may be adopted.

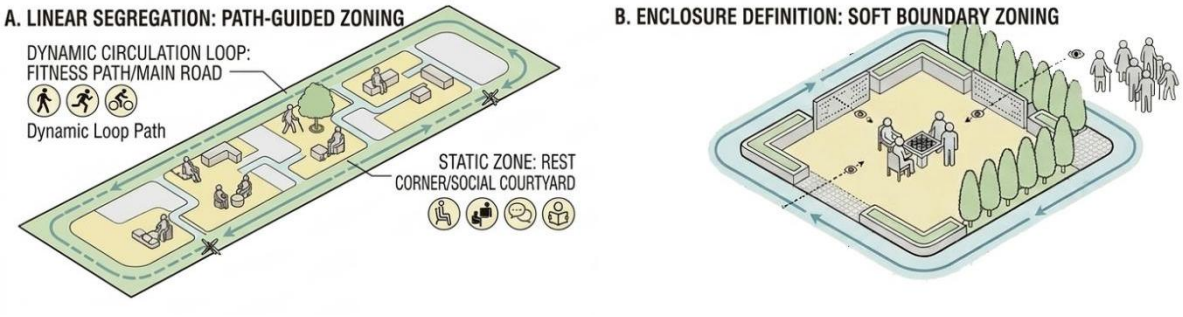


Figure5- 7 Schematic Diagram of the Dynamic – Static Zoning Design Strategy

Source: Drawn by the Author

In narrow or linear spaces, circulation can be arranged along one side, while a series of quiet nodes is embedded along the other, allowing active and quiet uses to coexist without direct interference. Since some spaces may support different functions at different times of day—for example, exercise in the morning and social gathering in the afternoon—spatial flexibility should be improved through movable furniture, modular paving, or multifunctional elements such as seating with storage. In this way, the organization of active and quiet zones in social-oriented public space can improve space utilization through flexible separation, functional adaptation, circulation guidance, and adaptable design.

(3)Optimize the Continuity of the Pedestrian System and Strengthen Pedestrian–Vehicular Separation

As high-number nodes frequently used by older adults in their daily movement, areas in front of shops should provide clearly defined, independent, and continuous pedestrian corridors. In accordance with the Code for Design of Shop Buildings, which requires that public passageways in department stores or street-facing shops satisfy both fire-safety egress standards and everyday circulation needs, a minimum clear walking width of 1.5 m should be maintained even after the installation of resting seats. In terms of paving, differentiated materials may be used to distinguish the pedestrian corridor from adjacent spaces. For

street-facing shops located near the main entrances of the community, raised crossing platforms, speed humps, or planted islands should be introduced at pedestrian – vehicular conflict points to reduce vehicle speed physically and provide visual buffering. Temporary parking by motor vehicles on pedestrian routes should be strictly prohibited, so as to ensure uninterrupted pedestrian circulation throughout the day, especially for older adults and wheelchair users who rely on safe and stable walking environments.

In summary, renovation for accessibility should focus on strengthening connections between nodes and bringing service support closer to everyday routes. By establishing a continuous, safe, and convenient spatial network, scattered public service facilities can be transformed into a daily activity system that older adults can use continuously.

5.4.2 Renovation Strategies for the Infrastructure Factor

The previous investigation shows that some roads in Zhongxing Community suffer from insufficient clear passage width, encroachment by miscellaneous objects and vehicles, blurred spatial boundaries, and discontinuous node connections, all of which reduce the convenience of older adults' mobility and the recognizability of space. The infrastructure factor is a key condition affecting older adults' walking experience and use of public space, and can be examined from two dimensions: the composition of pedestrian space and the physical characteristics of sidewalks. The composition of pedestrian space mainly concerns path organization, functional zoning, and the spatial relationship between walking routes and elements such as planting, building interfaces, and resting facilities, all of which directly affect the continuity and efficiency of the walking environment. The physical characteristics of sidewalks include paving materials, spatial width, level-difference treatment, barrier-free facilities, and boundary definition, which are crucial to the safety and comfort of older adults' movement. Together, these two dimensions determine both the accessibility and the overall experiential quality of pedestrian space. Based on the above analysis, the following three targeted design strategies are proposed.

(1) Provide Multifunctional Resting Facilities

In traditional high-density urban communities, the quantity, scale, and infrastructure of public space are often limited, making it difficult to meet the diverse needs of older adults.

Under such conditions, promoting multifunctional resting facilities is an effective way to address spatial constraints. Here, multifunctional provision refers to the integration of multiple uses—such as resting, social interaction, viewing, storage, and light exercise—within a limited facility size or spatial node through functional combination, spatial coordination, and sensory adaptation. In this way, daily needs can be supported more precisely and efficiently without increasing land occupation.



Figure5- 8 Infrastructure of Shanghai Green Carpet Park (Source: Gooood)

As shown in Fig. 5-8, the resting facility is integrated with the natural ground surface at an ergonomic reclining angle, which helps compensate for the shortage of resting facilities while also enhancing the overall spatial coherence. Accordingly, in social-oriented public space, resting facilities should move beyond the conventional single-bench model and instead adopt more modular and movable seating units, such as wheeled wooden stools or combined planter-seating elements, in order to respond to the different activity needs of older adults. At the same time, intergenerational elements, such as low slides or drawing boards, may be embedded at the edges of resting areas to better support activities involving the accompaniment of younger generations.



Figure5- 9 Suan San Pocket Park, Thailand (Source: Gooood)

(2) Activate the Potential of Gray Space and Create Multifunctional Composite Forecourt Interfaces

The gray space beneath building eaves should be fully utilized by incorporating age-friendly seating with backrests and armrests, small service stations such as shared umbrella points or information screens, movable planters, and shading elements, thereby creating a flexible frontage zone that supports staying, sitting, observing, and shopping. Shopkeepers should also be encouraged to participate in micro-renewal, with coordinated arrangements of outdoor furniture, planting, and lighting guided by unified design guidelines, so as to enhance commercial visibility while improving social inclusiveness and the quality of stay.

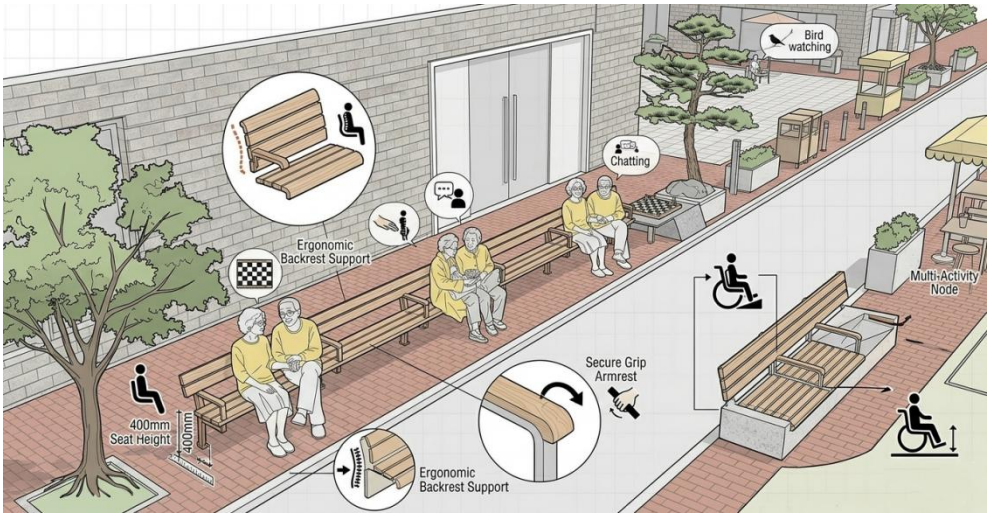


Figure5- 10 Public Seating in the Commercial Forecourt Area

Source: Redrawn by author based on Reference [42]

(3) Continuous Gentle-slope Treatment

In the age-friendly renovation of community public space, existing level differences should be addressed through a strategy of continuous gentle-slope treatment. By controlling slope gradients and extending path length, abrupt changes in level can be transformed into a continuous and gradual walking experience, thereby meeting older adults ' needs for barrier-free access and safe movement. At the same time, segmented resting nodes and landscape elements can be incorporated along the gentle-slope route to reduce walking fatigue and improve both comfort and continuity of use.

Continuous gentle-slope treatment not only improves circulation, but also strengthens

spatial guidance through path organization, allowing level changes to be transformed into a more legible and participatory pedestrian system. In practical design, the slope should generally be controlled to no steeper than 1:12, and intermediate landings should be provided where necessary to ensure safety.



Figure5- 11 Continuous Gentle Slope

Source: Redrawn by author based on Reference [42]

In summary, renovation of the infrastructure factor should establish a continuous, safe, and clearly organized pedestrian system. Through the optimization of walking interfaces, path organization, and circulation quality, it can provide older adults with a more stable and comfortable environment for daily mobility.

5.4.3 Renovation Strategies for Aesthetics and Environmental Quality

At the level of design implementation, aesthetics and environmental quality often shape older adults' spatial perception through combined interventions in planting, material use, interface improvement, and the creation of gray space. For this reason, the two dimensions are discussed together in this study.

The earlier field investigation and behavioural analysis show that community public space generally suffers from limited planting hierarchy, insufficient shading facilities, and a lack of variation in the spatial landscape. As a result, the overall environment tends to be monotonous and cannot adequately meet older adults' needs for comfort and visual enjoyment. In terms of behavioural characteristics, older adults' activities in public space show a strong

dependence on environmental conditions. They tend to prefer spaces with good shade, open views, and richer landscape qualities for staying and social interaction. At the same time, their activities are often low in intensity but long in duration, which means they place relatively high demands on microclimatic conditions, such as shading and ventilation, as well as on the overall spatial atmosphere. When environmental comfort is insufficient, older adults tend to shorten their stays or shift to areas with better conditions.

At the level of design implementation, aesthetics and environmental quality often shape older adults' spatial perception through combined interventions in planting, material use, interface improvement, and the creation of gray space. For this reason, the two dimensions are discussed together in this study.

(1) Add Coloured Guidance Lines

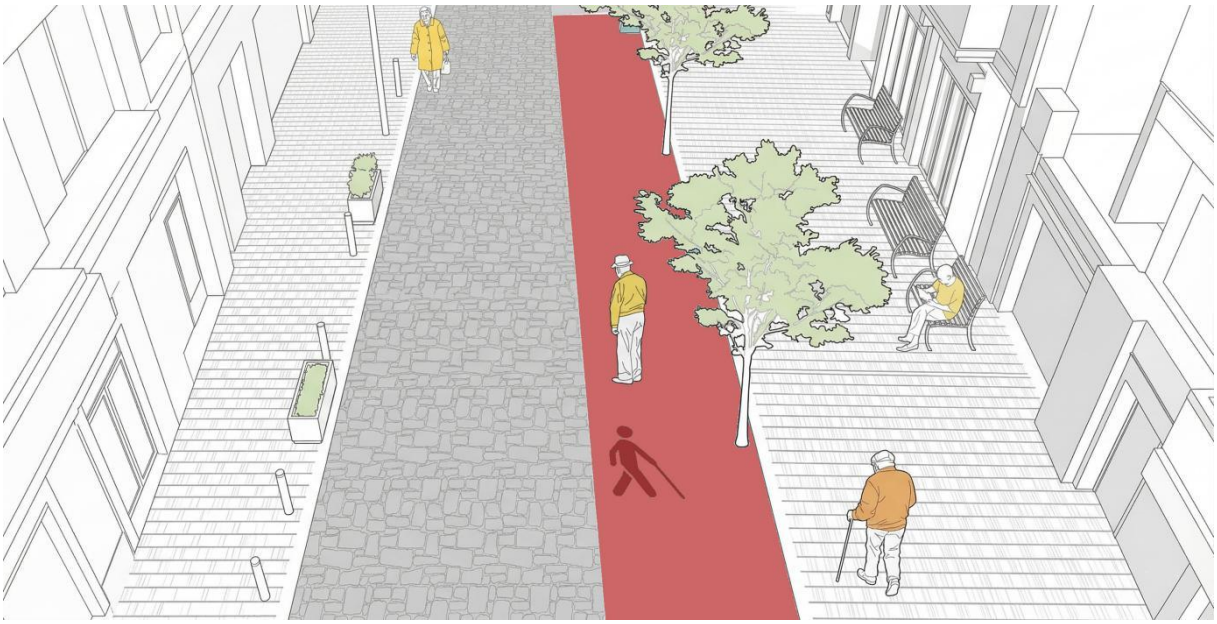


Figure5- 12 Colored Wayfinding Line on Street Pavement

Source: Drawn by the Author

As the main circulation network within the urban fabric, transport-oriented public space must balance the operational efficiency of motor traffic with the safety needs of cyclists and pedestrians. Independent and continuous pedestrian routes should therefore be provided between key functional nodes such as residential entrances, the community social park, the Elderly Care Center, and commercial-oriented public space, so as to avoid unnecessary crossing of vehicular roads. At necessary conflict points, raised crossings, coloured paving, or speed-control devices should be introduced. At the same time, clear and continuous ground

markings, such as tactile paving and coloured guidance lines, should be arranged along main walking routes to improve spatial legibility, especially for the oldest-old and those with declining cognitive ability.

(2) Integrate Age-friendly Resting Nodes with Planting

Field investigation shows that the layout of seating within the community is problematic in both location and quantity. Seating should not be arranged primarily for visual effect or graphic composition, but should instead be based on systematic planning and design that responds first to older adults' physiological and psychological needs, such as nearby places to rest, clear sightlines, opportunities for social interaction, and a sense of safety, thereby ensuring practicality and comfort in everyday use[36].

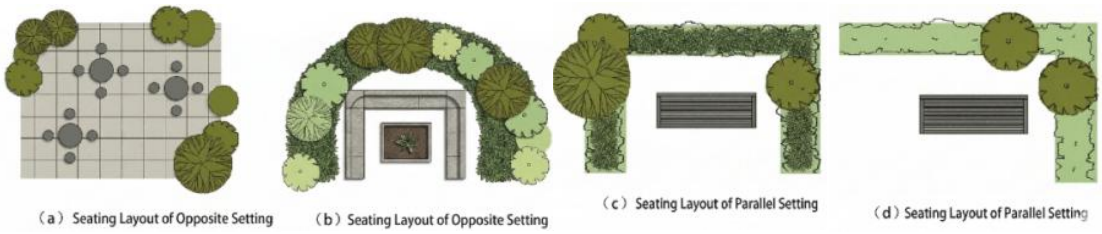


Figure5- 13 Seating Arrangement Types

Source: Reference[36]

Resting facilities should be reasonably arranged at key nodes in the pedestrian network, such as road corners, intersections, and the midpoints of long straight paths, so as to reduce fatigue caused by older adults' limited physical capacity. Resting points are recommended to be provided at intervals of 50 – 80 m, in line with the physiological rhythm by which older adults may need a short rest after every 3 – 5 minutes of walking.

Facilities should adopt multifunctional seating design with backrests and armrests, with seat height controlled at 40 – 45 cm. They may also be combined with shading structures, small planted enclosures, or storage compartments, so as to flexibly support multiple activities such as resting, accompanying grandchildren, and neighbourly interaction. At the same time, resting areas should be moderately separated from the main circulation flow through planter edges, low walls, or changes in paving material, thereby creating semi-enclosed spaces for staying. This can avoid interference with pedestrian movement while still ensuring users' visual connection to the main path and a sense of environmental safety, as shown in Fig. 5-14.

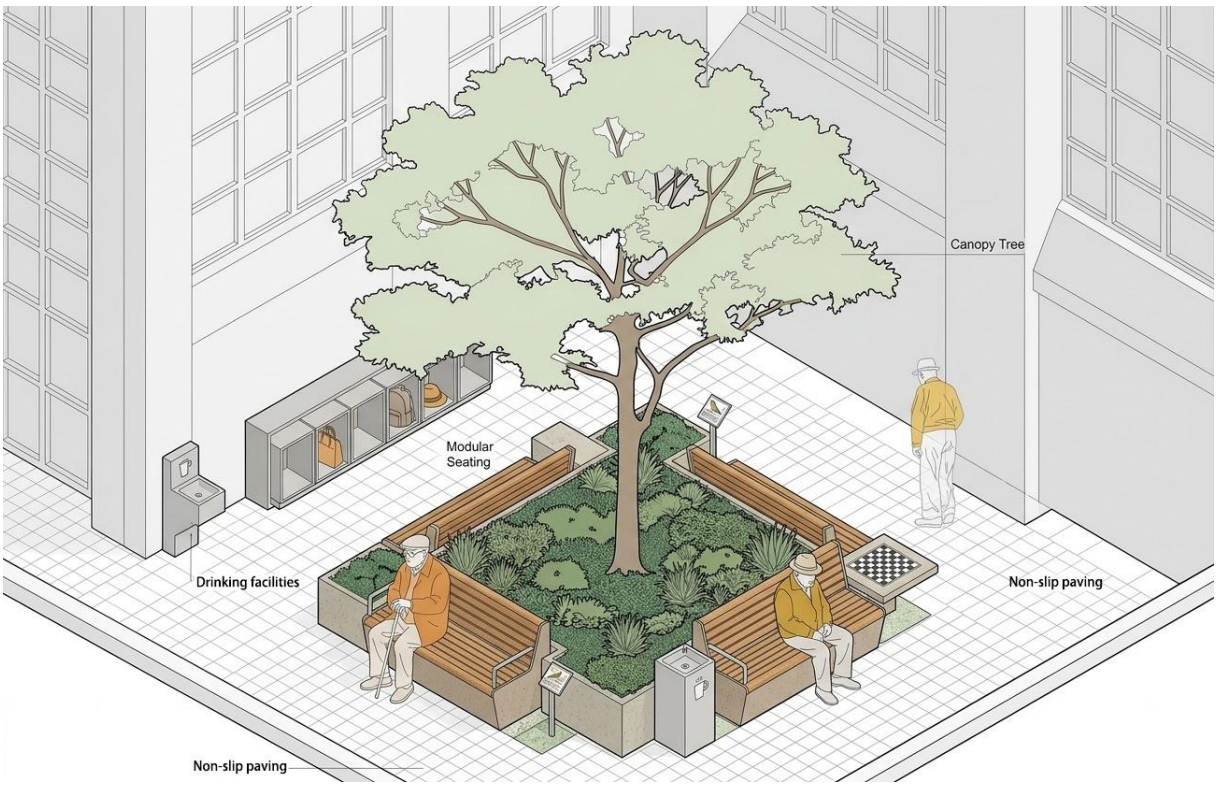


Figure5- 14 Public Seating Integrated with Greenery

Source: Drawn by the Author

(3) Improve Microclimate and Environmental Comfort through Greening

Greening plays a key role in shaping the spatial form of road space. In design practice, a combination of hedges, street trees, and lawns can be used together with curvilinear, linear, or organic road alignments to create street interfaces with a clear sense of rhythm and direction. This approach not only strengthens spatial order, but also creates a softer transition between hard paving and the natural environment, thereby enhancing visual layering and spatial affinity, as shown in Fig. 5-15. At the same time, community-led planting activities may be appropriately introduced within street space to strengthen the interaction between space and users while also improving the road environment. In spatially constrained areas, priority may be given to one-sided planting, narrow green strips, or alternating grass-and-shrub arrangements. In temporary interventions or settings with harsh hardscape conditions, modular planters, movable flower boxes, or vertical green walls may be used flexibly as alternatives to improve environmental quality. Where sidewalk width is sufficient, conventional planted paving areas at intersections may also be transformed into community vegetable gardens, as shown in the right side of Fig. 5-15.



Figure5- 15 Street Greenery(Source: Gooood)

Service spaces should not be arranged as isolated facilities, but should instead be embedded within active interfaces or gray spaces whenever possible. By integrating resting seats, shading structures, planted enclosures, and small-scale social elements, purely functional nodes can be transformed into micro-scale spaces that support rest, informal caregiving, and everyday interaction. At the same time, the use of unified materials, planting styles, and lighting atmosphere can help these spaces blend naturally into the community fabric, thereby strengthening residents' sense of belonging and willingness to use them. The currently underused corridor beside the existing Elderly Care Center may be combined with the centre's service functions and enhanced through the introduction of age-friendly resting facilities and small social nodes. In this way, the originally passive circulation-oriented gray space can be transformed into a multifunctional extension of the service space, increasing both older adults' access to community elderly-care facilities and their willingness to stay.

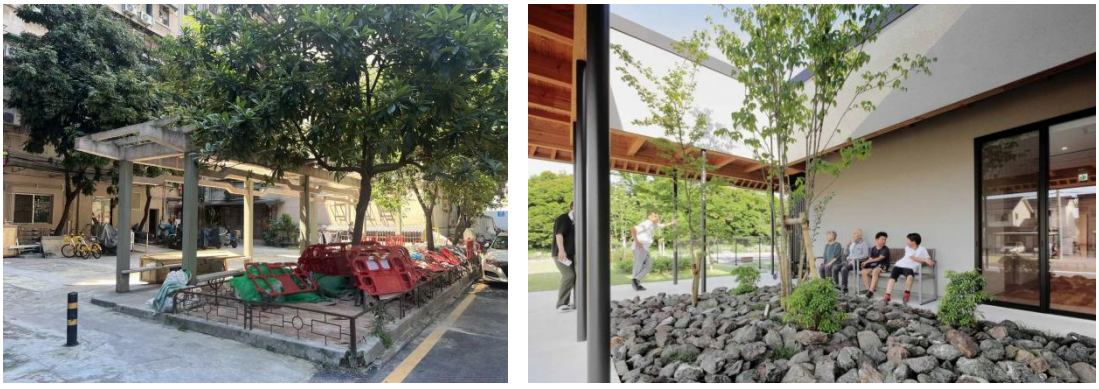


Figure5- 16 Corridor Renovation

Source: HIBINOSEKKEI + Youji no Shiro / Welfare Facility Research Institute

Drawing on the experience of the sensory garden in the St. Joseph Senior Apartment case,

fragrant planting corners and seasonal colour zones can be introduced, together with tactile material walls and safe water features, to support sensory stimulation and training for older adults with dementia. Seating in service-oriented public space should adopt L-shaped or back-to-back arrangements to form semi-enclosed settings, while two-person benches may also be provided in parallel. Boundary treatment should use transparent hedges or open woodland–grass planting rather than enclosed walls, so as to avoid a sense of oppression.

5.4.4 Renovation Strategies for Safety

As spaces closely associated with specific service facilities such as nursing homes, community health centers, and rehabilitation institutions, service-affiliated public spaces may take the form of either exterior or interior environments. Their design generally aims to improve service accessibility, enhance user comfort, and promote physical and psychological rehabilitation. The previous site investigation and node analysis indicate that the community still suffers from a series of spatial problems, including discontinuous level transitions, damaged pavement, pedestrian-vehicle conflict, insufficient lighting, and unclear boundary definition. These issues are particularly prominent in traffic spaces, commercial forecourt spaces, and building entrance areas. In response to these problems, age-friendly renovation can be carried out from the following three aspects.

(1) Establishing a hierarchical wayfinding system



Figure5- 17 Community Wayfinding Sign(Source: Baidu Baike)

To enhance the recognizability and accessibility of service-affiliated spaces, a clearly structured and continuously connected three-level wayfinding system should be established. At the primary level, comprehensive information boards should be installed at the main

entrances of the community, park entrances, and major intersections, clearly indicating the locations and walking distances of key service facilities such as the Yikang Center and accessible toilets.

Along routes with a high number of elderly activities, such as paths leading to the fitness plaza and circulation routes around residential buildings, secondary guidance may be provided through ground-embedded arrows or small freestanding signposts installed at intervals of 30 – 50 meters. High-contrast color schemes, such as black text on a yellow background, may be adopted to improve visual recognition. Within a 10-meter radius of service facilities, tertiary guidance can be created through illuminated signage, distinctive paving, or landscape elements such as colored floor tiles and themed flower planters, thereby enabling residents to identify destinations more precisely and improving spatial accessibility. At the entrances of residential buildings within the community, these wayfinding elements may also be connected with the internal pedestrian guiding lines, which helps promote pedestrian-vehicle separation, as shown in Figure 5-18.

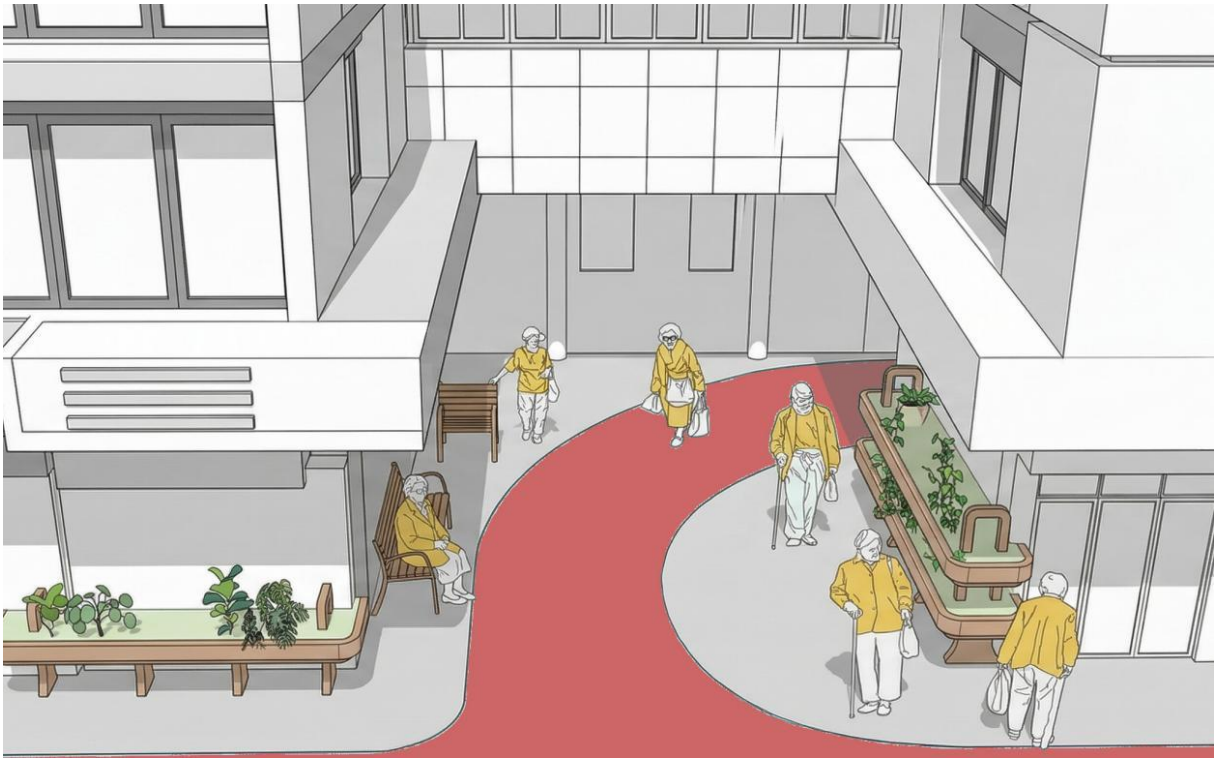


Figure5- 18 Colored Guiding Line at the Unit Entrance(Source: Drawn by the Author)

(2) Optimizing the existing community road layout to improve accessibility



Figure5- 19 Dutch Memory Garden

Source: Reference[38]

Based on elderly residents' actual behavioral trajectories, direct pedestrian shortcuts should be added between activity nodes with a high number of uses and service facilities. At pedestrian-vehicle intersections, raised crossings or traffic-calming measures should be introduced to ensure safe, convenient, and barrier-free passage. Drawing on the design logic of Tama Daira no Mori, which emphasizes the experience of "seeing greenery from the window and entering the garden upon stepping outside," the rigid boundary between indoor and outdoor spaces should be softened. The main entrances of service facilities may be renovated into fully openable glass porches to enhance visual continuity between interior and exterior spaces. In front of these entrances, semi-sheltered gray spaces, such as roofed wooden platforms, may be provided as transitional areas for short stays, offering shade and rain protection.

(3) Installing barrier-free ramps at entrances and exits

An examination of the current conditions in Zhongxing Community shows that some entrances and exits still suffer from pronounced level differences, missing ramps, or discontinuous connections, forcing elderly residents to take detours during entry and exit and, in some cases, rely on assistance from others, which significantly weakens their ability to travel independently. Therefore, in the renovation process, priority should be given to the addition and improvement of barrier-free ramps at the main community entrances, in front of public service facilities, at the entrances of street-facing shops, and around activity nodes with a high number of uses. For those building entrances where level differences cannot be easily eliminated due to site constraints, resulting in obstructed access and an increased risk of falls

for elderly residents, barrier-free ramps should be added to achieve a gradual and safe transition, as shown in Figure 5-20.

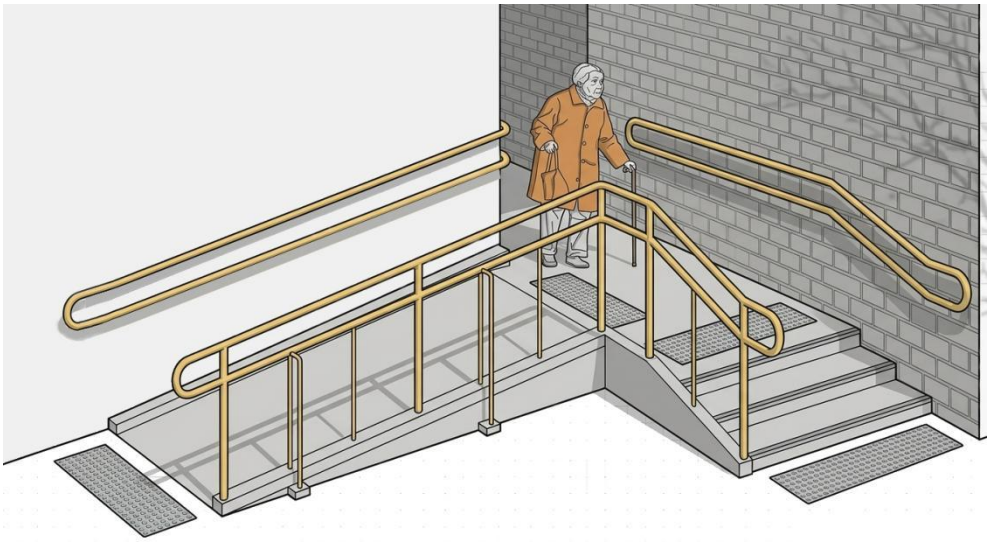


Figure5- 20 Age-Friendly Steps and Ramp at Building Entrances
Source: Redrawn by author based on Reference[50]

5.5 Summary

This chapter, building on the site investigation in Chapter 2, the behavioral activity analysis in Chapter 3, and the case study in Chapter 4, completes the research translation from problem identification to strategy generation. In response to the problems identified in the public spaces of Zhongxing Community, including insufficient pedestrian continuity, weak facility support, unstable environmental quality, and inadequate social support, four age-friendly renovation principles are proposed: safety assurance, barrier-free accessibility, environmental comfort, and social support. Centered on five major dimensions, including facility accessibility and pedestrian infrastructure, this chapter constructs a renewal strategy system tailored to the actual age-friendly issues of Zhongxing Community. Unlike the previous chapters, which focused on problem identification and case-based synthesis, the emphasis of this chapter lies in further translating the analytical findings into a strategic language applicable to master planning and node design. It stresses that the creation of age-friendly public space should not be limited to the mere addition of individual facilities, but should instead be approached through integrated planning and multidimensional interventions, including path continuity, functional integration, systematic wayfinding,

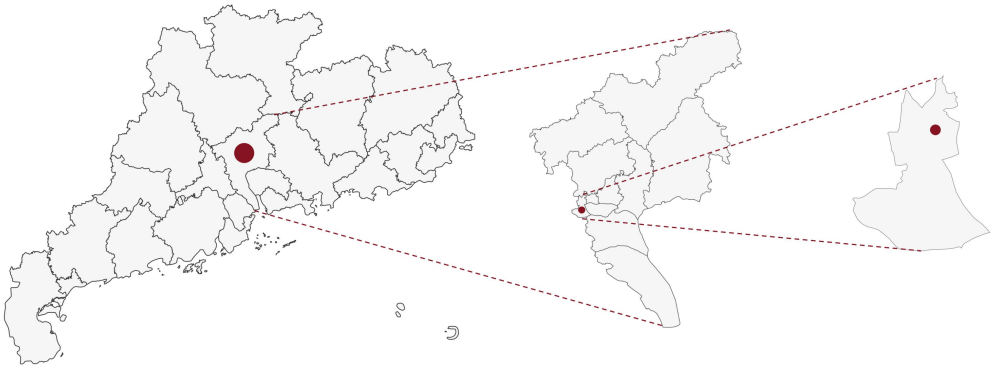
microclimatic comfort, and emotional identification with the environment.

These strategies provide the theoretical basis and methodological support for the subsequent spatial renovation. On this basis, the following chapter will focus on the existing conditions and usage characteristics of the specific site. Combined with the design principles proposed above, it will conduct site diagnosis and potential analysis, and accordingly develop a targeted and implementable age-friendly public space renewal scheme for Zhongxing Community.

Chapter6 Application of Age-Friendly Renovation in the Public Space of Zhongxing Community

6.1 Site Analysis

6.1.1 Location Analysis



Guangdong Province　　Guangzhou City　　Liwan District

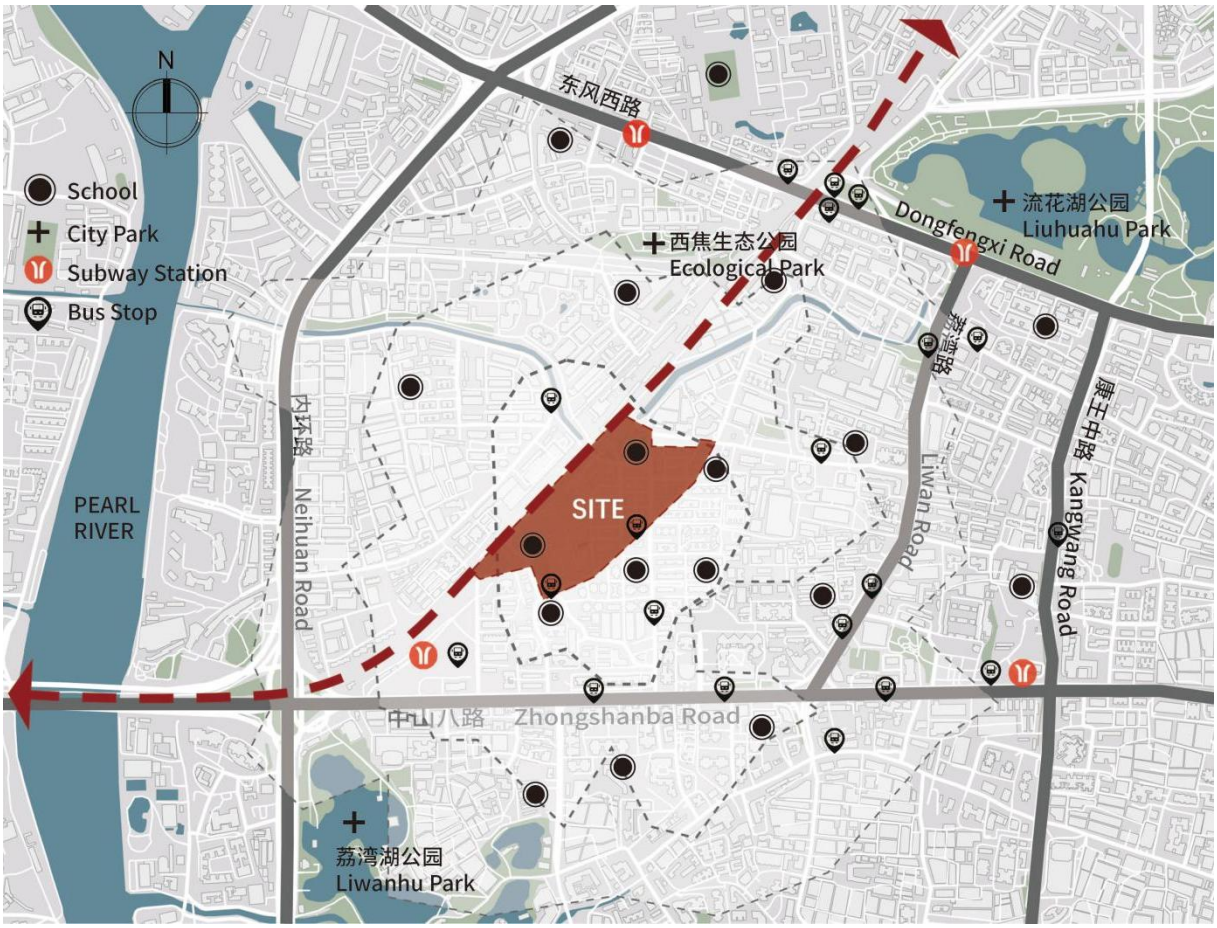


Figure6- 1 Location Analysis of Zhongxing Community(Source:Drawn by the Author)

Zhongxing Community is located in Caihong Subdistrict, Liwan District, Guangzhou. It is bounded by the Guangmao Railway to the east, Zhoumen South Road to the west, and lies between Shiguili and Zhoumen Road to the south and north, respectively (Figure 6-1). Covering an area of approximately 0.117 km^2 , the community has a green coverage rate of 30.8%. It is equipped with relatively complete infrastructure and public service facilities, including the Caihong Subdistrict Integrated Elderly Care Service Center, the Liwan District Center for Disease Control and Prevention, the Liwan District Library (Zhoumen Branch), Guangzhou Xiguan Foreign Language School, and Xiguan Kindergarten, and is also adjacent to the Caihong Subdistrict Community Health Service Center and Zhoumen Market.

Therefore, under the combined conditions of a high aging population, high density, and spatial aging, Zhongxing Community holds typical research value for age-friendly renovation in old communities and may serve as a representative sample for similar communities in Guangzhou and even the broader South China region. More importantly, the community not only exhibits the overlapping characteristics of high density and high aging, but also presents a series of typical problems, including aging public spaces, discontinuities in the pedestrian circulation system, and mismatches in service facility provision. These spatial characteristics closely correspond to the key contradictions involved in age-friendly renovation in old urban areas, thereby giving the case clear representativeness and a well-defined problem orientation.

6.1.2 Functional Zoning

Zhongxing Community is predominantly residential, with some street-facing ground-floor commercial units. Commercial activities within the community mainly include chess and card rooms, barbershops, and supermarkets. The residential area consists of Zhongxingyuan Community, Zhoumen Community, and Zhoumen Dayuan, and is mainly composed of mid-rise residential buildings, with a total of 69 apartment blocks ranging from 6 to 9 stories in height. In addition, the community is supported by educational facilities such as a high school and a kindergarten.

In terms of spatial organization, public facilities are concentrated along the main streets and in central areas. Public service facilities such as the kindergarten, library, and community health center are distributed in the northern and central parts of the community, with service

radii covering most residents. The school is located in the southwestern corner, independently arranged with a dedicated entrance and exit. Commercial facilities, such as Dongfang Market, are located at street corners or pedestrian flow intersections and serve daily shopping needs. Although the area of park green space is limited, as a community-level open space it has become an important node for elderly residents' morning exercise and social interaction. In addition, logistics and storage units are embedded along the edges of the residential area, reflecting the practical problem of functional mixing.

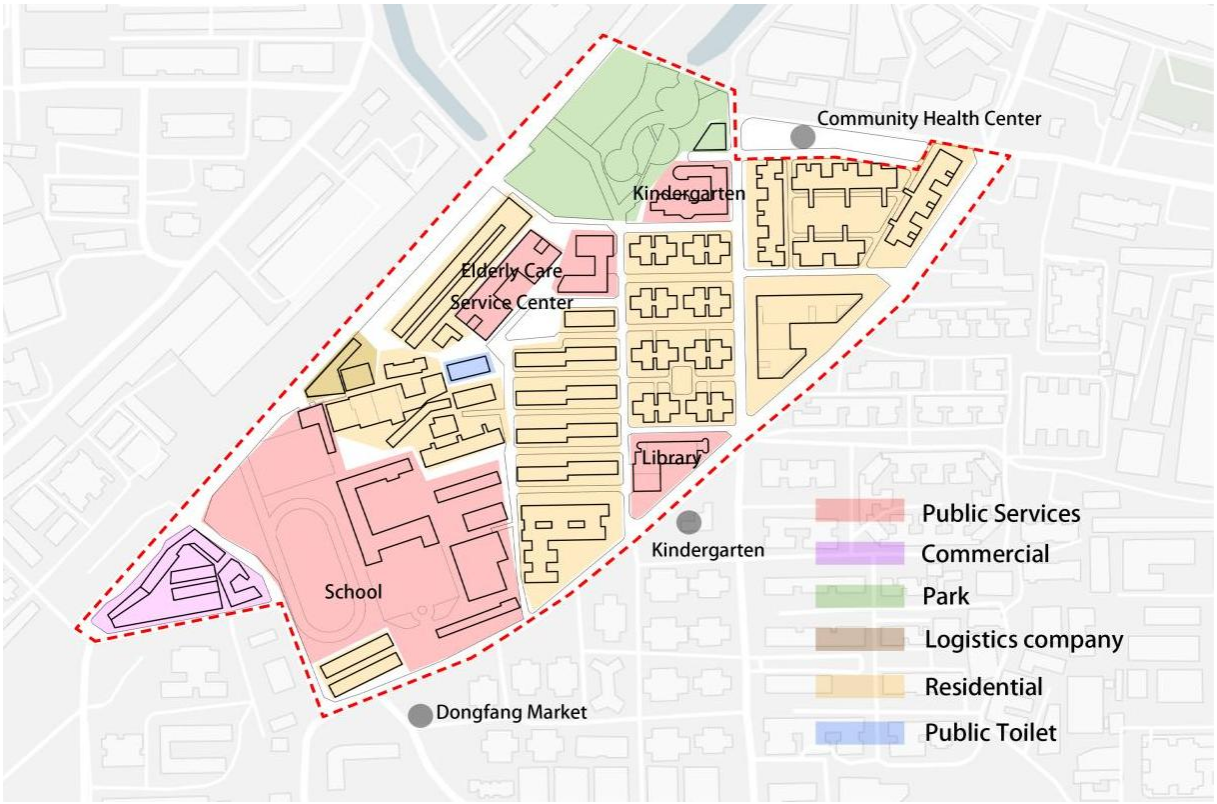


Figure6- 2 Functional Zoning and Public Service Facility Distribution

Source:Drawn by the Author

Overall, the community possesses a relatively complete supporting service network. However, prominent problems remain, including the lack of a systematic public space structure, poor pedestrian continuity, and weak barrier-free connections. These issues urgently call for micro-renewal interventions to improve accessibility and user comfort for the elderly population.



Figure6- 3Current Commercial Conditions within Zhongxing Community

Source:Author

Street-facing commercial units are mainly composed of small-scale businesses such as restaurants, pharmacies, and barbershops. Figure 6-3 presents the typical existing conditions of commercial spaces within Zhongxing Community, which as a whole exhibit the characteristics of high density, small scale, mixed functions, and a strong orientation toward everyday life. The four photographs taken during the field survey document the actual use scenarios of small commercial units, including convenience stores, barbershops, and corner grocery shops. These shops are generally arranged along the street, and the spaces in front of them are often used for temporary parking, goods storage, or the placement of waiting seats, resulting in functional overlap in the commercial forecourt areas. Meanwhile, sidewalks are generally narrow, electric bicycles pass through frequently, and pedestrian and vehicular circulation flows are intertwined, significantly compressing public circulation space. Although this type of commercial form effectively supports residents' high-number, short-distance daily service needs, it still displays evident shortcomings in environmental order, pedestrian safety, facility aging, and overall spatial quality. Given the relatively high

proportion of elderly residents in Zhongxing Community, commercial service spaces are used particularly frequently, which further reflects the urgent need to reorganize functions, optimize interfaces, and improve the pedestrian environment in commercial forecourt spaces through age-friendly renovation design.

From the perspective of spatial structure, the community currently exhibits the characteristics of spatial mixing and fragmented pedestrian continuity. This structural problem directly affects the continuity and safety of elderly residents' daily activities.

6.1.3 Traffic Circulation

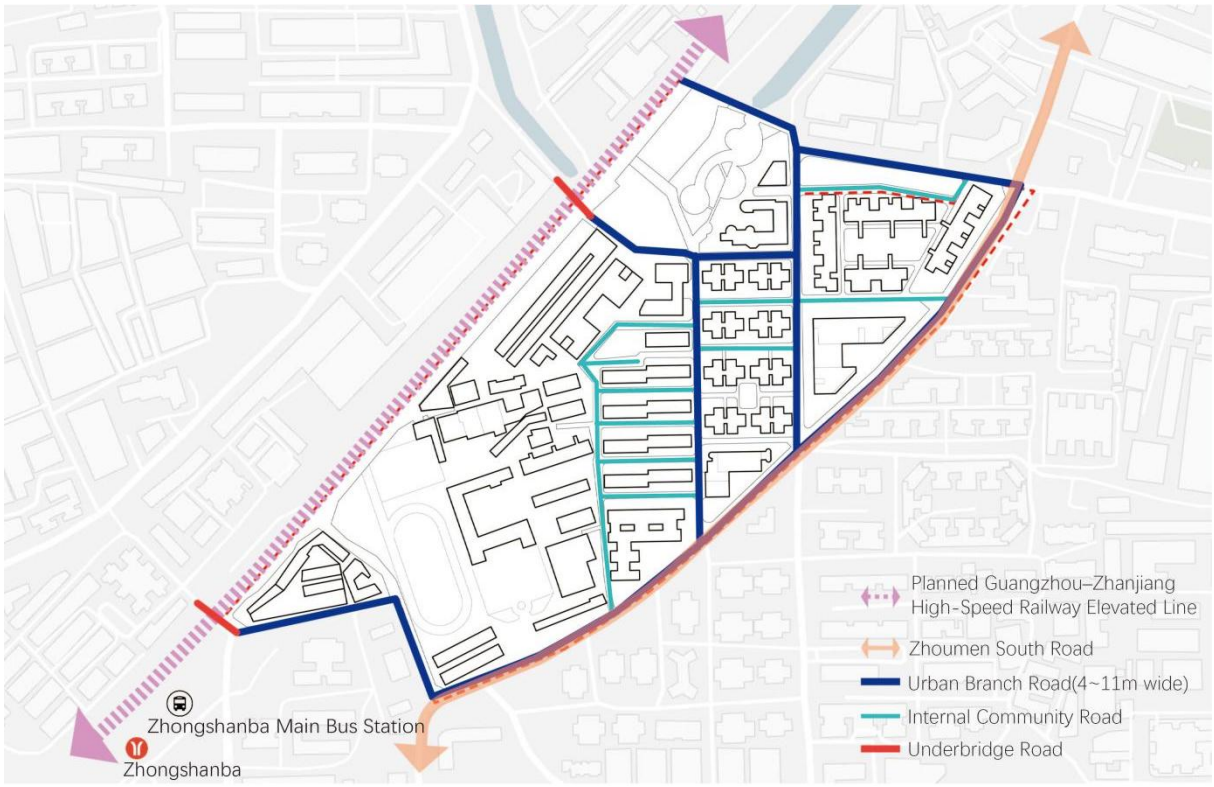


Figure6- 4 Road Traffic Conditions of Zhongxing Community

Source:Drawn by the Author

(1) Traffic Network

Zhongxing Community has neither clearly defined boundary walls nor formalized entrances and exits separating it from neighboring communities. Its traffic organization also fails to achieve pedestrian-vehicle separation, which to some extent undermines the safety of elderly residents' travel. Owing to the incomplete pedestrian system and the fact that some walkways are less than 1.2 meters wide—or, in the case of the Shiluji section, lack dedicated

pedestrian space altogether—elderly residents are in some places forced to use motor vehicle lanes. In addition, the increase in private car ownership has resulted in insufficient parking spaces, leading to the occupation of road space and a reduction in the effective carriageway area, all of which create potential safety risks for elderly residents' mobility. Steps are also installed at the junctions between pedestrian and vehicular roads within the community, causing considerable inconvenience for elderly residents.

(2)Public Transportation

Zhongxing Community is located near Zhongshanba Station on Metro Line 5 and Chen Clan Academy Station on Metro Line 1, both of which are within approximately a 10-minute walking distance. The surrounding bus network is dense, and Zhongshanba Bus Terminal, located nearby, provides convenient public transport connections. Roads within the community are mainly secondary roads or narrow lanes with widths of 6 – 8 meters, such as Zhongxing Back Street and Zhoumen East Street. However, these roads lack clear pedestrian-vehicle separation, continuous tactile paving, and barrier-free ramps. Non-motorized vehicles frequently pass through the area, resulting in considerable safety risks. In addition, some road sections are dead ends, which weakens the efficiency of internal circulation.



Figure6- 5 Current Parking Conditions in Zhongxing Community

Source:Author

Parking is also a prominent problem within the community. There is a substantial shortage of parking spaces, and no underground parking garage is provided. At present, 12 marked surface parking spaces are located in the southern part of the community and are managed by the Caihong Subdistrict Office, while the parking garage at No. 17 Zhoumen

West Street contains only 10 parking spaces. These are far from sufficient to meet the parking demand generated by nearby residents' private cars, resulting in the widespread occupation of road space by parked vehicles.

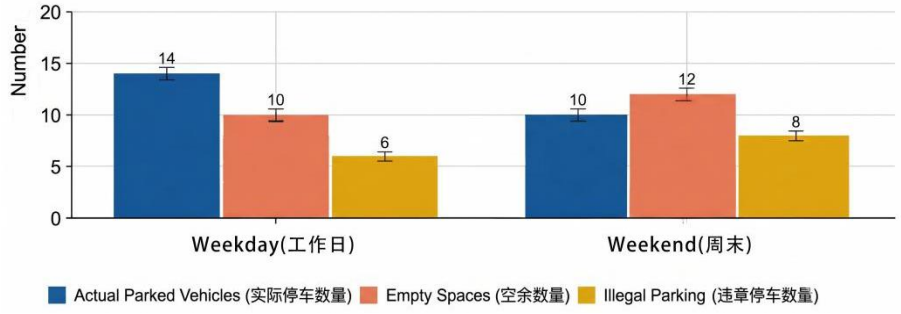


Figure6- 6 Current Use of Parking Spaces in Zhongxing Community

Source:Drawn by the Author

6.1.4 Public Space Layout of Zhongxing Community

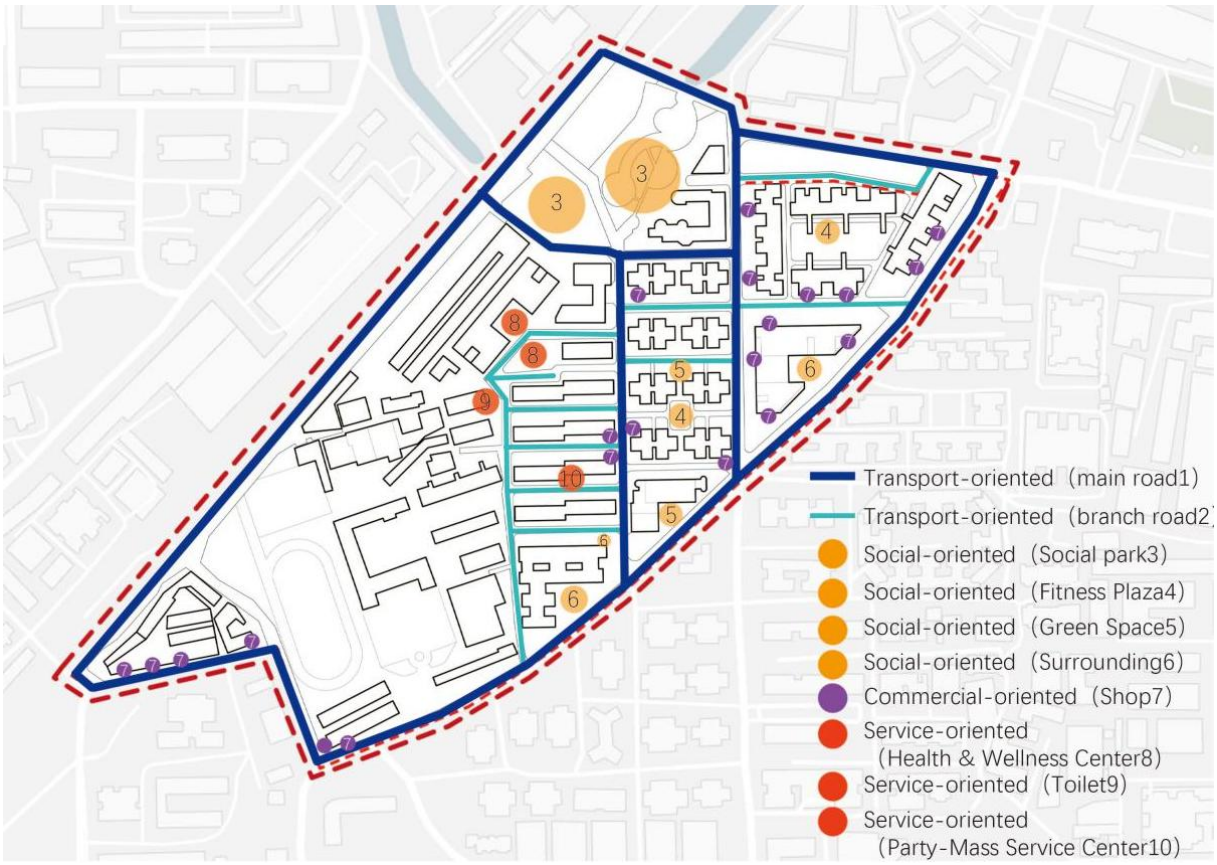


Figure6- 7 Classification of Public Spaces in Zhongxing Community

Source:Drawn by the Author

According to the field investigation, the existing public spaces in Zhongxing Community

exhibit a spatial pattern characterized by functional concentration, uneven distribution, and a predominance of point-like nodes. As shown in Figure 6-6, public spaces within the community are mainly concentrated in three core areas. The first is the fitness park located in the northeastern part of the community (Social-oriented, Social Park 3), which serves as the primary place for residents' daily exercise. The second is the Fitness Plaza 5 in the south-central area, which forms an open activity space in conjunction with the surrounding residential buildings. The third is the Elderly Care Center 8 in the northwestern part of the community and its affiliated service facilities, which together constitute the core node of elderly care services within the community.



Figure6- 8 Spatial Distribution Map of Elderly Residents' Behavioral Activities in Zhongxing Community

Source:Drawn by the Author

In addition, service facilities such as commercial forecourt spaces, public toilets, and the Party – Mass Service Center are mostly arranged along main roads or secondary roads, forming several small and scattered spaces in a point-like pattern. Overall, although public spaces within the community have a certain degree of coverage, they still suffer from problems such as spatial fragmentation, insufficient connectivity, and weak integration of the pedestrian network. Most nodes are distributed in isolation and lack the support of a

continuous slow-traffic system, making it difficult to effectively connect elderly residents' daily activity routes and thereby constraining the overall accessibility and use efficiency of public space.

As shown in Figure 6-8, elderly residents' daily activities in Zhongxing Community are mainly carried out along the principal internal pedestrian routes and boundary roads of the community, and are concentrated in areas with a high number of activities, such as the community park, the spaces surrounding fitness facilities, commercial forecourt spaces, residential affiliated spaces, and service facility nodes. The main activity types include walking/strolling, resting, socializing/chatting, exercising, shopping, accompanying descendants, sunbathing, and collecting parcels, showing clear characteristics of functional overlap and node-based clustering. Among these, the community park and its surrounding area constitute the core zone with the highest concentration of elderly activities, while commercial forecourt spaces and residential affiliated spaces more often accommodate daily staying, neighborhood interaction, and everyday service-related functions. This figure reflects the coupling relationship between elderly residents' behavioral activities and the community's spatial structure, and may provide a basis for the subsequent optimization of the pedestrian circulation system and the renovation of key nodes.

6.1.5 Current Aging Situation in Zhongxing Community

Zhongxing Community is located in Caihong Subdistrict, Liwan District, where the proportion of residents aged 60 and above has reached 25.56%. Compared with the major subdistricts in Liwan District, it is one of the areas with a relatively high degree of population aging, as shown in Table 6-1. At present, the community has a resident population of more than 6,000, of which approximately 33.6% are elderly people. The proportion of residents aged 60 and above is significantly higher than the average level in Guangzhou, indicating that Zhongxing Community is a highly aged community. In some residential buildings, there is a concentrated presence of "elderly-only households" and elderly people living alone at an advanced age. The increase in the proportion of the oldest-old residents living alone means that public space is required to assume a greater substitute role for family support, particularly in terms of safety, accessibility, and neighborhood support. 。

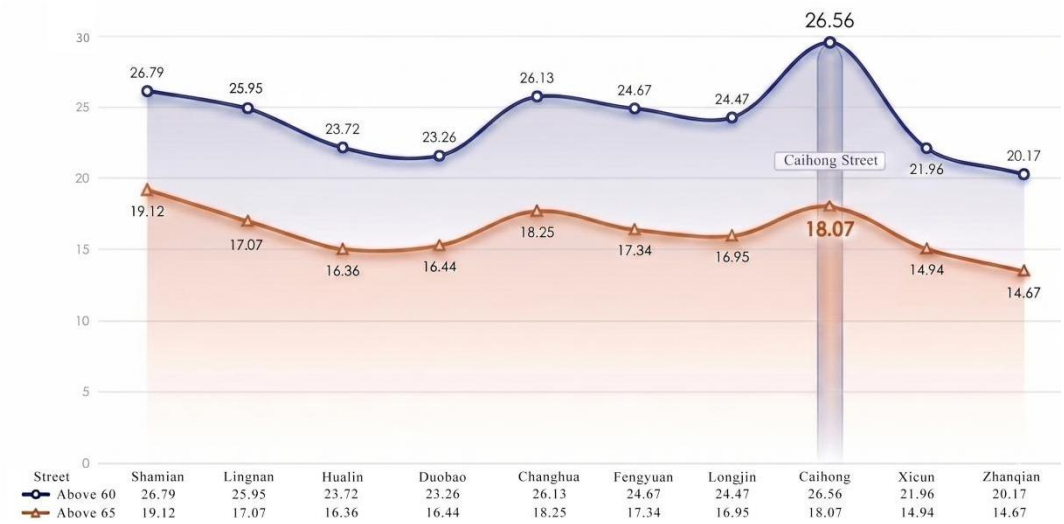


Figure6- 9 Proportion of Elderly Population in Major Subdistricts of Liwan District

Source: Reference[39]

Against this background, elderly residents show a stronger dependence on public space, and their daily activities are highly concentrated within the residential community and its surrounding walkable range. Their travel frequency, duration of stay, and patterns of space use all display distinct age-friendly characteristics. Therefore, conducting a systematic investigation of the existing age-friendly conditions not only helps to accurately identify the current shortcomings of public space in terms of barrier-free access, resting support, social facilitation, safety protection, and microclimatic comfort, but also enables a deeper understanding of the actual needs of elderly residents at the physiological, psychological, and social levels.

6.1.6 Guidelines for the Construction of Age-Friendly Communities in Guangzhou

Against this background, elderly residents show a stronger dependence on public space, and their daily activities are highly concentrated within the residential community and its surrounding walkable range. Their travel frequency, duration of stay, and patterns of space use all display distinct age-friendly characteristics. Therefore, conducting a systematic investigation of the existing age-friendly conditions not only helps to accurately identify the current shortcomings of public space in terms of barrier-free access, resting support, social facilitation, safety protection, and microclimatic comfort, but also enables a deeper

understanding of the actual needs of elderly residents at the physiological, psychological, and social levels.

Table6- 1 Summary Table of Policies Related to Age-Friendly Community Development in Guangzhou

Document Title	Main Content	Design Implications
Technical Regulations for Urban and Rural Planning of Guangzhou and *Standards for the Provision of Public Service Facilities in Residential Areas*	Clarify that residential areas should be equipped with elderly care service facilities, such as elderly service centers and day-care centers	Provide the basic standards for the provision and scale of elderly care facilities, serving as an important basis for community spatial allocation
Regulations of Guangzhou on Elderly Care Services	Establish an elderly care service system covering both urban and rural areas, and promote the integrated development of home-based, community-based, and institutional elderly care	Clarify the direction of community elderly care service system construction and emphasize embedded elderly care services
Implementation Plan for Guangzhou to Carry Out the Establishment of National Demonstration Age-Friendly Communities	Put forward construction requirements in terms of the living environment, travel environment, health services, and social participation	Build a comprehensive guideline framework for age-friendly communities and directly guide the age-friendly renovation of public space
14th Five-Year Plan for the Development of the Elderly Care Service System in Guangzhou	Promote the construction of the Elderly Care Center and community elderly care service stations, and form a three-level service network	Clarify the “Elderly Care Center + service station” system and provide an important basis for facility layout

Source:Drawn by the Author

Based on the above policy, this study translates its requirements into five categories of spatial design control priorities: first, the provision of facilities within a five-minute living circle; second, a continuous barrier-free pedestrian circulation system; third, multi-level social spaces; fourth, a safety protection system; and fifth, microclimate optimization.

6.1.7 Elderly Service Facilities in Zhongxing Community

As shown in Figure 6-10, Zhongxing Community has established a 15-minute living circle based on walkable accessibility. In terms of facility types, the surrounding area of the community incorporates a variety of functions, including medical and health care, cultural and educational services, commercial services, and public services, which generally meet residents' daily living needs. Within the five-minute living circle, community service centers, health service stations, and basic commercial facilities are the main facilities provided, meeting the high-number daily needs of elderly residents. The ten-minute living circle further covers educational facilities and more comprehensive service functions, while the fifteen-minute living circle extends to higher-level public service resources.

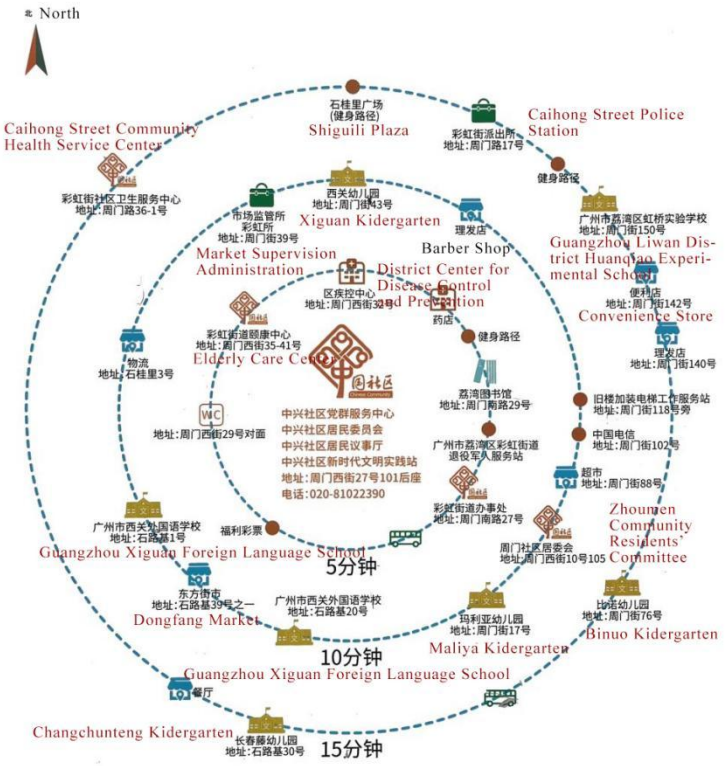


Figure6- 10 15-Minute Living Circle Service Facility Distribution

Source:Drawn by the Author

Although the existing service system meets the spatial distribution requirements of the 15-minute living circle, it still fails to satisfy the actual needs of the oldest-old residents for access within five minutes. Therefore, in the subsequent renovation process, it is necessary to strengthen the provision of elderly care services and public activity spaces within the five-minute living circle, while also optimizing the pedestrian path system, so as to improve the accessibility and safety of elderly residents' daily lives.

As shown in Figure 6-11, the existing elderly care service facilities around Zhongxing Community mainly include the Elderly Care Center, community elderly care service centers, and other related facilities. These services are relatively diverse in type and are able, to a certain extent, to meet elderly residents' multi-level needs for daily care and health management. However, from the perspective of age-friendly usage needs, the existing facilities still show certain deficiencies in terms of spatial layout, the coordination of service levels, and pedestrian accessibility. Some higher-level medical and elderly care resources are located on the periphery of the community, and elderly residents' actual access to these facilities is still constrained by factors such as a complex road environment, discontinuities in the pedestrian circulation system, and insufficient barrier-free facilities.

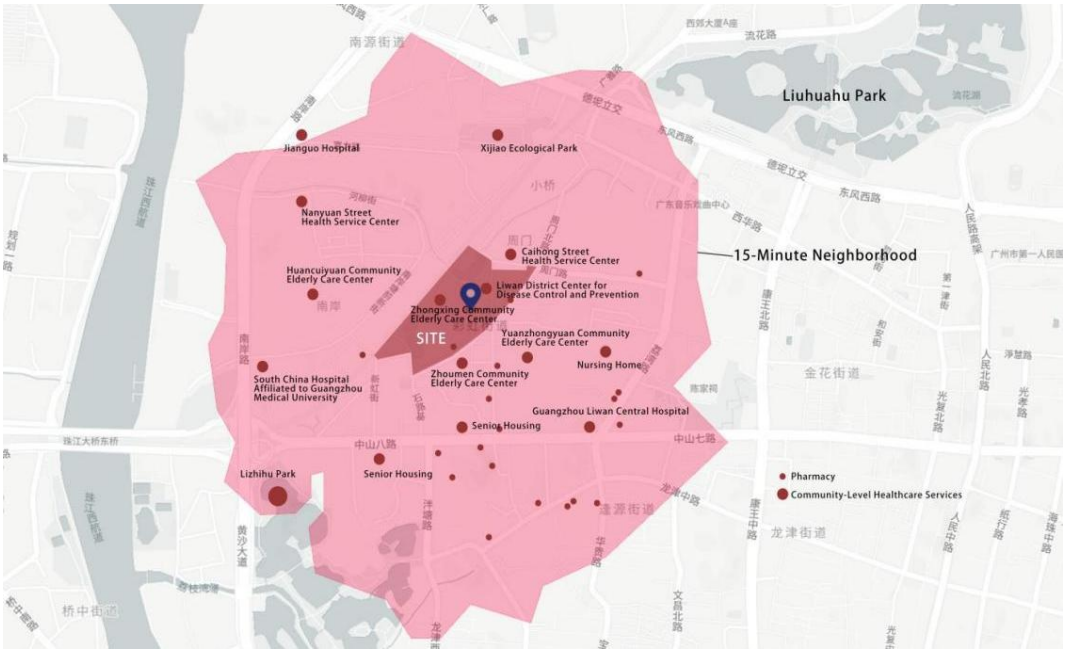


Figure6- 11 Distribution Map of Elderly Care Service Facilities

Source:Drawn by the Author

6.1.8 Summary of Age-Friendly Problems in Zhongxing Community

Based on the comprehensive analysis in Section 6.1 of location, traffic conditions, spatial structure, and aging characteristics, together with the questionnaire survey and behavioral investigation results presented in Chapter 3, the age-friendly problems of public space in Zhongxing Community can be summarized into the following four core categories, as shown in Table 6-2.

Table6- 2 Summary of Age-Friendly Problems in Zhongxing Community(Source:Author)

Primary Problem	Secondary Problem	Spatial Manifestation	Existing Conditions
Insufficient Accessibility	Discontinuous Road Network	Dead-end roads, detours, and encroached sidewalks	
	Insufficient Seating Density	Inadequate resting facilities along routes and at nodes	
	Lack of Barrier-Free Facilities	Steps and absence of ramps	
Inadequate Pedestrian Safety	Pedestrian–Vehicle Conflict	No separation in alley spaces	
	Parking Encroachment	Occupation of sidewalks	
Insufficient Spatial Quality	Disorder in Commercial Forecourt Areas	Cluttered storage and piled materials	
	Insufficient Greenery	Lack of shading facilities	
Inadequate Social Support	Isolated Nodes	The park and plaza are not effectively connected	

Among these issues, accessibility and safety are the primary factors constraining elderly residents' daily activities, while environmental quality and social support constitute secondary directions for further optimization. As shown in Figure 6-12, the age-friendly problems in Zhongxing Community exhibit a clear pattern of spatial clustering. Pedestrian discontinuities are mainly concentrated in key transitional areas where the community connects with the urban road system, particularly along the Shiluji – Xinhong Street – Zhoumen South Road corridor, while pedestrian-vehicle conflict is widely distributed throughout the internal branch road network, especially around the intersection of Zhoumen South Road and Zhoumen Street.

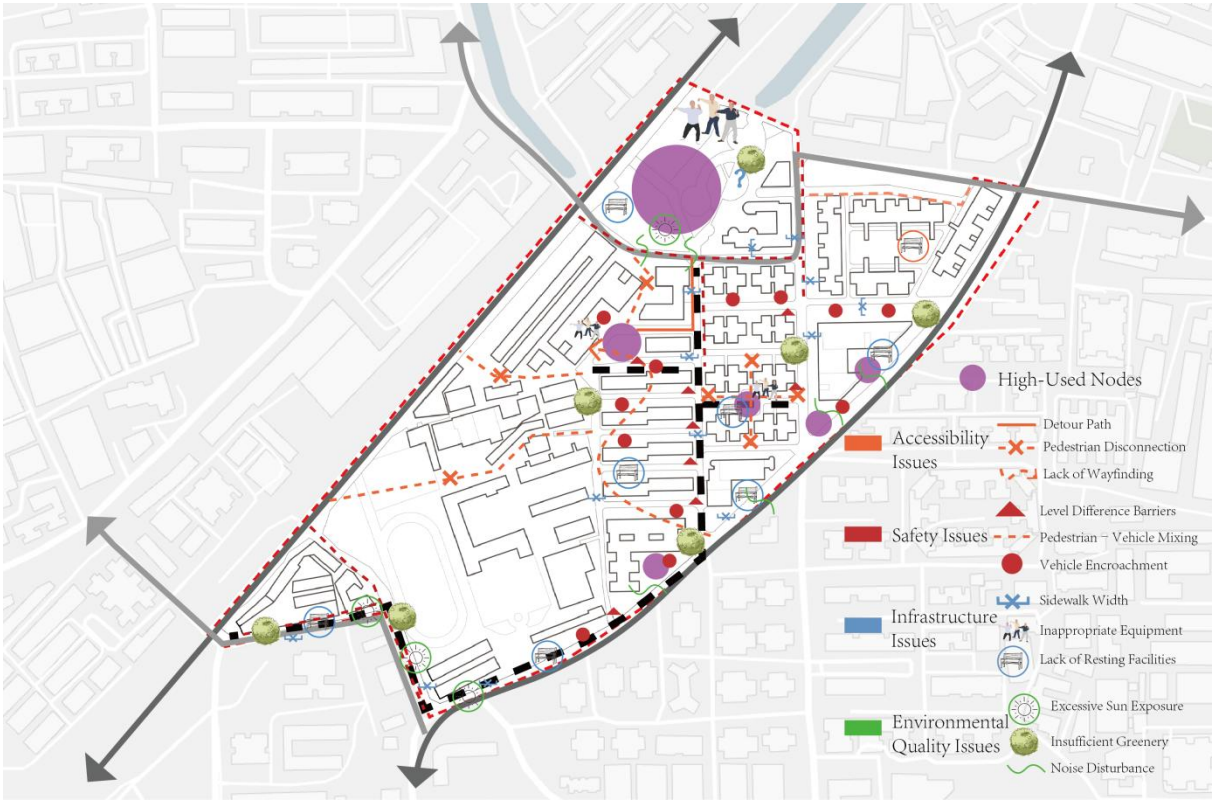


Figure6- 12 Spatial Distribution Map of Age-Friendly Problem Areas in Zhongxing Community

Source:Drawn by the Author

From the perspective of safety, pedestrian-vehicle conflict is mainly distributed along the internal branch road system and around the main entrances and exits of the community, and is particularly prominent in the north – south passage through the central area and near the southern entrance. At the same time, the occupation of road space by parked vehicles is especially concentrated in the southern part of the community and along street-facing spaces.

From the perspective of infrastructure, problems such as insufficient walkway width, damaged pavement, and the lack of resting facilities are mostly found along routes with a high number of activities and at the edges of activity nodes. These problems are particularly evident in residential affiliated spaces, commercial forecourt spaces, and some service-affiliated spaces in the central and southern parts of the community. From the perspective of environmental quality, problems such as insufficient greenery, inadequate shading, and noise disturbance are mainly concentrated along spatial edges with strong traffic interfaces and high openness. In contrast, the lack of barrier-free facilities is more concentrated at public service nodes, residential entrances, and path connection points, indicating that Zhongxing Community still has significant shortcomings in service accessibility and continuous barrier-free circulation.

Overall, the distribution of problem spaces highly overlaps with the routes most frequently used by elderly residents, indicating that age-friendly renewal in Zhongxing Community should prioritize the continuity of the pedestrian circulation system and the optimization of key nodes.

6.2 Age-Friendly Evaluation Index System

Based on the preceding analysis of existing problems in public space, the behavioral characteristics of older adults, and relevant case study experience in Zhongxing Community, this study further develops an age-friendly evaluation index system for public spaces in old communities. The system is structured around five dimensions — functional facilities, walkability, environmental quality, barrier-free accessibility, and material safety — and, through specific secondary indicators and evaluation content, assesses whether community public spaces can effectively support older adults' daily travel, resting, and social interaction. Compared with a simple description of individual spatial problems, this evaluation system places greater emphasis on the correspondence between behavioral needs and spatial elements, thereby helping to identify the weak links in the age-friendly development of current public spaces from an overall perspective. At the same time, it also provides a clear analytical framework and evaluative basis for the subsequent assessment of high-frequency activity nodes, the extraction of key problems, and the formulation of renovation strategies.

Table6- 3 Age-Friendly Evaluation Index System

Primary Indicator	Secondary Indicator	Evaluation Content
Functional Facilities	Facility Density	Coverage within 5-, 10-, and 15-minute walking ranges
	Suitability of Facility Types	Day-care centers; Elderly Care service stations
	Seating Provision	Whether the number, spacing, orientation, and arrangement of seats meet the needs for staying, communication, and intermediate rest
Walkability	Road Continuity	Whether there are interruptions, detours, blind corners, or dead-end roads, and whether continuous slow-traffic connections are formed between nodes
	Width	≥ 1.5 m
	Pedestrian–Vehicle Separation	Whether pedestrian-vehicle conflict exists, and whether clear pedestrian boundaries, pedestrian-priority organization, and separation measures are provided
Environmental Quality	Greenery and Shading	Coverage rate
	Noise Control	Whether the space is adjacent to railways or roads, and whether green buffers and quiet staying spaces are provided
Barrier-Free Accessibility	Continuity of Ramps	Whether ramps are continuously provided, and whether their slope, level transition, and turning treatment meet the circulation needs of elderly residents and wheelchair users
	Completeness of Tactile Paving	Whether tactile paving is continuous, clear, and free of interruptions
Material Safety	Slip Resistance	Paving type
	Flatness	Control of level differences

6.3 Design Concept and Translation of Strategies

The design content of this chapter corresponds to the stages of problem identification, strategy extraction, and spatial translation in the technical route presented in Chapter 1, and represents a comprehensive application of the findings from the previous investigation and case analysis. Based on the results of the earlier research and analysis, the design theme for the age-friendly renovation of public spaces in Zhongxing Community is defined as health

care and healing. The aim is to create a continuous, convenient, safe, and experientially rich spatial environment in which elderly residents can achieve autonomous activity, social interaction, and physical and psychological well-being within the community.

Table6- 4 Table of Public Space Types, Problems, and Design Strategies in Zhongxing Community

Strategy (Chapter 5)	Spatial Object	Design Measure
Accessibility Improvement	Roads	Provide barrier-free ramps, eliminate level differences, and ensure access for wheelchairs and mobility aids
	Service-oriented Space	Optimize paths between nodes, add shortcut routes, and strengthen wayfinding signage
Infrastructure Optimization	Roads and pedestrian paths	Continuously pave sidewalks, designate pedestrian–vehicle separation zones, and add slip-resistant ground surfaces
	Social-oriented Space	Arrange continuous walkways and add segmented resting seats and shading facilities
Aesthetics and Environmental Optimization	Commercial-oriented Space	Enrich the greenery layout, introduce landscape nodes, and improve visual recognizability
	Social Park; Fitness Plaza	Create dynamic–static zoned landscapes that accommodate both health and wellness activities and intergenerational interaction
Safety Improvement	Roads and entrances	Add lighting, slip-resistant ground surfaces, and gentle slope treatment to reduce the risk of falls
	Social Park; Fitness Plaza	Add guardrails and anti-collision facilities, and standardize the layout of equipment

Source:Drawn by the Author

In the design process, safety and accessibility are regarded as the primary objectives. Through the provision of barrier-free ramps, smooth walkways, and rational path design, the continuity of movement for wheelchairs and mobility aids is ensured. At the same time, attention is given to environmental comfort through the well-planned arrangement of resting facilities, adequate shading and wind protection, a clear and recognizable wayfinding system, and enriched green landscapes, so as to enhance the livability and experiential quality of the space. Through the zoning of dynamic and static activities, functional integration, and the optimization of activity nodes, social spaces and healing spaces are activated. In response to the fragmented spatial structure of the old community and the characteristics of its existing buildings, the design mainly adopts low-cost and incremental micro-renewal interventions,

thereby gradually improving spatial functions and achieving sustainable renewal. In this way, a safe, comfortable, convenient, and vibrant community public space environment can be created for elderly residents.

This study further constructs a three-dimensional spatial organization model of pedestrian paths – node network – interface support, clarifying how each strategy can be implemented in different spatial objects and providing direct guidance for the subsequent renovation design.

6.4 Master Plan

Based on the previous analysis of the current conditions of public spaces in Zhongxing Community, the behavioral characteristics of elderly residents, and the environmental evaluation of nodes with a high number of activities, this study argues that the key to age-friendly renewal in the community lies not in the isolated improvement of individual nodes, but in the reconstruction of the overall organizational logic of its internal public space system. Therefore, the master plan is developed on the basis of elderly residents' activity range and daily walking routes, taking the community park, fitness plaza, Elderly Care Center, and commercial forecourt spaces as core nodes, and establishing a continuous pedestrian circulation system together with a hierarchical activity network. Through the integrated organization of paths, nodes, interfaces, and micro-environmental conditions, the originally scattered and fragmented public spaces are transformed into an age-friendly activity system that is safe, accessible, comfortable, and capable of providing social support.

Accordingly, the master plan takes as its overall objectives the construction of a continuous pedestrian circulation system, the connection of nodes with a high number of activities, the improvement of hierarchical staying spaces, and the enhancement of overall environmental quality. In terms of spatial structure, it forms an age-friendly community public space system composed of major pedestrian linkage axes, core activity nodes, secondary staying nodes, and supportive interfaces along the routes. Among these, the major pedestrian linkage axes undertake the functions of high-number daily travel and node connection within the community; the core activity nodes accommodate composite activities such as resting, exercising, socializing, and access to services; and the secondary staying

nodes serve as transitional spaces between residential units and core nodes, providing elderly residents with opportunities for short stays, observation, and neighborhood interaction.

6.4.1 Overall Spatial Structure

According to the behavioral maps and activity frequency statistics presented in Chapter 3, elderly residents' daily activities in Zhongxing Community are mainly concentrated in the Social Park, accounting for 32%, the affiliated spaces of the Elderly Care Center, accounting for 28%, and commercial forecourt spaces, accounting for 21%. Accordingly, this study identifies these nodes with a high number of activities as the key targets for renovation. Considering that the activity radius of elderly residents in Zhongxing Community is mainly concentrated within 500 meters of their residences, the master plan takes the interior of the community and its adjacent living service spaces as the priority area for optimization. By strengthening the horizontal and vertical connections among nodes, the plan aims to improve the continuity and convenience of elderly residents' daily activity routes. In the original spatial structure, the various nodes were scattered and weakly connected by paths. In contrast, the renovated overall structure places greater emphasis on networked organization, in which a core pedestrian route with a primary linking function connects multiple nodes with a high number of activities and extends through several branch paths to building entrances, spaces around residential buildings, and peripheral service facilities.。

Therefore, the master plan organizes the pedestrian system as a composite public space with the potential for staying, recognition, and social interaction. Along the main route, resting facilities, shaded greenery, wayfinding systems, and low-level lighting are arranged. In addition, secondary staying spaces are introduced at path turns, node transitions, and interface openings, enabling elderly residents to flexibly choose whether to stop or continue walking according to their physical condition, activity needs, and willingness to engage in social interaction.



Figure6- 13 Master plan

Source: Drawn by the Author

6.4.2 Age-Friendly Walkways and Hierarchical Node Organization

On the basis of the overall spatial structure, this renovation further establishes a hierarchical activity network centered on nodes with a high number of activities. The core nodes mainly include the Social Park, the affiliated spaces of the Elderly Care Center, the fitness plaza, and commercial forecourt public spaces. These spaces directly accommodate elderly residents' composite daily activities, such as resting, exercising, social interaction, waiting, short stays, and access to services. Secondary nodes are mainly distributed in transitional areas such as building entrances and the spaces around residential buildings, where they serve as links between the core nodes and residential units. Through the layered organization of core and secondary nodes, community public space is transformed from its original scattered, point-based pattern of use into an activity system characterized by hierarchical relationships and continuous connections.



Figure6- 14 Age-Friendly Renovation Scheme for Zhongxing Community

Source:Author

Within this framework, each node is further upgraded in a targeted manner according to its functional attributes. The Social Park strengthens the zoning of dynamic and static activities while enhancing the integration of resting functions. The fitness plaza optimizes the arrangement of exercise equipment and improves anti-slip ground treatment. The Elderly Care

Center activates idle corridors as extensions of service space. Commercial forecourt spaces introduce gray-space resting zones and achieve pedestrian-vehicle separation. The accessible toilet is connected to the main loop through a shortcut route and supplemented with additional wayfinding signage.

6.5 Age-Friendly Renovation of the Social Park

6.5.1 Summary of Existing Problems and Behavioral Characteristics



Figure6- 15 Existing Problems of the Social Park(Source:Author)

As the principal social public space on the northern side of Zhongxing Community, the Social Park reveals multiple deficiencies in age-friendly conditions. In terms of pedestrian infrastructure, although the internal pathway system is relatively complete in layout, the walkways are narrow, and some areas are paved mainly with hard materials, with slight unevenness and local level differences, which increase safety risks for elderly pedestrians and wheelchair users. At the same time, resting facilities are insufficient in number and are mainly limited to a small number of stone benches along the edges of tree pits, making it difficult to meet elderly residents' diverse needs for staying and social interaction. In terms of safety, the park adopts an open layout and lacks complete boundary separation. One side passage has to be shared with a driving school, creating potential traffic safety hazards. In terms of facility accessibility, although the park is within a five-minute walking distance of the surrounding residential areas, the number of fitness facilities inside the park is limited and lacks age-friendly provision, making it difficult to meet the health and exercise needs of elderly residents of different age groups and physical conditions.

Behavioral observation shows that elderly residents' activities in the park display a clear pattern. Areas with a high number of uses are concentrated around the main community entrance and residential nodes nearby, while the main activity types include walking, morning exercise, chess and card playing, and social interaction. Activity time shows a bimodal distribution, with peaks in the morning and evening. In terms of spatial choice, elderly residents show a preference for nodes with high accessibility, open views, and adequate resting facilities, while they tend to avoid areas with uneven ground, narrow paths, or insufficient places to rest. This indicates that elderly residents' use of space is significantly influenced by accessibility, safety, environmental comfort, and the completeness of facilities, and that a close coupling relationship exists between their behavioral trajectories and spatial functions.

Therefore, the existing problems of the Social Park are closely related to the behavioral characteristics of elderly residents. High-number nodes within the park are spatially concentrated and accommodate relatively limited activity types, yet their functional performance remains constrained and potential safety hazards persist due to limitations in the spatial environment. By contrast, low-use areas are often neglected because of missing facilities, inconvenient access, or low levels of environmental comfort.

6.5.2 Strategy Application

Table6- 5 Translation of Design Strategies for the Social Park(Source:Author)

Strategy	Spatial Object	Design Measure
Accessibility Improvement	Walkways and major nodes	Provide barrier-free ramps and gentle slopes, eliminate level differences, and optimize paths between nodes
Infrastructure Optimization	Walkways and resting areas	Continuously pave slip-resistant ground surfaces and add segmented resting seats and shading facilities
Aesthetics and Environmental Optimization	Overall park space	Enrich the hierarchy of vegetation, introduce landscape nodes, create dynamic–static zoning, and improve visual recognizability
Safety Improvement	Activity nodes and resting areas	Add lighting, guardrails, and anti-collision facilities, and rationally organize resting and activity spaces to support chess and card playing, fitness activities, and social interaction

Based on the foregoing analysis of the existing problems of the Social Park and the

behavioral characteristics of elderly residents, this study applies age-friendly strategies to the park in a targeted manner, with the aim of achieving the integrated optimization of accessibility, safety, comfort, and social support. Through the translation of strategies into design interventions, the spatial renewal principles proposed in Chapter 5 are implemented in specific park nodes and paths, so that the design not only responds to elderly residents' behavioral patterns, but also takes into account spatial functionality and environmental experience.

Through the above strategy application, the Social Park has been effectively optimized in terms of spatial structure, functional layout, and environmental experience. On the one hand, barrier-free treatment of the pathways and node optimization have improved the accessibility and safety of elderly residents' activities. On the other hand, resting facilities, landscape nodes, and the zoning of dynamic and static activities have responded to elderly residents' diverse needs for comfort, social interaction, and physical exercise. The implementation of these overall strategies has transformed the park from its original fragmented and inefficient state into a safe, convenient, comfortable, and vibrant elderly-friendly space, thereby providing a direct basis for the subsequent design of specific renovation schemes.

6.5.3 Scheme Presentation



Figure6- 16 Master Plan of the Social Park Renovation (Source:Author)

Based on the previous analysis of existing problems and the behavioral characteristics of elderly residents, the renovation of the Social Park introduces the landscape of the Simayong waterway and carries out a systematic restructuring of the overall space. The renovation scheme organizes the spatial structure through a looped pathway, connecting various functional nodes to form a continuous, safe, and spatially layered activity network.



Figure6- 17 Axonometric Drawing of the Social Park

Source:Author

In terms of functional layout, the park is divided into several functional spaces, including the health and wellness garden, lawn theater, looped pathway, terraced garden, children's playground, waterside platform, and leisure pergola. Among these, the health and wellness garden and the terraced garden strengthen ecological and therapeutic experiences, providing quiet and comfortable environments for rest. The lawn theater and the children's playground create spaces for intergenerational interaction and enhance community vitality. The waterside platform, together with the looped pathway, forms a continuous waterfront activity interface. The looped pathway achieves barrier-free circulation through gentle slope design while enriching spatial hierarchy. The leisure pergola meets elderly residents' daily needs for resting and social interaction.



Figure6- 18 Lawn Theater(Source:Author)

The lawn theater follows the site's existing level differences to create a stepped terraced space, transforming the original changes in elevation into a participatory public activity venue. It integrates both social and activity functions, and can accommodate a variety of scenarios, including community cultural and recreational activities, small-scale performances, and everyday communication, thereby promoting interaction and exchange between elderly residents and other user groups, as shown in Figure 6-18.



Figure6- 19 Children's playground(Source:Author)

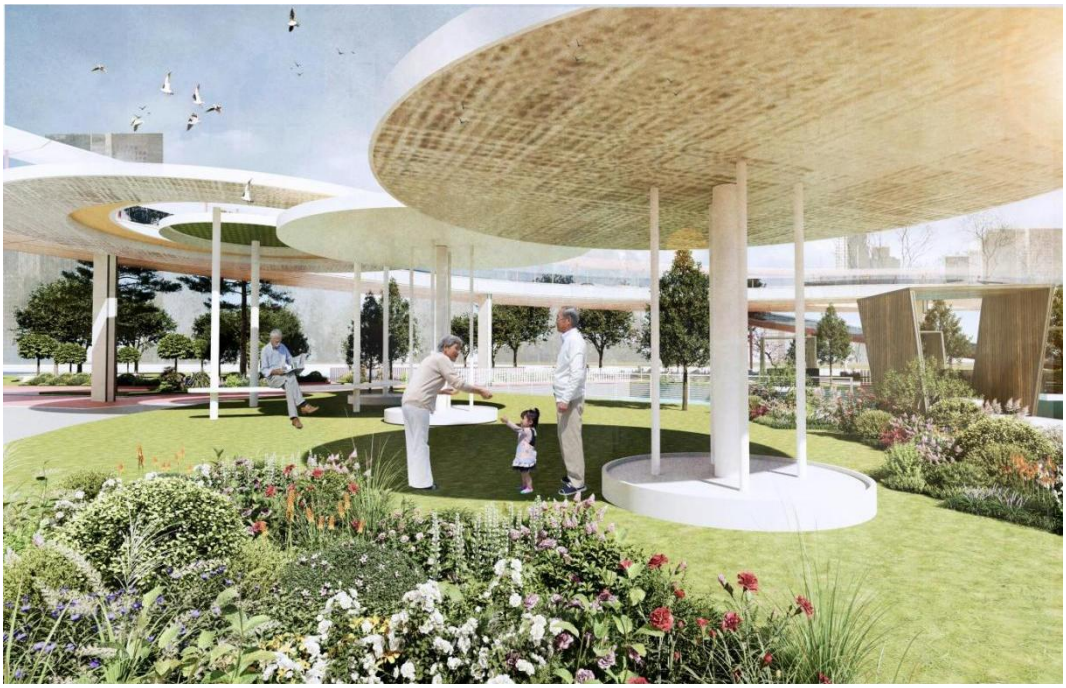


Figure6- 20 Under-corridor Space(Source:Author)

By introducing an elevated looped walkway, the design not only ensures the continuity and safety of pedestrian circulation, but also achieves a subtle vertical layering of functions. The upper level serves as a dedicated barrier-free walking route for elderly residents, while the lower level naturally forms a semi-sheltered gray space that can be flexibly arranged with resting seats and children's play facilities, as shown in Figure 6-20.



Figure6- 21 Healing Space(Source:Author)



Figure6- 22 Circular Walkway(Source:Author)

6.6 Age-Friendly Renovation of the Public Space of the Elderly Care Center

6.6.1 Summary of Existing Problems and Behavioral Characteristics

As an important node of community elderly care services, the Elderly Care Center and its affiliated public space exhibit certain functional and environmental deficiencies in actual use. In terms of spatial accessibility, the pedestrian connections between the Elderly Care Center and the surrounding residential areas are not sufficiently direct, with some routes requiring detours. In addition, certain sections have discontinuous paving or level differences, which create obstacles for elderly residents with limited mobility. In terms of space utilization, although the corridor and affiliated spaces provide basic shelter from sun and rain, their overall use rate remains low and their spatial vitality is limited due to the lack of resting facilities and activity-supporting elements. In terms of environmental quality, problems such as monotonous greenery and insufficient staying space are also evident, while the incomplete wayfinding system reduces the recognizability and convenience of the space.



Figure6- 23 Existing Conditions of Public Space of the Elderly Care Center

Source:Author

From the perspective of behavioral characteristics, elderly residents' activities around the Elderly Care Center are mainly characterized by short stays, waiting and communication, and low-intensity social interaction. These activities mostly occur near the entrance or at spatial nodes with sheltered conditions, showing clear features of "nearby staying" and "facility-dependent" behavior. Because the existing space lacks clearly defined staying nodes and a comfortable resting environment, elderly residents' activities are characterized by short duration and dispersed spatial distribution. At the same time, some elderly residents tend to avoid areas with complicated routes or unclear orientation, which further reduces the efficiency of space use.

In summary, there is a clear correspondence between the existing problems of the affiliated space of the Elderly Care Center and the behavioral characteristics of elderly residents. Inadequate spatial accessibility and unclear routes restrict elderly residents' range of movement and use, while the lack of facility provision and insufficient environmental comfort weaken the occurrence of staying and social behaviors. This analysis provides a clear basis for the formulation of subsequent age-friendly strategies, namely, improving accessibility, recognizability, and spatial vitality by optimizing the path system, activating affiliated spaces, improving resting facilities, and strengthening the wayfinding system, so as to better meet elderly residents' daily activity and social interaction needs.

6.6.2 Strategy Application

As an important node of community elderly care services, the renovation of the Elderly Care Center should focus on elderly residents' daily needs for staying, communication, and rehabilitation activities. In response to the problems identified in the previous analysis, including insufficient accessibility, low space utilization, and inadequate environmental comfort, the present design applies strategies from four aspects — accessibility, safety, environmental comfort, and pedestrian infrastructure. Through the optimization of path organization, the improvement of facility provision, and the activation of affiliated spaces, the overall use efficiency and spatial quality of the Elderly Care Center are enhanced.

Table6- 6 Translation of Design Strategies for the Elderly Care Center (Source:Author)

Design Strategy	Spatial Object	Design Measure
Accessibility Improvement	Entrance spaces; path guidance	Optimize entrance circulation and add barrier-free ramps
Safety Optimization	Pedestrian passages	Use slip-resistant paving and reduce level differences
Environmental Comfort Improvement	Corridor spaces; courtyard spaces	Enrich the hierarchy of greenery
Addition of Pedestrian Infrastructure	Resting nodes	Create communication spaces and arrange enclosed seating

6.6.3 Scheme Presentation

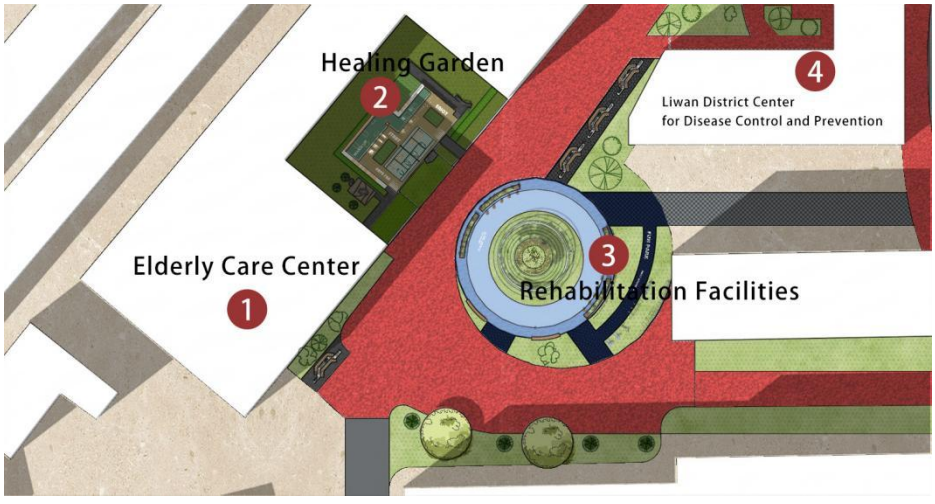


Figure6- 24 Plan of the Affiliated Space of the Elderly Care Center

Source:Author

In response to the problems identified in the field investigation — including inadequate

wayfinding, indirect pedestrian routes, a lack of resting facilities, and weak connections between the forecourt space of the Elderly Care Center and other activity nodes within the community—this renovation adopts seamless connection, friendly transition, and functional integration as its design orientation. Through this approach, the originally negative and isolated affiliated forecourt is transformed into a vibrant interface integrating barrier-free circulation, healthy waiting, social rest, and the extension of community services.



Figure6- 25 Barrier-Free Walkway and Resting Facilities

Source:Author

The design extends the pedestrian guiding line to connect the Elderly Care Center with surrounding residential entrances and the Social Park, thereby forming a closed age-friendly circulation loop. The main route is no less than 2.4 meters in width and is marked by a red pedestrian guiding line. Level differences are eliminated throughout the route, while ground guidance markings and low-level lighting are installed at key turning points and intersections, ensuring that even elderly residents with declining vision can travel independently, as shown in Figure 6-25.

According to the earlier field investigation, an enclosed corridor structure was originally located on the eastern side of the Elderly Care Center, but it had long remained idle due to the

accumulation of building materials and the lack of maintenance. Research has shown that plant diversity not only helps create a quiet and natural microenvironment, reducing environmental noise and the heat island effect, but that the colors and scents of plants can also stimulate cognitive function, evoke positive memories, and relieve loneliness and anxiety [20]. Therefore, this renovation removes the original enclosed structure, releases the greenbelt space along the side, and introduces an open semi-enclosed social corner and healing garden instead. By increasing plant diversity, the design aims to promote physical and psychological relaxation as well as emotional healing for elderly residents, as shown in Figure 6-26.



Figure6- 26 Partial Perspective View of the Affiliated Space of the Elderly Care Center

Source:Author

Through the above strategies, the design is able to effectively respond to elderly residents' needs identified in the Chapter 3 investigation, particularly their demand for sun exposure and everyday outdoor staying. The originally enclosed and inactive space on the eastern side of the Elderly Care Center has been effectively activated, and it also addresses the problem of insufficient seating reported by elderly residents in the questionnaire survey. The semi-enclosed social corner and healing garden not only meet elderly residents' needs for security and privacy, but the continuously connected red pedestrian guiding line also

effectively improves the accessibility of this space.

6.7 Age-Friendly Renovation of the Public Space of the Fitness Plaza

6.7.1 Summary of Existing Problems and Behavioral Characteristics



Figure6- 27 Existing Conditions of the Fitness Plaza (Source:Author)

As an important open activity space within the community, the fitness plaza is one of the main places where elderly residents engage in daily exercise and social interaction[59]. However, field investigation and behavioral observation reveal that it still has certain deficiencies in terms of age-friendliness. First, regarding the spatial environment, the plaza is mainly paved with hard materials, and some areas show signs of aging or uneven surfaces, which increase safety risks during elderly residents' activities. In addition, the fitness equipment is relatively limited in type and lacks graded design for elderly residents with different physical conditions, leaving room for improvement in its efficiency of use. Second, in terms of facility provision, resting facilities are insufficient in number and unevenly distributed, while shading and protective facilities are lacking, making it difficult to meet elderly residents' needs for prolonged stays and intermittent rest. Furthermore, some areas suffer from inadequate lighting, which creates certain safety hazards during nighttime use.

According to the field investigation presented in Chapter 3, elderly residents' activities in the fitness plaza are mainly characterized by low-intensity physical exercise, the use of fitness equipment, and social interaction. The timing of these activities shows clear peaks in the morning and evening. In terms of spatial distribution, activities tend to cluster around fitness equipment and shaded areas. The areas surrounding the equipment constitute high-number use

zones, whereas the edges of the space or areas lacking facilities show relatively low usage rates.

Insufficient facility provision and inadequate environmental comfort limit elderly residents' duration of stay and the quality of their activities, while unreasonable spatial organization results in uneven patterns of use. In addition, safety problems to a certain extent affect elderly residents' willingness to participate in activities. Therefore, it is necessary to improve the overall use efficiency and spatial vitality of the fitness plaza through age-friendly renovation, including the optimization of equipment configuration, the improvement of resting facilities, and the enhancement of environmental comfort and safety.

6.7.2 Strategy Application

In response to the current problems of the fitness plaza, including the limited variety of equipment, the lack of resting facilities, poor entrance connection, and insufficient environmental comfort, and in combination with the analysis of elderly residents' behavioral activities presented in Chapter 3, this study translates age-friendly strategies into the renovation of the fitness plaza from four aspects: accessibility, safety, environmental comfort, and the addition of basic facilities. The aim is to enhance the site's capacity for continuous use and its overall age-friendliness. Rather than merely supplementing individual facilities, these strategies systematically optimize the spatial organization of the site by addressing the complete process of elderly residents' use, including entering the site, participating in activities, making short stays, and engaging in neighborhood interaction.。

Table6- 7 Translation of Design Strategies for Fitness Plaza (Source:Author)

Design Strategy	Spatial Object	Design Measure
Accessibility Improvement	Plaza entrances and pedestrian paths	Optimize entrance connections, improve barrier-free access, and enhance path continuity
Safety Optimization	Activity areas and equipment zones	Use slip-resistant paving, standardize the layout of equipment, and improve nighttime lighting
Environmental Comfort Improvement	Fitness areas and edge spaces	Add shading facilities and tree shade, and provide segmented seating
Addition of Infrastructure	Equipment concentration areas and resting nodes	Create communication spaces and arrange enclosed seating

6.7.3 Scheme Presentation



Figure6- 28 Renovation Drawing of the Fitness Plaza

Source:Author

Based on the field investigation, although the existing fitness plaza in Zhongxing Community already has a certain foundation for use, it still suffers from several problems, including a mismatch between the existing equipment and elderly residents' actual needs, insufficient ground slip resistance, a lack of shading and resting support, the mixing of dynamic and static activities, and weak barrier-free connections. These shortcomings make it difficult to meet elderly residents' needs for a safe, comfortable, and sustainable exercise environment. In response, the present renovation follows principles such as safety assurance and barrier-free accessibility, and seeks to optimize the fitness plaza into a composite public space integrating low-intensity exercise, health monitoring, neighborhood interaction, and microclimate regulation.

In terms of functional layout, strategies of dynamic – static zoning and circulation optimization are adopted. The dynamic zone is equipped with age-friendly fitness facilities, such as waist and back massage equipment, Tai Chi push-hand trainers, and slow walking

machines, while the ground is treated with highly elastic and slip-resistant rubber paving, as shown in Figure 6-26. The static zone is arranged around the perimeter with resting seats with backrests, shaded pergolas, and drinking facilities, so as to meet elderly residents' needs for stretching, resting, and social interaction before and after exercise. At the same time, soft separation is achieved through hedges, flower beds, or changes in paving, which helps avoid interference from through movement while maintaining visual permeability and enhancing the sense of safety, as shown in Figure 6-28.



Figure6- 29 Small-scale Activity Space

Source:Author

6.8 Age-Friendly Renovation of Other Public Spaces

6.8.1 Age-Friendly Renovation Design of Commercial Forecourt Public Space

As a type of public space with a high number of elderly residents' daily activities, the commercial forecourt not only accommodates composite everyday behaviors such as shopping, social interaction, waiting, and short stays, but also serves as an interface connecting the community with the city and functioning as a main entrance and exit. At the

same time, the previous investigation shows that elderly residents' behavioral choices in this type of space are jointly influenced by multiple environmental factors. Therefore, in response to problems identified in the street-facing commercial forecourt on the eastern side of Zhongxing Community—such as narrow sidewalks and the encroachment of non-motorized vehicles — this study proposes a systematic renovation approach, including widening pedestrian space and optimizing non-motorized vehicle parking so as to release more public space.



Figure6- 30 Existing Conditions of Commercial Forecourt Public Space(Source:Author)

As shown in Figure 6-30, the introduction of a circular landscape water feature not only effectively increases the width of pedestrian space, but also helps lower the ambient temperature through its mist-spraying function, thereby creating a cooler and more pleasant atmosphere. At the same time, continuous resting seats are arranged around it, providing places for elderly residents to stop and talk. In terms of spatial organization, the design connects the open paved interface with the surrounding pedestrian system, thereby ensuring both the convenience of pedestrian gathering and dispersal and the continuity of circulation. The overall site maintains clear sightlines, while the surrounding trees provide moderate shading, effectively enhancing the sense of safety and environmental comfort. This design not only responds to the original problems of insufficient pedestrian space, inadequate staying facilities, and monotonous environmental quality in the commercial forecourt, but also transforms the area from a purely circulation space into an elderly-friendly public node integrating landscape display, everyday rest, and neighborhood interaction.



Figure6- 31 Renovation Drawing of Commercial Forecourt Public Space

Source:Author

6.8.2 Age-Friendly Renovation of Public Space around Residential Buildings



Figure6- 32 Existing Conditions of Space around Residential Buildings

Source:Author

In response to the problems identified in the earlier field investigation, particularly the occupation of spaces around residential buildings by non-motorized vehicles, the original public spaces around residential buildings were systematically optimized. Before renovation, these spaces were characterized by scattered functional layout, disordered traffic conditions, extensive hard paving, and irregular vehicle parking, while lacking facilities for rest and social interaction, thereby posing evident safety hazards for elderly residents. After renovation, a central activity area is created through paving treatment and combined with landscaped

greenery, providing a suitable place for elderly residents to carry out daily activities such as Tai Chi and dancing. At the same time, seats are added around the activity area to facilitate rest and neighborhood interaction, as shown in Figure 6-33.



Figure6- 33 Renovation Drawing of Space around Residential Buildings

Source: Author

6.9 Summary

This chapter, based on the earlier field investigation of public spaces in Zhongxing Community and the analysis of elderly residents' behavioral characteristics, and combined with a systematic study of typical age-friendly renovation cases at home and abroad, proposes and develops a targeted age-friendly renovation scheme. Centered on five core dimensions—accessibility, safety, pedestrian infrastructure, aesthetics, and environmental quality—the scheme carries out systematic optimization of four types of public space frequently used by elderly residents within the site, namely social spaces, road spaces, service-affiliated spaces, and spaces around residential buildings.

In the specific design process, the scheme connects the nodes most frequently selected in the previous investigation through the rational organization of spatial layout, the improvement of walking and resting facilities, the introduction of landscape elements, and the enhancement of road conditions and barrier-free accessibility, thereby effectively improving spatial

accessibility, safety, and user comfort. At the same time, while meeting functional needs, the design also emphasizes the enhancement of environmental aesthetics and neighborhood interaction, so that elderly residents' daily needs for activity, social communication, and rest can be more fully satisfied.

In addition, the scheme presented in this chapter not only provides a practical and feasible renovation design for the existing public spaces of Zhongxing Community, but also summarizes a set of replicable age-friendly design ideas and methods, offering practical reference and theoretical support for the age-friendly renovation of public spaces in similar communities. Overall, the work of this chapter achieves an organic integration of spatial function optimization, safety enhancement, environmental quality improvement, and community interaction promotion, thereby demonstrating the comprehensive value and practical applicability of age-friendly design.

Conclusion and Prospects

Conclusion

Against the background of the continued deepening of population aging in China, improving the inclusiveness and supportiveness of urban public spaces for older adults has become a core issue in the construction of age-friendly cities. Taking Zhongxing Community in Liwan District, Guangzhou, as the empirical subject, this study focuses on the actual needs of older adults' daily behavioral activities in high-density old communities. Through a systematic theoretical review, multidimensional field investigation, behavioral observation, and spatial evaluation of typical blocks, the following findings were obtained.

(1) Identifying the existing problems of public spaces in Zhongxing Community

Through systematic field investigation and resident interviews on the public spaces of Zhongxing Community, combined with spatial mapping and environmental assessment, this study identified the existing problems in the following five categories of environmental elements, which collectively reflect the deficiencies in the provision of age-friendly public spaces in high-density old communities. First, the pedestrian network is discontinuous and traffic safety is insufficient. Second, resting facilities are seriously lacking and irrationally distributed. Third, high-frequency activity nodes are isolated and lack systematic connection. Fourth, public spaces are occupied and environmental order is chaotic. Fifth, environmental comfort is inadequate.

(2) Constructing an age-friendly evaluation framework for public spaces in old communities

By applying behavioral tracking and questionnaire surveys, this study conducted a comprehensive diagnostic analysis of the current public spaces in Zhongxing Community. It closely examined the characteristics of social public spaces, street spaces, and important nodal spaces, and identified typical problems such as discontinuous walking environments, imbalanced distribution of resting facilities, inadequate age-friendly facilities, and fragmented barrier-free systems. These spatial deficiencies are further intensified under Guangzhou's hot and rainy summer climate, significantly reducing older adults' sense of safety and convenience in outdoor activities and limiting the frequency of their social interactions.

(3) Proposing targeted age-friendly renovation design strategies and schemes

Based on the theory of active aging, this study proposed the design principles of safety assurance, barrier-free accessibility, environmental comfort, and social support, and completed an overall age-friendly renovation and improvement scheme for Zhongxing Community. Through refined design of key nodes, such as optimizing the existing layout of pocket parks, renovating community entrances, and adding resting nodes, it can not only improve the age-friendliness of the physical space, but also stimulate the social vitality of older adults in the community through spatial mediation and promote intergenerational integration.

Reflections

Although this study has carried out a systematic exploration in strategy formulation and scheme design, it still has the following shortcomings due to objective constraints, which need to be further deepened in subsequent research.

There are some limitations in the construction of the age-friendly evaluation system. Owing to the limited scope of the selected literature and case references, some dimensions and sub-indicators may not have been fully covered. Therefore, the applicability and generalizability of this evaluation framework for old communities with different characteristics still require further verification through additional empirical research.

The research methods have not yet formed a complete quantitative evaluation scheme. The current study mainly focuses on identifying existing problems and conducting qualitative analysis, and still lacks a precise quantitative scoring system for walkability and age-friendliness. As a result, the findings are limited in supporting intuitive comparisons across different streets or similar communities, and the objectivity of the evaluation results still needs to be improved.

The accuracy of the survey data in capturing the real needs of older adults still needs to be improved. Due to the limited survey period and the relatively small number of valid questionnaire samples, the findings may be limited in fully reflecting the diverse and differentiated needs of older adults in the community, especially the oldest-old and physically frail groups.

Prospects

At the level of age-friendly research on public spaces in old communities, this study approaches community public space renewal from the perspective of behavior–space coupling, providing a new line of thinking for age-friendly transformation in high-density old communities. Compared with existing studies, which mainly focus on spatial environmental improvement, facility supplementation, and physical space optimization, this study starts from the characteristics of older adults' daily activities and spatial needs, and combines behavioral observation, questionnaire surveys, and spatial evaluation to identify the environmental factors affecting older adults' mobility, stay, social interaction, and rest, and to establish the relationship among behavioral characteristics, spatial elements, and renovation strategies. Overall, this study enriches the theoretical and empirical research on age-friendly renewal in old communities to a certain extent, and provides a reference for the systematic age-friendly design of community public spaces.

On this basis, there remains room for further deepening research on age-friendly public spaces in old communities. On the one hand, comparative studies can be carried out across a wider range of community types and urban contexts to further test and refine the existing evaluation framework and design methods, thereby enhancing the generalizability and applicability of the research findings. On the other hand, more refined data collection and quantitative analysis methods can be introduced to improve the accuracy of identifying older adults' actual needs, behavioral differences, and spatial perceptions. At the same time, greater attention should also be given to multidisciplinary perspectives, with a focus on psychological perception, health support, and smart elderly care, so as to further improve age-friendly public spaces in old communities.

References

[1] 王泽夏, 张晓明, 廖顺意, 等. 全龄友好城市目标下广州市适老化交通对策[J].城市交通,2022,20(04):18-27.

[2] 杨雪莲, 刘波. 广州市社区居家养老问题及对策[J]. 城市观察,2013,(04):53-61.

[3] 周岚, 丁志刚. 面向积极老龄化的城市空间治理[J].城市规划,2025,49(09):43-46+102.

[4] 黎均文, 陈诺思, 袁媛, 等. 积极老龄化背景下的大城市养老设施规划研究——以广州市社区嵌入式养老服务机构规划为例[J].上海城市规划,2024,(06):55-61.

[5] 郑宇, 方凯伦, 何灏宇, 等. 老幼友好视角下的健康社区微改造策略研究——以广州市三眼井社区为例[J].上海城市规划,2021,(01):31-37.

[6] 李海洲. 老年友好视域下老旧小区公共空间更新设计研究[J].建筑与文化,2025,(02):253-255.

[7] Liu T ,Zhu C ,Zhou D , et al.Research on Planning Strategy for Urban Community Living Environment for the Elderly That Promotes “Living Mutual Aid”[J].Buildings,2024,14(6):1575-1575.

[8] 贺舒雅. 人与环境匹配理论视角下城市老旧社区景观适老性设计研究[J].中国住宅设施,2025,(01):16-18.

[9] 张剑敏. 适宜城市老人的户外环境研究[J].建筑学报,1997,(09):11-15+65.

[10]林文洁, 于喆, 杨绪波.居住区老年人户外活动及其空间特征研究——夏季户外活动实态调查[J].建筑学报,2011,(02):73-77.

[11]李健红, 郝飞, 白小鹏. 适宜老年人活动的城市公共户外空间特征分析[J].华中建筑,2011,29(09):83-85.

[12]周燕珉, 刘佳燕. 居住区户外环境的适老化设计[J].建筑学报,2013,(03):60-64.

[13]董贺轩,刘乾,王芳.嵌入·修补·众规:城市微型公共空间规划研究——以武汉市汉阳区为例[J].城市规划,2018,42(04):33-43.

[14]司海涛,李超,王亚娜.旧城区社区微公共空间适老性更新策略研究——以铁岭旧城区为例[C]//中国城市规划学会,重庆市人民政府.活力城乡 美好人居——2019 中国城市规划年会论文集(20 住房与社区规划).沈阳建筑大学;,2019:607-618.

[15]周博,刘石磊,申威.基于行为差异性的社区公共空间适老化调查研究——以大连市为例[J].上海城市规划,2020,(06):22-29.

[16]孙旭阳,汪丽君,廖攀,等.旧城区街角小微公共空间老年人自发参与性研究[J].建筑学报,2021,(S1):

65-69.

[17]Mika M ,Jelle C V ,Rachel H , et al.Understanding the relationships between the physical environment and physical activity in older adults: a systematic review of qualitative studies.[J].The international journal of behavioral nutrition and physical activity,2014,11(1):79.

[18]陈友华.适老化改造的多维度理论剖析与实践思考[J].老龄科学研究,2025,13(08):1-12.

[19]王淑芬,王瑶,黄思齐.景观叙事视角下老旧社区公共空间更新研究——以北京朱家坟社区为例[J].中国勘察设计,2020,(08):38-42.

[20]姜玉培,甄峰,孙鸿鹄,等.健康视角下城市建成环境对老年人日常步行活动的影响研究[J].地理研究,2020,39(03):570-584.

[21]赵立志,丁飞,李晟凯.老龄化背景下北京市老旧小区适老化改造对策[J].城市发展研究,2017,24(07):11-14.

[22]何凌华,魏钢.既有社区室外环境适老化改造的问题与对策[J].规划师,2015,31(11):23-28.

[23]胡惠琴,胡志鹏.基于生活支援体系的既有住区适老化改造研究[J].建筑学报,2013,(S1):34-39.

[24]程晓青,张华西,尹思谨.既有建筑适老化改造的社区实践——北京市大栅栏社区养老服务驿站营建启示[J].建筑学报,2018,(08):62-67.

[25]裘知,楼瑛浩,王竹.国内老旧住区适老化改造文献调查与综述[J].建筑与文化,2014,(02):86-88.

[26]于一凡,陈金平.上海既有住宅区适老化改造意愿和需求分析[J].上海城市规划,2014,(05):98-101.

[27]窦永佳.既有住宅区公共空间适老化可持续性更新方法研究[D].东南大学,2017.

[28]姚栋,徐蜀辰,李华.住宅适老化改造的目标与内容——国际经验与上海实践[J].城市建筑,2017,(14):9-13.

[29]谢青.基于适老化的老旧社区公共空间微改造——以广州市白云区交电新村微改造为例[J].城市住宅,2019,26(01):69-72.

[30]赵之枫,巩冉冉.老旧小区室外公共空间适老化改造研究——以北京松榆里社区为例[C]//中国城市规划学会,沈阳市人民政府.规划 60 年:成就与挑战——2016 中国城市规划年会论文集(06 城市设计与详细规划).北京工业大学;,2016:301-316.

[31]张文阁,李兢兢,田永英.老旧小区适老化改造策略研究[J].建筑经济,2023,44(08):99-104.

[32]黄文炜,王涵,王紫熙.基于结构方程模型的既有住区适老化改造研究——以湖北省宜昌市为例[J].南方建筑,2021,(04):138-144.

[33]张如彬,孔德博,李昊.社区居家养老模式下老旧小区适老化改造策略[J].规划师,2024,40(S2):61-68.

[34]张纯,柴彦威,李昌霞.北京城市老年人的日常活动路径及其时空特征[J].地域研究与开发,2007,(0

4):116-120.

[35]姚时章,王江萍.城市居住外环境设计[M].重庆:重庆大学出版社,2001

[36]高岳.社区养老模式下西安市住区公共空间适老化改造设计研究[D].西安建筑科技大学,2018.

[37]林正财等.香港住宅通用設計指南[M].香港:香港房屋協會,2005

[38]PLACEMAKING FOR AN AGING POPULATION,UCLA,2014

[39]广州市荔湾区第七次全国人口普查公报.广州市荔湾区统计局.2021.

[40]WenBing M, CheYu H, ShengJung O. Research on the Evaluation Index System of the Construction of Communities Suitable for Aging by the Fuzzy Delphi Method[J].Environments,2020,7(10):92-92.

[41]周燕珉. 我国老年居住建筑的发展现状与矛盾问题分析[J].建设科技,2019,(13):14-17.

[42]国内外城市社区居家适老化改造典型案例集[M]. 北京: 中国城市规划设计研究院, 2023.

[43]刘佳燕,邓翔宇.北京清河阳光社区三角地改造[J].城市建筑,2018,(25):68-71.DOI:10.19892/j.cnki.csjz.2018.25.016.

[44]孙伟, 王莉静. 养老社区规划与设计[M]. 天津: 凤凰空间 / 江苏凤凰科学技术出版社, 2023.

[45]黄建中,胡刚钰,李敏.老年视角下社区服务设施布局适宜性研究——基于步行指数的方法[J].城市规划学刊,2016,(06):45-53.

[46]李楠,文佳.城市老旧社区公共空间微更新策略研究[M].云南大学出版社:202107:212.

[47]薛丰丰.城市社区邻里交往研究[J].建筑学报,2004,(04):26-28.

[48]Towards Lifetime Neighborhoods: Designing sustainable communities for all[J]. A discussion paper,2007(11):20.

[49]韩继文, 王墨晗, 李晋琦, 等. 国外老年友好社区评价体系的比较研究综述[J]. 建筑学报, 2024,(02):56-62.DOI:10.19819/j.cnki.ISSN0529-1399.202402009.

[50]梁玮男,曹阳.基于社区养老模式的公共空间设计研究[J].城市发展研究,2012,19(11):132-134.

[51]广州市规划和自然资源局. 广州市无障碍环境设计导则[Z]. 广州市规划和自然资源局, 2023.

[52]黄慧明,周岱霖,王烨.基于居住形态类型的社区生活圈空间组织模式研究——以广州为例[J].城市规划学刊,2021,(02):94-101.DOI:10.16361/j.upf.202102015.

[53]Singapore Building and Construction Authority. Universal design guide for public places[M]. Singapore Building and Construction Authority, 2016.

[54]Pan Z, Liu Y, Liu Y, et al. Age-friendly neighbourhood environment, functional a bilities and life satisfaction: A longitudinal analysis of older adults in urban China[J]. Social Science & M

edicine, 2024, 340: 116403.

[55]BUFFEL T, et al., eds. Age-Friendly Cities and Communities: A Global Perspective [M/OL]. 1 st ed. Bristol: Bristol University Press, 2018.

[56]Golant, S.Conceptualizing time and behavior in environmental gerontobgy:Apair of old issuedes erving new thought[J].The Gerontologist, 2003(43):638-648

[57]Wang T.Study on the Outdoor Activity Space for Older People in Residential Areas[J].Shanxi Architecture, 2009, 3(2):19-25.

[58]Karin J ,Lena B ,Margareta L .Older persons' navigation through the service system towards h ome modification resources.[J].Scandinavian journal of occupational therapy,2009,16(4):227-37.D OI:10.3109/11038120802684307.

[59]吴斌, 许剑峰. 老旧社区公共空间适老化调查研究[C]//中国城市规划学会,贵阳市人民政府.新常态:传承与变革——2015 中国城市规划年会论文集(16 住房建设规划).重庆大学建筑城规学院;博建建筑设计有限公司;,2015:370-383.

[60]扬·盖尔.交往与空间[M].何人可,译.北京: 中国建筑工业出版社,2002.

[61]裘知, 楼瑛浩, 王竹. 国内老旧住区适老化改造文献调查与综述[J]. 建筑与文化,2014,02:86-88.

[62]林勇强, 史逸. 城市老年人室外休闲行为初探——以老年人室外活动场地设计为例[J]. 规划师,2002,07

[63]Marcus C C, Francis C. People Places:Design Guidelines for Urba Open Space[J]. E & Fn Sp on,1998(5):213-243.

[64]吴岩. 重庆城市社区适老公共空间环境研究[D].重庆大学,2015.

[65]金俊,齐康,白鹭飞,等.基于宜居目标的旧城区微空间适老性调查与分析——以南京市新街口街道为例[J].中国园林,2015,31(03):91-95.

[66]许广通,何依,毕瑜菲.基于 PSPL 调研法的社区微空间评价与优化策略——以武汉钢花 120 社区为例[J].华中建筑,2018,36(11):108-115.DOI:10.13942/j.cnki.hzjz.2018.11.022.

[67]张亦凡.我国城市微空间研究与实践综述[J].城市建筑空间,2022,29(S2):89-93.

[68]胡惠琴,畅流.老旧住区文娱活动设施规划布局适老性改造研究——以北京红北社区为例[J].建筑学报,2016,(02):22-27.

[69]李伟,寒梅.基于“积极老龄化”理念下的城市适老空间设计探究[J].建筑学报,2014,(11):84-89.

[70]Cao R ,Wang L .The Elderly-Oriented Design Strategy of Urban Slow Space in China[J].Journ al of Social Science and Humanities,2023,5(11):DOI:10.53469/JSSH.2023.5(11).28.

[71]Zhao Y ,Zeng W ,Zhou Y , et al.Elderly-oriented Reconstruction Plans of Outer Public Space in Small Town Communities[J].E3S Web of Conferences,2019,13604079.DOI:10.1051/e3sconf/201913604079.

[72]van Hoof J, Marston H R. Age-friendly cities and communities: State of the art and future perspectives[J]. International journal of environmental research and public health, 2021, 18(4): 1644.

[73]Xu Y .Research on Aging Adaptation of Urban Residential Environment Design in the Era of Artificial Intelligence[J].Applied Mathematics and Nonlinear Sciences,2024,9(1):DOI:10.2478/AMNS.2023.2.01606.

[74]李文君,公伟.基于 Kano 模型的城市老旧社区公共空间适老化更新研究——以北京双榆树社区为例[J].工业设计,2023,(03):50-52.

[75]杨赟.老旧社区“适老化口袋公园”改造模式探索——以武汉市新洲区北壕社区为例[J].现代园艺,2021,44(21):138-140.DOI:10.14051/j.cnki.xdyy.2021.21.059.

[76]徐素雅.“积极老龄化”视角下的社区空间营造研究——以北京市海淀区社区菜园现象为例[J].北京规划建设,2017,(05):67-70.

[77]周燕珉,赵子敬.养老设施中适老化标识的设计要点[J].当代建筑,2022,(10):20-23.

[78]张秋瑶,张伟郁.积极老龄化背景下既有社区“适老化”改造设计策略研究[J].建筑与文化,2023,(03):176-178.DOI:10.19875/j.cnki.jzywh.2023.03.054.

[79]吴岩,赵科科.基于老年人健康与生活状况差异的住区公共空间及环境设计研究[J].城市住宅,2020,27(11):8-10.

[80]姜洪庆,尹心桐,梁伟研,等.广州市越秀区既有城市住区公共服务设施适老化评价研究[J].城市发展研究,2020,27(10):125-133.

[81]丁魁礼,贺静.城市老旧小区适老化微更新的政策创新研究[J].广州大学学报(社会科学版),2020,19(01):109-116.

[82]World Health Organization. Global age-friendly cities: A guide[M]. Geneva: World Health Organization, 2007.

Appendix1 Behavioral Path Tracking Record of Elderly Residents in Zhongxing Community

No.	Path	Activity Information							
		Transport	Behavior	Social	Behavior	Commercial	Behavior	Service	Behavior
7	Node 6a–Node 7b–Node 4b–Node 7c–D–Node 6b	Main Road 1	Wheelchair	Social Park (3) / Fitness Plaza (4b, 4a) / Small Green Space (5a) / Space around Residential Buildings (6a)	Exercise/ Shopping/ Sunbathing/ Exercise/ Sunbathing	Street-facing Shops (7b, 7c)	Sunbathing / Shopping	Elderly Care Center (8)	Leisure and Recreation
8	Node 6a–k–L–J–Node 3–A–d–Node 7c–Node 4b–d–c–Node 8–a–j–Node 7b–Node 6a	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Crossing the Road/ Shopping/ Walking	Street-facing Shops (7b)	Shopping	Elderly Care Center (8) / Public Toilet (9)	Chatting / Using the Toilet
9	Node 4b–j–5a–a–8–a–3–A–7c–4b–7b–6a–k–4a	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Crossing the Road/ Accompanying Descendants / Sunbathing	Street-facing Shops (7b, 7c)	Shopping / Shopping	Elderly Care Center (8)	Chatting
10	Node 4b–d–c–Node 9–Node 8–a–Node 3–A–i–Node 7b–Node 6a	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Leisure and Recreation/ Shopping / Resting	Street-facing Shops (7b)	Walking	Elderly Care Center (8)	Leisure and Recreation
11	Node 6a–Node 7b–Node 4b–d–a–Node 8–a–Node 3–A–Node 7c	Main Roads and 2	1 Ride bike	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a, 6b)	Resting / Walking / Chatting / Resting	Street-facing Shops (7b, 7c)	Accompanying Descendants / Shopping	Elderly Care Center (8)	Walking

No.	Path	Activity Information							
		Transport	Behavior	Social	Behavior	Commercial	Behavior	Service	Behavior
12	Node 4b–d–c–Node 8–a–Node 3–A–i–Node 7b–Node 6a	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b, 4a) / Space around Residential Buildings (6a, 6b, 6c)	Waste Disposal / Walking / Exercise / Shopping / Resting	Street-facing Shops (7b, 7c)	Walking / Shopping	Elderly Care Center (8) / Public Toilet (9)	Resting / Using the Toilet
13	Node 6b–h–c–Node 8–a–Node 3–d–Node 7c–d–Node 4b–Node 7b–Node 6a	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Chatting / Shopping / Resting	Street-facing Shops (7b, 7d)	Sunbathing / Shopping	-	-
14	Node 6b–D–f–Node 6c–g–9–8–a–3–7c–4b–7b–6a–k–4a	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Leisure and Recreation / Parcel Collection / Walking	Street-facing Shops (7b, 7a)	Shopping / Shopping	Elderly Care Center (8)	Walking
15	Node 6a–Node 7b–Node 4b–d–a–Node 3–H–G–Node 7d	Main Road 1	Ride bike	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Walking / Walking / Sunbathing	Street-facing Shops (7b, 7a, 7c)	Resting / Shopping / Shopping	Elderly Care Center (8)	Sunbathing
16	Node 4b–d–a–Node 8–a–Node 3–J–i–k–i–7a-7b–6a	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a, 6c)	Waste Disposal / Chatting / Sunbathing / Shopping / Resting	Street-facing Shops (7b, 7c)	Walking / Shopping	Elderly Care Center (8) / Public Toilet (9)	Resting / Using the Toilet
17	Node 8–a–Node 3–J–L–k–Node 7a–j–d–Node 7c–4b–Node 7b–6a	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings(6a)	Leisure and Recreation / Sunbathing / Walking	Street-facing Shops (7b, 7c)	Walking / Shopping	Elderly Care Center (8)	Chatting

No.	Path	Activity Information							
		Transport	Behavior	Social	Behavior	Commercial	Behavior	Service	Behavior
18	Node 6c–f–Node 7c–Node 3–A–a–8–9–e–7c–4b–7b–6a–C–Node 5b	Main Roads and 2	1 Walk	Fitness Plaza (4a) / Space around Residential Buildings (6a)	Exercise / Resting	Street-facing Shops (7b, 7a)	Walking / Shopping	-	-
19	Node 6a–C–D–E–F–G–H–Node 3–a–Node 8–c–d–7c–Node 4b–Node 7b	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Small Green Space (5b)	Resting / Walking / Sunbathing / Chatting / Resting	Street-facing Shops (7b, 7c)	Resting / Shopping	Elderly Care Center (8) / Public Toilet (9)	Walking / Using the Toilet
20	Node 4a–i–Node 7a–Node 7b–Node 6a	Main Road 1	Wheelchair	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Leisure and Recreation / Chatting / Walking	Street-facing Shops (7b)	Resting	Elderly Care Center (8)	Chatting
21	Node 5b–D–d–Node 4b–d–Node 3–a–Node 8–Node 9–d–Node 7c–Node 7b–Node 6a–C–Node 6b	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Leisure and Recreation / Resting / Walking	Street-facing Shops (7b, 7c)	Resting / Shopping	Elderly Care Center (8)	Sunbathing
22	Node 4b–d–c–Node 8–a–Node 3–A–i–Node 7b–Node 6a–C–D–Node 6c	Main Roads and 2	1 Wheelchair	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Accompanying Descendants / Chatting / Chatting	Street-facing Shops (7b)	Walking	Elderly Care Center (8) / Public Toilet (9)	Sunbathing / Using the Toilet
23	Node 6a–Node 7b–Node 4b–d–a–Node 8–a–Node 3–A–Node 7c	Main Roads and 2	1 Wheelchair	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings(6a)	Resting / Exercise / Chatting	Street-facing Shops (7b)	Chatting	Elderly Care Center (8) / Public Toilet(9)	Resting / Using the Toilet

No.	Path	Activity Information							
		Transport	Behavior	Social	Behavior	Commercial	Behavior	Service	Behavior
24	Node 4b–d–c–Node 9–Node 8–a–Node 3–J–j–Node 7b–Node 6a	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Small Green Space (5a) / Space around Residential Buildings (6a)	Walking / Walking / Sunbathing / Sunbathing	Street-facing Shops (7b, 7c)	Resting / Shopping	Elderly Care Center (8) / Public Toilet (9)	Sunbathing / Using the Toilet
25	Node 4b–d–c–Node 9–Node 8–a–Node 3–A–i–Node 7b–Node 6a	Main Roads and 2	1 Ride bike	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a, 6b)	Accompanying Descendants / Accompanying Descendants / Chatting / Resting	Street-facing Shops (7b)	Walking	Elderly Care Center (8)	Sunbathing
26	Node 8–Node 9–e–Node 7c–d–Node 3–J–j–Node 5a–j–Node 4b–Node 7b–Node 6a	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Small Green Space (5b) / Space around Residential Buildings (6a)	Waste Disposal / Walking / Sunbathing / Resting	Street-facing Shops (7b, 7c, 7a)	Walking / Shopping / Shopping	Elderly Care Center (8)	Resting
27	Node 6b–h–c–Node 8–a–Node 3–A–B–j–Node 4b–Node 7b–Node 6a	Main Roads and 2	1 Wheelchair	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Resting / Exercise / Shopping	Street-facing Shops (7b, 7a)	Resting / Shopping	Elderly Care Center (8)	Walking
28	Node 5b–C–4b–7c–3–a–8–a–i–7a–7b–6a– 5b	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b)	Exercise / Resting	-	-	-	-

No.	Path	Activity Information							
		Transport	Behavior	Social	Behavior	Commercial	Behavior	Service	Behavior
29	Node 7b–Node 4b–d–c–Node 8–a–Node 3–A–B–C–Node 7a–Node 7b–Node 6a	Main Roads and 1 2	Walk	Social Park (3) / Fitness Plaza (4b, 4a) / Space around Residential Buildings (6a, 6b)	Chatting / Parcel Collection / Exercise / Walking / Resting	Street-facing Shops (7b, 7c)	Shopping / Shopping	Elderly Care Center (8)	Chatting
30	Node 4b–d–Node 3–J–i–Node 4a	Main Road 1	Wheelchair	Social Park (3) / Fitness Plaza (4b) / Small Green Space (5b) / Space around Residential Buildings (6a)	Exercise / Shopping / Sunbathing / Chatting	Street-facing Shops (7b, 7c)	Shopping / Shopping	Elderly Care Center (8)	Leisure and Recreation
31	Node 6b–D–Node 7c–a–Node 8–a–Node 3–d–Node 4b–Node 7b–Node 6a–k–Node 4a	Main Roads and 1 2	Walk	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Leisure and Recreation / Resting / Shopping	Street-facing Shops (7b, 7c)	Sunbathing / Shopping	Elderly Care Center (8)	Sunbathing
32	Node 6a–Node 7b–C–Node 5b–D–Node 7c–Node 4b–d–a–Node 8–a–Node 3–A–Node 7c	Main Roads and 1 2	Ride bike	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Exercise / Chatting / Walking	Street-facing Shops (7b, 7c)	Shopping / Shopping	Elderly Care Center (8) / Public Toilet (9)	Leisure and Recreation / Using the Toilet
33	Node 6a–Node 7b–j–Node 5a–d–Node 7c–Node 4b–j–a–Node 8–a–Node 3	Main Roads and 1 2	Ride bike	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Crossing the Road / Shopping / Walking	Street-facing Shops (7b, 7c)	Resting / Shopping	Elderly Care Center (8)	Sunbathing

No.	Path	Activity Information							
		Transport	Behavior	Social	Behavior	Commercial	Behavior	Service	Behavior
34	Node 9–e–7c–A–3–A–7a-8–a–d–4b–7b–6a	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b)	Exercise / Resting	Street-facing Shops (7b, 7c)	Chatting / Shopping	Elderly Care Center (8)	Chatting
35	Node 6a–C–B–A–Node 3–a–Node 8–c–d–Node 7c–Node 4b–Node 7b	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Small Green Space (5a) / Space around Residential Buildings (6a, 6b)	Waste Disposal / Chatting / Sunbathing / Sunbathing / Resting	Street-facing Shops (7b, 7a, 7c)	Shopping / Shopping / Shopping	Elderly Care Center (8)	Resting
36	Node 7b–C–D–Node 7c–Node 4b–d–c–Node 8–a–Node 3	Main Roads and 2	1 Ride bike	Social Park (3) / Fitness Plaza (4b) / Small Green Space (5a) / Space around Residential Buildings(6a)	Crossing the Road / Shopping / Sunbathing / Walking / Resting	Street-facing Shops (7b, 7c)	Resting / Shopping	Elderly Care Center (8)	Sunbathing
37	Node 5a–j–Node 7a–B–A–Node 3–a–Node 8–a–d–Node 7c–Node 4b–Node 7b–Node 6a–C–D–Node 6b	Main Roads and 2	1 Ride bike	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Exercise / Chatting / Sunbathing	Street-facing Shops (7b, 7c)	Chatting / Shopping	Elderly Care Center (8)	Resting
38	Node 6a–C–D–Node 6b–h–e–Node 7c–Node 3–a–Node 8–c–d–Node 4b–Node 7b–Node 5b	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b, 4a) / Space around Residential Buildings (6a)	Walking / Parcel Collection / Exercise / Chatting	Street-facing Shops (7b)	Shopping	Elderly Care Center (8)	Resting

No.	Path	Activity Information							
		Transport	Behavior	Social	Behavior	Commercial	Behavior	Service	Behavior
39	Node 6a–Node 7b–Node 4b–d–Node 7c–e–Node 8–a–Node 3	Main Roads and 2	1	Walk	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Resting / Chatting / Shopping	Street-facing Shops (7b, 7c)	Shopping / Shopping	Elderly Care Center (8)	Walking
40	Node 4a–i–B–A–Node 3–B–j–Node 7b–Node 4b–f–g–c–Node 8–a–i–k–Node 6a	Main Roads and 2	1	Walk	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Accompanying Descendants / Resting / Shopping	Street-facing Shops (7b, 7c, 7d)	Accompanying Descendants / Accompanying Descendants / Shopping	Elderly Care Center (8)	Walking
41	Node 8–a–Node 3–J–j–Node 4b–Node 7c–D–Node 7b–Node 6a	Main Roads and 2	1	Walk	Social Park (3) / Fitness Plaza (4b, 4a) / Space around Residential Buildings (6a)	Waste Disposal / Chatting / Exercise / Sunbathing	Street-facing Shops (7b)	Shopping	Elderly Care Center (8)	Chatting
42	Node 7d–E–c–Node 8–a–Node 3–A–Node 7c–Node 4b–Node 7b–Node 6a	Main Roads and 2	1	Wheelchair	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Accompanying Descendants / Accompanying Descendants / Walking	Street-facing Shops (7b, 7c)	Resting / Shopping	Elderly Care Center (8)	Accompanying Descendants
43	Node 6a–k–L–J–Node 3–A–B–j–Node 4b–d–c–Node 8–a–j–Node 7b–Node 6a–k–Node 4a	Main Roads and 2	1	Ride bike	Social Park (3) / Fitness Plaza (4b, 4a) / Small Green Space (5a) / Space around Residential Buildings (6a)	Waste Disposal / Exercise / Sunbathing / Chatting	Street-facing Shops (7b)	Sunbathing	Elderly Care Center (8)	Chatting

No.	Path	Activity Information							
		Transport	Behavior	Social	Behavior	Commercial	Behavior	Service	Behavior
44	Node 6a–Node 7b–Node 4b–d–a–Node 8–a–Node 3–A–Node 7c	Main Roads and 2	1 Wheelchair	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a, 6b)	Waste Disposal / Exercise / Chatting / Resting	Street-facing Shops (7b, 7a)	Sunbathing / Shopping	Elderly Care Center (8)	Leisure and Recreation
45	Node 4a–m–J–3–B–j–7b–4b–d–c–8–a–i–k–6a–C-5b	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b)	Crossing the Road / Accompanying Descendants	Street-facing Shops (7b)	Sunbathing	Elderly Care Center (8)	Chatting
46	Node 7a–i–B–A–Node 3–J–j–Node 7b–Node 4b–d–c–Node 8–a–i–j–Node 7b–Node 6a–D–Node 6b	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Leisure and Recreation / Sunbathing / Resting	Street-facing Shops (7b, 7c, 7a)	Walking / Shopping / Shopping	Elderly Care Center (8)	Leisure and Recreation
47	Node 7b–Node 4b–d–c–Node 8–a–Node 3	Main Roads and 2	1 Wheelchair	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings(6c)	Walking / Exercise / Resting / Chatting	Street-facing Shops (7b, 7c, 7a)	Chatting / Shopping / Shopping	Elderly Care Center (8)	Resting
48	Node 7b–Node 4b–d–Node 7c–D–E–F–G–H–Node 3–a–Node 8–a–A–B–C–Node 7a–Node 7b–Node 6a	Main Roads and 2	1 Ride bike	Social Park (3) / Fitness Plaza (4b, 4a) / Space around Residential Buildings (6a)	Resting / Exercise / Sunbathing / Shopping	Street-facing Shops (7b, 7c)	Chatting / Shopping	Elderly Care Center (8)	Resting
49	Node 6c–f–7c–3–A–a–8–c–d–4b–7b–7a–k–6a	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a, 6b)	Leisure and Recreation / Resting / Walking / Sunbathing	Street-facing Shops (7b, 7c, 7d)	Accompanying Descendants / Shopping	Elderly Care Center (8)	Accompanying Descendants

No.	Path	Activity Information							
		Transport	Behavior	Social	Behavior	Commercial	Behavior	Service	Behavior
50	Node 4a–i–B–A–Node 3–B–j–Node 7b–Node 4b–Node 7c–f–g–c–Node 8–a–j–Node 7b–Node 6a	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Chatting / Sunbathing / Resting	Street-facing Shops (7b, 7c)	Shopping / Shopping	Elderly Care Center (8)	Walking
51	Node 7d–E–h–Node 6b–D–A–Node 3–A–a–b–Node 8–c–d–Node 7c–Node 4b–Node 7b–Node 6a	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Small Green Space (5a) / Space around Residential Buildings (6a)	Accompanying Descendants / Resting / Sunbathing / Shopping	Street-facing Shops (7b, 7c)	Accompanying Descendants / Shopping	Elderly Care Center (8)	Walking
52	Node 7b–Node 6a–C–Node 4b–Node 7c–d–c–Node 8–a–Node 3	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b, 4a) / Space around Residential Buildings (6a)	Exercise / Chatting / Resting / Sunbathing	Street-facing Shops (7b, 7c)	Chatting / Shopping	Elderly Care Center (8) / Public Toilet (9)	Resting / Using the Toilet
53	Node 5a–a–Node 8–a–Node 3–A–Node 7c–Node 4b–Node 7b–Node 6a	Main Roads and 2	1 Walk	Social Park (3)	Leisure and Recreation	Street-facing Shops (7c)	Shopping	Elderly Care Center (8)	Accompanying Descendants
54	Node 9–Node 8–a–Node 3–J–j–Node 4b–Node 7b–Node 6a–k–Node 4a	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Chatting / Shopping / Resting	Street-facing Shops (7b, 7c)	Sunbathing / Shopping	Elderly Care Center (8)	Walking

No.	Path	Activity Information							
		Transport	Behavior	Social	Behavior	Commercial	Behavior	Service	Behavior
55	Node 8–a–Node 3–d–Node 7c	Main Roads and 2	1 Wheelchair	Social Park (3) / Fitness Plaza (4b) / Small Green Space (5a) / Space around Residential Buildings (6a, 6c)	Chatting / Sunbathing / Sunbathing / Resting / Sunbathing	Street-facing Shops (7b, 7a)	Walking / Shopping	Elderly Care Center (8) / Public Toilet (9)	Resting / Using the Toilet
56	Node 6a–Node 7b–Node 4b–d–a–Node 8–a–Node 3–A–Node 7c	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a, 6b)	Leisure and Recreation / Resting / Shopping / Sunbathing	Street-facing Shops (7b, 7c)	Sunbathing / Shopping	Elderly Care Center (8) / Public Toilet (9)	Accompanying Descendants / Using the Toilet
57	Node 4b–d–a–Node 8–Node 9–g–Node 6c–f–Node 3–J–i–Node 7a–Node 7b–Node 6a–C–Node 5b	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Small Green Space (5a) / Space around Residential Buildings (6a)	Walking / Exercise / Resting / Sunbathing	Street-facing Shops (7b, 7c)	Chatting / Shopping	Elderly Care Center (8)	Sunbathing
58	Node 6b–h–c–Node 9–Node 8–a–Node 3–d–Node 7c–d–Node 4b–Node 7b–Node 6a	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Accompanying Descendants / Accompanying Descendants / Walking	Street-facing Shops (7b, 7c)	Resting / Shopping	Elderly Care Center (8)	Accompanying Descendants
59	Node 5a–a–Node 3–A–Node 7c–e–Node 8–a–d–Node 7c–Node 4b–Node 7b–Node 6a	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Crossing the Road / Accompanying Descendants / Walking	Street-facing Shops (7b, 7a)	Sunbathing / Shopping	Elderly Care Center (8)	Chatting

No.	Path	Activity Information							
		Transport	Behavior	Social	Behavior	Commercial	Behavior	Service	Behavior
60	Node 4b–d–Node 7c–e–Node 8–a–Node 3–J–j–Node 7b–Node 6a	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b, 4a) / Space around Residential Buildings (6a)	Chatting / Resting / Exercise / Resting	Street-facing Shops (7b, 7c, 7a)	Walking / Shopping	Elderly Care Center (8)	Resting
61	Node 7b–Node 4b–d–c–Node 8–a–Node 3–A–B–C–Node 7a–Node 7b–Node 6a	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Small Green Space (5b) / Space around Residential Buildings (6a, 6c)	Resting / Walking / Sunbathing / Shopping / Sunbathing	Street-facing Shops (7b, 7a)	Shopping / Shopping	Elderly Care Center (8)	Walking
62	Node 4a–i–Node 7a–Node 7b–Node 6a–C–Node 4b–Node 7c–d–c–Node 8–a–Node 3	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b, 4a) / Space around Residential Buildings (6a)	Exercise / Resting / Sunbathing / Walking	Street-facing Shops (7b, 7a)	Chatting / Shopping	Elderly Care Center (8)	Chatting
63	Node 5b–C–Node 7b–Node 4b–d–a–Node 8–a–Node 3–A–B–Node 7a–k–Node 6a–C–D–f–Node 6c	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6b)	Walking / Exercise / Sunbathing	Street-facing Shops (7c)	Shopping	-	-
64	Node 4b–d–a–Node 8–a–Node 3–J–i–Node 7a–Node 7b–Node 6a–k–Node 4a	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Exercise / Resting / Walking	Street-facing Shops (7b, 7c)	Chatting / Shopping	Elderly Care Center (8)	Chatting

No.	Path	Activity Information							
		Transport	Behavior	Social	Behavior	Commercial	Behavior	Service	Behavior
65	Node 6b–D–A–Node 3–A–Node 7c–Node 4b	Main Road 1	Wheelchair	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Crossing the Road / Sunbathing / Walking	Street-facing Shops (7b, 7c, 7a)	Sunbathing / Shopping / Shopping	Elderly Care Center (8)	Sunbathing
66	Node 7b–Node 6a–C–D–Node 7c–Node 4b–d–c–Node 8–a–Node 3	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)	Accompanying Descendants / Accompanying Descendants / Walking	Street-facing Shops (7b, 7d)	Resting / Shopping	Elderly Care Center (8) / Public Toilet (9)	Accompanying Descendants / Using the Toilet
67	Node 7b–Node 4b–d–Node 7c–e–Node 8–a–Node 3–A–B–C–Node 7a–Node 7b–Node 6a	Main Roads and 2	1 Walk	**Social Park (3) / Fitness Plaza (4b) / Space around Residential Buildings (6a)**	**Crossing the Road / Sunbathing / Walking**	**Street-facing Shops (7b, 7c, 7a)**	**Shopping / Shopping**	Elderly Care Center (8)	**Sunbathing**
68	Node 7d–E–h–Node 9–Node 8–a–Node 3–J–j–Node 4b–Node 7b–Node 6a	Main Roads and 2	1 Walk	Social Park (3) / Fitness Plaza (4b, 4a) / Small Green Space (5a) / Space around Residential Buildings (6a)	Exercise / Shopping / Sunbathing / Exercise / Sunbathing	Street-facing Shops (7b, 7c)	Sunbathing / Shopping	Elderly Care Center (8)	Leisure and Recreation

Appendix 2 Questionnaire on the Use of Public Spaces in Zhongxing Community

广州市中兴社区公共空间老年人使用状况调研问卷

Hello! I am a student from South China University of Technology. In order to understand older adults' use of and needs for public activity spaces in residential communities, and to improve age-friendly community renewal, we sincerely invite you to complete this questionnaire. This survey is conducted anonymously. Please put a √ next to the answer you find most appropriate. Thank you for your support!

Basic Information

1.Your gender: ☐ Male ☐ Female

2.Your age:

60–69 years old 70–79 years old 80 years old or above

3.Length of residence in Zhongxing Community:

☐ Less than 5 years ☐ 5–10 years ☐ 10 years or more

4.Main modes of daily travel (multiple selections allowed):

☐ Walking ☐ Bicycle / Electric bike ☐ Public bus

☐ Private car ☐ Other (please specify): _____

Behaviors in public space

5.Where do you usually engage in activities? (multiple selections allowed):

☐ Community plaza ☐ Fitness area

☐ Service-related ancillary spaces (e.g., near Kangle Center)

☐ Rear of residential buildings (near building entrances)

☐ Other (please specify): _____

6.Approximate daily outdoor activity duration:

☐ Less than 30 minutes ☐ 30 minutes to 1 hour ☐ 1 hour to 2 hours

☐ More than 2 hours

Environmental Perception Assessment (Please select the option that best reflects your actual experience)

(1)Node 3 – Community Park

Have you stayed here? ☐ Yes ☐ No (if "No", please skip this section)





Accessibility

7.1. I can easily get here.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

7.2. The pedestrian paths here are well connected, making it convenient for me to move from one place to another.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Safety

7.3. At night, the lighting conditions here make me feel safe.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

7.4. I find the traffic conditions here safe, suitable for walking and staying.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Pedestrian Infrastructure

7.5. There are sufficient resting seats available for me to use.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

7.6. There are tables and chairs here, making it convenient for me to chat and enjoy leisure time with others.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Aesthetics

7.7. The greening and landscape design here are aesthetically pleasing, making me feel pleasant.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

7.8. The design here makes me feel comfortable and willing to stay.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Environmental Quality

7.9. The air quality here is good, making me feel comfortable.

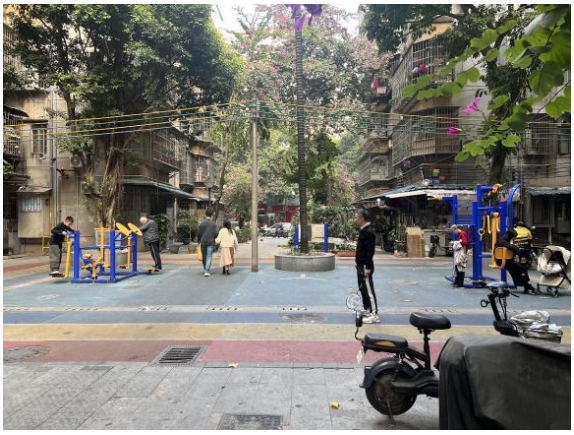
☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

7.10. During summer, there are adequate shading facilities here to avoid direct sunlight.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

(2)Node 4b - Fitness Square

Have you stayed here? ☐ Yes ☐ No (if "No", please skip this section)





Accessibility

8.1. I can easily reach this place.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

8.2. The pedestrian paths here are well-connected, making it convenient for me to walk from one place to another.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Safety

8.3. At night, the lighting conditions here make me feel safe.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

8.4. I feel that the traffic conditions here are safe, suitable for walking and staying.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Pedestrian Infrastructure

8.5. There are sufficient resting seats available here for my use.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

8.6. The fitness equipment here is diverse, and I often come to use it.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Aesthetics

8.7. The greening and landscape design here are beautiful, making me feel happy.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

8.8. The layout of fitness equipment and surrounding greenery here make me feel comfortable.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Environmental Quality

8.9. The air quality here is good, making me feel comfortable.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

8.10. During summer, there are adequate shading facilities here to avoid direct sunlight.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

(3）Node 6a -Space around Residential Area

Have you stayed here? ☐ Yes ☐ No (if "No", please skip this section)





Accessibility

9.1. I can easily reach this place.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

9.2. The pedestrian paths here are well-connected, making it convenient for me to walk from one place to another.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Safety

9.3. At night, the lighting conditions here make me feel safe.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

9.4. I feel that the traffic conditions here are safe, suitable for walking and staying.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Pedestrian Infrastructure

9.5. There are sufficient resting seats available here for my use.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Aesthetics

9.6. The greening and landscape design here are beautiful, making me feel happy.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Environmental Quality

9.7. The air quality here is good, making me feel comfortable.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

9.8. During summer, there are adequate shading facilities here to avoid direct sunlight.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

（4）Node 8 - In Front of Elderly Care Center

Have you stayed here? ☐ Yes ☐ No (if "No", please skip this section)





Accessibility

10.1. I can easily reach this place.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

10.2. The pedestrian paths here are well-connected, making it convenient for me to walk from one place to another.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Safety

10.3. At night, the lighting conditions here make me feel safe.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

10.4. I feel that the traffic conditions here are safe, suitable for walking and staying.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Pedestrian Infrastructure

10.5. There are sufficient resting seats available here for my use.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Aesthetics

10.6. The greening and landscape design here are beautiful, making me feel happy.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

Environmental Quality

10.7. The air quality here is good, making me feel comfortable.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

10.8. During summer, there are adequate shading facilities here to avoid direct sunlight.

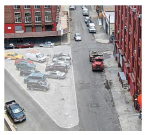
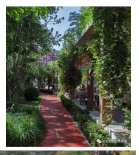
☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

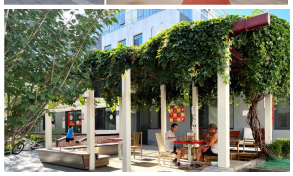
1.What aspects of the community public spaces do you think need improvement?

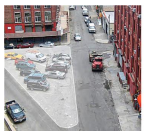
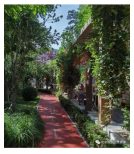
2.Do you have any other suggestions or comments?

Appendix 3 Statistical Table of Age-Friendly Case Strategies

Table4-1 Accessibility - Statistical Summary of Case Strategies (Continued)

Case Studies		Social-oriented	Commercial -oriented	Transport -oriented	Service-oriented
United States, AARP Age-friendly Park Development Strategies	  	Greenery + leisure seating. High accessibility to resting areas	Wall murals + lighting installations + brightly colored furniture. High accessibility to daily destinations / resting areas	Grid pattern. High transport accessibility	Greenery + leisure seating. High accessibility to resting areas
China, Beijing: Renovation of the Triangular Site in Qinghe Community	 	Honeycomb-shaped shading structure + greenery. High accessibility to resting areas	-	Loop road system. Moderately high transport accessibility	Wall murals + leisure seating. High accessibility to daily destinations / resting areas
China, Beijing: Environmental Renovation of the Jinsong Subdistrict	  	Traditional framed shading structure + greenery. High accessibility to daily destinations / resting areas	Paving in the same material as the building facade to define the space. High accessibility to resting areas	Cul-de-sac vehicular road. Slightly lower transport accessibility	Box-shaped space added at the entrance. High accessibility to resting areas
China, Shanghai: Environmental Renovation of Jiangchuan Road Subdistrict	 	Distinctive paving + greenery. High accessibility to resting areas	Distinctive paving + greenery. High accessibility to resting areas	Cul-de-sac vehicular road. Slightly lower transport accessibility	Distinctive paving + greenery. High accessibility to resting areas
France, Yonne: Riverside Nursing Home		Roof platform + staircase directly connected to the ground floor. High accessibility to daily destinations	-	Loop road system. Moderately high transport accessibility	Arranged around the building courtyard, with brightly colored paint defining the space + leisure seating.

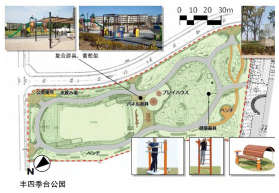
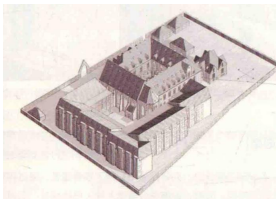
Case Studies		Social-oriented	Commercial -oriented	Transport -oriented	Service-oriented
France, Normandy :Aubry-le-Panthou Elderly Home	 	Roof platform + roof greenery. High accessibility to resting areas	-	Cul-de-sac vehicular road. Slightly lower transport accessibility	Arranged around the building courtyard, with brightly colored paint defining the space + leisure seating.
France, Mircourt: Mircourt Nursing Home	 	Roof platform + staircase directly connected to the ground floor. High accessibility to daily destinations / resting areas	-	Cul-de-sac vehicular road. Slightly lower transport accessibility	Building courtyard plaza + greenery. High accessibility to resting areas
China, Changsha: Age-friendly Renovation of Area A, Guangsha Xinyuan	 	Traditional framed shading structure + greenery. High accessibility to resting areas	-	Loop road system. Moderately high transport accessibility	Slide + landscaped green mound. High accessibility to daily destinations / resting areas
China, Beijing: Age-friendly Renovation of Courtyard No. 11	 	Traditional framed shading structure + greenery. High accessibility to resting areas	-	Loop road system. Moderately high transport accessibility	Distinctive paving + greenery. High accessibility to resting areas
China, Hangzhou: Age-friendly Renovation Project of Hemu Xincun Old Residential Community	 	Greenery + fitness equipment. High accessibility to exercise opportunities / resting areas / daily destinations	Gray space formed by long eaves + small plaza + greenery. High accessibility to resting areas	Grid pattern. High transport accessibility	Greenery. High accessibility to resting areas
Case Studies		**Social-oriented**	**Commercial -oriented**	**Transport-oriented**	**Service-oriented**

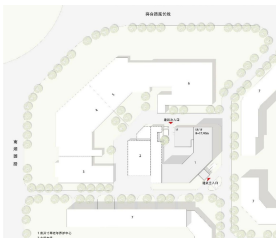
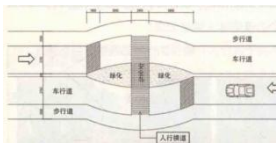
	Case Studies	Social-oriented	Commercial -oriented	Transport-oriented	Service-oriented
United States, AARP Age-friendly Park Development Strategies	  	Greenery + leisure seating	Wall murals + lighting installations + brightly colored furniture	Linear pedestrian path + circular plaza space	Greenery + leisure seating
China, Beijing: Renovation of the Triangular Site in Qinghe Community	 	Honeycomb-shaped shading structure + greenery	-	Linear pedestrian path + circular plaza space	Wall murals + leisure seating
China, Beijing: Environmental Renovation of the Jinsong Subdistrict	  	Traditional framed shading structure + greenery	Paving in the same material as the building façade to define the space	Organic pedestrian path + organic plaza space	Box-shaped space added at the entrance
China, Shanghai: Environmental Renovation ,Jiangchuan Road Subdistrict	 	Distinctive paving + greenery	Distinctive paving + greenery	Organic pedestrian path + organic plaza space	Distinctive paving + greenery
France, Yonne: Riverside Nursing Home		Roof platform + stairs directly connected to the ground floor	-	Irregular road + irregular plaza space + rectangular roof platform space	Arranged around the building courtyard, with brightly colored paint defining the space + leisure seating

	Case Studies	Social-oriented	Commercial -oriented	Transport-oriented	Service-oriented
France, Normandy:Aubry-le-Panthou Elderly Home	 	Roof platform + roof greening	-	Irregular road + irregular plaza space + rectangular roof platform space	Arranged around the building courtyard, with brightly colored paint defining the space + leisure seating
France, Mircourt: Mircourt Nursing Home	 	Roof platform + stairs directly connected to the ground floor	-	Linear pedestrian path + triangular plaza space	Building courtyard plaza + greenery
China, Changsha: Age-friendly Renovation of Area A, Guangsha Xinyuan	 	Traditional framed shading structure + greenery	-	Curvilinear pedestrian path + rectangular plaza space	Slide + landscaped green mound
China, Beijing: Age-friendly Renovation of Courtyard No. 11	 	Traditional framed shading structure + greenery	-	Curvilinear pedestrian path + rectangular plaza space	Distinctive paving + greenery
China, Hangzhou: Age-friendly Renovation Project of Hemu Xincun Old Residential Community	 	Greenery + fitness equipment	Gray space formed by long eaves + small plaza + greenery	Linear pedestrian path + circular plaza space	Greenery

Source:Drawn by the Author

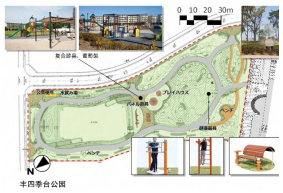
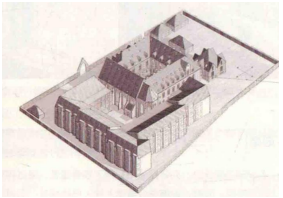
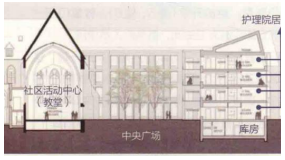
Table4-3 Aesthetics - Statistical Summary of Case Strategies (Continued)

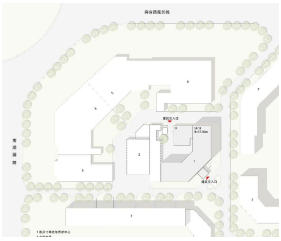
Case Studies		Social-oriented	Commercial -oriented	Transport-oriented	Service-oriented
Japan, Kashiwa City, Chiba Prefecture: Toyoshikidai Community	 	Wood paving + greenery	Deep overhanging eaves + large glass curtain wall + greenery	Curvilinear pedestrian path, with greenery separating the road	Greenery
Japan, Tokyo: Yui no Mori Tama-daira Elderly Apartments	 	Timber platform + greenery + unified wood tone	Wood-toned wall surfaces (gray space), integrated with nature	Curvilinear pedestrian path, with greenery separating the road	Greenery + timber platform
Denmark, Copenhagen: St. Joseph Elderly Apartments and Nursing Home	 	Red brick facade + greenery	Red brick facade + cultural building facade (integration of old and new)	Curvilinear pedestrian path, with greenery separating the road	Use of symbolic site elements (cross-shaped seating)
The Netherlands ,Gelderland: De Benring Intergenerational Co-housing Apartment	 	Greenery + open views	Greenery + open views	Linear pedestrian path, with greenery separating the road	Greenery + open views
China, Beijing: Yinheyuan Elderly Care Station, Dashilar Subdistrict	 	Timber platform + greenery + unified wood tone	Eaves imitating traditional Chinese architecture + unified wood tone	Irregular road form of traditional villages	Timber platform + greenery + unified wood tone

China, Beijing: Shoukai Cuncao Wangjing Elderly Care Center	 	Timber platform + greenery + unified wood tone	Greenery	Linear pedestrian path, with greenery separating the road	Wood tone + white (interior)
China, Shanghai: Nandan Neighborhood Center	 	Greenery + unified wood tone	Greenery + open views	Linear pedestrian path	Wood tone + white + green (interior)
China, Shanghai: Yuexiang Canteen, Jiangchuan Road Community	 	Timber platform + greenery + unified wood tone	Red brick facade + greenery	Linear pedestrian path, with greenery separating the road	Red brick facade + greenery
Singapore: Senior Safety Zone Renewal Project	 	Greenery	Greenery	Eye-shaped and serpentine vehicular road	Greenery
Japan, Kashiwa City, Chiba Prefecture: Toyoshikidai Community	 	Organic shading structure	Timber platform + greenery + unified wood tone	Curvilinear pedestrian path, with greenery separating the road	Red-painted ground

Source:Drawn by the Author

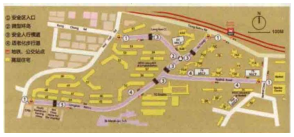
Table4-4 Environmental Quality - Statistical Summary of Case Strategies (Continued)

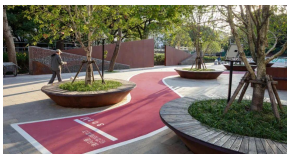
Case Studies		Social-oriented	Commercial -oriented	Transport -oriented	Service-oriented
Japan, Kashiwa City, Chiba Prefecture: Toyoshikidai Community	 	Greenery improves air quality	Deep sloping overhang increases sunlight	Lawns + trees arranged on both sides	Greenery improves air quality
Japan, Tokyo: Yui no Mori Tama-daira Elderly Apartments	 	Sufficient sunlight spacing between buildings	Gray space with good ventilation	Lawns + shrubs on both sides, trees on one side	Open corridor with good ventilation
Denmark, Copenhagen: St. Joseph Elderly Apartments and Nursing Home	 	Sloped roof daylighting device increases sunlight	The building courtyard has a good stack effect and good ventilation	Lawns + shrubs on both sides, trees on one side	Enclosure walls and buildings form cool alleys with good ventilation
The Netherlands ,Gelderland : De Benring Intergenerational Co-housing Apartment	 	Greenery improves air quality	Greenery improves air quality	Lawn + shrubs + trees arranged on one side	Greenery improves air quality
China, Beijing: Yinheyuan Elderly Care Station, Dashilar		Use of roof platform for sufficient sunlight	Spacing between shading panels increases sunlight	Potted plants arranged on one side	Use of roof platform for sufficient sunlight

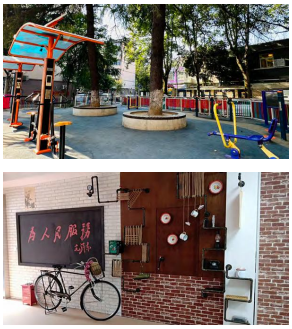
Case Studies		Social-oriented	Commercial -oriented	Transport -oriented	Service-oriented
Subdistrict					
China, Beijing: Shoukai Cuncao Wangjing Elderly Care Center	 	Use of roof platform for sufficient sunlight	Greenery improves air quality	Lawn + shrubs + trees arranged on one side	Large indoor space + multiple windows for sufficient sunlight
China, Shanghai: Nandan Neighborhood Center	 	Greenery improves air quality	The building courtyard has a good stack effect and good ventilation	Lawn + shrubs + trees arranged on one side	Large indoor space + multiple windows for sufficient sunlight
China, Shanghai: Yuexiang Canteen, Jiangchuan Road Community	 	Use of roof platform for sufficient sunlight	Use of river water to regulate microclimate	Lawns + trees arranged on both sides	Use of river water to regulate microclimate
Singapore: Senior Safety Zone Renewal Project	 	Greenery improves air quality	Greenery improves air quality	Lawns + shrubs + trees arranged on both sides	Greenery improves air quality

Source:Drawn by the Author

Table4-5 Safety - Statistical Summary of Case Strategies (Continued)

Case Studies		**Social-oriented**	**Commercial -oriented**	**Transport -oriented**	**Service-oriented**
Singapore: Senior Safety Zone Renewal Project	 	Installation of clear signage	Large glass curtain wall providing sufficient light and liveliness at night	Special road forms to reduce vehicle speed	Installation of clear signage
Singapore: Park Connector Network	 	Open visibility and fewer crime-prone spaces	Open visibility and fewer crime-prone spaces	Special road forms to reduce vehicle speed	Red-painted paving separating vehicular roads and pedestrian areas to achieve pedestrian–vehicle separation
United States, AARP Age-friendly Park Development Strategies	 	Increased pedestrian area	Converting vehicular roads into pedestrian roads to increase vitality	Increased pedestrian area	Converting vehicular roads into pedestrian roads to increase vitality
China, Beijing: Renovation of the Triangular Site in Qinghe Community	 	Waste tires placed at site edges for soft separation and buffering	-	Waste tires placed at site edges for soft separation and buffering	Waste tires placed at site edges for soft separation and buffering
China, Beijing: Environmental Renovation of the Jinsong Subdistrict	 	Greenery separating vehicular roads and pedestrian areas to achieve pedestrian–vehicle separation	Large glass curtain wall providing sufficient light and liveliness at night	Greenery separating vehicular roads and pedestrian areas to achieve pedestrian–vehicle separation	Large glass curtain wall providing sufficient light and liveliness at night

Case Studies		Social-oriented	Commercial -oriented	Transport -oriented	Service-oriented
China, Shanghai: Environmental Renovation of Jiangchuan Road Subdistrict	 	Greenery separating vehicular roads and pedestrian areas to achieve pedestrian–vehicle separation	Greenery separating vehicular roads and pedestrian areas to achieve pedestrian–vehicle separation	Greenery separating vehicular roads and pedestrian areas to achieve pedestrian–vehicle separation	Red-painted paving separating vehicular roads and pedestrian areas to achieve pedestrian–vehicle separation
France, Yonne: Riverside Nursing Home	 	Activity spaces arranged on roof platforms to separate them from vehicles	-	Greenery separating vehicular roads and pedestrian areas to achieve pedestrian–vehicle separation	Large glass curtain wall providing sufficient light and liveliness at night
France, Normandy :Aubry-le-Panthou Elderly Home	 	Activity spaces arranged on roof platforms to separate them from vehicles	-	Greenery separating vehicular roads and pedestrian areas to achieve pedestrian–vehicle separation	Large glass curtain wall providing sufficient light and liveliness at night
France, Mircourt: Mircourt Nursing Home	 	Activity spaces arranged on roof platforms to separate them from vehicles	-	Greenery separating vehicular roads and pedestrian areas to achieve pedestrian–vehicle separation	Large glass curtain wall providing sufficient light and liveliness at night
China, Changsha: Age-friendly Renovation of Area A, Guangsha Xinyuan	 	Greenery separating vehicular roads and pedestrian areas to achieve pedestrian–vehicle separation	-	Greenery separating vehicular roads and pedestrian areas to achieve pedestrian–vehicle separation	Greenery separating vehicular roads and pedestrian areas to achieve pedestrian–vehicle separation

Case Studies		Social-oriented	Commercial -oriented	Transport -oriented	Service-oriented
China, Beijing: Age-friendly Renovation of Courtyard No. 11		Greenery separating vehicular roads and pedestrian areas to achieve pedestrian–vehicle separation	-	Red-painted paving separating vehicular roads and pedestrian areas to achieve pedestrian–vehicle separation	Red-painted paving separating vehicular roads and pedestrian areas to achieve pedestrian–vehicle separation
China, Hangzhou: Age-friendly Renovation Project of Hemu Xincun Old Residential Community		Greenery separating vehicular roads and pedestrian areas to achieve pedestrian–vehicle separation	Deep gray space achieving pedestrian–vehicle separation	Greenery separating vehicular roads and pedestrian areas to achieve pedestrian–vehicle separation	Greenery separating vehicular roads and pedestrian areas to achieve pedestrian–vehicle separation

Source:Drawn by the Author

Table4- 6Statistical Summary of Case Strategies

Factor	Social-oriented	T	Commercial -oriented	T	Transport -oriented	T	Service -oriented	T
Accessibility	1. Resting areas	10	1. Resting areas	8	2. Cul-de-sac vehicular road	9	1. Resting areas	8
	3. Resting areas / daily destinations	7	3. Resting areas / daily destinations	3	4. Loop vehicular road (moderate traffic accessibility)	7	3. Resting areas / daily destinations	8
	5. Exercise opportunities / resting areas / daily destinations	3	6. Exercise opportunities / resting areas	2	7. Grid-pattern vehicular road (high traffic accessibility)	3	6. Exercise opportunities / resting areas	2
	-	-	8. Exercise opportunities / daily destinations	1	9. Mixed vehicular road with zoned design	1	8. Exercise opportunities / daily destinations	2
Infrastructure	10. Roof platform + roof greening	4	11. Gray space formed by long eaves	3	12. Curvilinear pedestrian path + rectangular plaza space	5	13. Large indoor space	4

Factor	Social-oriented	T	Commercial -oriented	T	Transport -oriented	T	Service -oriented	T
	14. Traditional framed shading structure	3	15. Building courtyard plaza + greenery	2	16. Linear pedestrian path + circular plaza space	3	17. Garden path	2
	18. Greenery + fitness equipment	2	19. Greenery	2	20. Clustered pedestrian paths	2	19. Greenery	2
	19. Themed garden / greenery	2	21. Waterfront platform + waterfront walkway	2	22. Linear pedestrian path + rectangular plaza space	2	23. Distinctive paving + greenery	2
	24. Planting area / greenery + resting seats	2	25. Small vegetable garden + gym	1	26. Organic pedestrian path + organic plaza space	2	27. Gray space equipped with full service facilities	1
	28. Roof platform + stairs directly connected to the ground floor	2	29. Gray space formed by large shading panels	1	30. Irregular road + irregular plaza space + rectangular roof platform space	2	11. Gray space formed by long eaves	1
	31. Timber platform + resting seats	1	32. Wall murals + lighting installations + brightly colored furniture	1	33. Linear pedestrian path + rectangular roof platform space	1	34. Roof platform and semi-indoor space	1
	15. Building courtyard + greenery	1	35. Paving in the same material as the facade to define the space	1	36. Linear pedestrian path + rectangular plaza space + rectangular roof platform space	1	21. Waterfront plaza + waterfront walkway	1
	37. Organic shading structure	1	23. Distinctive paving + greenery	1	38. Linear pedestrian path + triangular plaza space	1	39. Slow-traffic space under the viaduct	1
	40. Honeycomb-shaped shading structure	1	-	-	41. Rectangular roof platform space + irregular plaza space	1	42. Greenery + leisure seating (park edge)	1
	23. Distinctive paving + greenery	1	-	-	-	-	43. Wall murals + leisure seating	1

Factor	Social-oriented	T	Commercial -oriented	T	Transport -oriented	T	Service -oriented	T
Aesthetic	46. Timber platform + greenery + unified wood tone	7	47. Red brick facade	3	48. Curvilinear pedestrian path, with greenery separating the road	8	19. Greenery	3
	14. Traditional framed shading structure	3	49. Greenery + open views	2	50. Linear pedestrian path, with greenery separating the road	3	51. Red + white geometric color blocks (interior)	2
	52. Wood-toned paving + greenery	1	19. Greenery	2	53. Linear pedestrian path	2	52. Greenery + timber platform	1
	47. Red brick facade	1	54. Deep sloping overhang + large glass curtain wall	1	55. Organic pedestrian path	2	56. Use of symbolic site elements (cross-shaped seating)	1
	49. Greenery + open views	1	57. Wood-toned wall surface (gray space)	1	58. Irregular road (following topographic contour lines)	2	49. Greenery + open views	1
	19. Greenery	1	59. Red brick facade + cultural building facade (integration of old and new)	1	60. Irregular road form of traditional villages	1	46. Timber platform + greenery + unified wood tone	1
	37. Organic shading structure	1	61. Eaves imitating traditional Chinese architecture + unified wood tone	1	62. Eye-shaped and serpentine vehicular road	1	63. Wood tone + white (interior)	1
	64. Symmetrical concentric circular plan pattern shaped by greenery	1	46. Timber platform + greenery + unified wood tone	1	65. Linear + circular pedestrian path	1	66. Wood tone + white + green (interior)	1
	40. Honeycomb-shaped shading structure	1	67. Gray brick texture (paving)	1	-	-	47. Red brick facade	1

Factor	Social-oriented	T	Commercial -oriented	T	Transport -oriented	T	Service -oriented	T
	68. Red + white paint (ground)	1	68. Red + white paint (ground)	1	-	-	69. Red paint (ground)	1
	70. Green facade + timber platform	1	-	-	-	-	71. Green paint (ground)	1
	72. Circular tree pit + circular ground pattern	1	-	-	-	-	73. Wall murals	1
	-	-	-	-	-	-	74. Metal frame + glass curtain wall	1
Environmental Quality	19. Greenery improves air quality	7	19. Greenery improves air quality	5	78. Lawns + shrubs + trees arranged on both sides	12	19. Greenery improves air quality	10
	10. Use of roof platform for sufficient sunlight	6	11. Gray space with good ventilation	2	79. Lawn + shrubs + trees arranged on one side	3	15. Use of courtyard space for sufficient sunlight	3
	14. Shading structures improve micro-environmental comfort	4	15. Building courtyard with stack effect and good ventilation	2	80. Lawns + trees arranged on both sides	2	81. Large indoor space + multiple windows for sufficient sunlight	2
	82. Sufficient sunlight spacing	1	83. Use of river water to regulate microclimate	2	84. Lawns + shrubs on both sides, trees on one side	2	85. Open corridor with good ventilation	1
	86. Sloped roof daylighting device increases sunlight	1	87. Deep sloping overhang increases sunlight	1	88. Potted plants arranged on one side	1	89. Use of enclosure walls and buildings to form cool alleys with good ventilation	1
	83. Use of river water to regulate microclimate	1	90. Spacing between shading panels increases sunlight	1	-	-	83. Use of river water to regulate microclimate	1

Factor	Social-oriented	T	Commercial -oriented	T	Transport -oriented	T	Service -oriented	T
	-	-	91. Use of the cool-alley effect of lane spaces to enhance ventilation	1	-	-	92. Large glass curtain wall provides sufficient sunlight	1
Safety	93. Activity spaces set on roof platforms (pedestrian–vehicle separation)	6	92. Large glass curtain wall providing light and liveliness	4	94. Greenery separating vehicular roads and pedestrian areas	8	94. Greenery separating vehicular roads and pedestrian areas	6
	94. Greenery separating vehicular roads and pedestrian areas	5	94. Greenery separating vehicular roads and pedestrian areas	3	95. Pedestrian areas concentrated in the building courtyard (pedestrian–vehicle separation)	4	92. Large glass curtain wall providing light and liveliness	4
	96. Open visibility and fewer crime-prone spaces	3	11. Deep gray space (pedestrian–vehicle separation)	2	97. Separation of pedestrians and vehicles by enclosure walls	3	69. Red-painted paving separating vehicular roads and pedestrian areas	3
	98. Timber paving separating vehicular roads and pedestrian areas	1	96. Open visibility and fewer crime-prone spaces	2	99. Special road forms to reduce vehicle speed	2	100. Indoor spaces equipped with fire elevators	2
	101. Raised outdoor ground to reduce level differences	1	102. Additional entrances/exits to reduce crowding and walking distance	1	103. Increased pedestrian area	1	97. Separation of pedestrians and vehicles by enclosure walls	1
	97. Separation of pedestrians and vehicles by enclosure walls	1	97. Separation of pedestrians and vehicles by enclosure walls	1	104. Waste tires placed at site edges as buffers	1	93. Activity spaces set on roof platforms (pedestrian–vehicle separation)	1
	105. Installation of clear signage	1	106. Converting vehicular roads into pedestrian roads	1	69. Red-painted paving	1	105. Installation of clear signage	1

Factor	Social-oriented	T	Commercial -oriented	T	Transport -oriented	T	Service -oriented	T
	103. Increased pedestrian area	1	-	-	-	-	106. Converting vehicular roads into pedestrian roads	1
	104. Waste tires placed at site edges as buffers	1	-	-	-	-	104. Waste tires placed at site edges as buffers	1

Source:Drawn by the Author

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第一章 绪论

1.1 研究背景与研究问题

1.1.1 社会背景

随着全球人口结构深刻转型，老龄化已从发达国家现象演变为21世纪人类共同挑战。联合国《2024 世界人口展望》[注1]的预测显示，中国老年人口的绝对规模和相对比重将会持续增加，这意味着我国的老龄化问题在未来将会长期存在。截至2024年末，全国60周岁及以上老年人口31031万人，占总人口的22.0%；全国65周岁及以上老年人口22023万人，占总人口的15.6%。全国65周岁及以上老年人口抚养比22.8%。全国人均预期寿命达79.0岁[注2]。到2035年我国老年人将达到4.2亿，占总人口的30.31%；到2100年，我国的老年人口数量将超过年轻人（图1-1）。随着人口老龄化程度的加剧，社区尺度的空间适配问题逐渐成为老龄化应对的关键切入点。然而，相较于宏观养老政策与设施供给研究，针对高密度老旧社区中老年人行为空间环境耦合机制的相关研究仍相对不足，尤其缺乏基于实证数据的空间优化路径[61]。

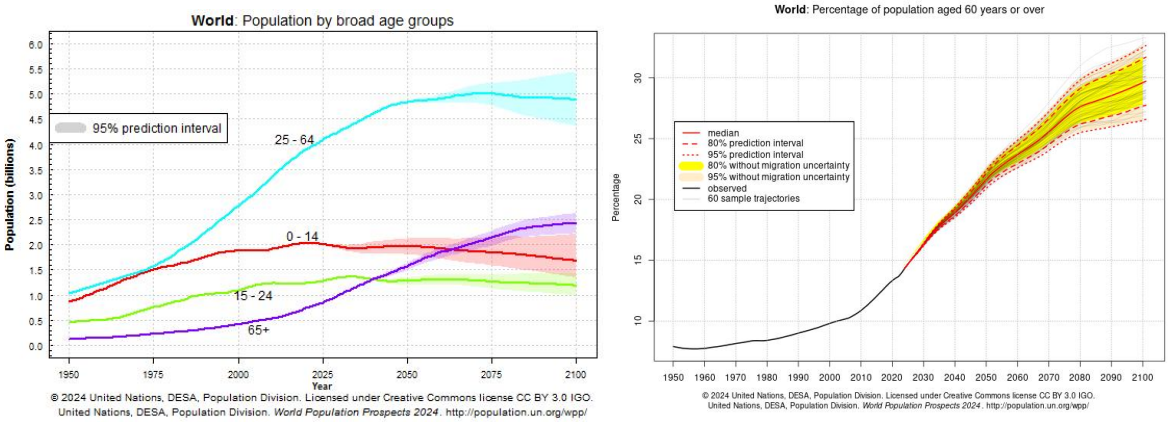


图 1- 1 未来老年人口数据变化

图片来源：《2024 世界人口展望》[1]

根据广州市统计局《2024年广州市老年人口和老龄事业统计数据》[3]数据显示，截至2024年年末，广州市户籍人口1075.02万人，其中60岁及以上老年人口212.92万人，占比19.81%，虽略低于全国老龄化平均水平（22%），但其中心城区如荔湾区、越秀

[1] 联合国经济和社会事务部人口司．2024 世界人口展望[R]．纽约：联合国，2024
[2] 民政部．2024 年度国家老龄事业发展公报[R]．北京：民政部，2025
[3] 广州市民政局．2024 年广州市老年人口和老龄事业统计数据[R]．广州：广州市民政局，2025

区和海珠区已进入老龄化与高密度叠加的局部深度老龄化阶段，呈现出更为突出的空间适老化压力。从区域分布看，户籍老年人口数量最多的 3 个区分别为越秀区、海珠区和荔湾区。在年龄结构上，60 岁及以上老年人口中，60-69 岁组占 53.6%，70-79 岁组占 32.2%，80 岁及以上组占 14.2%。

表 1- 1 2024 年末广州市各区老年人口基本情况（节选）

地区	总人口（万人）	60 岁及以上		65 岁及以上		80 岁及以上	
		人数（万人）	占本地区总人口比重（%）	人数（万人）	占本地区总人口比重（%）	人数（万人）	占本地区总人口比重（%）
全市	1075.02	212.92	19.8	151.72	14.1	30.24	14.2
荔湾区	81.39	25.72	31.6	18.36	22.6	3.57	13.9
越秀区	116.51	35.11	30.1	25.33	21.7	5.71	16.3
海珠区	111.58	32.83	29.4	23.73	21.3	4.91	14.9
天河区	110.57	17.79	16.1	12.54	11.3	2.91	16.3

来源：笔者自绘

在老龄化加速的背景下，广州市大量传统社区（建成于 20 世纪 90 年代左右的老旧小区）普遍存在适老功能系统性缺失。物理环境的适老性是保障老年人安全、独立出行的基础[6]。然而在广州的传统住宅区，无障碍设施的系统性缺失是老年人出门难、回家难的普遍痛点。在多层住宅占据主导地位的老城区，缺乏电梯是老年人，特别是腿脚不便或高龄老人，实现在地养老的最大障碍之一。下楼难导致许多老年人动范围受限于室内，严重影响其身心健康和社区参与。有研究指出，越秀区作为老年人口最集中的区域，其社区养老服务建筑的垂直电梯设置率仅为 4.4%[1]。除了物理环境的硬件短板，满足老年人日常照料、健康管理、文化娱乐和社交需求的社区服务设施，同样存在着供给不足和质量不高的双重问题。尤其在寸土寸金的老城区，新建或改建养老设施的难度极大。这导致日间照料中心、长者饭堂、社区卫生服务站、康复训练中心、老年活动中心等基础性养老设施严重短缺[2] 。

因此，推动老旧社区适老化改造，从公共空间、服务多维度重构“老年友好型”社

区居住环境，已成为广州应对深度老龄化、提升城市韧性与人文关怀的紧迫任务。由此可见，中国老龄化已由结构变化转向规模压力与结构压力并存的阶段。这一转变意味着社区层面空间适配问题将成为应对老龄化的关键弱点。

1.1.2 政策背景

2020 年是中国老旧社区适老化改造政策史上的关键分水岭。在此之前，相关政策多散见于养老服务体系、无障碍环境建设、老旧小区改造等不同领域，缺乏系统性和强制性。2020 年，以《国务院办公厅关于全面推进城镇老旧小区改造工作的指导意见》、《关于加快实施老年人居家适老化改造工程的指导意见》和《关于开展示范性全国老年友好型社区创建工作的通知》为起点，国家层面的适老化改造政策进入了密集发布、系统构建的新阶段。2022 年，《“十四五”国家老龄事业发展规划》首次将“老年友好型社区”纳入国家政策体系，明确提出“实施老年人居家适老化改造工程，完善社区养老服务设施，推动社区环境与服务适老化升级”，并要求“到 2025 年，建成 5000 个以上示范性老年友好型社区”[注4]。2023 年，《住房和城乡建设部等部门关于推进城市社区嵌入式服务设施建设的指导意见》推动在社区（尤其是老旧社区）中紧凑、复合地嵌入养老托育、社区助餐、家政便民、健康服务、体育健身等服务设施，直接回应了老旧社区公共服务空间不足的痛点。同年 9 月，《中华人民共和国无障碍环境建设法》要求“对既有的不符合无障碍设施工程建设标准的居住建筑、居住区、公共场所等进行无障碍改造”，直接赋予老旧社区适老化（无障碍）改造以法律义务。2024 年，《关于发展银发经济增进老年人福祉的意见》将适老化改造纳入“银发经济”范畴，鼓励社会资本参与，推广“物业+养老”、“互联网+养老”等新模式，为适老化改造提供了更广阔的市场化发展空间和可持续的商业逻辑。

广州市作为国家中心城市和超大城市，积极响应国家部署，将“老龄友好型社区”建设纳入城市更新核心议程，其相关政策是在国家顶层设计的指导下展开的。2020 年，民政部等九部门联合印发的《关于加快实施老年人居家适老化改造工程的指导意见》，为各地开展居家适老化改造提供了政策依据和行动指南。2022 年，《广州市老龄事业发展“十四五”规划》率先提出打造全国老龄友好型社区示范标杆的目标，明确到 2025 年，完成 1000 个老旧小区适老化改造项目，覆盖率达 50%以上，并设立市级专项资金，

[4] 国务院．“十四五”国家老龄事业发展规划：国发〔2021〕40 号[R]．北京：国务院，2021

建立政府主导、社会参与、居民共治的改造机制。同时，广州在越秀区试点社区嵌入式养老服务中心+适老设施一体化模式，探索微更新改造路径，形成政策创新样本。

由此，以空间适老化为目标导向，展开针对当前老龄化程度较高的地区居住社区公共空间的研究，在响应提升社区适老化水平政策方针的同时，又符合健康老龄化的总体发展目标。伴随着老龄人口的动态增长，以老年人群需求为优先的适老化改造对于改善居民生活环境、建设老龄友好型社区具有深刻意义，为全国超大城市应对深度老龄化提供可复制的“广州方案”。综上，可以看出我国适老化改造策略已从早期的分散引导阶段逐步转向体系化推进、法制约束、市场参与的综合治理阶段，其核心特征表现为设施补短板向空间服务治理一体化转型。

基于上述社会现象与政策背景，可以发现当前老旧社区适老化改造面临 3 个核心矛盾：第一，改造对象复杂，空间高度碎片化，缺乏系统化空间分类指导。第二，改造内容多停留于设施增设层面，缺乏老年人真实行为模式的空间机制响应。第三，公共空间更新通常以工程导向为主，缺少行为效果的评估闭环。

因此，本文研究围绕于以下问题展开：（1）高密度老旧社区老年人的行为模式与公共空间结构之间存在何种耦合关系？（2）当前公共空间在哪些维度上未能有效支撑老年人的日常活动？（3）如何构建基于行为数据驱动的行为特征-空间要素设计改造策略的映射机制以支撑适老化空间优化的系统决策？

1.2 研究意义

1.2.1 实践意义

本研究的实践意义聚焦于通过系统性适老化改造，切实提升老年人在社区中的日常生活质量与空间适应性，为广州乃至全国超大城市应对深度老龄化提供可操作、可复制的行动路径。具体而言，其价值体现在以下三个维度，都体现出当前老旧社区改造中的核心痛点。

一是方法层面，构建行为空间要素量化分析方法为适老化研究提供数据支撑路径。传统适老化评估多依赖主观问卷或经验判断，难以精准捕捉老年人与空间的真实互动关系[17]。本研究尝试通过融合多源数据采集方式，建立一套“行为—空间”耦合的量化分析方法，弥补现有适老化研究中以主观评价为主，缺乏行为数据支撑的方法缺口。具体而言，在实地调研中采用行为观察法，对老年人在社区公共空间中的活动类型、停留时

长、及移动轨迹进行系统记录。

二是策略层面，建立围绕空间要素展开的空间更新策略体系。针对老旧社区中功能属性、使用特征与现状问题不同的公共空间类型，提出差异化、精准化的适老化改造路径。本研究基于实地调研与行为分析，聚焦老年人日常行为所依赖的关键物理环境要素，围绕可达性、行人基础设施、美学、环境质量、安全性五个空间要素，构建与之匹配的空间评价体系与设计策略库。

三是实践层面，提供中兴社区可实施的适老化改造设计方案。本文提出的社区公共空间相关的适老化改造方法，通过改善公共空间节点的可达性，增设休憩设施，改善微环境等方式能够在实际应用中为老旧社区中的老年人创造更多的户外活动机会。

1.2.2 理论意义

当前，国内适老更新策略多集中于单一空间要素的改造（如增设无障碍设施或改造活动室），缺乏系统性、分类指导的策略体系，导致改造碎片化、同质化问题突出[78]。基于对中兴社区的深入调研，构建“行为特征-空间要素-改造策略”的对应关系模型。针对高密度传统街区的适老更新，可以有效地提出因地制宜的策略体系。

本研究在现有适老化更新研究基础上提出以公共空间类型为基本单元的分类指导框架，通过行为观察、问卷调查与半结构式访谈，将行为观察数据与空间要素识别进行对应分析，构建行为频率、空间停留时间、空间要素缺失度三维分析模型，通过多变量关联分析识别关键影响因子，有助于从经验判断转向为行为证据的空间优化决策，为高密度传统社区的适老化更新提供量化分析路径。

1.3 概念界定

1.3.1 老旧社区

根据中华人民共和国国务院办公厅发布的《关于全面推进城镇老旧小区改造工作的指导意见》，城镇老旧小区被明确界定为城市或县城（城关镇）建成年代较早、失养失修失管、市政配套设施不完善、社区服务设施不健全、居民改造意愿强烈的住宅小区[61]。在现行标准中一般指建成时间早于公元 2000 年、建设标准不高，在伴随着城市社会发展过程中，内部与现在社会发展情况不适应[14]。住房和城建部后续补充指出，此类社区普遍呈现建筑密度高、人口老龄化率超 30%、公共空间碎片化等典型特征，为其空间更

新提出迫切需求。因此，本文所指的老旧社区特指建成于 2000 年前空间结构老化，且公共服务设施不足，老龄化程度较高的城市居住区。

1.3.2 老旧社区公共空间

老旧社区公共空间是城市公共空间系统的重要组成部分，主要指位于老旧住宅区内部的户外空间，如社区入口、半开放的庭院、道路边缘的空地、居民楼下的空地等[19]。这些空间不仅是居民日常社交、休闲和通行的场所，也是承载社区文化记忆、历史文脉的载体[63]。本文所指的老旧社区公共空间主要指服务于社区居民日常交往与休闲与通行的开放性空间系统，包括室外开敞空间和相关公共服务设施空间，在本文中进一步按照功能属性划分为社交型、道路型、商业前和服务附属空间四类。

表 1- 2 社区公共空间的属性特征

属性特征	具体内容	理论依据
社会属性	强调"公共性”与“共享性”，是社区成员自由进入、平等使用的社会交往场所;区别于住宅等私密空间。	WHO 老年友好城市框架、包容性设计理论
功能特点	具有多功能性，承载居民日常生活的复合需求，包括休闲、交往、康体、文化、服务等。	I'DGO 项目研究成果、通用设计原则
形态特点	不仅指室外开放空间(如广场、绿地、步行道)，也包括室内公共场所(如活动室、服务中心)及公共设施(座椅、标识、照明等)，构成室内外联动的立体空间网络。	环境行为学

来源：参考文献[64]

1.3.3 适老化改造

根据世界卫生组织在 2007 年的“老年友好城市”[82]倡议中提出了老年人友好环境的理念，明确适老化改造是指在城市老旧社区中，通过对住宅和公共空间的结构性改造与环境优化，消除物理障碍，降低环境复杂度，以适应老年人因生理功能退化导致的生活能力下降[18]。其核心目标是帮助老年人“安全、便利、舒适地生活”，并通过环境的优化来增强老年人的独立性、社会交往性和生活满意度[18]。

本文所研究适老化改造主要针对社区公共空间，通过优化空间结构与环境要素，以提升老年人日常活动的安全性、可达性与舒适性的空间更新过程。

1.4 研究对象与范围

1.4.1 中兴社区典型性说明

中兴社区位于广州市荔湾区彩虹街道，是广州中心城区典型的高密度老旧住区之一。其典型结构主要体现在以下几个方面：一是人口结构层面，老龄化程度高，社区内 60 岁及以上老年人口占常住人口比例超过 35%,显著高于全市平均水平 19.8%。二是空间形态方面以高密度住宅为主，空间碎片化。三是设施条件层面，无障碍设施不足，步行系统不连续。四是服务基础层面，具备一定服务设施，但空间衔接不足。

因此，中兴社区在老龄化程度、空间形态、设施短板与服务条件等方面均具有较强代表性，能够较为典型地反映广州中心城区高密度老旧社区公共空间适老化改造中的关键矛盾。因此，以中兴社区为例展开研究，不仅能够为该社区自身更新提供设计依据，也可为同类型老旧社区的适老化更新提供一定的参考。

1.4.2 基本概况

本研究以广州市荔湾区中兴社区及其周边区域为基地，主要研究对象为该区域内 60 岁及以上常住老年人。选取该群体主要基于以下考量：一方面，从人口结构特征上来看，中兴社区作为典型的 20 世纪建成的老旧住区，建筑密度高、公共设施老化、更新滞后。其人口结构呈现高度老龄化特征，老年人口比例显著高于全市平均水平，这种高度老龄化的社区结构，使得社区公共空间的实际使用者以老年人为主，其需求理应成为空间优化的核心导向；另一方面，该区域老年人长期在地生活，日常活动高度依赖社区内部及周边公共空间，其行为模式、空间使用习惯与环境需求具有典型性和代表性，能够真实反映高密度传统街区老年群体的生活状态与适老诉求。

在空间范围上，本研究划定的研究区域总面积约为 8.67 公顷，边界总路径长度约为 1.53 千米。具体研究区域位于荔湾区彩虹街道辖区内，由石桂里、周门南路等城市道路共同围合而成（详见图 1-2）。该区域东起荔湾路，沿线分布彩虹街社区管理中心；南至中山八路，涵盖多所学校与社区医院，构成社区南部的主要功能区；西近塘前新街，包括南岸牌坊、环翠园小区等历史风貌与居住功能交织的片区；北侧则以周门路及社区卫生服务中心周边道路为界，区域内还包含中兴苑小区等多元功能单元。整体研究范围面积约 0.12 平方公里，内部街巷肌理清晰，建筑密度高，公共空间碎片化特征明显，且缺乏系统性的适老化设计，是广州中心城区老旧社区的典型缩影。



广东省　　广州市　　荔湾区

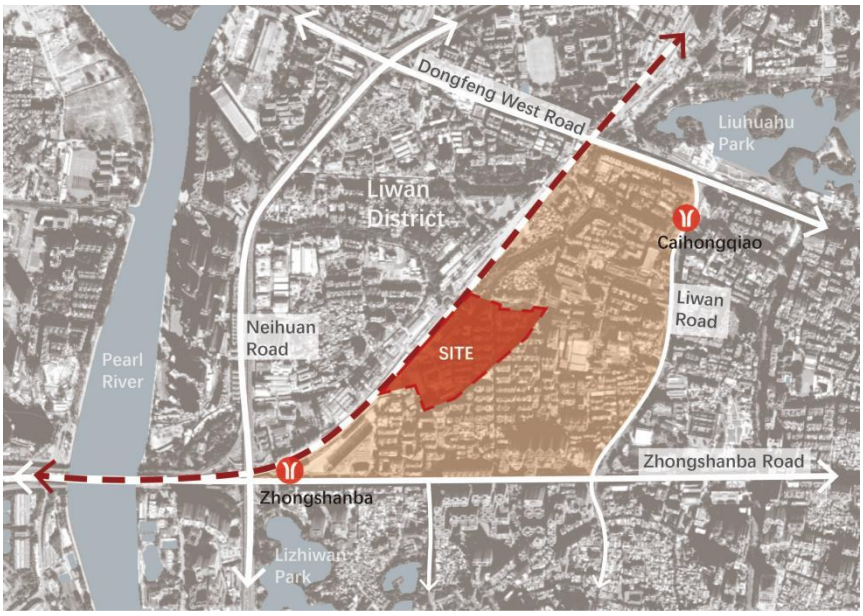


图 1- 2 中兴社区区位图

来源：笔者自绘

通过实地测绘，确认研究区域的空间范围具有代表性，能够有效支撑后续关于老年人行为特征的观察与分析。该尺度既保证了研究的可操作性，又充分涵盖老年人日常生活所需的各类空间要素。因此，以此区域为研究样本，既能深入观察老年人在有限空间内的行为轨迹与活动偏好，又能全面评估现有公共空间对老年群体的支持能力，从而为后续基于环境行为学的适老化改造策略提供扎实的实地依据。

1.5 研究方法与框架

1.5.1 研究方法

本研究采用定性与定量相结合的方法体系，以行为数据为核心，将空间分析与设计

转化相衔接。围绕行为-空间关系解析与设计转化展开，采用以下一系列方法体系：

(1) 文献研究法

对文献的系统整理是进行研究的前提。本文通过搜集、广泛阅读和整理国内外环境行为学相关理论、社区养老、适老化改造、无障碍设计、公共空间更新以及城市社区更新等方面的相关书籍著作、期刊论文、学位论文等，对应第二章公共空间研究的理论方法。

(2) 行为观察与路径记录法

笔者通过对广州市荔湾区中兴社区实地观察社区公共空间的现状资料，发现老年人喜爱聚集的活动场所，并对不同老年人的活动行为进行观察和路径记录，实际地感受体验社区老年人的空间偏好与具体的行为活动类型[60]。通过对照片的整理分类，得出中兴社区公共空间现状并分析存在的问题。采集老年人空间使用行为数据，对应第三章内容。

(3) 访谈与问卷调查法

在实地调研的过程中，对居住在社区中的老年人发放调查问卷，调查老年人对社区内不同公共空间的需求以及当前存在的适老化问题、老年人对目前公共空间的满意度及对未来的期望等，获取主观感知评价数据对应第三章 3.3 部分内容。

(4) 空间要素量化分析法

本文基于中兴社区公共空间现状调研与老年人行为数据采集，将设施可达性、行人基础设施、安全性、美学及环境质量等要素进行分类量化，并结合问卷评价结果，分析行为特征与空间要素之间的关系，从而识别影响老年人活动意愿与空间使用效率的关键因素，对应第三章 3.3 中不同环境要素对行为特征的影响部分内容。

(5) 案例归纳法

本文通过梳理国内外典型适老化设计案例，从设施可达性、行人基础设施、安全性、美学及环境质量等维度归纳具体做法，对应第四章中的案例研究部分。同时提炼具有借鉴意义的设计策略，为第五章改造策略构建及中兴社区改造提供参考。

(6) 设计转化法

本文结合老年人行为特征、空间问题识别及案例归纳结果，以广州市中兴社区为研究对象，将评价要素与策略原则转译为总平优化、路径组织、节点改造和设施配置等具体设计内容，具体开展适老化改造，对应第五章与第六章的内容。

1.5.2 研究框架

本文以研究广州市荔湾区中兴社区为典型案例，构建数据采集行为解析要素，关联策略生成设计验证，核心逻辑为实地调研到行为数据到空间要素到作用机制到设计策略到空间策略的研究框架。首先，将中兴社区内公共空间按照功能导向分为四类典型公共空间，通过实地调研与行为观察，梳理每类公共空间在老年人使用中的现状特征，包括行人基础设施、安全性等五大评价要素，形成空间现状的全面认知。在调研的基础上聚焦老年人在各类空间中的典型行为，归纳其行为特征，并结合空间环境要素，分析行为与空间之间的关系，探讨当前空间存在的适老化缺陷。

基于上述调研结果，按空间类型提出适老化改造策略，针对每类空间的行为特征提出具有针对性的空间改造方案，并结合具体空间节点进行设计实践，从而实现从理论分析到实际应用的闭环。

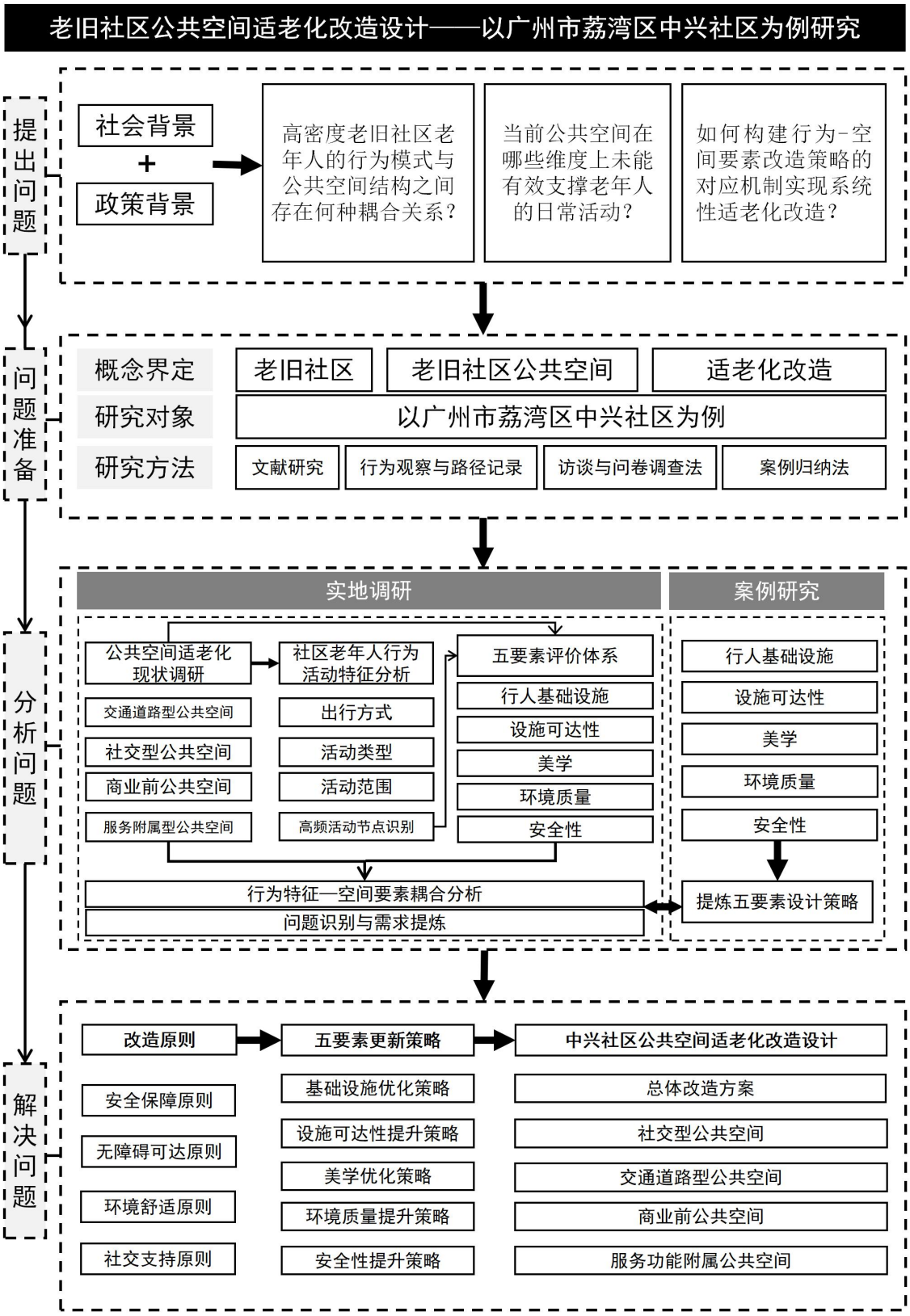


图 1- 3 技术路线图

来源：笔者自绘

第二章　中兴社区公共空间现状调研分析

社区公共空间，包括道路、广场、绿地等，是老年人日常生活中不可或缺的载体。它不仅是老年人走出家门、进行物理活动的主要场所，更是其维系社会联系、进行情感交流、获得心理慰藉的核心领域[6]。研究表明，一个安全、舒适、便捷、富有活力的社区公共环境，能够显著提升老年人的出行频率、促进其参与社会交往活动、延缓身体机能衰退、降低孤独感和抑郁风险[7]。反之，一个充满障碍、缺乏人性化设计的公共空间，则会加剧老年人社会隔离，严重影响其生活质量。因此，适老化改造的本质，是运用人与环境匹配理论 ，重塑物理空间以更好地支持老年人的能力与需求[8]。

2.1 社区公共空间类型分类

在公共空间类型划分上张剑敏依据老年人的生理、心理与社会需求，将户外活动空间细化为户外活动中心、坐息空间、步行空间等功能空间类型[9]。李健红、郝飞等人基于老年人的生理、心理和社会需求，将城市公共户外空间划分为四大功能类别：活动空间、社交空间、休憩空间和服务空间，通过精准匹配老年人行为特征，实现空间功能与使用体验的深度契合。司海涛、李超[14]等人在《旧城区社区微公共空间适老性更新策略研究——以铁岭旧城区为例》中依据空间形态、使用功能、使用方式、使用人群，以及周边城市功能和环境等特征进行类别划分。

综合现有文献可知，行为导向分类更适用于微观行为路径分析，而形态导向分类更强调空间结构特征。鉴于本研究以改造策略为目标，需在设计层面形成可操作的空间类型单元，因此选择以功能为主导的分类方式以增强后续策略落地的针对性与可实施性。

表 2- 1 现有文献中对公共空间类型划分的方式

研究对象	划分依据	公共空间具体类型	文献来源
家居老人和集居老人	老年人的生理、心理与社会需求和功能	户外活动中心、坐息空间、步行空间、私密性空间、园艺场所	张剑敏（1997）《适宜城市老人的户外环境研究》[9]
北京市近年来新建居住小区中的老年人	基于老年人户外活动的地点	晨练场所、打乒乓球和器械健身场所、休息交流场所、下棋场所、带孩子场所	林文洁,于喆,杨绪波（2011）《居住区老年人户外活动及其空间特征研究——夏季户外活动实态调查》[10]

表 2-1 现有文献中对公共空间类型划分的方式(续）

研究对象	划分依据	公共空间具体类型	文献来源
具有一定活动能力的老年人	基于老年人的生理、心理和社会需求特征分析	活动空间、社交空间、休憩空间、服务空间	李健红,郝飞,白小鹏.（2011）《适宜老年人活动的城市公共户外空间特征分析》[11]
居住区户外环境中的老年人(特别是行动能力受限的老年人）	老年人户外活动的生理、心理及社会需求	活动区、散步道、小型交流场所	周燕珉,刘佳燕（2013）《居住区户外环境的适老化设计》[12]
武汉市汉阳区的微型公共空间，服务于居民日常生活需求	微型公共空间周边的城市功能环境及其主要服务人群	社区类、商业类、交通类、公共游览类、公共服务类	董贺轩,刘乾,王芳（2018）《嵌入 •修补众规:城市微型公共空间规划研究——以武汉市汉阳区为例》[13]
铁岭旧城区 55 个社区的微公共空间	空间形态、功能、使用人群	空间形态：点微公共空间、线微公共空间、面微公共空间 空间模式：开敞、围合、半开敞半围合	司海涛,李超,王亚娜（2019）《旧城区社区微公共空间适老性更新策略研究——以铁岭旧城区为例》[14]
大连市既有住区中居住时间超过 1 年且无身体活动限制的 60 岁以上老年人	老年人日常行为的差异性	开放式公共空间 灵活性边界空间 线性交通空间 多样性节点空间	周博,刘石磊,申威（2020）《基于行为差异性的社区公共空间适老化调查研究——以大连市为例》[15]
天津市旧城区街角小微公共空间中的老年人	以空间"边界"为划分基础，根据空间边界的不同种类和组合方式，以及空间与边界之间的关联	同时存在建筑边界和街道边界 只存在街道边界 只存在建筑边界 同时存在街道边界和水体边界 同时存在建筑边界和水体边界	孙旭阳,汪丽君,廖攀,等（2021）《旧城区街角小微公共空间老年人自发参与性研究》[16]

来源：笔者依据文献整理

现有研究多从单一维度，如安全性或可达性或特定人群展开，但在社区公共空间情境下，缺乏兼顾空间属性与行为需求的综合评价框架。因此，本文在既有基础上整合行人基础设施、安全性、可达性、美学与环境质量五维评价体系用于支撑后续实证分析。

基于社区公共空间类型分类的文献研究基础，老旧社区中公共空间有着不同的分类体系，现有分类方法主要基于三大逻辑维度：功能导向、行为导向及形态导向。每种分类框架均服务于特定研究目标。因此，分类方法的适用性取决于研究目的的匹配度，而

非追求形式统一。

根据 Mika M ,Jelle C V ,Rachel H [17]等作者从 3047 篇身体活动相关文献中筛选出 31 篇符合纳入标准的 1996-2012 年发表文献系统性综述聚焦老年人对物理环境的主观感知，研究对提取的发现进行归纳式内容分析，以识别与老年人身体活动相关的环境要素，并依据研究方法对要素进行分组。详细阐述了可能影响老年人身体活动行为的环境因素，这些因素被归纳为五大主题：行人基础设施、安全性、设施可达性、美学特征及环境条件[17]。其中，与老年人需求高度相关的环境要素在结合访谈与空间定性方法的研究中出现频率显著更高，如设施可达性、绿色开放空间及休息区。

表 2- 2 中兴社区公共空间类型划分方式

功能空间分类	具体内容
社交类公共空间	社区活动广场、健身活动场地、廊亭座椅休憩区、小型棋牌活动角等
商业前公共空间	临街商铺外延的公共区域、社区临时微型市集等
交通类公共空间	入户空间、道路无障碍、交通标识和导引等
服务功能附属公共空间	颐康中心、社区卫生站、图书馆等公共服务设施附属公共空间、无障碍卫生间、标识导引等

来源：笔者自绘

本章选取广州市荔湾区中兴社区为研究对象，将老旧社区公共空间系统划分为社交类、商业类、交通类、服务类四大类别[13]。其中：社区类聚焦为满足老年人日常社交需求的开放空间；商业类侧重社区内底层商业前的公共空间；交通类强调通行与衔接的连续性；服务类是指社区内长者饭堂、颐康中心附属的公共空间和无障碍公共卫生间等的嵌入式空间。通过此分类体系，结合实地调研并结合行人基础设施、安全性、设施可达性、美学五大要素作为评价指标[17]，分析其公共空间适老化现存在哪些问题。交通型空间当前保障坡道连续性与宽度是否达标，社交型空间当前休憩设施的适老化高度与防滑处理妥当，商业型空间入口坡道是否设置，服务型空间是否在导引标识、座椅布局及服务台高度上体现老龄友好。本文通过文献频次统计与专家访谈相结合的方式，对评价指标进行筛选与归并，最终形成五项核心维度。

表 2- 3 中兴社区公共空间评价指标

评价要素	具体指标	测量方式
行人基础设施	人行道的连续性、质量、坡度、路缘石 行人与其他非机动交通工具（如自行车）的分离	实测、观察

表 2- 3 中兴社区公共空间评价指标（续）

评价要素	具体指标	测量方式
安全性	与犯罪相关的安全（照明、涂鸦、热闹与冷清） 与交通相关的安全（高差、出入口数量、步行距离、	观察
设施可达性	锻炼机会的可达性（健身设施的距离、年龄适宜性） 日常目的地的可达性（公共交通、菜市场、公交站、活动中心） 休息区的可达性（长椅、公共卫生间）	步行分析
美学	周围建筑物和街景、自然景观（绿植、水体）	问卷
环境质量	光照、空气质量、通风效果	实测、问卷

来源：根据文献整理[17]

表 2- 4 中兴社区公共空间综合等级

空间类型	行人基础设施	安全性	设施可达性	美学	环境质量	综合等级（满分 5.0）
道路系统	1.0	2.0	3.0	2.0	3.0	差
社区公园	4.0	3.0	3.0	4.0	4.0	中等
健身广场	4.0	3.0	4.0	1.0	2.0	较差
宅前屋后	2.0	2.0	3.0	2.0	2.0	较差
商业前空间	1.0	2.0	3.0	1.0	2.0	差
公共服务设施前空间	3.0	4.0	4.0	3.0	4.0	中等

来源：笔者依据问卷整理

2.2 交通道路型公共空间现状与问题

本文所研究的社区内交通道路型公共空间指的是社区内部及与外部连接区域中，以保障居民日常出行、串联居民楼与交通节点、菜市场等为核心功能的开放空间[12]。这包括社区内部道路、人行道、步行网络、社区出入口、小型集散场地以及与外部公共交通接驳的区域。这些空间不仅是老年人实现购物、就医、社交等基本生活需求的物理通道，更是他们融入社会、维持身心健康的重要载体[40]。然而，我国大量现有社区，特别是老旧社区，其建设年代早于人口老龄化高峰的到来，其交通型公共空间的设计普遍缺乏对老年人特殊需求的考量[15]。道路狭窄、人车混行、无障碍设施缺失、休憩场所不足等问题普遍存在，极大地限制了老年人的出行能力，增加了跌倒等意外风险。因此，对社区内交通型公共空间进行系统性的适老化改造，已成为积极应对人口老龄化、推进城市更新和建设老年友好型社会的迫切需求。

2.2.1 道路与步行系统

社区道路作为老年人日常活动的必行公共空间，直接决定了老年人外出活动的可行性和安全性[15]。在行人基础设施方面，实地走访调研揭示了该社区道路在空间组织上的一些不足，居民楼周边存在连续的人行道，但周门南路与周门街路口人行道仅 98cm,低于《人行道设计规范》中轮椅交错宽度需大于 1.8m 的规定，石路基自新虹街与周门南路段缺乏人行道。非机动车没有合理规划停车区，在荔湾区图书馆门口出现侵占人行道的现象。

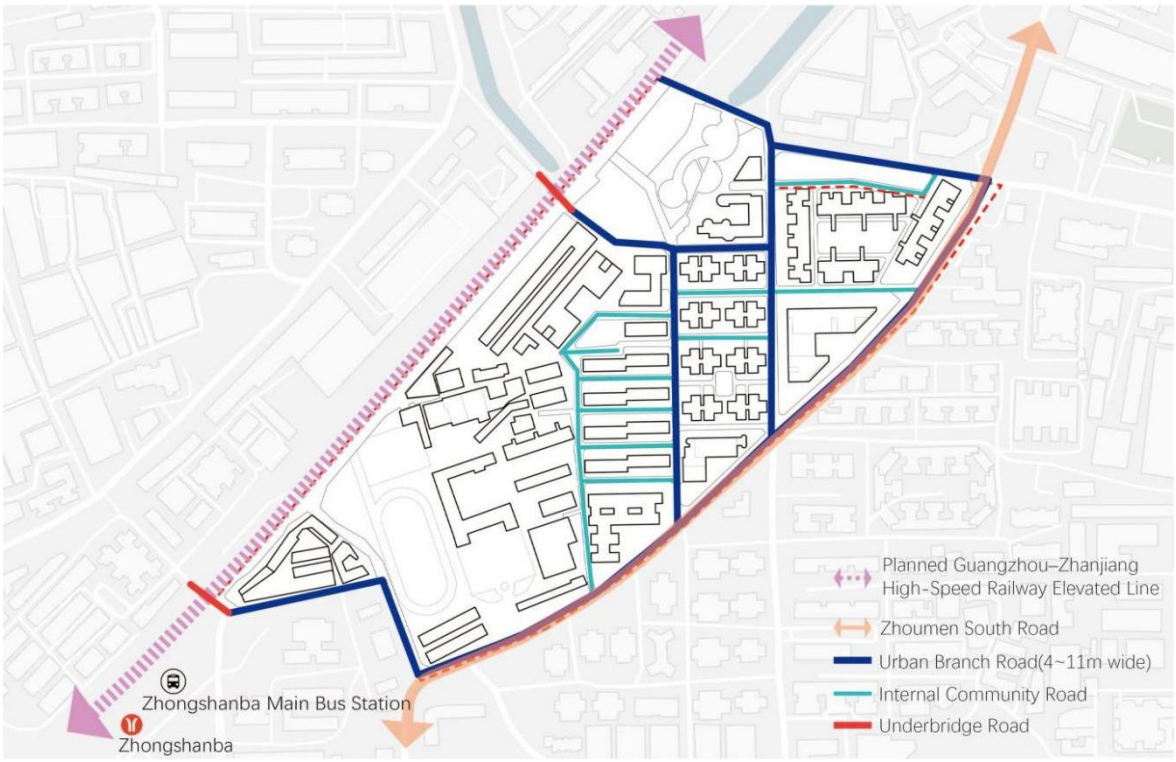


图 2- 1 中兴社区现状道路图

来源：笔者自绘

在安全性方面，由于该社区采用了典型的开放型社区规划特征，导致社区道路与城市主干道之间缺乏必要的过渡带或自然屏障，人行道时断时续。这种布局特征使得社区道路实际上成为了城市道路的延伸段，而非独立的生活环路。街道设计呈现出宽敞但缺乏组织性的特征，快速的车流、宽阔的路面以及缺乏的过街安全岛，会对行动迟缓的老年人构成穿越障碍和安全隐患，如图 2-2 所示。老年人需要主动伸手拦停非机动车以通过马路。在工作日上午 8：00-8：15 进行实地统计，出入机动车通行量为 34 辆/15 分钟，非机动车通行量为 52 辆/15 分钟，行人与非机动车行为冲突记录 11 次。

在设施可达性方面，从周门小区步行 850m(13 分钟）可达附近的地铁站与公交枢纽站，相对便利。虽然规划显示了道路与公交枢纽的衔接，但石路基不具有从公交站到社

区内部的无障碍连接细节，如平缓的坡道、充足的休憩座椅、清晰易读的标识等，这些缺失会严重影响老年人的出行意愿与可行性。



图 2- 2 石路基与周门南路三岔路口

来源：笔者自摄

在美学方面，沿路设置了高大树木遮荫，但步行途中在周门南路西关外国语学校门口出现装修材料堆砌挤占人行道的情况。在环境质量方面，笔者于 7 月高温天气和 1 月寒冷天气在实地走访时发现石路基自新虹街与周门南路段没有任何遮荫措施且路上设置有垃圾投放点，影响连续性步行体验，观察发现老年人走这段路时会出现先过路到对面再回来的情况。



图 2- 3 中兴社区内部道路

来源：笔者自摄

在环境质量方面，中兴社区道路系统不同路段之间存在较大差异。人部分内部道路沿线设有绿植，步行感受相对较好；但石路基自新虹街至周门南路一段缺乏遮荫设施，且沿线设置有垃圾投放点，在高温或寒冷天气下均会对老年人的连续步行体验产生不利影响。实地观察还发现，部分老年人为规避暴晒、异味或狭窄路段，会选择绕行至道路对侧后再返回原路径，说明现状环境质量已对其步行行为产生直接影响。

综上所述，中兴社区道路空间存在一人行道连续性与宽度不足、二非机动车停放无序，侵占步行空间、三社区道路边界模糊、四缺少过街设施、五无障碍衔接不足、六部分道路空间步行环境差等问题。

2.2.2 出入口空间

从社区边界与出入口过渡空间的视角看，出入口不仅承担交通衔接功能，也是影响领域识别、安全感与步行转换效率的重要边界节点[16]。在中兴社区的调研中，该社区的道路空间布局具有显著的开放性特征，缺乏传统意义上封闭式小区所具备的出入口空间这一过渡缓冲带。这一特征导致社区道路与外部城市道路在物理空间上形成了自然的无缝衔接，形成了三个对外连接的大型十字路口。

行人基础设施方面，位于社区南侧两个出入口均设置人行斑马线，但东侧出入口缺乏人行道，如图 2-4 右侧所示。

安全性方面，该路口段缺乏必要的缓坡设计，导致路缘石与车行道之间形成了 8cm 的高差。对于依赖轮椅或助行器的老年人而言，这种硬性高差严重影响了其平顺过渡的能力，迫使其在过路时被迫选择绕行，或是依赖他人搀扶以跨越高差，增加了出行的不便。同时，在主要出入口空间未设置红绿灯、限速标识、凸透镜等辅助交通秩序的设施，过马路存在视线盲区。



图 2- 4 中兴社区周门小区主要主入口

来源：笔者自摄

在设施可达性方面，出入口是十分便利的，可以选择最近的出入口到达菜市场、社区公园、幼儿园等老年人关键活动节点，唯有公交站与地铁站需要进行一部分绕路。同时，在社区主要出入口休憩设施集中于南侧，西侧与城市衔接的道路普遍缺乏休息长椅。

美学方面和环境质量方面也是社区南部质量相对较好，位于中兴社区的东北角的中

兴苑小区，入口空间白天能见度低，缺乏采光，商业环境复杂，环境脏乱。



图 2- 5 中兴社区中兴苑小区主要主入口

来源：笔者摄于晴天白天中午 13：30 和下午 17：18

社区内楼栋单元出入口分片区进行了加装电梯的适老化改造，结合实地调研照片，临近周门西路的居民楼尚未进行加装电梯的改造，实测通道净宽 1.18 米，但两侧公共设施严重侵占通行空间：左侧密集排列着空调外机、电表箱及天然气管道，右侧则设有电线杆与密集架空线，实际通行净宽 0.97 米，低于无障碍规范中规定的最小净宽 1.2m 的标准。（如图 2-6）缺乏无障碍扶手等设施，单元门为平开门设计，开启时占用通道约 0.5 米空间，轮椅进出需后退避让，对独自出行的老年人极不友好。门宽仅 70cm，未达到《无障碍设计规范》中“无障碍门宽≥80cm”的标准，使用轮椅的老年人无法独立通过，需他人协助推轮椅侧身挤过。



图 2- 6 无障碍设施缺失与空间侵占并存

来源：笔者自摄

针对老年人进出单元的实际通行环境，笔者通过实地走访调研发现，单元门口的空间利用率极低，功能划分混乱。尽管部分单元楼已完成了加装电梯的改造工作，但存在单元门入口通行空间被杂物侵占的现象。笔者在调研中记录到，门口区域堆放了大量的

盆栽、自行车及生活废弃物等。这些杂物直接占据了原本设计用于通行的空间，导致实际有效通行宽度远低于适老化设计规范中规定的 1.2 米标准。其根本原因在于停车空间供给不足与管理缺位，老年人在进出时无法正常侧身通行，必须采取“侧身绕行”等不规范的方式。同时，单元门口的绿化景观围挡直接影响了无障碍设施的可用性。笔者观察到，周门小区西片 25 号楼绿植景观围挡的设置直接阻断了坡道的入口通道。24 号楼一侧一楼住户将公共空间侵占，改造成种植花园，人行通道失去了实际的通行价值。对于隔壁单元楼的老年人而言，这些坡道无法提供必要的无障碍通行支持。

中兴社区出入口空间在五大要素层面均存在不同程度的适老化缺陷，主要表现为过渡空间缺失、无障碍通行不足、交通安全设施不完善、环境界面杂乱以及局部光照与通风条件较差等问题。这些问题使得出入口成为老年人日常出行中的薄弱环节，也为后续出入口空间的适老化改造提供了明确方向。

2.2.3 公共交通设施类空间

公共交通设施类空间是老年人跨社区出行的重要节点，其可达性、候车舒适度与无障碍衔接水平会直接影响老年人的出行意愿与公共服务利用效率[20]。经实地调研走访发现，老年人利用该类空间的主要活动类型包括接送孙辈、候车等，其中上午（7：00-8：30）与傍晚（16：30-18：30）为其活跃的时间段。

行人基础设施方面，中兴社区周边公共交通设施虽具备一定的基础配置，但其与社区内部步行系统之间的衔接仍不理想。公交候车点规划了人行专用通道并在地铁站与公交出车口设置小型红绿灯辅助通行。

安全性方面，公共交通设施类空间的主要问题并不在站点本身，而在于从社区到站点的连接过程。由于石路基沿线人行道宽度不足，局部甚至缺失，老年人在通往公交站和地铁站的过程中容易与机动车、非机动车产生冲突，如图 2-7 所示。特别是在早晚高峰时段，接送孙辈、候车和日常通勤活动叠加，使得该类空间的交通干扰更为明显。

可达性方面，老年人自社区南门前往最近的公交站与地铁站均需步行约 13 分钟。到达地铁和公交站的必经道路石路基存在道路幅宽狭窄（机动车道约为 3.5m，北侧商店前有效人行通道 80cm,南侧约 50cm)、地面高差 12cm 且缺乏无障碍人行道等问题，导致道路拥挤且行走不便。以中山八路公交车站为例，该站虽设有简易等车棚及座椅，但设施规模微小，仅能容纳 2-3 名老年人进行休息等候，无法满足老年人对公共空间的需求。

美学与环境质量方面，公交车站候车点只有简易候车棚，并没有绿植等自然景观，

从而也导致了在调研中夏天存在暴晒、过热等环境问题。




图 2- 7 人行道缺失的石路基与公交车候车点

来源：笔者自摄

因此，中兴社区公共交通设施类空间存在连接路径行人基础设施不足、通行过程安全性较弱、站点实际可达性不高、空间美学品质单一以及候车环境舒适性偏低等问题，缩进了老年人利用公共交通拓展日常活动范围，同时在后续改造应从“社区—站点”连续慢行联系与候车节点舒适性提升两个层面着手。

2.3 社交型公共空间现状与问题

社交型公共空间是老年人进行休憩、交往、轻体力活动和代际互动的重要场所，其空间品质与设施适配性直接关系到老年人的日常交往频率、社区归属感与心理健康水平[47]。从积极老龄化和老年友好社区建设的视角看，高质量的社交空间不仅是老年人开展晨练闲谈、棋牌娱乐和聊天休息的物理载体，也是维系社会联系、缓解孤独感和增强社会参与的重要场域[55]。因此，对社区社交型公共空间实施系统性适老化改造，是积极应对人口老龄化、推动社区治理现代化、践行“老年友好型城市”建设理念的战略举措。本研究聚焦中兴社区社交空间现状，旨在通过五维分析框架初步构建针对老年人需求的适老化改造清单。

2.3.1 社区公园

社区公园作为老旧社区中相对完整的开放式社交空间，通常承担休息、散步、轻运动与邻里交往等复合功能，是老年人高频使用的重要公共场所[11]。既有研究表明，休息设施、绿化景观、步道连续性与微气候环境，是影响老年人在公园空间中停留与活动的重要因素[17]，老年人倾向选择可视性强、熟人密度高的空间。

中兴社区北侧驷马涌沿岸社区公园，是依托驷马涌滨水生态廊道规划建设的线性带状公共空间。公园呈狭长形布局，沿涌岸延伸约 110 米，总面积约 760 平方米。在行人基础设施方面，内部布置有健身设施和步道，步道两侧错落布置少量健身器材，未设置专项适老器械；休憩座椅数量不足，仅在树池边缘设置简易石凳。该空间虽具备基础健身功能，但多为硬质铺地。



图 2- 8 驷马涌社区公园

来源：笔者自摄

在安全性方面，公园是开放型空间，采用石墩阻挡非机动车进入，但一侧的驾校和租车公司需要从公园中穿行而过，因此公园内部被车行道分为左右两部分。公园内部地面铺装软硬区分，没有高差，距离周门小区、中兴苑小区均步行 5 分钟内可达。

在设施可达性方面，公园内部布置有少量健身器材，但调研中在连续三日（工作日两天，周末一天）每天下午 16：30-18：30 观察中，平均每小时使用人数约为 4.2 人，器械闲置率高达 62%，显示其利用率偏低。其低使用率源于空间供给与老年人行为模式之间的结构不匹配。

美学方面，公园依托驷马涌自然水体形成相对独立的活动区域，有效隔离外部机动车流，基础安全环境优于社区内部道路交叉口，为老年人提供了一定程度的活动安全感。

环境质量方面，公园内树荫覆盖区域过于集中，缺乏可供老年人晒太阳的开阔空间。但微气候舒适，适宜老年人活动。

中兴社区社区公园虽具备一定景观基础与活动条件，但仍存在健身器材适老性不足、休憩设施缺乏、机动车穿行干扰、安全性不足及导视系统不完善等问题，导致空间连续性、舒适性与复合使用效率均有待提升。

2.3.2 健身广场

健身广场是社区内部最直接服务于老年人日常锻炼、短暂停留和邻里交流的节点性空间[11]，其设施类型、可达性与停留支持条件对老年人使用频率具有显著影响。



图 2- 9 周门小区健身广场

来源：笔者自摄

中兴社区内部设有一处户外健身活动节点，位于周门小区 27、29 号楼与 31、33 号楼围合形成的开敞空间。作为周门小区内唯一集中配置的公共活动场地，其适老化现状尚有不足。

行人基础设施方面，健身器材类型单一，仅设基础型上肢训练与扭腰类器械，缺乏针对老年人生理特征的适配化设备。休憩系统严重缺失，仅依赖建筑周边树池提供非标准化坐憩功能，且邻近理发店长期将健身设施挪作晾晒用途，造成健身设施资源闲置，在连续三日（工作日两天，周末一天）每天下午 17：30-19：30 观察中，平均每小时使用人数约为 2.3 人，器械闲置率高达 78%，显示其利用率显著偏低。

在安全性方面，健身广场位于住宅楼围合形成的内部空间，与外部机动车道路之间存在一定高差隔离，整体上避免了机动车直接穿行带来的安全风险，基础安全条件相对较好，如图 2-9 所示。

设施可达性层面，西侧主入口因电动车无序停放导致通行困难，社区内部道路未实施人车物理隔离，老年人前往该区域需横穿非机动车流，场地与周边道路存在高差，衔接处设有一级直角台阶。

在美学方面，场地中央设置有花坛，周边亦有底层住户自发种植的零星绿植，在一定程度上提升了空间的生活气息。但整体来看，健身广场的景观组织较为薄弱，缺乏统一的空间界面与场所氛围营造，未能形成具有吸引力和识别性的公共活动环境。

环境质量方面，健身广场虽处于住宅围合空间内部，具备一定的安静性，但现状遮荫体系不足，硬质铺装面积较大，夏季硬质铺装区域地表温度实测常超 40℃，易产

生暴晒现象，影响老年人的停留舒适度与活动持续时间。

中兴社区健身广场虽具备一定的场地基础和相对安全的内部区位，但仍存在无障碍衔接不足、器材适老性不强、休憩设施缺乏、环境舒适性较弱及空间使用效率偏低等问题。

2.3.3 宅前屋后空间

宅前屋后空间作为老旧社区中最具生活性与邻里性的微型公共空间，往往承担着短暂停留、邻里交流和熟人社会互动等功能，其适老化品质直接影响日常交往的便捷性与自发性[47]。

行人基础设施方面，中兴社区内部零星散状利用宅前屋后微型公共空间设置了休憩设施和健身器材，但都由于规划不合理等问题处于闲置状态，如将休憩座椅设置在楼栋主入口以及道路旁，健身设施被非机动车停放无法使用。



图 2- 10 宅前屋后空间

来源：笔者自摄

在安全性方面，该空间未与周边区域进行有效隔离，缺乏明确的领域边界，导致其在调研期间未观察到实际使用行为。

设施可达性方面，现有设施布置不合理，在实际连续三天（工作日一天，周末两天）的观察中，由于非机动车侵占，导致此处设施无人使用，实际使用率几乎为 0，未能有效满足老年人日常休憩与轻度活动需求。

美学方面，空间美感整体欠佳，缺乏组织，未能营造积极、温馨的社区氛围，难以支持老年人聊天的行为活动。

环境质量方面，这两处空间都紧临社区道路，相对嘈杂，非机动车乱停乱放，在调研期间右处健身角面积 28 ㎡，非机动车占用面积 15 ㎡，非机动车占用率高达 54%，

导致空间闲置率较高。

因此，在当前中兴社区宅前屋后公共空间中，存在设施错置、空间被侵占、环境品质较弱等问题，使老年人难以在此形成稳定、安全的停留与交流行为，也使社区内部原本可被激活的零散公共空间长期处于低效甚至闲置状态。

2.4 商业前公共空间现状与问题

商业前公共空间是介于建筑内部经营空间与社区公共空间之间的过渡性场所，兼具消费服务、停留休憩与邻里交流等复合属性[46]。在老旧社区中，这类空间往往因底层商业与居民日常生活高度耦合，而成为老年人购物、驻足、观察街道活动及进行熟人交往的重要半公共场所[47]。该空间类型具有商业和社交双重属性，具有半公共性的空间属性。

中兴社区内，周门小区与中兴苑小区的底层建筑均以商业功能为主导，形成典型的下商上住混合使用模式[52]。其中，周门大院部分一层住户则对原有住宅单元进行内部功能改造，并在建筑外侧围合出半私密性的庭院空间，呈现出自发性空间再利用的特征。在周门小区内部，底层商业业态主要包括两家理发店及一处棋牌室，服务对象以本社区老年居民为主；而临城市道路一侧的居民楼底商则设有一家社区超市。调研观察发现，该超市门前常有居民驻足休息交谈。经访谈确认，由于社区居民长期居住、彼此熟识，商户基于日常交往需求，呈现出典型的非正式空间生产现象。供顾客及周边居民休憩、社交之用。经测量 A 处商铺门前宽度约 2.5m,实际可通行距离 1m。



图 2- 11 商业服务设施门前空间

来源：笔者自摄

行人基础设施方面，从居民楼通往底层商户的步行路径存在明显的连续性中断。在笔者实际调研观察老年人活动路径中，居民需穿越社区内部车行道方可抵达商铺入口，缺乏独立、连续的人行通道系统，尤其对使用助行器或轮椅的老年人构成通行障碍。步

行路径未设置明确引导标识或地面铺装区分，人车混行现象普遍。此外，仅配置 2–3 处简易座椅，难以满足老年人群聚聊天的行为特征。

安全性方面，由于大部分底商位于社区内部，日常机动车流量较低，交通冲突频率较小，客观上为老年人提供了相对安全的活动环境。

设施可达性方面，商业门前空间具有较强的日常生活服务属性，便于老年人完成买菜、理发、打牌、聊天等高频行为，整体使用基础较好。但从适老化角度看，现有商铺门前普遍缺乏无障碍通道，休憩设施数量也较为有限，如图 2-11 所示。

美学方面，居民在窗台、门前及庭院内自发种植绿植，虽在一定程度上提升了视觉亲和力与生活气息，但因缺乏统一规划，反而加剧了空间拥挤感与视觉混乱。

环境质量方面，沿街绿化带有效缓冲了外部交通噪音，使该区域声环境相对安静，适宜老年人短暂停留。（如图 2-11 左）右侧图中大型商超门前设置的圆形休息座椅恰好位冠幅较大的乔木下方，形成了天然的遮阳休憩节点。但此类优质微环境呈点状分布、缺乏系统串联，整体环境支持能力仍显薄弱。

因此，中兴社区商业服务设施门前空间虽具有一定的使用基础，但仍存在步行系统不连续、人车分流不足、无障碍支持薄弱、空间界面零散及舒适性分布不均等问题，在一定程度上限制了老年人对该类空间的持续使用。

2.5 服务功能附属公共空间现状与问题

中兴社区内部公共服务设施配置相对完善，荔湾区图书馆、颐康中心、荔湾区疾病预防控制中心等重要公共机构均集中布局于社区核心区域，形成了较为密集的服务功能组团。这些设施不仅承担着文化教育、健康照护、公共卫生等基础职能，其门前及院落空间亦自然衍生为老年人日常等候、短暂停留和社交互动的重要场所[80]。此类空间虽依托正式公共服务设施而存在，具备良好的区位可达性与使用基础，但在适老化设计层面仍存在明显短板。

2.5.1 公共服务设施门前空间

经调研走访，现存公共服务设施建成时间长，多为后期规划改造。在行人基础设施方面，在颐康中心对面有一处小型绿地，但仅有 4 个休憩座椅，在工作日上午 10：00-12：00，下午 16：30-18：30 的观察中，并未有居民停留使用，处于闲置状态，北侧有一休息长廊，但因年久失修，现多堆砌建筑装修材料。

安全性方面，服务设施门前普遍未设置独立人行区域，步行路径直接与车行道合并，缺乏物理隔离。车辆随意停放现象突出，尤其在颐康中心门前，私家车侵占通行空间。



图 2- 12 服务附属门前空间

来源：笔者自摄

设施可达性方面，这些公共服务设施均处于社区中心位置，配置无障碍坡道，但门前空间的适老化支持仍显不足。现有座椅、遮荫、导引设施配置有限，老年人在等待、休息或同行陪伴时缺少舒适的停留条件，影响了公共服务设施的实际可达性。

美学层面，空间具有一定开敞性和公共性，但整体景观组织较为普通，空间界面缺乏识别性与亲和力。环境质量方面，由于所处位置远离社区内主路，因此较为安静，同时社区内存在大量绿植，为老年人提供了较为舒适的户外活动环境。

由此，中兴社区公共服务设施门前空间虽具有一定服务基础与区位优势，但仍存在步行联系不畅、停留设施不足及空间识别性较弱等问题，从而降低老年人对公共服务设施的到达效率与使用便利性，并限制老年人日常交往与社区参与。

2.5.2 无障碍卫生间

公共卫生间作为老年人高频依赖的基础服务设施，其可达性、导向清晰度与入口无障碍衔接水平，直接影响老年人公共空间活动半径与停留安全感[12]。社区西侧设置有一处公共卫生间紧邻颐康中心，如图 2-13 所示。

行人基础设施方面，该卫生间入口已按规范设置无障碍坡道，坡度与宽度基本满足轮椅-通行要求。与周边道路及活动节点之间虽具备基本通行联系，但到达路径缺乏连续、明确的引导，整体识别度较低，导致老年人在陌生或紧急使用情境下难以及时发现。



图 2- 13 无障碍卫生间

来源：笔者自摄

安全性方面，该设施紧邻社区内部车行道，但位于道路尽端，在实地调研中非机动车穿行数量为 0，交通冲突风险相对可控，客观上为使用者提供了一定程度的安全保障。

设施可达性方面，该卫生间距离社区公园步行距离约 160 米，但社区内部未设置任何卫生间导向标识系统，不在老年人日常活动的主要动线上。

美学层面，门前空间缺乏景观设计，原有绿化带已被硬化为水泥地面，与道路连接生硬。作为社区公共服务设施的一部分，缺乏清晰、友好的视觉提示，难以在复杂社区环境中形成足够识别性。

环境质量方面，周边绿植覆盖具备一定的微气候调节潜力，但其东侧紧邻社区生活垃圾定点投放点，对局部环境舒适度造成显著负面影响。

中兴社区无障碍卫生间虽已具备一定设施基础，但仍存在导视不足、路径联系不清、识别性较弱及实际可达性不高等问题，尤其是需要加强与其他适老化服务设施之间的联系。

2.6 本章小结

通过对四类公共空间的系统分析可知，一、交通类空间主要问题集中于人行连续性中断与无障碍高差控制不足，从而导致人车混行、老年人出行存在安全隐患；二、社交类公共空间存在设施适配度低与休憩系统缺失问题，健身器材闲置，休憩设施难以满足聚集性老年人活动；三、商业前公共空间虽具有一定自发活力，但缺乏人车分流与连续舒适廊道；四、服务附属空间在导引系统与节点衔接方面明显不足，颐康中心前公共空间以及无障碍卫生间缺少指引，与老年人高频活动节点缺少直接联系，需要绕路。这些问题均指向一个矛盾，空间供给形式未能匹配老年人行为特征，因此下一步有必要进一

步从行为机制展开，该矛盾将在下一章通过行为实证分析进行验证。

从空间维度来看，中兴社区在交通连续性、休憩设施布置、空间尺度组织以及无障碍体系等方面均存在明显短板，然而仅凭物理环境观察不足以揭示其对老年人行为的真实影响，因此下一章将通过行为路径跟踪与问卷调查，验证上述空间问题是否直接制约老年人的活动频率与停留行为，并且进一步构建行为-空间耦合关系模型。

第三章　中兴社区老年人行为活动分析

老旧社区公共空间的适老化改造应充分反应老年群体的实际使用需求，因此有必要通过实地调研系统识别老年人在社区公共空间中的行为特征及空间偏好。既有研究表明老年人日常活动行为与空间环境之间存在显著关联，行为观察、路径记录与主观评价相结合的研究方法，有助于揭示公共空间供给与老年人实际需求之间的匹配关系[15][60]。本研究通过行为观察与问卷调查相结合的方式，对广州市荔湾区彩虹街中兴社区老年居民的日常活动路径，活动类型以及空间使用情况进行调查分析，以期为后续公共空间适老化改造策略提供实证依据。

3.1 调研设计与方法

3.1.1 调研对象与年龄分层

《中华人民共和国老年人权益保障法》第 2 条明确规定：“本法所称老年人，是指六十周岁以上的公民。”根据《中华人民共和国老年人权益保障法》，我国将 60 岁及以上的公民界定为老年人。当前各级政策实践中，常将老年人进一步细分为年轻老年人（60－69 岁）、中龄老年人（70－79 岁）与高龄老年人（80 岁及以上），以便更精准地制定改造设计策略。

表 3- 1 老年人群体年龄划分

类型	年龄范围	描述
年轻老年人	60－69 岁	身体机能相对良好，活动能力较强
中等老年人	70－79 岁	身体机能开始下降，对环境安全性要求提高
高龄老年人	80 岁及以上	活动能力较弱，对无障碍设施依赖度较高

来源：参考文献[12]

3.1.2 调研内容与指标体系

本文以中兴社区居住生活的老年人作为调研对象，依据第二章由五个环境维度构成的评价指标体系，包括设施可达性、行人基础设施、美学、环境质量、安全性[17]。问卷采用 likert 量表进行评分，一分是非常差，两分较差，三分一般，四分较好，五分非常好。问卷具体内容详见附录。本次调研中共发放问卷 72 份，回收有效问卷 59 份，以此为基础，本文就老年人活动特征进行了归纳并针对老年人对现居住社区公共空间适老化

改造设计的需求进行了初步分析。

本研究依据扬·盖尔的空间行为理论[60]将老年人在社区公共空间中的活动划分为三类：一、必要性活动，如购物、丢垃圾、取快递等日常事务性活动。二、自发性活动，如散步、晒太阳、休闲娱乐等环境质量诱发的活动。三、社会性活动，如闲聊、陪伴后代、棋牌等需要人与人互动的活动。

采用非干预式行为观察法，于 2025 年 10 月-11 月期间，抽取典型晴天工作日与周末各两天进行观察，共记录 59 位老年人的完整步行路径，其中年轻老年人（60-69 岁）共 22 人，中龄老年人（70-79 岁）共 19 人，高龄老年人（80 岁以上）共 18 人，男性 30 人，女性 29 人。样本采用分层随机观察法，确保不同年龄层均有代表性，同时样本中 59 位老年人均为社区内居住的老年人，受访时身体状况良好。系统梳理其在日常活动中所经过的各类公共空间类型（见图 3-1），并以表格形式详细记录每位受访者途经的空间节点及其对应的行为活动（见表 3-2）。59 位老年人指被观察对象人数，59 份有效问卷指主观评价样本数，而 68 条有效活动数据指对重复观测记录进行筛选整理后的行为记录条数，三者分别对应不同分析层级。



图 3- 1 公共空间类型分布图（来源：笔者自绘）

3.1.3 调研方法

（1）行为观察法

每位老人跟踪 2h，起点随机，并以时间满 2h 或老人活动结束为记录的终点，在行为观察过程中，部分受访者在不同时段被重复记录，因此对所有数据进行筛选后，有效的老人活动数据总共 68 条。内容：记录老人在 2h 内的活动路径与主要行为。

根据 WHO《Global Age-friendly Cities: A Guide》[82]相关规定，老年人的日常活动空间主要集中在距家 800 米范围内，核心活动空间通常为 500 米以内。在这个范围内，老年人的活动场所呈现出显著的层级分布：500 米以内主要为休闲活动场所（如广场、绿地），500 至 800 米主要为交通性活动场所（如市场、超市）[20]。

（2）问卷调查法

本研究采用结构化问卷对社区老年人开展公共空间环境感知评价。问卷以 Likert 5 点量表形式呈现，沿用第二章五大维度分析框架设计题项，在老年人户外活动高峰时段于公园、广场、宅前空地等高频使用场所进行面对面访谈式填写。Likert 量表适用于将受访者对环境质量的主观判断转化为可比较的等级数据，因而在社区环境评价与行为研究中应用较为广泛[59]。每位受访者基于其日常使用经验，对所处或常去的公共空间进行主观评分。为保证问卷数据的可靠性，本文采用 Cronbach’s Alpha 系数对量表进行信度检验，以判断各题项之间的内部一致性。一般认为，当 Cronbach’s Alpha 系数大于 0.7 时，量表具有较好的信度，可为后续统计分析提供可靠基础。

（3）路径追踪法

本研究采用 Kruskal-Wallis H 检验——一种适用于多组独立样本的非参数方法——以行为类型为分组变量，分别检验各环境要素评分在不同行为群体间的分布差异。该方法不依赖数据正态性假设，且能有效处理小样本与 Likert 量表数据，从而科学识别哪些环境维度对老年人行为选择具有显著影响，并通过效应量比较进一步判断其相对重要性。在统计分析中，本文采用 Kruskal-Wallis H 检验对不同类型行为在各环境评价要素上的评分差异进行检验。该方法适用于多个独立样本之间的非参数差异分析，能够较好适应本研究中样本量较小、问卷评分数据为 Likert 量表且不满足正态分布假设的情况。检验结果中，H 值反映不同组别之间差异的总体程度，H 值越大，说明组间差异越明显；p 值用于判断差异是否具有统计学显著性。一般认为，当 $p<0.05$ 时，表明不同类型行为在该环境要素上的评价存在显著差异；当 $p\geq0.05$ 时，则说明组间差异不显著。基于

此，本文结合 H 值大小与 p 值显著性，对各高频活动节点中环境要素与老年人行为特征之间的关系进行分析。

需要说明的是，本文前期共获得 68 条有效行为活动记录，该数据主要用于老年人行为路径、活动类型及空间偏好的总体特征分析。与此同时，问卷调查共回收 59 份有效问卷，主要用于高频活动节点环境评价及不同环境要素对行为特征影响的分析。由于问卷调查对象需与具体活动节点使用者相对应，因此后续 3.3 节中涉及环境评分与行为匹配分析时，采用的是与高频节点活动相对应的 59 位老年人样本。换言之，68 条行为记录与 59 份有效问卷分别服务于第三章中不同层次的分析内容，前者侧重行为总体特征识别，后者侧重行为与空间评价要素之间的对应分析。

3.2 老年人行为活动特征分析

基于行为观察与路径记录结果，本文进一步从出行方式、不同类型公共空间中的行为分布以及活动范围与空间偏好三个方面，对中兴社区老年人的行为活动特征进行归纳。相关研究表明，老年人的活动行为不仅受到个体年龄、身体条件等因素影响，也与公共空间的可达性、安全性、设施支持性及环境舒适度密切相关[20]。因此，对其行为活动特征进行分类分析，有助于进一步识别现状公共空间在适老化支持方面存在的关键短板。老年人活动的详细信息记录如表 3-2 所示，内容围绕老年人在基地中的不同类型的公共空间中的行为展开，并按照图 3-1 记录其活动路径。

表 3- 2 老年人行为记录（简表，详见附录）来源：笔者自绘

序号	路径	活动信息							
		交通型	行为	社交型	行为	商业型	行为	服务型	行为
1	节点 6b-D-A-节点 3-A-a-b-节点 8-c-d-节点 7c-节点 4b-节点 7b-节点 6a	主干道 1，2	骑自行车	社区公园（3） /健身广场（4b） /宅前屋后（6a，6b）	散步或步行 /锻炼身体 /晒太阳 /休息	临街商铺（7b，7c）	陪伴后代 /购物	颐康中心（8）	休息

表 3- 3 老年人行为记录（续）来源：笔者自绘

序号	路径	活动信息							
		交通型	行为	社交型	行为	商业型	行为	服务型	行为
2	节点 4a-k-L-J-节点 3-A-d-节点 7c-e-节点 8-a-j-节点 4b-节点 7b-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b，4a）/宅前屋后（6a）	休息/散步或步行/锻炼身体/闲聊	临街商铺（7b，7c）	陪伴后代/购物	颐康中心（8）	散步或步行
3	节点 8-a-节点 3-A-B-j-节点 4b-节点 7b	主干道 1，2	轮椅	社区公园（3）/健身广场（4b）	陪伴后代/陪伴后代	临街商铺（7b）	散步或步行	颐康中心（8）	晒太阳
4	节点 5b-D-节点 7c-节点 4b-d-节点 3-a-节点 8-节点 9-d-节点 7c-节点 7b-节点 6a-C-节点 6b	主干道 1，2	步行	社区公园（3）/健身广场（4b）/小型绿地（5b）/宅前屋后（6a，6b）	丢垃圾/散步或步行/晒太阳/休息	临街商铺（7b，7c）	休息/购物	颐康中心（8）/公共卫生间（9）	休息/上厕所
5	节点 5a-j-B-A-节点 3-A-节点 7c-e-节点 8-a-d-节点 7c-节点 4b-节点 7b-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b）/小型绿地（5a）/宅前屋后（6a）	陪伴后代/休息/晒太阳/闲聊	临街商铺（7b，7c）	陪伴后代/购物	颐康中心（8）	散步或步行
6	节点 9-节点 8-a-节点 3-J-L-k-节点 7a-j-d-节点 4b-节点 7b-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a）	闲聊/取快递/散步或步行	临街商铺（7b，7a）	购物/购物	颐康中心（8）/公共卫生间（9）	闲聊/上厕所

3.2.1 老年人出行方式特征

对表 3-2 中的行为记录进行整理后，本文以公共空间类型为基础，对老年人在交通型公共空间中的出行方式及其出现频率进行统计，结果如图 3-2 所示。统计结果表明，在交通型公共空间内，老年人的出行方式主要包括步行、轮椅出行和骑自行车三种，其中步行出现频率最高，共 47 次；轮椅使用频次为 12 次；骑自行车频次最低，为 9 次。总体来看，步行仍是中兴社区老年人最主要的日常移动方式。在步行样本共 47 条中可归入三类老年年龄组的为 45 条，60－69 岁占 19 人，约 42.2%；70－79 岁占 22 人，约 48.9%；80 岁及以上占 4 人，约 8.9%。轮椅出行样本共 5 条，其中 60－69 岁占 3 人，约 60.0%；70－79 岁占 1 人，约 20.0%；80 岁及以上占 1 人，约 20.0%。骑自行车样本共 8 条，其中 60－69 岁占 5 人，约 62.5%；70－79 岁占 3 人，约 37.5%；80 岁及以上为 0。整体来看，在该 59 位样本中，步行方式主要集中于 60－79 岁群体，而骑自行车更集中于低龄老年人，80 岁及以上老年人的移动方式则以步行和轮椅为主。

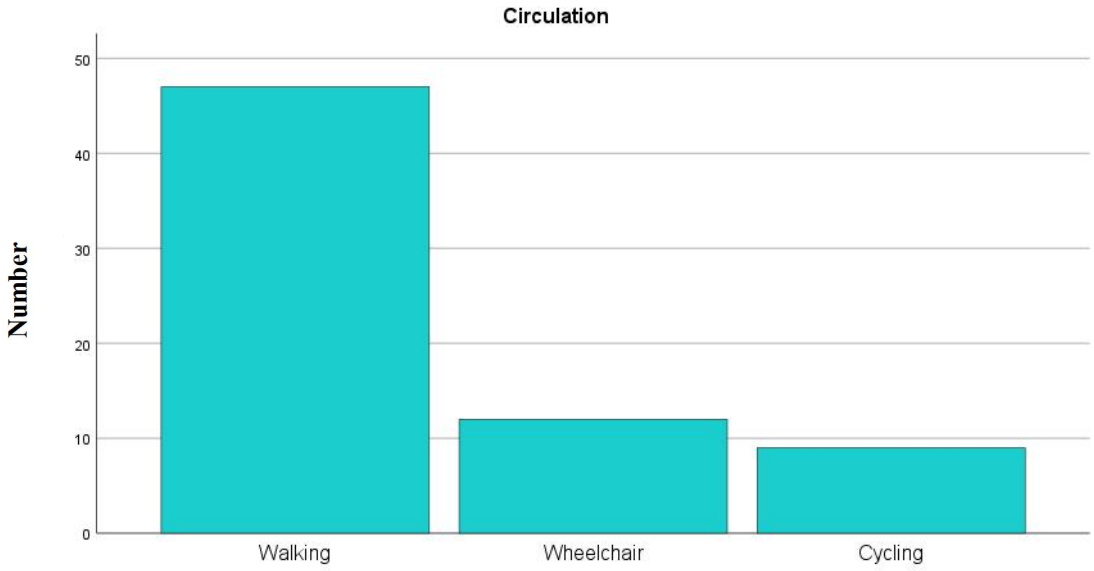


图 3- 2 交通型公共空间内行为统计

来源：笔者自绘

这一结果说明，在社区尺度内，老年人的活动展开高度依赖连续、安全、便捷的步行系统。与中青年群体相比，老年人的日常出行更强调路径的可识别性、路面平整度、通行安全性及无障碍支持条件，因此人行道的连续性、路面高差控制、休憩节点设置以及人车分流状况，会直接影响其出行意愿和活动半径。同时，轮椅出行在统计中占有一定比例，也反映出社区中部分高龄老人或行动能力较弱者对无障碍设施具有较高依赖性。

相比之下，骑自行车行为出现频次相对较低，说明在当前社区环境下，骑行并不是老年人最主要的日常出行方式，其活动组织仍主要围绕步行展开。

中兴社区老年人的出行方式特征表明，步行是连接居住单元与各类公共空间节点的基础性行为形式，也是其完成购物、休憩、散步、社交和服务获取等活动的前提。因此，交通型公共空间的适老化水平在很大程度上决定了老年人日常活动的便捷性与安全性。后续对于高频活动节点及空间环境要素的分析，也应建立在“步行为主导”的行为基础之上。

3.2.2 不同类型公共空间行为特征

不同类型公共空间由于功能属性、环境特征与设施条件不同，往往对应着差异化的老年人行为模式。相关研究指出，开放性较强、停留支持条件较好的空间更容易承载休息、交往等慢节奏活动，而交通性或商业性较强的空间则更多承载目的性活动和过渡性行为[11]。因此，本文按照社交型、商业前公共空间及服务功能附属公共空间三类进行行为频次统计，以识别不同空间类型中老年人行为活动的结构特征。

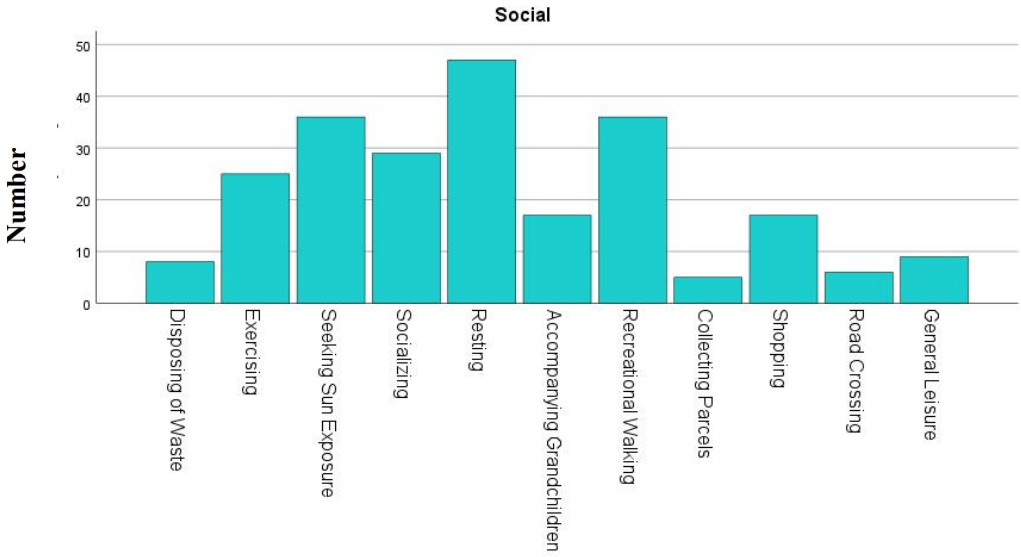


图 3- 3 社交型公共空间内行为统计

来源：笔者自绘

图 3-3 展示在社交型公共空间中观察到的各类老年人行为的频次分布。其中，休息行为出现频率最高，达 47 次，表明该类空间是老年人停留和放松的主要场所。休闲步行与晒太阳行为次数较多，反映出老年人对舒适环境和日照的偏好；社交互动行为也较为普遍，说明此类空间具备良好的人际交流功能。

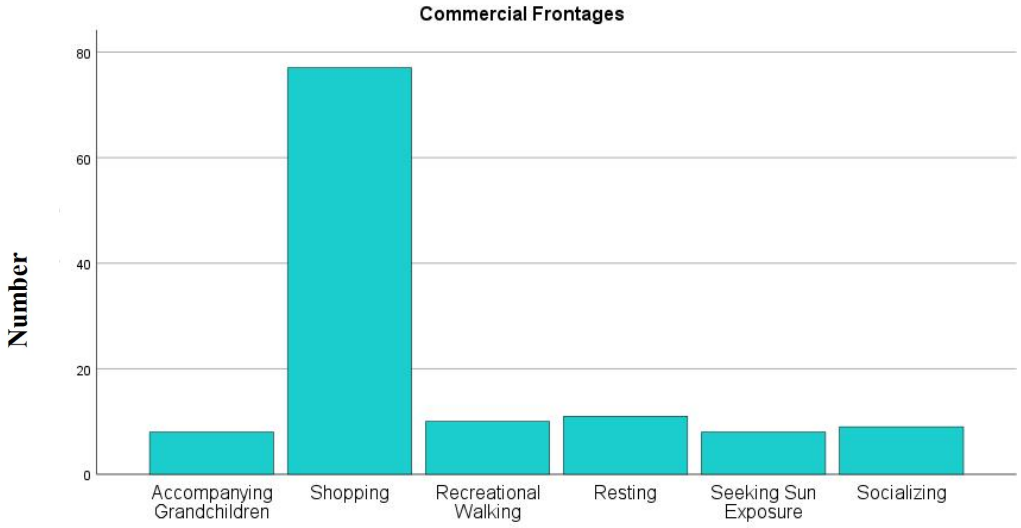


图 3- 4 商铺前公共空间内行为统计

来源：笔者自绘

图 3-4 所示在商铺前公共空间中观察到各类老年人行为的频次分布。其中，购物行为出现频率最高，达 77 次，表明该类空间是老年人日常消费活动的主要场所。休闲步行、休息、晒太阳和社交等行为频次相对较低，均在 10 次左右，说明这些空间虽具备一定的休憩与社交潜力，但其功能仍以商业服务与任务性活动为主。整体来看，商铺前公共空间呈现出明显的功能性导向，老年使用者多以完成购物任务为目的，停留时间较短，非目的性行为较少。

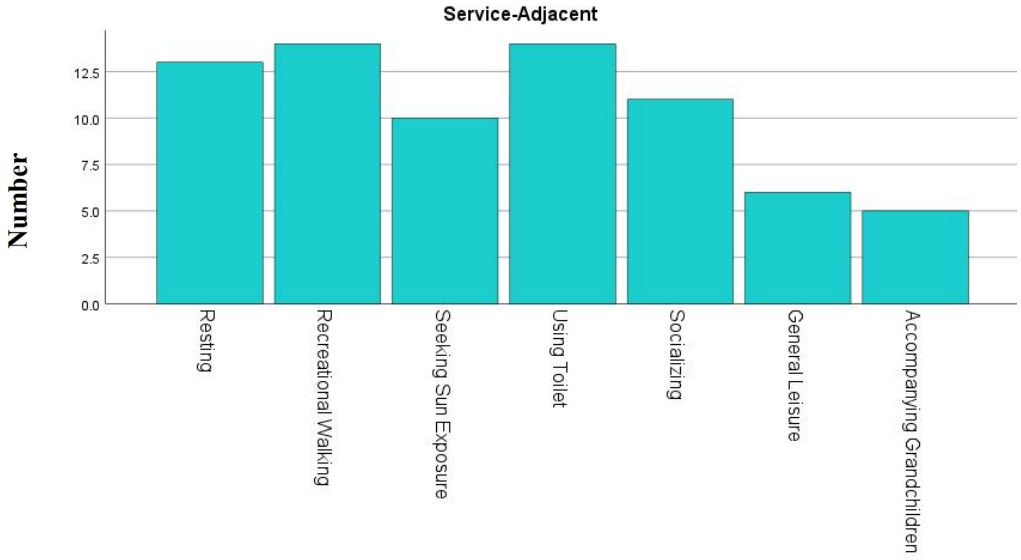


图 3- 5 服务设施附属公共空间内行为统计

来源：笔者自绘

图 3-5 中表明散步或步行与使用厕所行为频次最高，反映出该类空间兼具通行功

能与基本生活服务功能。休息行为表明老年人在完成任务或穿行过程中常有短暂停留需求。整体来看，服务设施附属公共空间呈现出多功能特征—既是日常服务的节点，也是休憩与社交的潜在场所。

综合比较三类空间的行为差异可以发现，中兴社区老年人的空间使用并非随机发生，而是与不同公共空间的功能定位和环境支持程度密切相关。社交型公共空间更强调停留、放松与交流，商业前公共空间更强调生活服务与必要性活动，服务设施附属公共空间则体现出日常服务节点的复合使用特征。这一结果说明，老旧社区公共空间适老化改造不能采取单一化更新方式，而应依据空间类型差异，从行为特征出发进行分类优化。

从横向比较来看，不同类型公共空间在老年人行为活动的类型构成、停留时长及使用目的上呈现出较为明显的差异。交通道路型公共空间主要承载通行、接送、候车等功能性行为，活动以短暂停留和路径性穿行为主，空间使用呈现较强的目的导向特征；社交型公共空间则更容易发生休息、聊天、锻炼及看护孙辈等停留性行为，具有较强的社交属性和复合活动特征，是老年人日常公共生活的重要载体；商业前公共空间兼具消费与交往双重属性，老年人在此类空间中的行为多围绕购物、驻足、观察和熟人交流展开，停留时间适中，生活性特征较为突出；服务功能附属公共空间则更多与等候、办事、短时休息等行为相关，其活动类型相对稳定，但对可达性、停留设施及空间识别性要求较高。总体而言，四类空间在行为发生机制上表现出由通行导向到停留导向、由功能性使用到社交性使用的差异，这也说明老年人公共空间活动并非均质分布，而是与空间类型、环境支持条件及日常生活需求密切相关。

3.2.3 老年人活动范围与空间偏好

老年人活动范围与空间偏好能够较为直接地反映社区公共空间系统是否与其日常生活需求相匹配。相关研究表明，老年人的高频活动通常集中在居住地周边步行可达范围内，尤其是 500 米以内的休闲与社交活动空间最为关键，而更远距离的空间则多与购物、交通接驳及服务设施使用相关[56]。基于此，本文通过对行为路径叠加结果的分析，识别中兴社区老年人的主要活动半径、高频路径与偏好节点，以判断现有公共空间供给与老年人活动需求之间的匹配程度。



图 3- 6 老年人行为路径叠加路线图

来源：笔者自绘

结合行为路径叠加结果可以发现，中兴社区老年人的日常活动呈现出明显的近距离集中特征，高频活动节点主要分布于居住单元周边步行可达范围内。参考既有研究中关于老年人活动空间以居住地周边近距范围为主的相关结论，并结合本研究对中兴社区行为路径的观察结果，本文认为老年人活动空间具有一定的层级性特征。总体来看，社区中贯穿南北的道路是老年人高频经过的主要路径，且老年人在行走过程中更倾向于选择道路较为笔直、空间连续、两侧公共空间类型较为丰富且无明显高差的步行环境。

从空间偏好来看，根据行为路径跟踪结果来看，老年人更倾向于选择步行路径连续、场地边界清晰、停留设施较完善、环境相对舒适且具有一定功能复合性的公共空间。一方面，具有座椅、树荫、慢行步道或可供短暂停留界面的空间，更容易吸引老年人停留、休息与交往；另一方面，靠近菜市场、商铺、服务设施或社区公园等日常目的地的空间节点，也因其兼具通行与使用价值而被高频选择。相反，道路狭窄、铺装破损、高差明显、缺少遮荫与休憩支持、且存在人车混行现象的空间，则较少成为老年人主动停留的活动场所，更多只是被动经过的通行路径。由此说明，老年人的空间偏好并非单纯由距离决定，而是与空间环境的支持程度密切相关。

从行为路径与节点选择的关系来看，中兴社区老年人的活动呈现出居住单元—近居微空间—高频节点逐级展开的特征。住宅区附属公共空间承担了最基础的近距离停留与邻里交往功能，社区公园和健身广场则进一步承载了散步、锻炼和社交活动，临街商铺前公共空间和颐康中心附属空间则满足购物、休息与服务获取等日常生活需求。这种层级化的活动结构表明，社区公共空间系统并非由彼此孤立的节点构成，而是通过老年人

的日常步行路径串联形成具有连续性的活动网络。

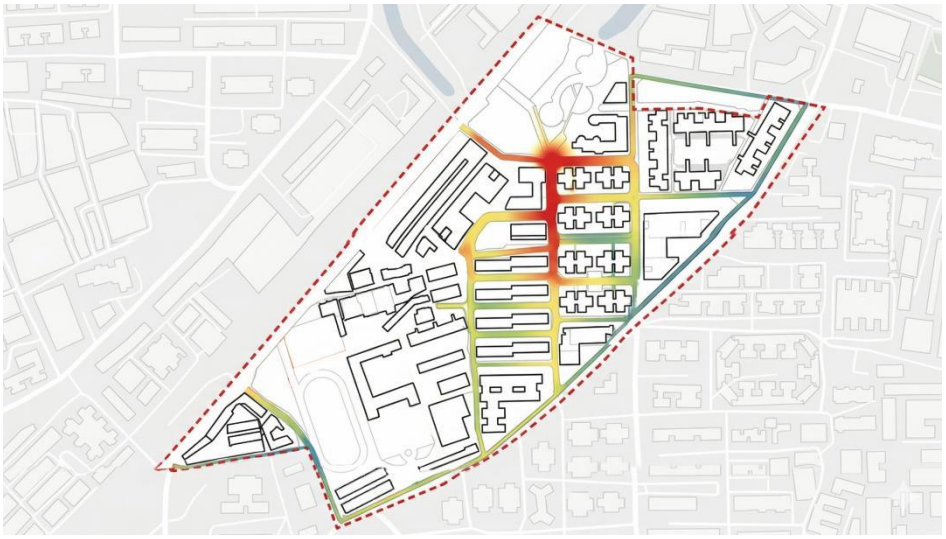


图 3- 7 老年人行为活动热力图

来源：笔者自绘

通过对老年人行为活动路径叠加分析可知，中兴社区老年人活动半径总体不大，但空间使用频率高，对路径安全性、节点可达性、停留舒适性和功能复合性的要求较为突出。这一结果进一步说明，老旧社区适老化改造不应仅关注单一节点的设施增补，而应从老年人真实活动范围和路径偏好出发，打造连续性公共空间体系。该分析也为后续高频活动节点环境评价及改造策略提炼提供了重要依据。

3.3 高频活动节点环境评价

为进一步识别环境要素对老年人行为活动的具体影响，本文在路径叠加与行为频次统计的基础上，选取社区中具有较高到达频次和活动承载度的公共空间节点作为重点分析对象。通过将行为记录与对应节点的环境评分进行匹配，并采用非参数统计方法检验不同环境要素在不同行为类型中的差异分布，可以更具体地识别哪些环境维度对老年人行为选择具有更强影响[59]。基于此，本文对中兴社区高频活动节点进行识别，并开展节点环境评价分析。

在对表 3-2 所记录的老年人行为路径进行梳理后，本研究识别出社区公园（节点 3）、健身广场（节点 4b）、住宅区附属公共空间（节点 6a）、颐康中心（节点 8）及临街商铺前公共空间（节点 7b）等 5 个高频活动节点。基于此，进一步筛选出活动路径经过上述高频节点、且具有相应环境评价问卷数据的老年人样本，共 59 位。结合与其对应的 59 份有效问卷，整理形成各样本在不同节点内对设施可达性、行人基础设施、安全性、

美学和环境质量等环境要素的评分数据，并借助 SPSS 软件开展描述性统计与非参数检验，以分析不同环境要素对老年人行为特征的影响关系。

3.3.1 高频次活动节点识别

结合老年人行为路径叠加结果、节点到达频次统计以及表 3-2 中的行为记录可以看出，中兴社区老年人的活动并非均匀分布，而是明显集中于少数兼具可达性、停留性与功能复合性的公共空间节点。其中，社区公园（节点 3）、健身广场（节点 4b）、住宅区附属公共空间（节点 6a）、颐康中心（节点 8）以及临街商铺前公共空间（节点 7b）被反复选择，构成了老年人日常活动的高频节点系统。这五类节点分别对应社交、健身、宅间停留、公共服务获取与日常消费等不同活动需求，能够较全面地反映中兴社区老年人公共空间使用的主要行为类型与环境偏好，因此被选定为后续重点评价对象。

（1）社交型公共空间：社区公园（节点 3）

第一个节点为社区公园（节点 3），在表 3-2 中共计被选择了 66 次，为最高频节点。按照老年人在该节点的行为特征重新梳理表格顺序，用于记录老年人的年龄、行为和对空间的评分等信息。结果如表 3- 4 社区公园（节点 3）（详见附录）评分统计所示。

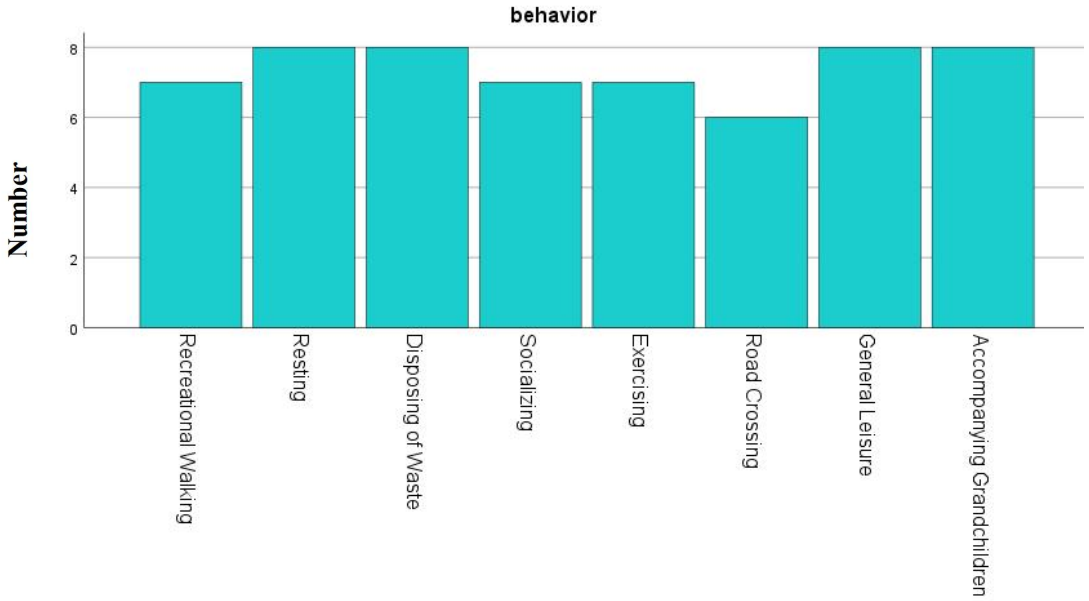


图 3- 8 社区公园的行为统计

来源：笔者自绘

经过统计，本研究整理了在该节点中记录的老人行为类别与频数等关键信息。图 3-7 中展示了在特定公共空间内观察到的老年人各类行为的频次分布。其中，休息、丢垃圾、休闲娱乐和陪伴后代均为最高频次行为，表明这些活动在该环境中具有较高的发生频率，

散步或步行、闲聊和锻炼身体反映出老年人在此空间中较多进行轻度体力活动与人际交流。整体来看，该空间兼具休憩、日常任务与社交功能，老年人在此不仅停留放松，也完成基本生活事务。

从表 3-4 中可知各个环境维度下不同行为类型的平均秩次分布情况。

表 3- 4 社区公园的 Kruskal-Wallis Test

Factors	behavior	N	Mean Rank
infrastructure	Recreational Walking	7	44.57
	Resting	8	24.44
	Disposing of Waste	8	36.25
	Socializing	7	17.57
	Exercising	7	17.57
	Road Crossing	6	52.33
	General Leisure	8	24.44
	Accompanying Grandchildren	8	27.13
	Total	59	
safe	Recreational Walking	7	38.36
	Resting	8	21.75
	Disposing of Waste	8	27.00
	Socializing	7	23.93
	Exercising	7	41.36
	Road Crossing	6	13.25
	General Leisure	8	33.63
	Accompanying Grandchildren	8	38.25
	Total	59	
available	Recreational Walking	7	42.71
	Resting	8	17.44
	Disposing of Waste	8	40.88
	Socializing	7	26.93
	Exercising	7	44.86
	Road Crossing	6	36.67
	General Leisure	8	17.63
	Accompanying Grandchildren	8	17.63
	Total	59	
aesthetic	Recreational Walking	7	37.93
	Resting	8	35.13
	Disposing of Waste	8	12.06
	Socializing	7	34.93
	Exercising	7	22.07
	Road Crossing	6	24.50

表 3- 4 社区公园的 Kruskal-Wallis Test（续）

Factors	behavior	N	Mean Rank
aesthetic	General Leisure	8	27.38
	Accompanying Grandchildren	8	45.25
	Total	59	
environment	Recreational Walking	7	31.86
	Resting	8	36.38
	Disposing of Waste	8	15.00
	Socializing	7	37.07
	Exercising	7	32.07
	Road Crossing	6	14.08
	General Leisure	8	34.56
	Accompanying Grandchildren	8	36.38
	Total	59	

来源：笔者自绘

结果显示，在基础设施这一环境维度下，“横跨马路”行为平均秩次为 52.33，排名最高，表明该行为主要发生在基础设施条件相对完善的区域，如设有信号灯、无障碍坡道或清晰标识的交叉口。这反映出老年人选择在设施保障充分的地点进行道路穿越，而非在任意路段随意穿行。散步或步行的平均秩次为 44.57，说明该节点的步道系统、无障碍设施及照明等硬件配置较为完善，对该类活动具有重要促进作用。相比之下，闲聊、锻炼身体和休息等行为在基础设施维度下的平均秩次较低，表明其发生对道路、铺装、无障碍等通行类设施的依赖程度较弱，可能更多受其他非物理因素（如社会习惯、活动传统或空间可达性）的影响。值得注意的是，丢垃圾行为的平均秩次为 36.25，处于中等水平，说明垃圾桶的设置位置与数量在一定程度上影响了其使用频率。综上所述，Kruskal-Wallis 检验结果表明，通行类行为对基础设施的依赖程度显著高于静止型或社交行为。

在安全这一环境因素下，锻炼身体的平均秩次为 41.36，表明老年人在进行体力活动时对环境的安全性要求最为敏感，例如地面防滑、照明充足、无车辆干扰等条件将提升其参与意愿。散步或步行和陪伴后代，说明在家庭出行或日常活动中，人们对安全环境的需求同样强烈。值得注意的是，丢垃圾和休闲娱乐的行为秩次中等，说明在完成任务性活动或进行轻度休闲时，安全性仍是一个基础保障条件，但并非决定性因素。

在可达性这一环境维度下，锻炼身体的平均秩次为 44.86，表明老年人在进行体力活动时对场所的便捷性与可接近性要求最为突出。这说明若健身设施或运动场地距离较远、路径不连贯或缺乏无障碍通道，可能将显著抑制其参与意愿。相比之下，休息、休

闲娱乐和陪伴后代等行为的平均秩次较低，提示这些活动的发生并不严格受限于空间的物理可达性，而更多取决于空间的舒适度、社会氛围或家庭出行安排。例如，老年人可能在临近住宅的角落短暂停留，即使距离稍远，只要环境适宜即可满足需求。横跨马路的平均秩次也较高，反映出过街行为对交通组织与路网连接性的敏感性——若路口密集、信号合理，则行人更愿意穿行；反之则可能绕行或回避。

在美学这一环境维度下，陪伴后代的平均秩次最高（45.25），表明老年人在陪伴孩子、接送孩子的过程中对环境的美观度尤为敏感，多选择绿化良好、整洁有序、具有宜人景观的空间进行亲子互动。散步或步行、休息和闲聊行为的平均秩次数值说明这些行为的发生显著受到环境视觉品质的影响。例如，绿树成荫、花坛点缀或水景环绕的区域更易吸引人们驻足停留、散步聊天，提升整体使用满意度。

在环境质量这一综合性环境维度下，不同行为类型的平均秩次呈现出清晰的分层特征。其中，闲聊、休息和陪伴后代的平均秩次最高，表明这些行为的发生高度依赖于空间的整体舒适度与宜人氛围。老年人倾向于在空气清新、噪音较低、温度适宜且无污染源的环境中进行人际交往或家庭活动，反映出对高质量生活体验的追求。休闲娱乐、锻炼身体和休闲步行行为的数值，说明日常活动虽以功能为主，但仍受整体环境品质的影响。例如，良好的微气候条件和整洁的地面可提升步行与运动的愉悦感。

总体而言，在社区公园中，不同环境维度对老年人公共空间行为的影响呈现出明显的行为类型分化特征：活动型与任务型行为（如锻炼、步行、丢垃圾）显著依赖于基础设施、可达性和安全性；而静止型与情感型行为（如休息、社交、陪伴后代）则更注重整体环境质量和美学品质，其发生不仅受物理设施影响，还可能与社会关系、空间氛围密切相关。

（2）社交型公共空间：健身广场（节点 4b）

第二个节点为健身广场，在表 3-2 中共计被选择了 66 次，与社区公园并列为最高频节点。按照老年人在该节点的行为特征重新梳理表格顺序，用于记录老年人的年龄、行为和对空间的评分等信息。结果如表 3- 5 健身广场（节点 4b）评分统计(详见附录）所示。

健身广场位于周门小区内部，是社区内少数具备相对明确活动功能的开敞场地，也是老年人行为路径中被反复经过和停留的重要节点。行为观察表明，该节点主要承载散步或步行、锻炼身体、休息、闲聊以及取快递等活动，其中以锻炼、短暂停留和穿越性活动较为突出。该空间被高频选择，主要是因为其位于住宅楼围合区域内部，距离居民

日常生活空间较近，便于老年人以较低成本到达；同时，作为社区内有限的集中活动场地，它在一定程度上承担了老年人日常身体活动与邻里互动的需求。

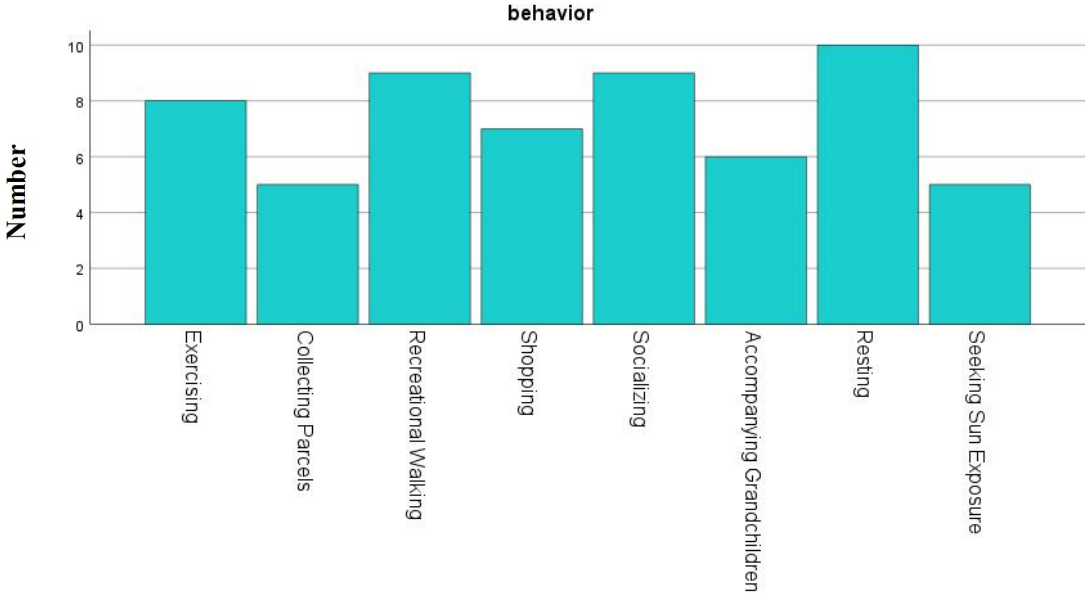


图 3- 9 健身广场的行为统计

来源：笔者自绘

不过，从空间支持条件来看，健身广场的适老化水平并不高。现有器械类型较为单一，停留休憩设施明显不足，场地与周边道路之间存在台阶高差，且老年人到达该场地的过程中需要穿越车行空间，这在一定程度上削弱了其作为老年友好型活动节点的使用品质。因此，健身广场虽具有较高使用频次，但更多体现出有限条件下被动使用的特征，其环境短板与老年人行为需求之间的张力较为典型，适合纳入后续评价分析。

表 3- 6 健身广场的 Kruskal-Wallis Test（笔者自绘）

Factors	behavior	N	Mean Rank
infrastructure	Exercising	8	47.06
	Collecting Parcels	5	15.30
	Recreational Walking	9	44.00
	Shopping	7	25.93
	Socializing	9	23.00
	Accompanying Grandchildren	6	38.25
	Resting	10	19.95
	Seeking Sun Exposure	5	20.70
	Total	59	
safe	Exercising	8	46.75
	Collecting Parcels	5	7.00
	Recreational Walking	9	30.78

表 3- 6 健身广场的 Kruskal-Wallis Test（续）

Factors	behavior	N	Mean Rank
safe	Shopping	7	11.14
	Socializing	9	35.00
	Accompanying Grandchildren	6	34.08
	Resting	10	29.90
	Seeking Sun Exposure	5	37.50
	Total	59	
available	Exercising	8	27.75
	Collecting Parcels	5	24.90
	Recreational Walking	9	31.17
	Shopping	7	33.86
	Socializing	9	26.17
	Accompanying Grandchildren	6	37.25
	Resting	10	32.25
	Seeking Sun Exposure	5	24.90
	Total	59	
aesthetic	Exercising	8	35.50
	Collecting Parcels	5	13.70
	Recreational Walking	9	33.00
	Shopping	7	18.79
	Socializing	9	28.67
	Accompanying Grandchildren	6	35.83
	Resting	10	33.75
	Seeking Sun Exposure	5	35.70
	Total	59	
environment	Exercising	8	32.44
	Collecting Parcels	5	29.60
	Recreational Walking	9	34.67
	Shopping	7	20.64
	Socializing	9	28.33
	Accompanying Grandchildren	6	31.50
	Resting	10	32.45
	Seeking Sun Exposure	5	27.50
	Total	59	

来源：笔者自绘

从空间—环境要素对应关系来看，健身广场作为老年人进行锻炼、散步和短暂停留的社交型节点，对安全性与行人基础设施具有高度依赖性。锻炼、散步等主动行为更需要平整防滑的铺装、明确的活动边界和较少干扰的步行界面；而取快递、购物前后停留

等辅助性行为，则对场地的连续通行、边缘停留条件及出入口衔接更为敏感。因此，该节点反映出一种典型关系：活动强度越高、身体参与度越强的行为，越依赖安全、连续且适老化的基础设施支持。这也说明，健身广场的改造重点应优先落在场地安全细节、器材区组织及慢行界面优化上，而非仅停留在形式美化层面。

（3）社交型公共空间：住宅区附属空间（节点 6a）

第三个节点为住宅区附属公共空间，在表 3-2 中共计被选择了 64 次。按照老年人在该节点的行为特征重新梳理表格顺序，用于记录老年人的年龄、行为和对空间的评分等信息。结果如表 3- 7 住宅区附属公共空间评分统计所示（详见附录）。

住宅区附属公共空间主要指分布于楼栋前后、住宅单元附近的宅前屋后微型公共空间。这类空间虽尺度较小、形态零散，但在老年人日常生活中出现频率较高，是距离居住单元最近的公共活动场所之一。行为记录显示，该节点中的主要活动包括休息、闲聊、晒太阳、短距离散步以及停留观望等，以低强度、短时性和高频次活动为主。其被高频选择的原因，在于该类空间具有显著的近居性与便利性，老年人无需远距离步行即可到达，尤其适合体力较弱、活动半径较小的居民进行短暂停留与熟人交往。

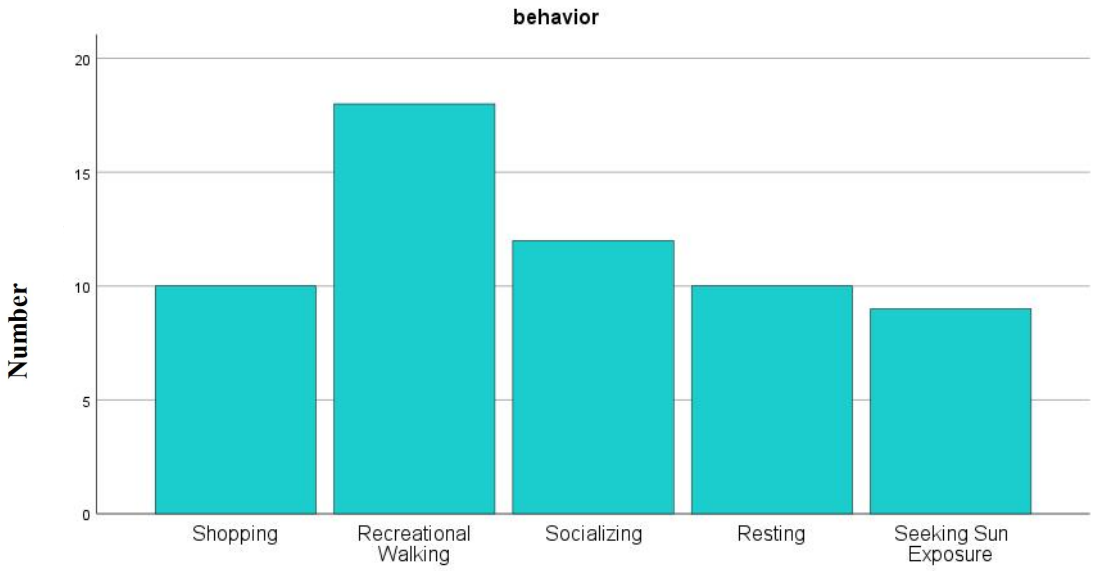


图 3- 10 住宅区附属公共空间的行为统计

来源：笔者自绘

然而，这类空间的公共性和活动支持条件普遍较弱。部分场地存在非机动车侵占、边界模糊、照明不足、设施闲置和景观秩序较差等问题，导致其虽然“距离最近”，却未能充分转化为真正高质量的停留与交往空间。因此，住宅区附属公共空间作为中兴社区老年人日常生活最贴近的微型节点，在反映近距离活动需求、邻里交往特征以及宅间

空间适老化问题方面具有重要代表性。

表 3- 8 住宅区附属公共空间的 Kruskal-Wallis Test

Factors	behavior	N	Mean Rank
infrastructure	Shopping	10	19.15
	Recreational Walking	18	18.39
	Socializing	12	42.46
	Resting	10	41.55
	Seeking Sun Exposure	9	35.83
	Total	59	
safe	Shopping	10	19.85
	Recreational Walking	18	17.28
	Socializing	12	41.58
	Resting	10	42.15
	Seeking Sun Exposure	9	37.78
	Total	59	
available	Shopping	10	41.75
	Recreational Walking	18	26.97
	Socializing	12	26.08
	Resting	10	27.80
	Seeking Sun Exposure	9	30.67
	Total	59	
aesthetic	Shopping	10	18.40
	Recreational Walking	18	32.86
	Socializing	12	31.13
	Resting	10	31.50
	Seeking Sun Exposure	9	34.00
	Total	59	
environment	Shopping	10	27.75
	Recreational Walking	18	25.58
	Socializing	12	30.33
	Resting	10	41.75
	Seeking Sun Exposure	9	27.83
	Total	59	

来源：笔者自绘

从空间—环境要素对应关系来看，住宅区附属公共空间主要承载休息、闲聊、晒太阳、陪伴后代等低强度、近邻性行为，这类行为对空间的需求并不在于“大而全”的设施配置，而更多依赖于可停留、可识别、可安心使用的小尺度环境支持。其中，美学要素对应的是空间界面的整洁性、绿化层次和场所氛围；行人基础设施和安全性则对应日常通行是否顺畅、是否存在杂物侵占和边界不清等问题；设施可达性则反映座椅、休息

区和小型活动设施是否便于就近使用。由此可见，宅前屋后空间的核心问题并非单纯“面积不足”，而是微空间环境品质与邻里交往需求之间尚未形成有效匹配。

（4）服务功能附属公共空间：颐康中心（节点 8）

第四个节点为颐康中心，在表 3-2 中共计被选择了 63 次。按照老年人在该节点的行为特征重新梳理表格顺序，用于记录老年人的年龄、行为和对空间的评分等信息。结果如表 3- 9 颐康中心评分统计所示（详见附录）。

颐康中心及其附属公共空间是中兴社区内部具有公共服务属性的重要节点，也是老年人路径记录中出现频率较高的服务型空间。行为观察结果表明，该节点承载的主要行为包括散步或步行、休息、晒太阳、闲聊以及到访相关服务设施等，体现出服务获取和停留交往的复合特征。一方面，颐康中心本身具有老年服务设施的功能吸引力，能够吸引老年人前往；另一方面，其位于社区内部相对核心的位置，与周边住宅和其他活动节点具有一定联系，因此在老年人的日常活动路径中具有较高穿越率和停留率。

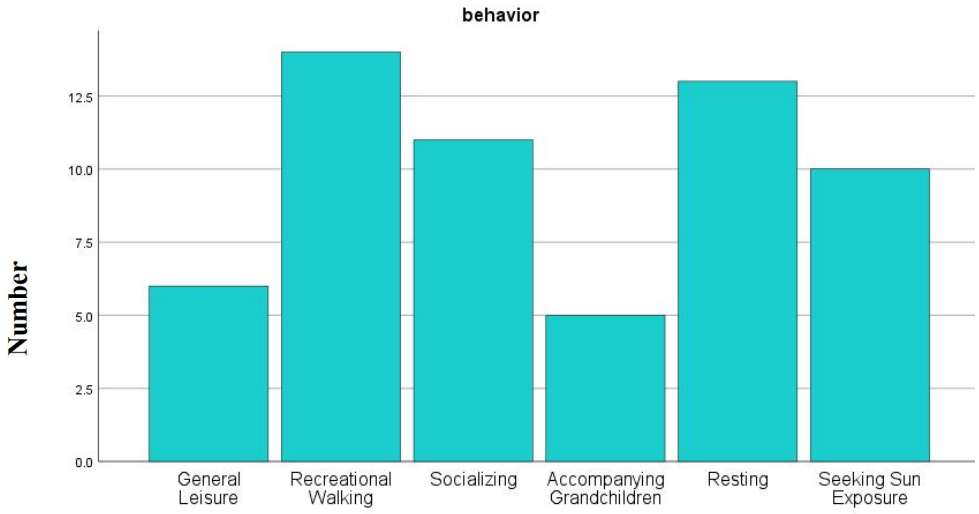


图 3- 11 颐康中心的行为统计

来源：笔者自绘

但从现状看，该节点的附属空间品质尚未与其服务功能相匹配。门前步行空间组织不够清晰，局部存在车辆侵占与休憩设施不足的问题，附属绿地与长廊空间的利用效率也偏低，导致该节点虽具备较强功能基础，却未能充分转化为高品质的老年公共活动场所。因此，颐康中心节点能够较好体现服务功能附属公共空间在有设施基础但空间支撑不足这一方面的典型问题。

表 3- 10 颐康中心的 Kruskal-Wallis Test

Factors	behavior	N	Mean Rank
infrastructure	General Leisure	6	18.00
	Recreational Walking	14	35.07
	Socializing	11	19.82
	Accompanying Grandchildren	5	16.70
	Resting	13	35.88
	Seeking Sun Exposure	10	40.30
	Total	59	
safe	General Leisure	6	40.50
	Recreational Walking	14	19.61
	Socializing	11	20.68
	Accompanying Grandchildren	5	28.80
	Resting	13	37.54
	Seeking Sun Exposure	10	39.30
	Total	59	
available	General Leisure	6	43.67
	Recreational Walking	14	37.64
	Socializing	11	23.86
	Accompanying Grandchildren	5	33.20
	Resting	13	23.92
	Seeking Sun Exposure	10	24.15
	Total	59	
aesthetic	General Leisure	6	10.33
	Recreational Walking	14	19.64
	Socializing	11	31.59
	Accompanying Grandchildren	5	38.70
	Resting	13	38.85
	Seeking Sun Exposure	10	38.70
	Total	59	
environment	General Leisure	6	21.67
	Recreational Walking	14	33.36
	Socializing	11	24.82
	Accompanying Grandchildren	5	23.40
	Resting	13	33.62
	Seeking Sun Exposure	10	34.60
	Total	59	

来源：笔者自绘

从空间—环境要素对应关系来看，颐康中心作为服务附属型节点，其主要承载晒太阳、休息、闲聊、等候及进出服务设施等行为，因此空间需求具有明显的“服务衔接性”

特征。行人基础设施对应的是出入口、连廊、等候区与周边道路之间的连续联系；安全性对应的是高差处理、轮椅通行、夜间照明和节点识别等基础保障；而可达性未达显著则说明，该节点在区位上本身相对容易到达，真正影响行为差异的关键在于到达之后是否能够安全、顺畅、体面地停留与转换。这意味着该类空间更新应优先强化入口过渡、缓坡设置、停留设施与导视系统，而不是仅从景观表层入手。

（5）商业前公共空间：临街商铺（节点 7b）

第五个节点为临街商铺，共计被选择了 65 次。按照老年人在该节点的行为特征重新梳理表格顺序，用于记录老年人的年龄、行为和对空间的评分等信息。结果如表 3- 11 临街商铺前公共空间评分统计所示（详见附录）。

临街商铺前公共空间位于社区内部与沿街商业界面相衔接的位置，是中兴社区老年人日常消费行为最集中的高频节点之一。根据行为记录，该节点中的主要活动包括购物、短暂停留、散步或步行、休息以及陪伴后代等，其中购物行为最为突出。该节点被反复选择，主要源于其日常生活服务功能较强，与老年人的买菜、购物、取物等必要性活动密切相关。同时，商铺前空间兼具社交性，部分老年人会在完成消费后短暂停留、聊天或观察街道活动，使其成为兼具功能性和生活性的重要节点。

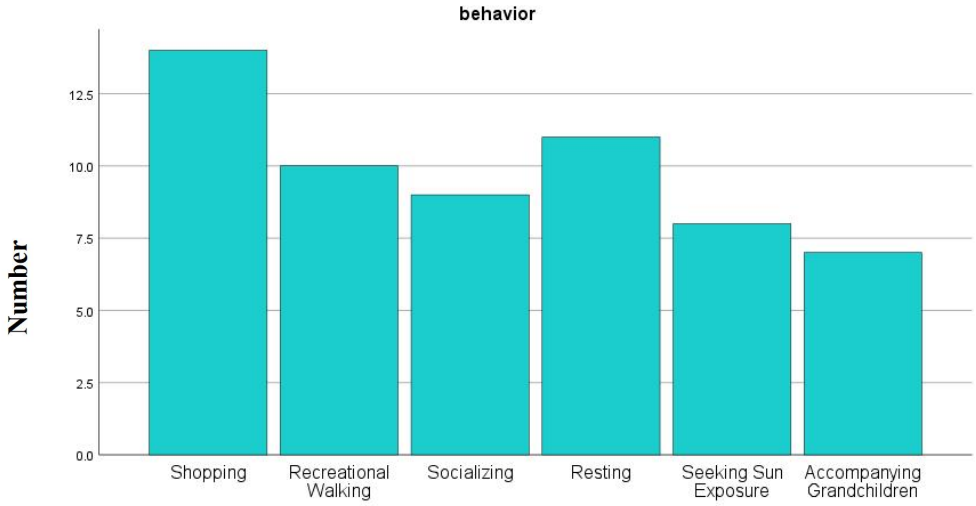


图 3- 12 临街商铺前公共空间的行为统计

来源：笔者自绘

但商业前空间也存在较突出的适老化问题，如人车混行、可通行宽度不足、休憩设施缺乏、入口无障碍衔接不足及空间边界较混乱等。这些问题会直接影响老年人在购物与停留过程中的安全性和舒适性。正因如此，临街商铺前公共空间体现了商业前公共空间在交通秩序、停留支持和功能复合方面的矛盾，因此具有较高分析价值。

表 3- 12 临街商铺的 Kruskal-Wallis Test

Factors	behavior	N	Mean Rank
infrastructure	Shopping	14	33.43
	Recreational Walking	10	13.30
	Socializing	9	37.83
	Resting	11	38.91
	Seeking Sun Exposure	8	35.94
	Accompanying Grandchildren	7	16.14
	Total	59	
safe	Shopping	14	32.54
	Recreational Walking	10	14.40
	Socializing	9	39.17
	Resting	11	38.86
	Seeking Sun Exposure	8	36.63
	Accompanying Grandchildren	7	13.93
	Total	59	
available	Shopping	14	38.07
	Recreational Walking	10	12.70
	Socializing	9	31.33
	Resting	11	33.59
	Seeking Sun Exposure	8	34.38
	Accompanying Grandchildren	7	26.21
	Total	59	
aesthetic	Shopping	14	20.89
	Recreational Walking	10	34.05
	Socializing	9	35.28
	Resting	11	37.41
	Seeking Sun Exposure	8	32.94
	Accompanying Grandchildren	7	20.64
	Total	59	
environment	Shopping	14	24.07
	Recreational Walking	10	35.00
	Socializing	9	37.89
	Resting	11	33.09
	Seeking Sun Exposure	8	36.69
	Accompanying Grandchildren	7	12.07
	Total	59	

来源：笔者自绘

在上述五类高频节点中，老年人的行为类型既包含购物、如厕、取快递等必要性活动，也包括散步、休息、晒太阳等自发性活动，以及闲聊、陪伴后代等社会性活动，表

现出明显的复合性特征。不同节点因其区位条件、功能属性和空间环境差异，吸引了不同结构的行为活动，也反映出老年人在中兴社区公共空间使用中的真实偏好与现实限制。基于此，本文将在下一节进一步结合环境感知评分数据，分析不同环境要素对各类行为活动的影响差异，从而识别各节点适老化改造中最关键的空间问题与优化方向。

3.3.2 不同环境要素对行为的影响分析

在识别高频活动节点的基础上，本研究进一步采用 Kruskal-Wallis H 检验，对设施可达性、行人基础设施、美学、环境质量与安全性五个维度在不同行为类型之间的评分差异进行比较分析。由于本研究中的环境评分数据来源于 Likert 量表，且不同节点的样本量相对有限，因此采用适用于多组独立样本等级数据比较的非参数检验方法更为合适[59]。通过对显著性结果与平均秩次进行综合判断，可以识别不同节点中更具行为区分度的关键环境因素。

在检验方法的选择上，由于因变量“行为”为名义分类变量（如散步、休息、丢垃圾、社交等），其编码仅用于标识类别身份，类别编号（1, 2, 3…）本身不具有数值意义或顺序关系，因此无法满足相关性分析对变量度量尺度的基本要求。Pearson 相关分析要求变量为连续且近似正态分布，而 Spearman 等级相关仍需变量具备可排序的数学结构，将名义变量强行纳入相关分析不仅会导致统计误用，还可能产生无实际解释意义的虚假关联。鉴于此，本研究采用 Kruskal-Wallis H 检验——一种适用于多组独立样本的非参数方法——以行为类型为分组变量，分别检验各环境要素评分在不同行为群体间的分布差异。该方法不依赖数据正态性假设，且能有效处理小样本与 Likert 量表数据，从而科学识别哪些环境维度对老年人行为选择具有显著影响，并通过效应量比较进一步判断其相对重要性。若检验结果显著（$p < 0.05$），则表明该环境维度对不同行为具有差异化影响，可进一步结合平均秩次高低判断其作用方向。结果下表所示：

(1)社交型公共空间：社区公园（节点 3）

从设计的角度来分析，社区公园的“基础设施”要素（ $H = 29.606$，$p < .001$）对行为选择的区分能力强，影响显著，改造的潜力大。进一步分析平均秩次发现，社交互动/闲聊与锻炼身体两项行为的平均秩次显著低于总体水平，提示这些活动常发生在基础设施条件相对薄弱的区域，可能受限于社区公园缺乏休憩设施、地面破损或路径不连贯等问题。而“散步或步行”（44.57）与“横跨马路”（52.33）则表现出极高的平均秩次，反映出这两类通行性行为高度依赖于连续、安全、无障碍的道路系统和配套设施。

表 3- 13 社区公园的 Kruskal-Wallis Test Statisticsa,b

	infrastructure	safe	available	aesthetic	environment
Kruskal-Wallis H	29.606	17.315	28.409	23.506	16.725
df	7	7	7	7	7
Asymp. Sig.	<.001	.015	<.001	.001	.019

a. Kruskal Wallis Test
b. Grouping Variable: behavior

来源：笔者自绘

因此，在社区公园设计中，应优先介入改造“社交互动”和“锻炼身体”行为相关的空间；同时，在社交与锻炼频发区补充基础服务设施，提升整体空间的包容性与可达性。此外，社区更新应优先构建“安全、连续、无障碍”的慢行网络，以保障老年人的步行等行为。尤其在住宅出入口、公共服务节点与公园路径之间形成无缝衔接，确保老年人能够自主、安心地完成日常移动。

(2)社交型公共空间：健身广场（节点 4b）

结合表 3-14 和表 3-5 的数据可知，健身广场中基础设施（$H = 28.152, p < .001$）与安全感知（$H = 30.266, p < .001$）对老年人行为类型的区分能力最强，表明其在行为选择中具有显著影响。从平均秩次来看，锻炼身体、休闲散步、购物等主动行为在基础设施完善、安全性高的区域集中分布，而陪伴孙辈、休息等静态行为则多出现在条件相对一般或环境较弱的区域。

表 3- 14 健身广场的 Kruskal-Wallis Test Statisticsa,b

	infrastructure	safe	available	aesthetic	environment
Kruskal-Wallis H	28.152	30.266	4.032	12.599	4.414
df	7	7	7	7	7
Asymp. Sig.	<.001	<.001	.776	.083	.731

a. Kruskal Wallis Test
b. Grouping Variable: behavior

来源：笔者自绘

从平均秩次的分布特征来看，“锻炼身体”在“基础设施”维度的平均秩次高达 47.06，远高于其他行为类型，说明老年人开展系统性体能活动强烈依赖于适老化健身器材的种类、布局合理性、地面防滑性能以及辅助扶手等硬件支撑；而散步或步行（44.57）与横跨马路（52.33）在安全维度中表现出极高的平均秩次，进一步印证了通行类行为对连续、无障碍、照明充足的慢行路径系统的高度关联性。值得注意的是，社交互动（平均秩次 17.57）与休息（19.33）在基础设施与安全维度中的得分均显著偏低，表明这些行为常

发生在设施简陋、缺乏座椅、地面破损或存在视线遮挡的边缘区域。

因此，健身广场应优先优化基础设施配置与安全环境营造，尤其在锻炼与社交活跃区增设适老型健身器材、遮阳休憩设施及无障碍路径。同时，明确划分健身专用区与公共通行道，采用不同铺装材质或色彩进行视觉引导；通过改善照明、地面平整度与视线通透性增强安全感知，促进功能分区与行为需求匹配。

(3)社交型公共空间：住宅区附属空间（节点 6a）

结合表 3-6 与表 3-15 的数据可知，在宅前屋后这类高度邻近、使用频率极高的小微公共空间中，美学品质（$H = 25.692, p < .001$）、基础设施（$H = 19.096, p = .002$）与安全感知（$H = 18.343, p = .003$）对老年人行为类型的区分能力最为显著，表明空间的视觉吸引力、功能配套与安全感是影响其日常活动选择的核心变量。相较之下，环境质量（$H = 6.024, p = .304$）未达显著水平，说明温湿度、空气质量等生态因子在此类半室内或小尺度户外空间中对行为差异影响有限。

表 3- 15 住宅区附属空间的 Kruskal-Wallis Test Statisticsa,b

	infrastructure	safe	available	aesthetic	environment
Kruskal-Wallis H	19.096	18.343	13.663	25.692	6.024
df	5	5	5	5	5
Asymp. Sig.	.002	.003	.018	<.001	.304

a. Kruskal Wallis Test
b. Grouping Variable: behavior

来源：笔者自绘

从平均秩次来看，晒太阳在美学维度的平均秩次高达 48.22，显著高于其他行为，反映出老年人强烈偏好具有景观视野、色彩协调、绿植环绕的休憩角落。锻炼身体在基础设施维度的平均秩次为 47.06，说明其高度依赖适老健身器材、平整地面及辅助扶手等硬件支持。而社交互动在安全维度的平均秩次为 35.00，表明良好的照明、开阔视线与无障碍布局是促进交流的重要前提。相反，“休息”“照看孙辈”等静态行为在各项维度中平均秩次普遍偏低，多发生在设施简陋或边缘区域。

因此，在对宅前屋后空间进行改造时，应将美学作为行为引导的重要工具，通过植物配置、材质肌理、遮阳构筑物形态等提升空间辨识度，提升老年人停留率。系统完善适老化基础设施，在高频使用区域配置防滑铺装、连续扶手、多功能座椅及适配的健身器材。消除高差隐患、减少视线遮挡，增强老年人对空间的控制感与信任度。

(4)服务功能附属公共空间：颐康中心（节点 8）

表 3- 16 颐康中心的 Kruskal-Wallis Test Statisticsa,b

	infrastructure	safe	available	aesthetic	environment
Kruskal-Wallis H	27.041	29.794	8.169	6.931	7.708
df	4	4	4	4	4
Asymp. Sig.	<.001	<.001	.086	.140	.103

a. Kruskal Wallis Test
b. Grouping Variable: behavior

来源：笔者自绘

结合表 3-17 与表 3-6 的数据可知，在颐康中心这一以老年人为主要使用者的社区养老服务空间中，基础设施（H = 27.041, p < .001）与安全感知（H = 29.794, p < .001）对老年人行为类型的区分能力最强，表明该空间的行为分布高度依赖于功能设施的完备性与环境的安全保障水平。

从平均秩次来看，晒太阳在基础设施维度的平均秩次高达 40.30，远高于其他行为，反映出老年人对该活动所依赖的遮阳设施、座椅配置及地面平整度要求较高。休闲散步行为在安全维度的平均秩次为 19.61，说明其对路径连续性、照明条件和障碍物控制有一定需求。而社交互动行为在安全维度的平均秩次为 20.68，表明观察中老年人多在光线良好、视线通透的空间中开展交流活动。

因此，颐康中心前公共空间应优先完善适老化基础设施，针对晒太阳、休息等高频率行为，增设带遮阳结构的坐凳等，提升空间的可用性。同时减少高差与障碍物、设置清晰标识，尤其在出入口、走廊转角等关键节点增强安全感，促进老年人自主出行。当前一般休闲行为多集中在设施简陋区域，可通过增设花池等手段提升空间品质。

(5) 商业前公共空间：临街商铺（节点 7b）

结合表 3-18 与表 3-12 的数据可知，在临街商铺这类兼具商业服务与公共交往功能的空间中，基础设施、安全感知、可达性、环境质量均达到统计学显著水平，表明老年人在该类空间中的行为选择受到多维环境要素的共同影响；而美学品质影响相对较弱，反映出该空间的功能属性仍以实用为导向。

表 3- 17 临街商铺的 Kruskal-Wallis Test Statistics[a,b]

	infrastructure	safe	available	aesthetic	environment
Kruskal-Wallis H	23.312	25.100	17.376	11.633	17.145
df	5	5	5	5	5
Asymp. Sig.	<.001	<.001	.004	.040	.004

a. Kruskal Wallis Test
b. Grouping Variable: behavior

来源：笔者自绘

从平均秩次来看，购物行为在基础设施维度的平均秩次高达 33.43，显著高于其他行为，说明老年人对该活动高度依赖清晰的出入口、无障碍通道、防滑地面等硬件条件。社交互动在安全维度的平均秩次为 39.17，表明老年人选择在照明良好、无安全隐患的区域进行交流。同时，休息行为在基础设施和安全维度中的平均秩次分别为 38.91 和 33.59，说明其使用需求强烈，但当前空间缺乏专用休憩设施，导致停留时间短。

此外，购物行为在可达性维度的平均秩次为 38.07，反映出老年人对商业服务的访问具有明确目的性，且更偏好步行便捷、连接顺畅的路径网络。而在环境质量维度，购物行为的平均秩次为 24.07，表明对空气质量、噪音控制等因素要求较低。

在后续改造中，应优先优化商业服务附属空间的适老化配置。在商铺出入口设置防滑地面材料、缓坡通道等无障碍设施，以提升通行安全性与便利性。在商铺前区域预留足够宽度的步行空间，防止人车混行，并在关键节点增设座椅、遮阳棚等设施，以满足老年人休憩及活动需求。

3.4 主要问题归纳与设计启示

结合老年人行为活动特征分析与高频节点环境评价结果可以看出，中兴社区公共空间当前存在的问题并非单一设施缺失，而是空间供给方式与老年人行为需求之间存在系统性错位。老年人的日常活动总体呈现出近距离、高频次、慢节奏和复合化特征，其空间选择高度依赖步行可达性、安全性、停留支持条件与环境舒适度。然而，现有公共空间在连续步行联系、人车分流、无障碍衔接、休憩设施配置以及导向系统组织等方面仍存在明显短板，导致部分空间虽然具备一定使用基础，却难以持续支撑老年人的多样化活动需求。

从空间类型来看，社交型公共空间的主要问题在于设施适配度不足、停留支持系统薄弱、动静分区不清，难以充分满足老年人休息、交往与轻体力活动并存的需求；交通型公共空间的核心矛盾在于人行连续性中断、道路尺度受限与安全保障不足，直接影响老年人外出活动的便捷性；商业前公共空间虽具有较强生活活力，但在人车混行、停留空间不足和边界模糊等方面仍制约其老年友好性；服务功能附属空间则主要表现为节点可达性和识别性不足，难以将既有服务资源高效转化为老年人的日常支持网络。

基于上述问题，本文认为老旧社区公共空间的适老化改造应从三个层面展开：一、以老年人高频行为路径为基础，优先完善社区内部慢行联系系统，强化主要节点之间的连续、安全、无障碍衔接。二、以高频活动节点为重点，针对不同空间类型补充休憩设

施、优化功能组织、提升环境舒适度，并构建更具包容性的停留与社交空间，三、以“行为—空间”耦合关系为依据，建立从问题识别、环境评价到策略转译的设计逻辑，使空间改造能够真正回应老年人的日常行为模式与使用需求。由此，第三章的分析不仅验证了第二章现状调研中发现的问题，也为后续第五章策略提炼与第六章设计实践提供了明确依据。

第四章　老旧社区公共空间适老化改造实践案例

4.1 案例研究方法与分析框架

本研究基于环境行为学视角，对老旧社区适老化改造中的典型实践案例进行系统梳理[55]。依据“五要素”分析框架[17]（即设施可达性、行人基础设施、美学、环境质量、安全因素），对每一要素下所涉及的四类公共空间（社交空间、商业前区空间、交通道路空间及服务功能附属空间）进行分类解析。案例选取遵循已建成、适老化明确、资料完整，具有代表性的原则。本研究采用内容分析法，以空间干预行为为基本编码单元对案例文本与图纸信息进行逐条拆解，通过双人交叉编码提高一致性，从 20 个国内外适老化改造案例中系统提取设计干预措施，共记录设计做法 370 条，通过对相同设计策略进行归纳合并，例如不同案例中重复出现的设置休息座椅、增加遮阳设施等。本研究采用功能属性和空间载体的双维分类逻辑，对设计做法进行归类[61]。该分类为后续不同空间类型与设计要素的统计分析提供基础。

需要说明的是，受限于案例样本的数量与地域覆盖范围，本研究中各类做法的出现频次并不具备严格的统计学意义，其数值仅用于识别策略出现趋势，不用于推断其优劣或效果。

本章通过对高频设计的归纳为第五章策略构建提供经验基础与实证支撑。

4.2 设施可达性因素

设施可达性因素可进一步细分为运动机会的可达性、日常目的地的可达性、交通系统的可达性以及休息区（如座椅、公共厕所等）的可达性等多个维度[58]。其中，“休息区”则更侧重于满足老年人在步行过程中的基本生理与社交需求。其典型做法包括设置固定式座椅、遮阳构筑物、防滑铺地及清晰的空间边界等，旨在提供安全、舒适且具有领域感的短暂停留场所[41]。而“日常目的地”则往往具有明确的功能导向，空间布局更为正式，规模也相对较大[54]。

本研究从多维视角综合评估社区公共设施的可达性水平，构建了包含空间连通性、到达距离、路径连续性和无障碍完整度四个维度的细化评价体系[15]。具体判定标准如下：

（一）空间连通性：指社区内部是否形成系统、闭合且无中断的步行网络，能够支持老年人在住区范围内安全、顺畅地通行至各类服务设施。

（二）到达距离：以老年人日常高频使用的活动设施（如休憩座椅、健身器材、社区绿地、服务中心等）为对象，依据其与居住单元的直线或步行距离进行分级≤300 米视为高可达性（满足“5 分钟生活圈”要求），300–800 米为中等可达性，>800 米则视为低可达性。

（三）路径连续性：考察步行路径是否存在物理中断（如台阶无坡道、断头路）、显著高差未设缓坡，或受到机动车穿行、占道停车等干扰，影响步行的流畅性与安全性。

（四）无障碍完整度：评估路径及设施周边是否全面满足老年人及轮椅使用者的基本通行需求，包括但不限于：路面平整防滑、通道宽度≥1.2 米、转弯半径充足、无高差障碍或已设置合规坡道、扶手连续等。

本研究借鉴老年友好社区可达性评价相关研究以及国内步行可达性研究方法，将设施可达性划分为空间连通性、到达距离、路径连续性与无障碍完整度四个维度，并采用综合评价的方式进行等级评定。当某案例在四项指标中同时满足 3 项及以上指标时判定为高可达性；满足 2 项者为中等可达性；仅满足 1 项或以下者则判定为低可达性。该方法兼顾客观空间特征与老年群体的实际使用体验，有助于精准识别社区适老化改造的关键短板。

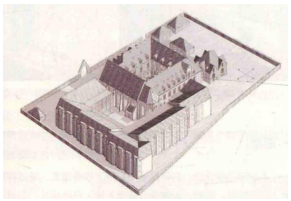
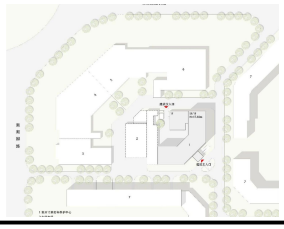
4.2.1 具体案例统计

本研究汇总案例中有关设施可达性因素的适老化设计做法，如表 4-1 所示。（详见附录）

表 4- 1 设施可达性-案例做法统计（简表，详见附录）

案例		社交空间	商业前空间	交通道路空间	服务功能附属空间
日本-千叶县柏市，丰四季台社区	 	绿化+健身器材。据前述可达性评价标准判定为运动机会/休息/日常目的地的可达性高	长屋檐形成的灰空间+小广场+绿化。据前述可达性评价标准判定为休息区可达性高	网格式车行道。据前述可达性评价标准判定为交通的可达性高	配备全套服务的灰空间。据前述可达性评价标准判定为日常目的地/休息区的可达性高

表 4- 1 设施可达性-案例做法统计（续）

案例		社交空间	商业前空间	交通道路空间	服务功能附属空间
日本-东京，结缘・多摩平之森老年公寓	 	绿化+木平台+休息座椅。日常目的地/休息区的可达性高	长屋檐形成的灰空间+小广场+绿化。休息区可达性高	尽端式车行道。据前述可达性评价标准判定为交通的可达性稍低	长屋檐形成的灰空间。据前述可达性评价标准判定为休息区可达性高
丹麦-哥本哈根，圣约瑟夫老年公寓与护理院		建筑中庭广场+绿化。休息区的可达性高	建筑中庭广场+绿化。日常目的地/休息区的可达性高	尽端式车行道。交通的可达性稍低	花园步道。日常目的地/运动机会的可达性高
荷兰-海尔德兰，德本灵青老共居公寓	 	主题花园。休息区的可达性高	小型种植菜园+健身房。日常目的地/运动区的可达性高。	尽端式车行道。交通的可达性稍低。	花园步道。日常目的地/运动机会的可达性高
中国-北京，大栅栏街道银鹤苑养老译站	 	屋顶平台+屋顶绿化。日常目的地/休息区的可达性高	大遮阳板形成灰空间。休息区的可达性高	尽端式车行道。交通的可达性稍低。	屋顶平台与半室内空间（室内观温室）。休息区/日常目的地的可达性高
中国-北京，首开寸草望京老年介护中心	 	屋顶平台+屋顶绿化。日常目的地/休息区的可达性高	绿化+等车空间。休息区的可达性高	环通式车道。交通的可达性中上	室内大空间。休息区/日常目的地的可达性高

来源：笔者自绘（案例来源[42]）

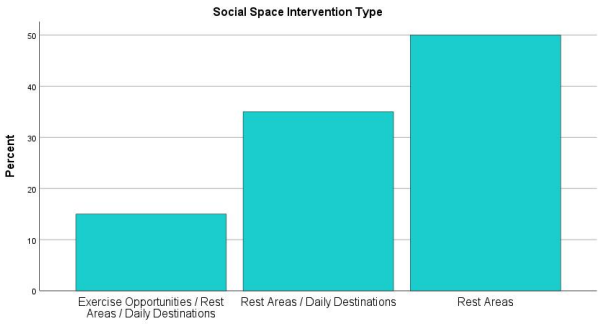


图 4- 1 社交类公共空间-适老化做法类型

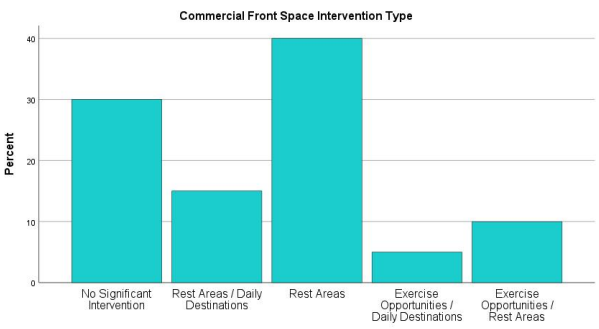


图 4- 2 商业前公共空间-适老化做法类型

来源：笔者自绘

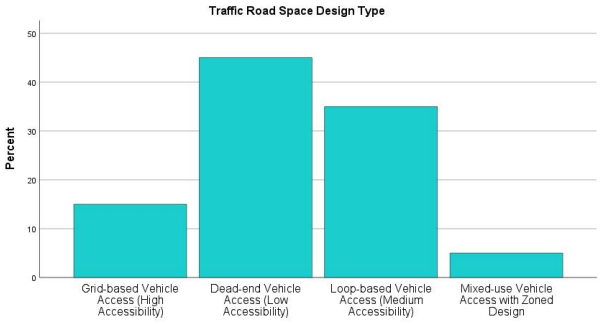


图 4- 3 交通类公共空间-适老化做法类型

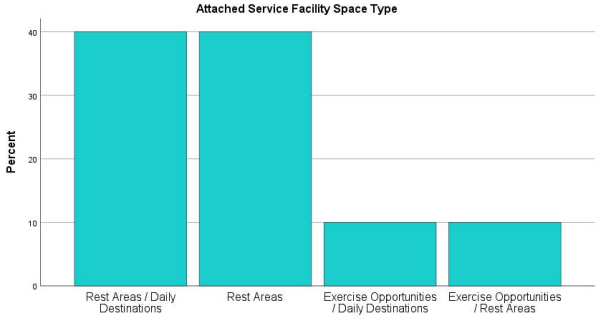


图 4- 4 服务设施附属类-适老化做法类型

来源：笔者自绘

在社交类公共空间的适老化做法类型（图 4-1）中，较多做法为通过设置休闲设施和绿化，提供临时休息场所，满足老年人短暂停留与交流的需求。

在商业前公共空间的适老化做法类型中，针对休息区的可达性的设计较多，表明该类空间在所选案例样本中已成为老年人在商业环境中停留与社交的重要节点，如图 4-2 所示。

在交通道路类公共空间的适老化做法类型中，尽端式车行道有效限制机动车穿行，降低车速与噪音干扰，从而提升步行安全性和环境舒适度，尤其适用于以老年人为主的居住社区。环形车行道在保障基本车辆进出的同时实现高效通行，兼顾了效率与通行便利性，适用于道路空间宽敞的社区。

在服务设施附属公共空间的适老化做法中，休息区/日常目的地和休息区已成为老年人在社区服务环境中停留、社交与日常活动的核心空间。相比之下，运动机会/日常目的地和运动机会/休息区的设计受空间尺度与功能单一性的限制，难以充分满足老年人对复合性与舒适性公共空间的需求，因此在实践中的应用相对较少。

综上可知，设施可达性在不同公共空间类型中具有差异化的设计指向：社交类空间

侧重停留与交流节点的便捷可达，商业前空间侧重休息区与日常消费场景的复合衔接，交通道路空间侧重连续安全的通行组织，服务设施附属空间则侧重休息区与服务目的地之间的高效联系。其共同目标在于构建符合老年人日常活动规律的便捷、连续、可持续使用的公共空间体系。

4.2.2 典型案例：结缘多摩平之森老年公寓

结缘・多摩平之森老年公寓位于日本东京都日野市多摩平 3-1-6，是 2011 年 10 月正式投入运营的综合性老年住宅项目。项目整体由老年公寓、集会食堂及小规模多功能设施三部分组成，总建筑面积约 3718 ㎡，其中老年公寓占地 3260 ㎡，共设 63 户住宅单元，并配套短期照护床位 7 个。该项目在既有建筑更新基础上，通过空间重组与功能复合，形成了兼顾居住、照护与日常活动支持的综合性老年居住环境。其可达性提升并非依赖单一设施增设，而是通过步行系统、服务节点与无障碍设施的整体整合，打造适宜老年人连续使用的空间体系。

从空间连通性来看，该项目将原本相对封闭的单元式布局转变为开放的外廊式组织，通过加建外廊道与电梯系统，显著强化了各住宅单元、公共活动空间与服务设施之间的联系。外廊不仅承担交通功能，也作为半开放的过渡空间，将老年公寓、集会食堂及小规模多功能设施串联为连续的生活网络，使不同功能单元之间不再彼此割裂，而是形成可步行、可停留、可交流的复合联系界面。

从到达距离来看，项目将多种高频使用功能整合在同一居住环境内部，使老年人能够在较短步行距离内完成用餐、短时停留、社交交流与基础照护等活动。尤其是集会食堂和小规模多功能设施的嵌入，减少了老年人获取日常服务所需的空间跨越。该案例通过缩短服务设施与居住空间之间的实际到达距离，提高老年人对高频生活目的地的使用可及性。

从无障碍完整度来看，该案例最关键的改造措施在于加建电梯系统，并以外廊取代原有封闭楼梯间组织，从根本上改善了既有建筑中垂直交通不便的问题。对于老年人尤其是行动能力下降者而言，电梯与开放式外廊的结合提升了垂直与水平移动的可达性。同时，项目对外立面、外围护材料、防水和保温系统进行同步更新，也在一定程度上提升了建筑整体使用安全性与环境稳定性，为无障碍系统的长期运行提供了支撑。

该案例在可达性方面的最重要的设计策略是通过强化空间连通、缩短服务距离、优化连续步行路径并完善无障碍设施，构建老年人可便捷到达、持续使用的复合生活空间

体系。

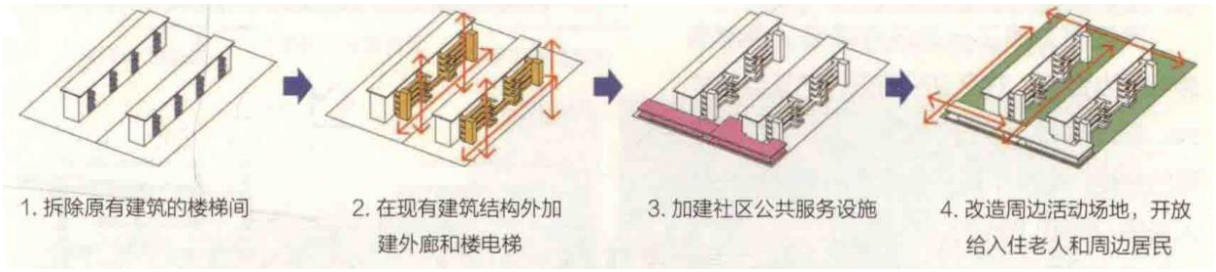


图 4- 5 改造内容示意图

来源：参考文献[42]

在社交类公共空间中，该案例主要通过绿化、木平台结合休息座椅的组合形式构建日常交往节点，如图 4-5 所示。该空间依托自然植被与木质平台营造亲和、舒适的环境氛围，搭配固定式休息座椅，形成具有明确使用意图的休憩场所。其布局位于场地核心或人流交汇处，可达性较高，便于老年人进行非正式交流与日常停留。



图 4- 6 社交类空间（左）和商业前空间（右）

来源：参考文献[42]

在商业前公共空间方面，设计采用长屋檐形成的灰空间、小广场及绿化的复合模式，如图 4-5 所示。屋檐下形成的半开放灰空间不仅提供了遮阳避雨的功能，也增强了空间的包容性与停留意愿；结合小型广场与周边绿化，进一步提升了环境品质与视觉舒适度。此空间虽不以商业盈利为主要目标，但其良好的可达性与宜人性使其成为社区居民聚集与互动的重要场所，具备较强的社交潜力。

在交通道路类公共空间中，主要表现为尽端式车行道，如图 4-6 所示。车行道采用尽端式布局，有效减少车辆穿行频率，提升步行安全。同时，沿建筑立面设置的长屋檐形成连续的灰空间，既为行人提供遮蔽，也增强了空间的连续性。

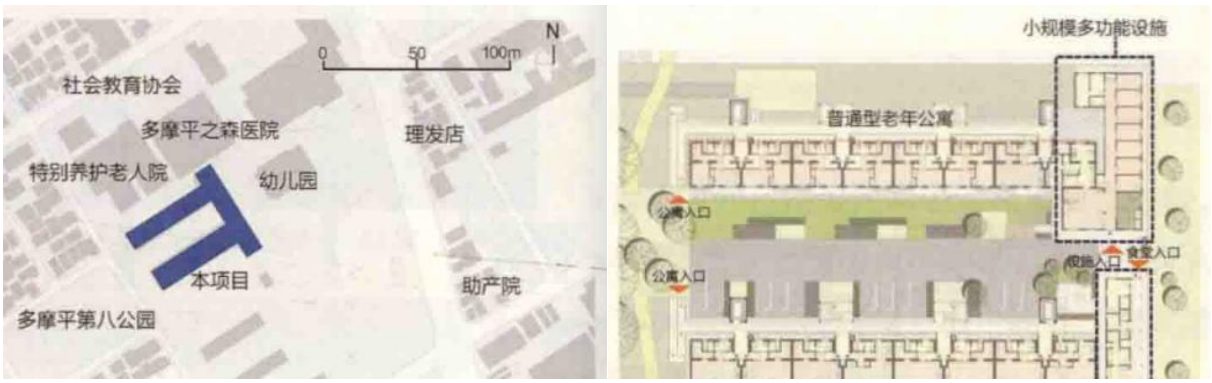


图 4- 7 交通道路空间（左）和服务设施附属空间（右）

来源：参考文献[42]

在服务功能附属公共空间中，可达性较高的空间设计为长屋檐形成的灰空间。此空间紧邻小规模多功能设施（图 4-6），兼具过渡与休憩功能。通过屋檐结构形成的半室外空间，不仅改善了微气候条件，也为老年人提供了便捷的临时停留点，实现了服务功能与空间体验的有机融合。

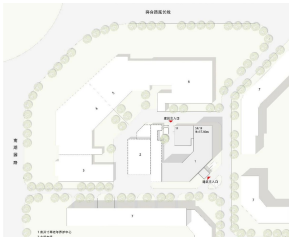
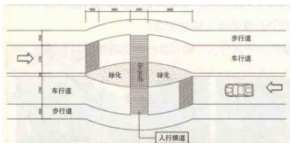
4.3 行人基础设施因素

行人基础设施因素可进一步细分为步行区域的空间构成与人行道的物理特征等维度[51]。其中，步行区域的构成主要涉及路径布局、功能分区及与其他空间要素（如绿化、建筑界面、休憩设施等）的组织关系。人行道特征则包括铺装材质、宽度、高差处理、无障碍设计及边界界定等具体属性，共同影响老年人的通行安全性与行走舒适性。

4.3.1 具体案例统计

综合上述案例可以看出，适老化公共空间更新普遍强调通过统一的材料语言、适度的绿化配置、清晰的步行系统以及有序的人车分流来提升空间品质。其中，木色、白色、红砖等温和且具有识别性的界面处理，有助于营造亲切、稳定的环境氛围；绿化不仅承担景观美化功能，也在空间分隔、视线组织和安全缓冲中发挥重要作用；而直线型步行道及减速化道路设计，则进一步强化了老年人日常出行的安全性与可达性。总体而言，这些案例表明，适老化设计应从环境整体出发，将材质、色彩、绿化与交通组织等要素协同整合，以构建安全、舒适、易识别且具有支持性的公共空间环境。

表 4- 2 行人基础设施-案例做法统计（简表，详见附录）

案例		社交空间	商业前空间	交通道路空间	服务功能附属空间
中国-北京，首开寸草望京老年介护中心	 	木平台+绿化+统一木色	绿化	直线型步行道，用绿化划分道路	木色+白色（室内）
中国-上海，南丹邻里汇	 	绿化+统一木色	绿化+宽阔视野	直线型步行道	木色+白色+绿色（室内）
中国-上海，江川路社区悦享食堂	 	木平台+绿化+统一木色	红砖立面+绿化	直线型步行道，用绿化划分道路	红砖立面+绿化
新加坡，乐龄安全区改造项目	 	绿化	绿化	眼型与蛇形车行道	绿化

来源：笔者自绘

在社交类公共空间的适老化做法类型（图 4-8）中，屋顶平台+屋顶绿化成为当前因素中最具代表性的设计策略之一。通过将建筑顶部空间转化为可进入的公共平台，并结合植被覆盖，不仅提升了环境舒适度与视觉美感，还为老年人提供了安全、安静且具有私密性的社交场所。此外，部分项目已尝试将生态功能与休闲活动相结合，营造多功能

复合型空间。例如，通过设置适老健身器材、主题花坛或休息座椅，增强空间的吸引力与使用频率。

在商业前公共空间的适老化做法类型（图 4-9）中，由悬挑屋檐形成的灰空间通过建筑出挑结构创造半开放过渡区域，既实现了遮阳避雨功能，又保留了通行便利性，是较为常见的被动式空间组织方式。此外，绿化、庭院内+绿化以及滨水平台+滨水步道等做法体现出部分项目开始尝试通过植物配置和空间界面优化来提升环境品质。

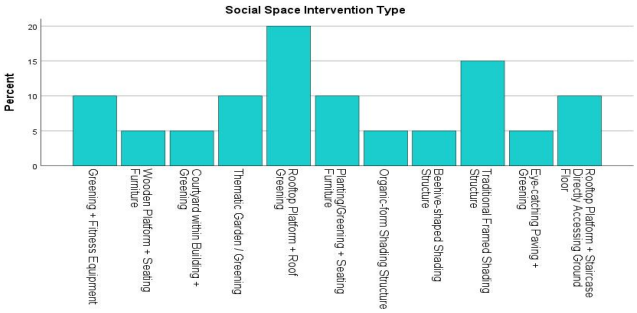


图 4- 8 社交类公共空间-适老化做法类型

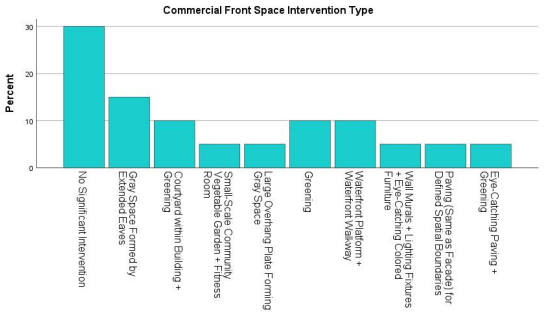


图 4- 9 商业前公共空间-适老化做法类型

来源：笔者自绘

在交通道路类公共空间的适老化做法类型（图 4-10）中，可采用曲线形步行道+矩形广场空间的设计手法，该类设计通过引入柔和的曲线路径与规整的矩形广场相结合，既增强了空间的视觉引导性与趣味性，又提供了稳定的停留节点，有助于缓解老年人行走疲劳并促进社交互动。

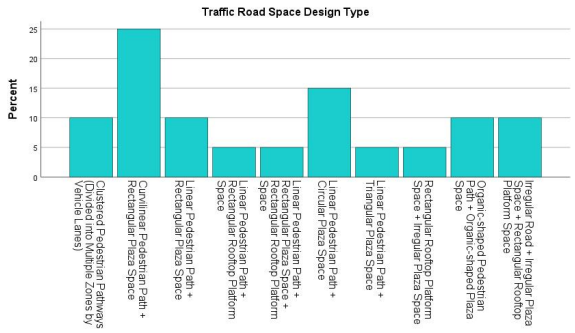


图 4- 10 交通类公共空间适老化做法类型

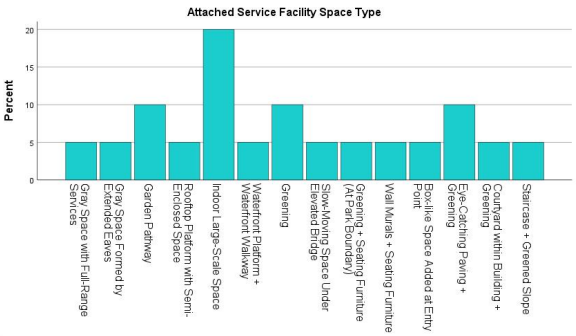


图 4- 11 服务设施附属类适老化做法类型

来源：笔者自绘

在服务设施附属公共空间的适老化做法类型（图 4-11）中，室内大尺度空间空间通常位于建筑内部或半封闭区域，通过提供宽敞、遮蔽且安全的环境，满足老年人寻求服务的需求。

综上可知，行人基础设施要素在不同公共空间类型中的设计重点具有明显差异。社

交类空间强调活动场地、休憩设施与绿化界面的综合组织，以提升停留舒适度与交往支持；商业前空间侧重灰空间与步行界面的整合，以兼顾通行、停留与消费行为；交通道路空间则以步行路径组织、节点设置和慢行系统连续性为核心，服务于老年人的安全出行；服务设施附属空间更强调室内外步行联系的完整性与服务过程中的连续通达。其共同目标在于通过完善步行环境与空间组织，构建更加连续、清晰且适宜老年人日常使用的慢行空间体系。

4.3.2 典型案例：清河阳光社区三角地改造

清河阳光社区位于北京市海淀区清河街道，是典型城郊混合型老旧社区的微更新项目。三角地原为社区内部闲置边角空间，长期存在场地破碎、设施老旧、功能单一及环境品质较差等问题，难以满足居民尤其是老年人日常停留、通行与交流需求。为改善社区公共环境并提升空间使用效率，项目以微更新方式对该场地进行适老化改造。

从行人基础设施层面看，改造策略主要包括以下三个方面：一是开辟活动场地，通过清除灌木丛、保留原有大乔木，优化铺地材料，将原本封闭、杂乱的空间转变为可供居民自由活动的开放场所；二是增设隔离带，在场地边缘布置废旧轮胎作为软质隔离带，有效分隔车行与步行区域，保障行人安全；三是丰富场地类型，设置阳光亭、休憩座椅及健身器材，满足不同年龄层居民的多样化使用需求；四是通过设置“三角地文明公约”标志牌、创意展板及居民自绘的山墙艺术，激发居民参与感，培育社区认同（图 4-12）。



图 4- 12 改造后的场地平面（左）和社交类空间（右）

来源：参考文献[42][43]

在社交类公共空间中，该案例主要采用蜂巢形遮阳构筑物+绿化的组合形式（图 4-12）。蜂巢状结构不仅具有良好的遮阳性能，其独特的几何形态也增强了空间的视觉吸引力与趣味性，营造出兼具功能性与艺术性的交往环境。搭配周边绿化植被，进一步

提升了微气候舒适度，为居民提供了适宜停留、交流的半开放场所，有效激发了邻里互动与社会交往行为。

在交通道路类公共空间中，设计以直线型步行道+圆形广场空间为主（图 4-13）。直线型路径简洁高效，便于居民快速通行；圆形广场则作为节点空间，起到组织人流、提供休憩点的作用。此类布局在有限用地条件下实现了空间的有序组织，兼顾了通行效率与活动需求。



图 4- 13 交通道路空间（左）和服务设施附属空间（右）

来源：参考文献[42]

在服务功能附属公共空间中，空间特征表现为墙面彩绘+休闲座椅的组合形式（图 4-13）。通过在居住建筑外立面绘制主题彩绘，增强了儿童游乐园空间的趣味性与视觉识别度，营造出亲切、活泼的社区氛围；同时设置休闲座椅，为老年人和儿童提供便捷的休息场所。

综上，清河阳光社区三角地改造表明，老旧社区中的边角空间可通过步行系统优化、设施补充与环境整合，转化为兼具通行、停留与交往功能的适老化公共空间，从而提升社区整体的可达性、安全性与生活活力。

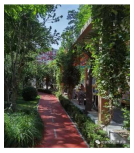
4.4 美学因素

美学因素涵盖与空间视觉相关的多重维度，主要包括建筑立面形式、街道景观构成以及自然景观要素等[63]。具体而言，既包括建筑的材质、色彩与细部设计，也涉及街道界面的连续性、绿化配置、公共艺术等街景元素，同时还包含山体、水体、植被等自然风光所营造的整体环境意象。这些要素共同塑造了公共空间的美学要素，对老年人的空间偏好与使用意愿具有显著影响[54]。

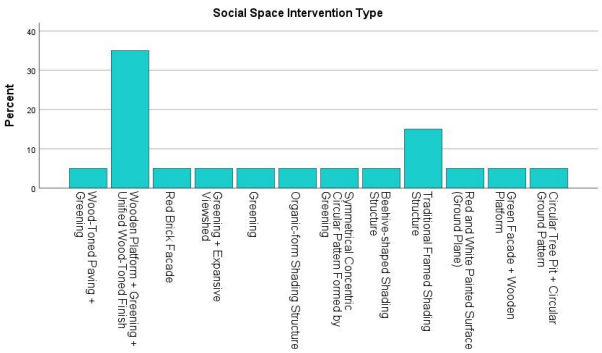
4.4.1 具体案例统计

本研究汇总案例中有关美学因素的适老化设计做法，如表 4-3 所示。（详见附录）

表 4- 3 美学-案例做法统计（详见附录）

案例		社交空间	商业前空间	交通道路空间	服务功能附属空间
美国，退休人员协会老年友好公园建设策略	 	用绿化塑造对称的同心圆平面图案	红砖立面+绿化	直线+圆形步行道	绿色涂料（地面）
中国-北京，清河阳光社区三角地改造	 	蜂巢形遮阳构筑物	不存在显著做法	曲线形步行道，用绿化划分道路	墙面彩绘
中国-北京，劲松街道综合整治试点示范区环境改造	  	传统框架形遮阳构筑物	灰砖纹理（铺地）	有机形步行道	金属边框+玻璃幕墙
中国-上海，江川路街道环境改造	 	红色+白色涂料（地面）	红色+白色涂料（地面）	有机形步行道	红色+白色涂料（地面）
法国-约讷，河畔养老院		木平台+绿化+统一木色	不存在显著做法	不规则型道路（顺应地形等高线）	红色+白色几何色块（室内）

来源：笔者自绘



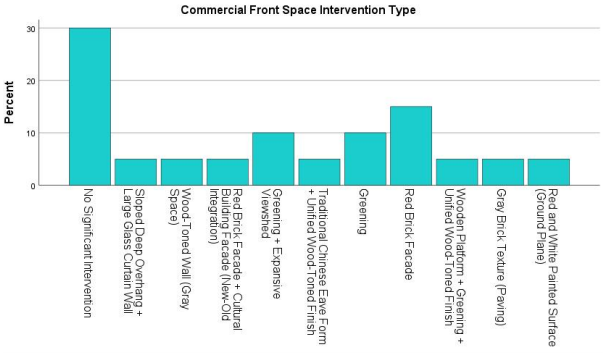
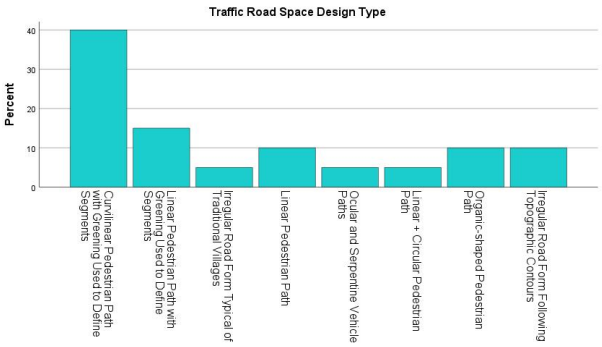


图 4- 14 社交类公共空间-适老化做法类型　　图 4- 15 商业前公共空间-适老化做法类型

来源：笔者自绘

在社交类公共空间的适老化做法类型（图 4-14）中，木平台+绿化+统一木色通过木质平台提供稳定的休憩界面，结合植被软化环境，并以统一的木色调营造温暖、自然的空间氛围。其余各类干预措施，如木色铺地+绿化、红砖立面、绿化+宽阔视野等，其多样性体现了设计师在材料选择、空间布局与视觉美学上的探索。例如，有机形遮阳构筑物、蜂巢形遮阳构筑物等非规则形态设计，强调形式创新与趣味性；而圆形树池+圆形地面图案则通过几何秩序引导空间节奏，增强场所感。

在商业前公共空间的适老化做法类型（图 4-15）中，红砖立面成为最具代表性的美学设计策略之一。其具有较强的视觉识别度和文化象征意义，常用于体现地域特色或历史延续性，能够在一定程度上增强空间的文化归属感。此外，绿化+宽阔视野与绿化显示出自然元素的引入也属美学设计的重要手段之一，通过植被软化硬质界面，并利用开阔视景提升空间通透性与心理舒适度。



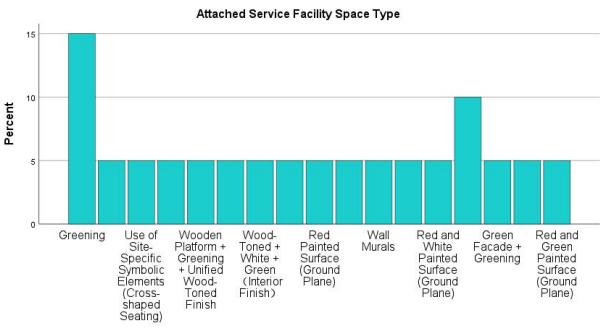


图 4- 16 交通道路类-适老化做法类型　　图 4- 17 服务附属类-适老化做法类型

来源：笔者自绘

在交通道路类公共空间的适老化做法类型（图 4-16）中，曲线型步行道，用绿化划分道路通过柔和的曲线形态弱化交通的机械感，同时利用植被作为视觉和空间上的分段元素，形成节奏分明、富有层次的步行体验。有机形态步行道与不规则型道路（顺应地

形等高线）体现了设计师对自然肌理与场地条件的尊重，尤其在山地或历史街区环境中具有较强的适应性与视觉表现力。

在服务设施附属公共空间的适老化做法类型（图 4-17）中，绿化出现频率最高，该类型通过植被的引入软化硬质界面，提升空间的生态感知与视觉舒适度，尤其在老年人使用场景中，能够有效缓解心理压力、增强场所归属感。红色+白色几何块体通过简洁的几何造型与鲜明的色彩对比，营造出清晰的空间节奏与现代感。

4.4.2 典型案例：圣约瑟夫老年公寓与护理院

圣约瑟夫老年公寓与护理院采用四层回形布局，北侧附设教堂，空间格局完整，具有深厚的历史文化与宗教氛围。改造前，建筑虽结构完好，但功能陈旧，无法满足现代适老化居住与护理需求，且缺乏无障碍设施、公共活动空间及专业照护配套，难以支撑高龄、失能老人的多元生活与社交需要。

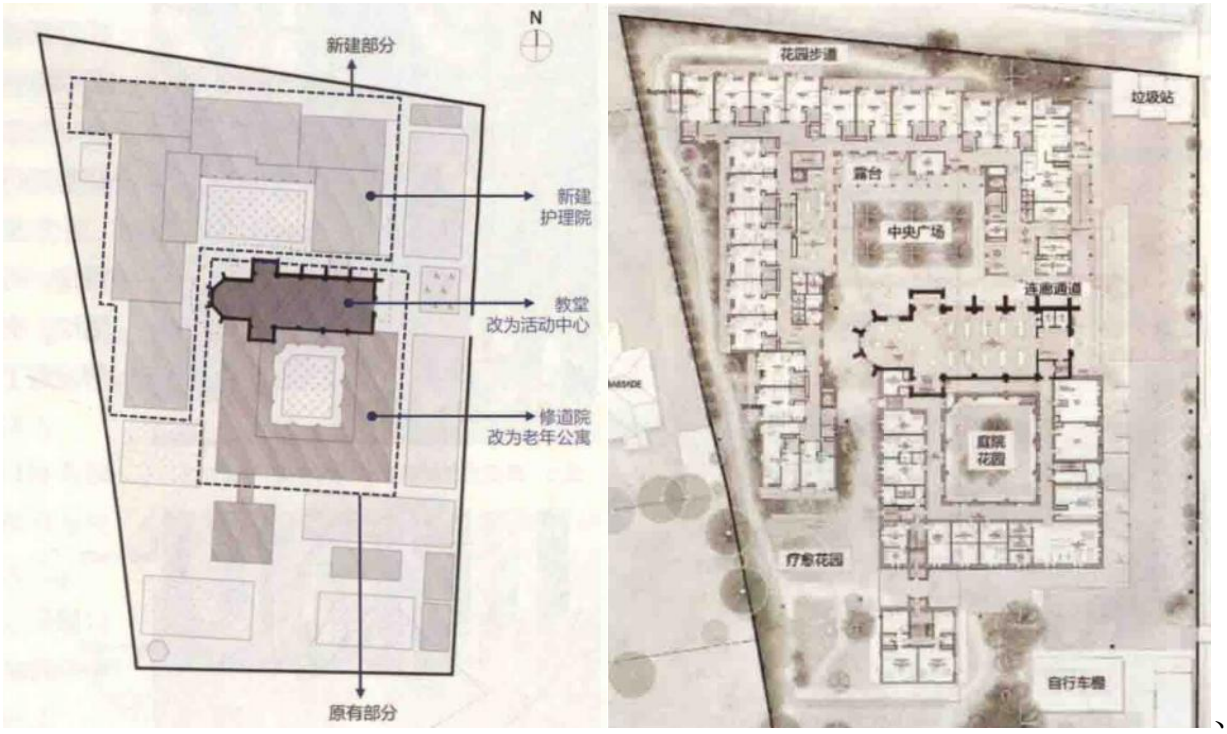


图 4- 18 改造总平面

来源：参考文献[42]

改造的核心策略是实现功能转化与空间延续的双重目标：一方面将原有修道院建筑整体改造为老年公寓，提供 29 套独立居住单元；另一方面在建筑北侧新建一座 7500 ㎡的护理院，共设 92 间护理居室，满足不同健康状况老年人的照护需求。此外，项目对

室外环境进行了系统性重构，包括建设中央广场、外圈步道等公共空间，强化步行可达性与空间开放性，提升整体环境品质与使用者的生活体验。建筑总面积达 11,600 ㎡，其中老年公寓部分为 4600 ㎡，护理院部分为 7500 ㎡，均为四层结构，充分考虑了无障碍设计与适老化的使用需求（图 4-18）。

在社交类公共空间中，该案例主要采用红砖立面+绿化的组合形式。红砖材质延续了原有修道院建筑的历史肌理，结合周边绿化植被，形成兼具私密性与开放性的交往环境，营造出适宜老年人停留、交流的半室外氛围，如图 4-19 所示。



图 4- 19 社交类空间和商业前空间

来源 参考文献[42]

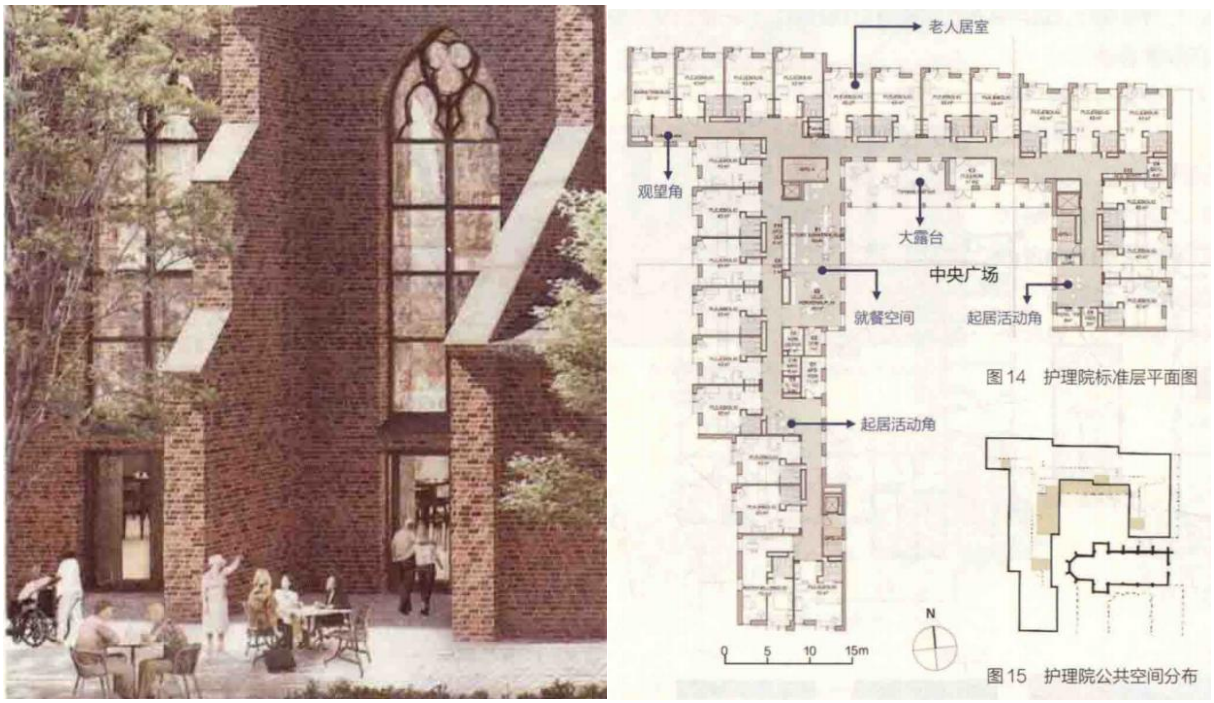


图 4- 20 商业前空间和服务设施附属空间

来源 参考文献[42]

在商业前公共空间方面，设计通过红砖立面+文化建筑立面实现历史与现代的对话。

原修道院建筑的红砖墙体被保留并加以修复，同时在新增护理院部分引入现代建筑语言，形成新旧材料与风格的有机融合。这种新旧共生的立面处理方式既尊重了场地的历史文脉，又满足了现代功能需求，增强了空间的文化表达力与视觉层次感（图 4-20）。

在交通道路类公共空间中，该案例采用曲线型步行道，用绿化划分道路的布局模式。步行路径以柔和的曲线形态组织，打破传统直线式交通流线的单调性，引导使用者缓慢穿行于景观之中，增强空间体验的趣味性与节奏感。体现了对老年人慢行需求的高度关注，如图 4-21 所示。



图 4- 21 服务设施附属空间

来源：参考文献[42]

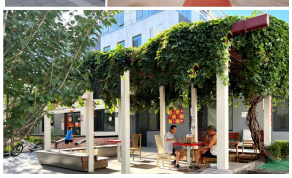
在服务功能附属公共空间中，空间特征表现为利用场地象征性元素。该设计巧妙地将宗教符号转化为公共设施，以十字架造型的休憩座椅作为空间节点，为老年人提供休憩设施。

4.5 环境质量因素

环境质量因素主要涵盖光照条件、空气质量、通风效果以及道路两侧绿化情况等维度。其中，光照条件涉及自然采光与人工设施的应用；空气质量关注空气的清新与否；通风效果则关注空气流通的顺畅程度；而道路绿化则不仅影响微气候调节与噪声消减，也构成视觉景观的重要组成部分。上述要素共同决定了公共空间的环境质量，尤其对老年人的日常活动与身心健康具有显著影响。

4.5.1 具体案例统计

表 4- 4 环境质量-案例做法统计（详见附录）

案例		社交空间	商业前空间	交通道路空间	服务功能附属空间
法国-诺曼底，奥尔贝克老人之家	 	利用屋顶平台，获得充足光照	不存在显著做法	双侧布置草坪+灌木+树	利用中庭空间，获得充足光照
法国-米尔库，米尔库养老院	 	利用屋顶平台，获得充足光照	不存在显著做法	双侧布置草坪+灌木+树	利用中庭空间，获得充足光照
中国-长沙，广厦新苑 A 区适老化改造	 	遮阳构筑物，增加微环境舒适度	不存在显著做法	双侧布置草坪+灌木+树	绿化提升空气质量
中国-北京，西城区大栅栏街道厂甸 11 号院适老化改造	 	遮阳构筑物，增加微环境舒适度	不存在显著做法	单侧布置草坪+灌木+树	绿化提升空气质量
中国-杭州，和睦新村老旧小区适老化改造项目	 	绿化提升空气质量	灰空间，通风效果好	双侧布置草坪+灌木+树	绿化提升空气质量

来源：笔者自绘

在社交类公共空间的适老化做法类型（图 4-22）中，通过引入植被系统，显著改善

局部空气品质。在老年人使用频繁的社区空间中，此类绿色干预提升了生态感知，同时也增强了使用者的心理舒适度。利用屋顶平台，获得充足光照反映出设计者对自然采光需求的高度关注。通过在建筑顶部设置开放平台，既拓展了公共活动空间，又利用高处位置实现全天候日照覆盖，尤其适用于低层建筑密集区。该策略在保障视觉舒适的同时，也有助于调节室内温湿度，间接提升热环境质量。此外，遮阳构筑物，调节微气候通过控制太阳辐射强度和降低地表温度，有效缓解夏季高温与强光问题，营造宜人的户外停留环境。其应用多见于广场、庭院等开放区域，是提升老年人户外活动意愿的重要支撑。

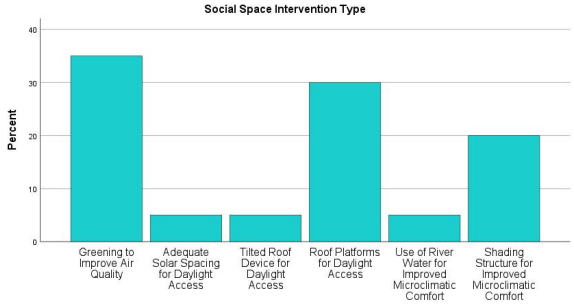


图 4- 22 社交类公共空间-适老化做法类型

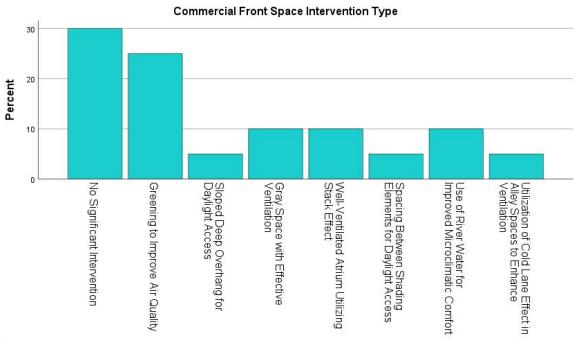


图 4- 23 商业前公共空间-适老化做法类型

来源：笔者自绘

在商业前公共空间的适老化做法类型（图 4-23）中，尤其在高密度商业街区，绿化不仅改善微环境，也提升了场所的吸引力与可达性。此外，灰空间，通风效果好和建筑中庭，拔风效果好，通风好这两类策略均强调通过空间形态控制气流路径：前者利用半开放界面引导穿堂风，后者则借助热压差形成烟囱效应，实现自然通风强化。这类设计在炎热季节尤为关键，有助于降低体感温度、缓解热岛效应。

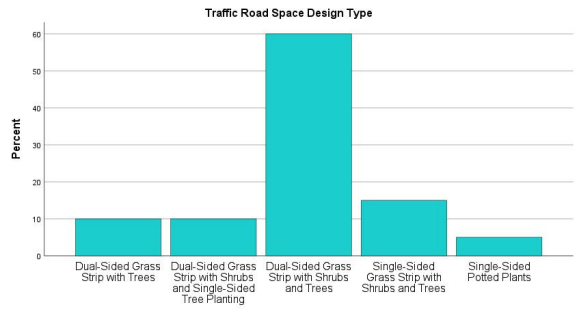


图 4- 24 交通类公共空间-适老化做法类型

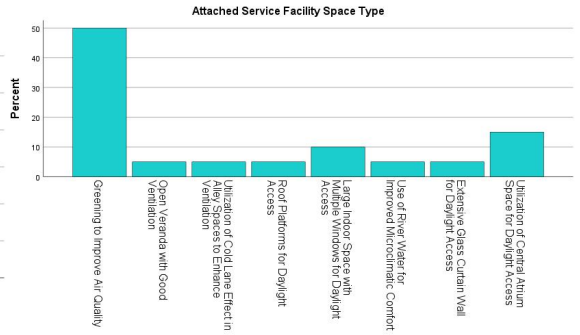


图 4- 25 服务设施附属类-适老化做法类型

来源：笔者自绘

在交通道路类公共空间的适老化做法类型（图 4-24）中，双侧布置草坪+灌木+树成为最具主导性的道路绿化形式。该模式通过构建完整的垂直植物层次——底层草坪提供

地被覆盖，中层灌木形成绿篱屏障，上层乔木实现遮荫降温—有效提升了道路空间的生态功能与景观品质。其优势在于：一方面可显著降低路面热辐射、吸收汽车尾气污染物；另一方面通过连续性绿色界面改善视觉环境，增强行人安全感与空间归属感，尤其适合老年人频繁通行的社区道路。

在服务设施附属公共空间的适老化做法类型（图 4-25）中，中庭作为建筑内部的垂直通透空间，能够将自然光引入深部区域，减少人工照明依赖，同时促进空气流通，形成良好的热环境循环。该策略在多层服务设施中尤为常见，既提升了视觉舒适度，也增强了空间的开放性与可达性。此外，通过扩大开窗面积和优化朝向，最大化自然采光效率，尤其适用于需要高亮度的老年人活动室、阅览区等功能空间。

4.5.2 典型案例：法国米尔库养老院

米尔库养老院强调与当地地理地貌及自然景观的融合，力求在尊重乡土环境的前提下，构建一个兼具功能性、舒适性与精神归属感的养老空间。

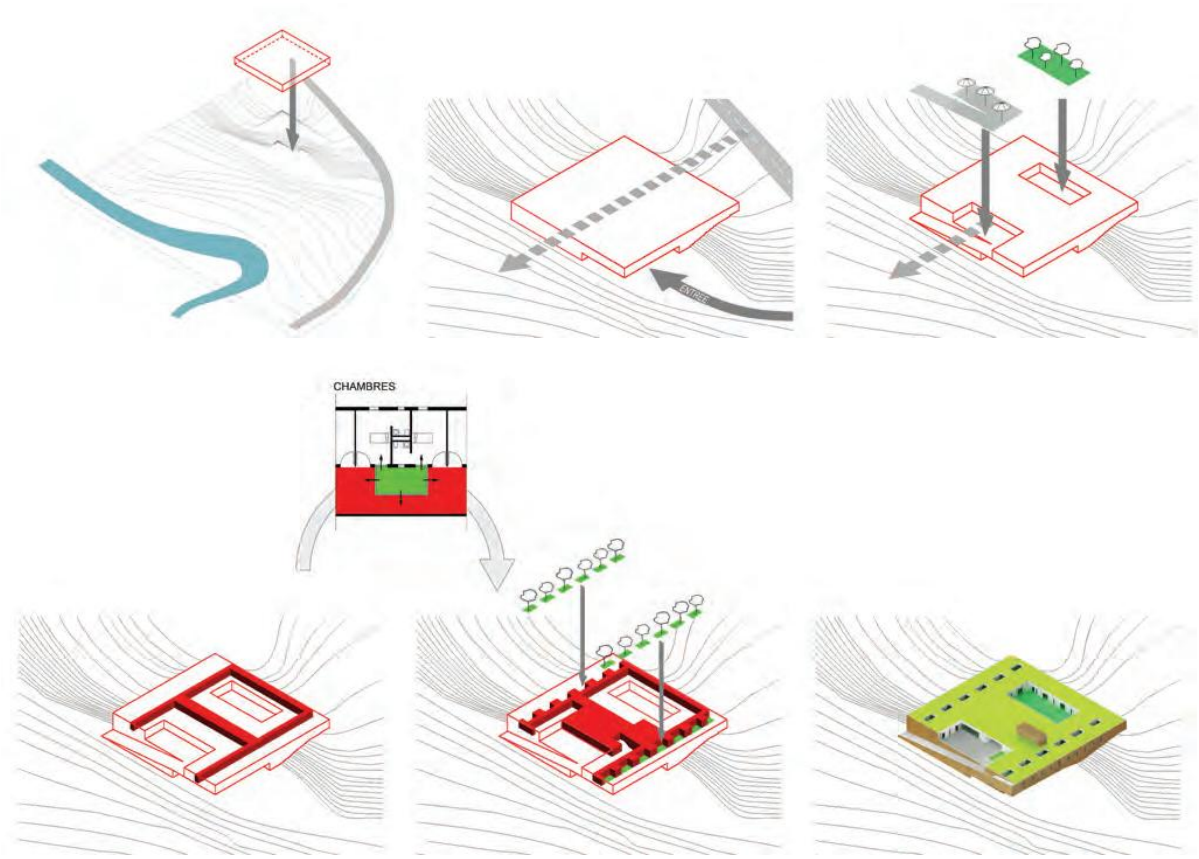


图 4- 26 设计示意图

来源：参考文献[44]

空间组织上，养老院采用双层结构布局：底层设有办公楼、员工休息区及公共接待

区域，并与外部花园共享同一标高；上层则分布着 40 个居住单元、公共起居室和诊疗室。这一垂直分层策略不仅实现了功能分区的合理性，也确保了老年人活动空间的独立性与私密性。房间仅通过门厅与走廊相连，其余部分被自然环境环绕，营造出私人空间中的自然包围之感。此外，色彩丰富的露台作为引导系统，不仅指引老人在建筑内部的行走路径，也增强了空间的识别性与趣味性（图 4-26）。



图 4- 27 社交类空间

来源：参考文献[42]

在社交类公共空间中，该案例主要通过利用屋顶平台这一垂直维度进行空间拓展，不仅有效规避了地面层的功能冲突与视线遮挡，更实现了自然采光的最大化。其结合木质铺装、低矮围护与绿化，营造出开放、明亮且具有较强聚集潜力的半室外环境，如图 4-27 所示。



图 4- 28 交通道路空间（左）和服务设施附属空间（右）

来源：参考文献[42]

在交通道路空间方面，设计采取在道路两侧系统性地布置了由草坪+灌木+树木组成的多层次绿化带。这种复合式绿廊不仅在物理层面有效分隔了车行道与步行区域，降低了机动车对行人的干扰与安全隐患，还在视觉上形成了连续、柔和的绿色界面，增强了街道的空间秩序感与生态美感。同时，植被的季节变化与生物多样性也为使用者提供了丰富的感官体验（图 4-28）。

在服务功能附属空间中，该案例则巧妙依托中庭空间增加空间的采光。中庭作为建筑内部的核心开敞区域，通过顶部天窗引入自然光线，并促进空气对流，显著改善了室内微气候条件。围绕中庭分布的服务单元（如饭厅、诊疗室等）均可获得良好的采光与通风。

4.6 安全因素

安全因素可划分为犯罪预防安全与交通安全两个维度。前者主要涉及空间的日常维护状况、夜间照明水平、视觉通透性等，这些要素共同影响潜在犯罪行为的发生概率；后者则聚焦于人车流线组织、建筑出入口的数量与布局、步行路径的拥挤程度及通行效率等，旨在降低交通冲突风险，保障老年人等弱势群体的通行安全与行动自由。

4.6.1 具体案例统计

本研究汇总案例中有关安全因素的适老化设计做法，如表 4-5 所示。（详见附录）

表 4- 5 安全-案例做法统计

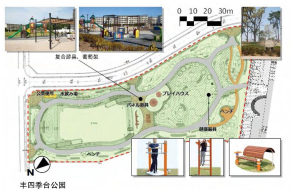
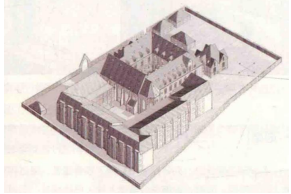
案例		社交空间	商业前空间	交通道路空间	服务功能附属空间
日本-千叶县柏市，丰四季台社区	 	视线通透，犯罪空间小	大面积玻璃幕墙，为夜间提供足够光线与热闹感	用绿化分隔车行道和步行区，实现人车分流	用绿化分隔车行道和步行区，实现人车分流
日本-东京，结缘·多摩平之森老年公寓	 	用木材铺地分隔车行道和步行区，实现人车分流	大进深灰空间，实现人车分流	步行区集中在建筑中庭，实现人车分流	用绿化分隔车行道和步行区，实现人车分流
丹麦-哥本哈根，圣约瑟夫老年公寓与护理院		抬高室外地面，减少高差	增设出入口，减少拥挤和步行距离	用围墙实现人车分流（区分内步行道和外车行道路）	用围墙实现人车分流（区分内步行道和外车行道路）

表 4- 5 安全-案例做法统计

案例		社交空间	商业前空间	交通道路空间	服务功能附属空间
荷兰-海尔德兰，德本灵青老共居公寓	 	视线通透，犯罪空间小	视线通透，犯罪空间小	步行区集中在建筑中庭，实现人车分流	用绿化分隔车行道和步行区，实现人车分流
中国-北京，大栅栏街道银鹤苑养老译站		将活动空间设置在屋顶平台，隔绝车辆	用绿化限定出主入口空间，实现人车分流	步行区集中在建筑中庭，实现人车分流	将活动空间设置在屋顶平台，隔绝车辆

来源：笔者自绘

在社交类公共空间的适老化做法类型（图 4-29）中，通过将老年人日常活动场所抬升至建筑顶部，实现与地面交通流线的彻底分离，有效避免了车辆侵入、碰撞风险及噪音干扰。同时，利用植被作为柔性屏障，不仅实现了人车分流，还提升了空间的生态美感与心理舒适度。绿化带可吸收噪声、阻挡视线盲区，并在视觉上引导行人走向，增强路径的可预测性与安全感，尤其适用于高密度居住区的社区广场或邻里花园。

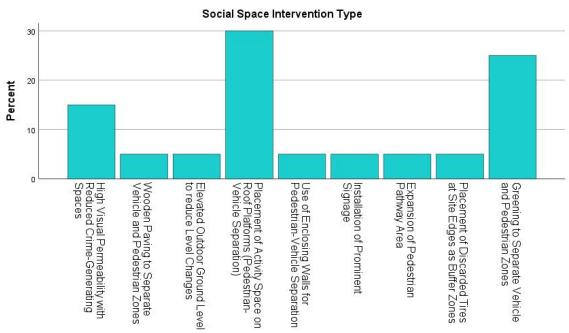


图 4- 29 安全因素下-社交类公共空间-适老化做法

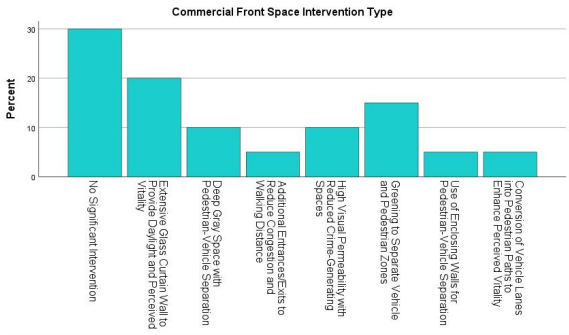


图 4- 30 安全因素下-商业前公共空间-适老化做法

来源：笔者自绘

在商业前公共空间的适老化做法类型（图 4-30）中，常通过设置过渡性半开放空间（如檐下、廊道），缓冲车流与人流之间的直接冲突。

在交通道路类公共空间的适老化做法类型（图 4-31）中，用绿化分隔车行道和步行区出现频率最高，可能表明该安全策略更加契合以交通道路空间。同时，通过将人流集

中于建筑内部或半封闭的中央庭院，形成相对独立的步行网络，避免了与地面车流的直接交叉。中庭空间通常具备良好的遮蔽性与照明条件，有助于提升夜间使用安全性。

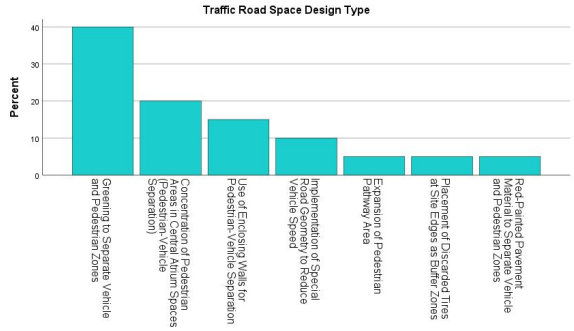


图 4- 31 安全因素下-道路类公共空间-适老化做法

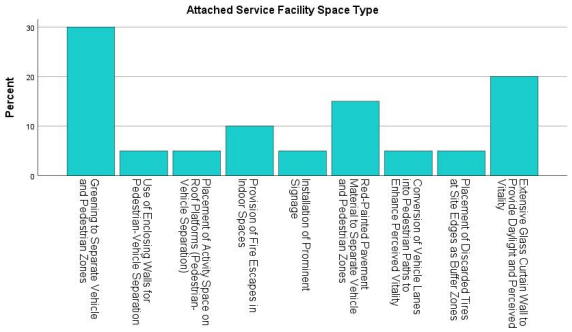


图 4- 32 服务设施附属公共空间-适老化做法类型

来源：笔者自绘

在服务设施附属公共空间的适老化做法类型（图 4-32）中，通过透明化建筑界面，增强室内外视觉连通性，增强安全感。同时，玻璃幕墙在白天引入充足日光，不仅改善照明条件，还能营造开放、明亮、活跃的空间氛围，提升行人安全感与停留意愿。此外，用红涂料铺地分隔车行道与步行区通过色彩强化功能分区，具有强烈的视觉引导作用，能够在不增加硬质屏障的情况下实现人车分流，特别适用于地面空间受限但需明确交通秩序的场所，如地下车库出入口、社区活动中心周边等。

4.6.2 典型案例：北京劲松街道综合整治试点示范区环境改造

位于北京市朝阳区的劲松二区是典型的 1978 年起建设的老旧小区，总建筑面积约 12 万平方米，老年人口占比达 39.6%，属于高密度、老龄化特征显著的居住社区。在改造前，该社区面临多重结构性问题。一是无障碍设计严重缺失。公共服务设施出入口缺乏坡道与扶手，多层住宅普遍未配备电梯，导致轮椅使用者及老年居民出行困难；社区道路存在高差且铺装不平整，增加了跌倒风险。二是基础设施不完善。非机动车停放空间不足，电动车与自行车无序堆放，部分楼道内堆积易燃杂物，不仅影响通行，更带来消防安全隐患。三是公共活动空间品质低下。既有活动场地地面破损、设施陈旧，缺乏功能性配置，使用率低，难以满足居民尤其是老年人的社交需求。



图 4- 33 方案鸟瞰图

来源：北京市规划和自然资源委员会

基于上述问题，本次改造聚焦于构建一街、两园、两核心、多节点的空间体系，系统提升社区环境质量与服务能级。一街即劲松西街，对入口大门、理发店、生鲜超市、早餐店、休闲长廊及公共卫生间等基础服务设施进行更新升级，强化街道的服务功能与生活便利性。两园包括中心公园（架松公园）和宅间花园（209 号楼花园），通过翻新铺地、增设活动设施等方式提升绿化景观与使用体验。两核心指社区居委会和物业服务中心，重点翻修建筑并完善无障碍设施设备，增强公共服务能力。多节点则涵盖新建标识系统、道路铺装优化、配套服务设施及自行车棚等微更新措施，实现全社区尺度上的环境改善。



图 4- 34 社交类空间（左）和交通道路空间（右）（来源：北京市规划和自然资源委员会）

在社交类公共空间和交通道路空间中，该案例主要采用绿化分隔车行道和步行区的策略。通过连续的植被带实现物理隔离与视觉缓冲，有效达成人车分流的目标。该做法不仅显著降低了机动车对行人活动的干扰与潜在安全风险，还通过引入乔木、灌木与地被植物的多层次配置，提升了街道的生态性能与景观连续性，营造出宜人的慢行环境（图4-34）。



图 4- 35 商业前空间（左）和服务设施附属空间（右）

来源：北京市规划和自然资源委员会

在商业前空间和服务功能附属空间中，该案例采用大面积玻璃幕墙的设计手法。此类透明界面在白天可引入充足自然采光。在夜间则借助室内照明向外透射，形成明亮、通透的视觉效果。不仅增强了使用者的心理安全感，尤其对老年人等弱势群体具有积极意义，同时也强化了街道界面的活跃度与识别性，有助于激发非正式社交行为（图 4-35）。

4.7 案例研究总结

在对案例进行系统性拆解的基础上，依据五要素分析框架对所收集的具体空间设计做法进行了分类汇总（见表 4-6，附录 4）。为揭示各类公共空间在安全干预策略上的共性与差异，本文将各项设计措施按其出现频次由高到低进行排序，并进一步按照公共空间类型进行纵向对比分析。通过该方法，不仅能够识别出各类型空间中普遍采用的设计策略，还可揭示不同功能空间在环境安全导向上的结构性差异，从而为后续的空间优化设计提供实证支持与理论依据。

4.7.1 社交类空间设计启示

社交类公共空间作为居民日常交往、休闲互动的核心场所，其空间设计通常以促进

人际交流、增强社区归属感为目标。

在设施可达性方面，可达性较高的区域多为临时性或具有明确功能导向的休息区。前者如公园长椅、小型坐凳等便于短暂停留的设施。后者则包括具备社区聚会、邻里活动等功能的休憩节点。

在行人基础设施的设计策略上，对于场地条件较为宽敞的案例，大多采用围绕绿化展开的设计，如设置主题花园、种植园、林荫步道等，通过自然元素营造宜人氛围，提升空间的亲和力与停留意愿。而在场地受限或空间局促的环境中，则更多将步行活动空间移至屋顶平台，充分利用垂直空间资源，结合绿植、楼梯连接等手段，实现空间的立体化利用。

在美学层面，设计常借助自然材料与生态元素以装饰空间。常见的做法包括使用木色材料装饰立面或平台结构，使建筑与自然环境融为一体。通过艺术化处理绿化部分，如对称图案种植、色彩搭配等，提升空间的观赏价值。

从环境质量的角度来看，绿化是提升空间微气候的重要手段。多数案例通过增加植被覆盖面积来改善空气质量、调节温度与湿度，不仅生态效益显著，且建设成本相对较低，具有良好的可持续性。其次，屋顶平台的广泛应用也为老年人提供了充足的日照机会，有助于改善身心健康。此外，遮阳构筑物的设置也被广泛用于提升局部热舒适度，尤其是在夏季高温时段，有效降低体感温度，提高空间的可使用时长。

在安全设计方面，最常见的策略是通过绿化实现人车分流。例如，在公园设计中，常将步行区域布置于内部核心地带，外围则设置车行道，并利用连续的绿化区域环绕步行区，形成物理隔离与视觉缓冲，从而减少车辆对行人的干扰与潜在安全隐患。

4.7.2 商业前公共空间设计启示

商业前公共空间作为连接城市空间与商业建筑的重要过渡界面，其设计通常以提升可达性、增强商业吸引力和优化用户体验为核心目标。

在设施可达性方面，部分案例通过引入明确的运动功能吸引老年群体前来活动，例如健身房前广场常设置简易健身器材或慢行步道，既满足老年人的日常锻炼需求，又强化了场所的活力感与使用频率。

在行人基础设施的设计方面，常见的做法是结合建筑屋檐下的灰空间进行整合设计。具备遮风避雨、缓冲人流的功能，既能为行人提供舒适的临时停留场所，又能有效延伸商业立面的使用范围，增强商业价值。较多案例利用自然景观元素改善步行体验，如通

过植被绿化、水景布置、滨水步道等手段，营造具有生态美感与亲自然性的步行环境。

从美学维度来看，商业前公共空间的设计普遍强调自然感与文化属性的融合。例如设置亲水平台等，不仅改善微气候环境，也增强了空间的视觉层次。

在环境质量方面，多数案例通过增加植被覆盖面积，实现降温增湿、吸附粉尘等功能。此外，也有案例增设屋檐以形成遮阳与导风结构，加建围合墙体，形成狭长巷道，利用风压差加强冷巷效应，从而降低体感温度，提升夏季热舒适性。

在安全层面，相对常见的设计策略是设置大面积玻璃幕墙，通过高透明度的建筑界面实现夜间充分照明，减少视觉盲区。同时，玻璃材质在夜间反射光源的能力也能提升老年人对空间的心理安全感。

4.7.3 交通道路类公共空间设计启示

交通道路作为城市肌理中的主要通行网络，其公共空间的设计在于平衡机动车运行效率与非机动车及行人安全需求。

在设施可达性方面，可达性较高的区域多采用尽端式或环通式布局，通过限制车辆穿行、减少交叉冲突点，为老年人提供更为安全、连续的步行环境。

在行人基础设施的设计方面，常见做法是结合曲线型步行道与矩形广场空间进行组织。曲线型步行道通过延长行走距离、增加路径曲折性，自然地减缓行人速度，还常配合绿化、水景等自然景观元素，增强老年人舒适的步行体验。

在美学层面，可利用植被引导道路轮廓，如通过曲线型、直线型或有机形态的道路设计，结合绿篱、行道树与草坪的组合，实现空间的自然过渡与视觉美化。

在环境质量方面，在道路两侧布置草坪、灌木与乔木，形成层次分明的绿色屏障，既可净化空气，又能提供遮阳降温功能，显著提升夏季热舒适度。

在安全层面，相对普遍的做法是通过绿化布置实现人车分流。此外，也有较多案例采取内步行、外车行的空间布局策略，将步行交通空间布置于场地内部（如封闭式步行街区），而将车行通道置于外部边缘区域，从而在空间结构上实现人车分离。

4.7.4 服务功能附属公共空间设计启示

服务功能附属公共空间作为与特定服务设施（如养老院、社区卫生中心、康复机构等）紧密关联的外部或内部空间，其设计通常以提升服务可达性、增强使用者舒适度与促进身心康复为目标。

在设施可达性方面，可达性较高的区域可多设置为具有明确功能导向的休息区，例如与老年人服务功能相结合的灰空间。此类空间不仅承担着过渡与停留的功能，还常被整合进服务体系之中，成为服务流程的重要组成部分。

在行人基础设施的设计方面，部分案例通过结合护理功能，在室内设置大型公共活动空间，将老年人的步行路径从室外引入室内，从而提升服务的可达性与连续性。

在美学层面的设计呈现出多样化特征。其中，结合绿化进行空间组织是最为常见的做法，如利用乔木、灌木与地被植物形成层次丰富的景观界面，营造宁静、自然的视觉环境。

在环境质量方面，常见的做法是利用绿化改善空气质量。增加植被覆盖面积，实现空气净化等功能，尤其在封闭式建筑环境中，绿化能够有效提升室内空气品质。

在安全层面，相对常见的做法是通过绿化实现人车分流，即在车行通道与步行区域之间设置连续的植被屏障，既起到物理隔离作用，又兼具生态与美观功能。

第五章　老旧社区公共空间适老化改造策略

本章在前文公共空间实地调研、老年人行为活动分析与案例分析的基础上，进一步完成从问题识别到策略生成的研究转译。第二章与第三章分别揭示了中兴社区不同类型公共空间在空间供给和行为支持上的现实问题，第四章则从典型案例中提炼出可迁移的适老化设计做法。在此基础上，本文首先提出老旧社区公共空间适老化更新的总体目标与原则，继而围绕设施可达性、行人基础设施、美学、环境质量与安全性五个维度构建更新策略，为第六章总体改造与重点节点设计提供理论依据和方法支撑。为后续设计实践提供理论依据。

5.1 更新目标

结合第二章对中兴社区公共空间现状的调研可知，社区内部不同类型公共空间普遍存在步行连续性不足、设施配置失衡、环境品质不稳定与空间支持系统碎片化等问题；第三章进一步表明，老年人日常活动具有近距离、高频次、慢节奏和复合化的特征，其空间选择高度依赖于安全性、可达性、停留支持条件与环境舒适度；第四章则通过案例研究说明，老旧社区公共空间的适老化更新并非单一设施增补，而应通过空间系统优化与多要素协同干预实现整体改善。在此基础上，本文将中兴社区公共空间适老化更新的目标概括为：在保障老年人安全出行的前提下，提升社区公共空间的可达性、舒适性、复合使用能力与社会支持水平，构建与老年人真实行为模式相适配的日常活动空间体系。

（1）构建连续无障碍的安全通行网络

针对调研中发现的非机动车乱停乱放、人行道有效宽度不足、过街设施缺失等问题，首要目标是消除通行安全隐患。重点规划临街商铺前、宅间道路等区域的占道行为，确保人行道净宽不低于 1.8 米；完善缘石坡道、防滑铺装、夜间照明及清晰标识系统，形成从住宅出入口至社区公园、菜市场、颐康中心等关键节点的连续、安全、无障碍步行路径，满足轮椅、助行器使用者的基本移动需求。

（2）营造身心兼容的舒适休憩环境

针对临街空间噪声高、遮阴不足、夏季暴晒等问题，通过绿化介入、材质优化与设施配置提升整体环境质量。在高频休憩区增设乔木遮荫、花池隔离带或声屏障，降低交通噪声干扰；选用透水、浅色、防滑铺装材料调节地表温度；结合座椅布局设置风雨连廊或可移动遮阳伞，创造四季可用、晴雨皆宜的户外停留环境。

（3）支持多层次、包容性的社交互动

尊重老年人“休息+闲聊+陪伴后代”等复合社交需求，在社区公园、健身广场、宅前空地等场所植入促进交往的空间载体。例如：设置成组布置的休憩座椅、代际互动角、小型信息公告栏等；保留并优化现有自发聚集点，提高公共空间的利用率。

（4）保障老年人对空间的自主使用权利

采用弹性、包容、多功能的空间使用模式，在保障核心功能的前提下，允许同一空间在不同时段承载不同活动，提高空间使用率。通过模块化设施、清晰的行为引导标识，赋予老年人根据自身意愿灵活使用空间的权利，体现以人为本的更新理念。

综上，本研究聚焦老年人日常生活中真实行为轨迹中的问题，以问题导向的干预策略推动中兴社区公共空间适老化转变。

5.2 适老化设计评价体系

基于第二章公共空间现状调研、第三章老年人行为活动分析以及第四章案例研究的归纳结果，本文进一步构建老旧社区公共空间适老化设计评价体系。为增强后续总体规划与节点设计的操作性，本文在前文“五要素”分析框架基础上，对设计实施层面的策略进行再组织，将其转译为功能设施、步行友好、无障碍、环境舒适与材质安全五类设计控制维度，并通过二级指标建立“问题—策略—空间落位”的对应关系，以增强后续总体规划与节点设计的系统性和可操作性[53]。为增强改造策略的系统性与可操作性，本文在策略构建之前，进一步建立了一个面向老旧社区公共空间适老化改造的综合评价逻辑。该逻辑既可作为前期现状问题识别与诊断的分析工具，也可作为后期方案设计与成效校验的判断依据。

在指标权重设置上，本文结合前期实证研究中老年人行为活动对不同环境要素的敏感程度，采用分层赋权的方法确定各维度的重要性。其中，步行友好直接关系到老年人是否能够安全、连续、自主地到达各类活动节点，是影响其活动频率与活动半径的首要前提，因此赋予最高权重 30%。其余维度分别为：无障碍 25%、安全保障 20%、功能设施 10%、环境品质 15%、、材质 10%。这一权重分配既体现了老年人日常行为以步行为主导的现实特征，也兼顾了停留舒适性、设施支撑性及空间安全性的综合要求。该评价体系在第六章作为设计校核工具，以验证设计有效性。

表 5- 1 适老化设计评价体系（笔者自绘）

一级指标	二级指标	对应问题	设计策略	设计落位
功能设施	座椅密度	座椅不足，停留与社交支持弱	增设模块化座椅、围合式座椅与分段休憩节点	宅前屋后空间、社区公园
	健身设施适配性	健身器材老旧、类型单一，与老年人身体条件不匹配	优化低强度健身器材配置，结合康养活动需求进行更新	健身广场、社区公园
	服务设施便捷性	公共厕所、颐康中心等服务设施联系弱，缺少停留支持	强化服务节点联系，设置健康等候空间和辅助休憩设施	颐康中心附属空间、无障碍卫生间周边
	社交设施复合性	缺少适合闲聊、陪伴后代和代际互动的设施	植入交流节点、代际互动角与复合活动设施	社区公园、宅前屋后空间、商业前空间
步行友好	路径连续性	步行系统中断，节点之间缺乏连续联系	构建连续慢行系统，串联高频活动节点	总体规划慢行网络、社区公园环形步道
	步道宽度	局部通道狭窄，步行空间被占用	拓宽步行界面，清理杂物和非机动车占道	交通道路空间、商业前空间、宅前屋后空间
	人车分流	人车混行明显，交通冲突频发	设置步行边界、慢行引导线与人车分流组织	商业前空间、社区道路、主要出入口
	停留友好性	缺乏步行过程中的中途休息点	分段设置休憩节点和遮荫停留点	社区公园、商业前空间
无障碍	高差处理	台阶、高差和坡道缺失影响通行	设置缓坡、零高差衔接和连续坡道	社区道路、颐康中心前区、社区公园入口
	路面安全性	铺装不平整、湿滑，跌倒风险高	采用防滑、平整、连续的铺装材料	健身广场、社区公园、社区道路
	导视识别	路径不清晰，服务节点识别性弱	设置清晰导视系统、色彩引导线和节点标识	颐康中心附属空间、总体规划路径系统、无障碍卫生间周边
	出入口友好性	住宅和服务设施入口通行不便	优化出入口过渡空间，增设扶手与缓坡	住宅单元入口、颐康中心入口、社区主要出入口
环境舒适	遮荫条件	暴晒明显，热舒适性差	增加乔木绿荫、廊架和遮阳设施	社区公园、健身广场
	绿化层次	景观单一，空间吸引力不足	通过灌木、模块化花箱等丰富绿化层次	社区公园、颐康中心附属空间、宅前屋后空间
	场所识别性	界面杂乱，空间缺乏场所感	通过景观界面更新、彩绘和小型景观装置增强识别性	商业前空间、宅前屋后空间、社区公园

表 5-1 适老化设计评价体系（续）

一级指标	二级指标	对应问题	设计策略	设计落位
材质安全	防滑性	地面湿滑，存在跌倒风险	采用防滑铺装和透水材料	健身广场、社区道路、社区公园
	舒适性	硬质材料过多，停留体验较差	结合柔性铺地、木质或复合材料提升接触舒适度	健身广场、社区公园、宅前屋后空间
	耐久与维护	老旧社区维护能力有限，设施易损耗	选用耐久、易维护、可替换的模块化材料	全区公共空间

来源：笔者自绘

5.3 改造原则

5.3.1 安全保障原则

中兴社区现状调研表明，社区道路与节点空间中普遍存在人车混行、铺装破损、高差处理不连续及夜间照明不足等问题，这些因素直接增加了老年人在步行、停留和过街过程中的跌倒与冲突风险。因此，公共空间必须保障老年人进行行为活动的安全性，通过消除物理隐患、强化风险预警与提升应急能力，为老年人提供一个安全的公共空间[55]。应在主要活动路径与车行道之间设置物理隔离设施，避免人车冲突。可利用花箱、矮墙、绿篱或护栏形成 1.0–1.5 米宽的缓冲带，既阻止非机动车随意穿行，又为老年人提供心理安全感。交叉路口应增设减速带、警示标志、凸透镜及夜间反光标识，降低机动车速度，提升过街安全性。同时，保证公共空间区域内视线无盲区，控制灌木高度，避免遮挡路口、转角及座椅周边视线。

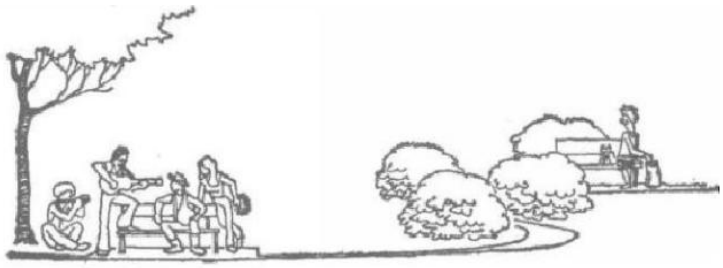


图 5- 1 视线通透的公共空间

图片来源：参考文献[22]

休憩与活动区域应避免设置孤立、封闭或视线遮蔽的角落，优先选择背风向阳、视野开阔的位置。夜间照明照度应不低于 15 lux，重点照亮路径转折点、出入口及公厕周

边，消除照明盲区，预防夜间跌倒或迷向。因此，在设计实践中，应通过设置连续绿化隔离带 1.0m-1.5m 铺装差异及高差控制，实现人车分流的空间界定。

5.3.2 无障碍可达原则

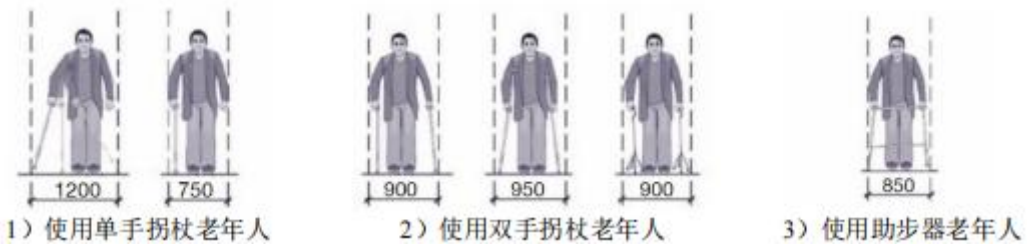


图 5- 2 老年人行走尺度

图片来源：《无障碍建筑设计手册》，2003

无障碍可达原则强调老年人应能独立、便捷、无阻碍地抵达并使用公共空间及其中的各类设施。第三章行为分析表明，中兴社区老年人的日常活动高度依赖步行系统展开，活动半径多集中于居住地周边 500 米范围内，高频活动节点之间的路径连续性和通行便利性直接影响其外出频率与空间选择。然而，现状中仍存在通道净宽不足、坡道设置不连续、道路高差明显、导向系统缺失等问题，削弱了老年人特别是高龄老人和辅助器具使用者的独立行动能力。因此，无障碍可达原则不仅意味着消除物理障碍，更要求在路径组织、节点衔接、服务设施联系与导视识别等层面建立完整的连续支持系统。同时设置大字体、高对比度的导向标识，辅助认知能力下降的老年人认路。针对人行道破损、侵占等常见地面隐患，应全面排查高风险区域，确保铺装平整、连续、防滑。优先采用透水砖、橡胶颗粒等柔性防滑材料，尤其在坡道、台阶、公共卫生间入口等易滑区域，有效降低雨雪天气跌倒风险，保障步行稳定性。

5.3.3 环境舒适原则

老年人在户外活动空间中不仅追求身体锻炼，更渴望获得身心放松与环境愉悦的体验。中兴社区现状中，部分空间存在暴晒、休憩设施不足、绿化遮荫分布不均与界面景观杂乱等问题，导致空间虽然可进入，却难以形成稳定的使用吸引力。因此，公共空间应通过优化物理环境质量，从而延长其停留时间，提升日常户外生活质量。该区域宜结合乔木遮荫、风雨连廊或可移动遮阳伞，形成夏季凉爽、冬季避风的半户外停留空间，满足老年人长时间静坐、晒太阳、看报等需求。对于宅前空地、楼间缝隙等小型空间，可采用集约化舒适性改造策略。例如：利用墙面设置垂直绿墙以降低热辐射与噪声；布

置浅色透水铺装减少地表升温；在角落嵌入小型花池式座椅，既美化环境，又提供阴凉休憩点。此类小尺度干预尤其适合高龄或体弱老人就近享受舒适户外环境。

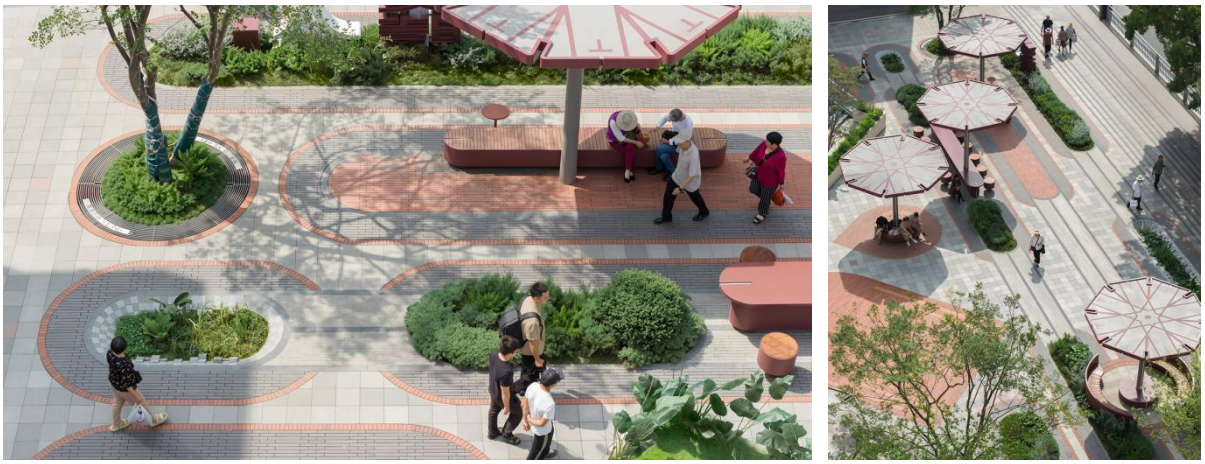


图 5- 3 社区街角

图片来源：HID 翰地景观

除物理设施外，视觉与听觉环境亦是舒适性的重要组成部分。空间应保持整洁有序，避免杂物堆放与视觉杂乱；通过绿篱、花池等软性元素降低临街交通噪声；相邻区域之间保持适度通透，使老年人在静坐时既能享受宁静，又能感知社区生活气息，获得心理上的安全感与归属感。因此，在设计实践中，应通过完善连续导视系统、增设遮阳休憩设施及优化无障碍坡道与入口过渡空间，强化服务节点之间的高效联系，提升老年人到达、停留与使用的便利性。

5.3.4 社交支持原则



图 5- 4 兼具多元使用方式的场地

图片来源：上海田林公园的全天候都市生境建构，VIA 维亚景观

社交支持原则强调公共空间不仅应满足通行和停留需求，还应为老年人提供交往、观察和参与社区生活的机会[47]。第三章行为分析显示，闲聊、陪伴后代、短时聚集与熟人互动是中兴社区老年人公共空间使用中的重要组成部分，这表明公共空间对老年人而言不仅具有物理使用价值，更承担着维系社会联系和缓解孤独感的社会支持功能。然而，

现状中部分空间虽然具备一定开放性，却因设施组织单一、交流节点缺失、场所边界模糊或停留条件不足，而难以形成稳定的社交场景。通过空间设计激发、承载并维系老年人的日常社会互动，增强社区归属感。可在宅前、街角、路径交汇处等自然聚集点，设置成组布置的休憩座椅，形成面对面或侧向交流的半围合领域，鼓励非正式交谈。同时引入棋牌桌、社区菜园、代际游戏装置、等公共服务设施，为不同兴趣和能力的老年人提供交往媒介与共同话题。因此，在设计实践中，应通过设置半围合交流界面、增补社交型设施并强化自然聚集点的空间组织，营造便于老年人交往、观察与参与社区生活的支持性环境。

5.4 中兴社区公共空间的五要素更新策略

5.4.1 设施可达性因素改造策略

设施可达性更新策略主要针对中兴社区高频活动节点之间联系不足、服务设施分布零散以及休憩支持体系不连续等问题展开。第三章的行为路径分析表明，老年人日常活动集中于社区公园、健身广场、颐康中心、临街商铺前空间及住宅区附属公共空间等少数高频节点，但这些节点之间缺乏连续、便捷的步行联系，导致部分公共服务设施虽然客观存在，却未能有效转化为老年人可持续使用的空间支持资源。因此，在设施可达性层面，改造应重点围绕节点联系强化和服务支持前置两方面展开：一方面，通过慢行路径串联社区公园、颐康中心、无障碍卫生间及商业前空间等高频节点，提升服务设施之间的连续到达能力；另一方面，在主要步行路径沿线增设休憩设施、健康等候空间和短暂停留节点，降低老年人在连续步行过程中的身体负担。通过这一方式，可将原本分散的服务设施组织为具有可持续支持能力的日常活动网络。

（1）构建分级社交空间体系

据调查研究表明，老年人的日常活动空间以自家为中心而展开的特征比较明显。[34] 老年人大多集中活动于离家 0.5km 以内的空间范围；0.5-1km 的社区内部空间范围内活动减弱，极少数休闲娱乐活动在社区外进行[34]。因此，在社区内合理分布公共空间能有效提高社区公共空间的利用率，同时为社区老年人提供便利。

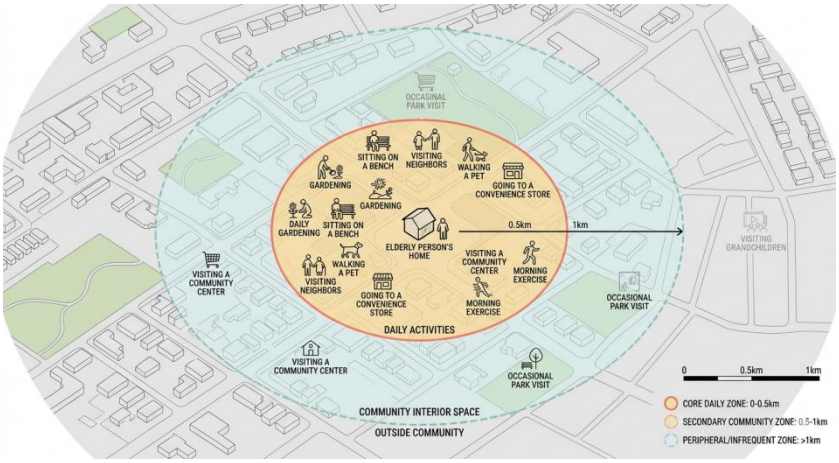


图 5- 5 老年人日常活动范围（来源：笔者自绘）

基于此，针对老年人身体能力、活动强度与社交偏好差异，将社交空间按尺度与功能划分为三个层级：中心型群体活动区：位于社区公园，服务于广场舞、太极拳等集体性活动，应配置防滑耐磨铺装、低冲击适老健身器材及设备收纳设施，并在周边设置成组带靠背座椅，吸引非参与者驻足观望；邻里型小微聚集点：分布于住宅楼间、宅前屋后等小尺度区域（5 – 15 m^2），通过垂直绿墙、花池式座椅、小型种植箱等集约化手段，为高龄或行动不便老人提供就近、便捷的低强度交往场所；静观型线性交流带：沿主要步行路径设置连续休憩座椅，保持空间通透，支持老年人在晒太阳、交谈等活动需求。

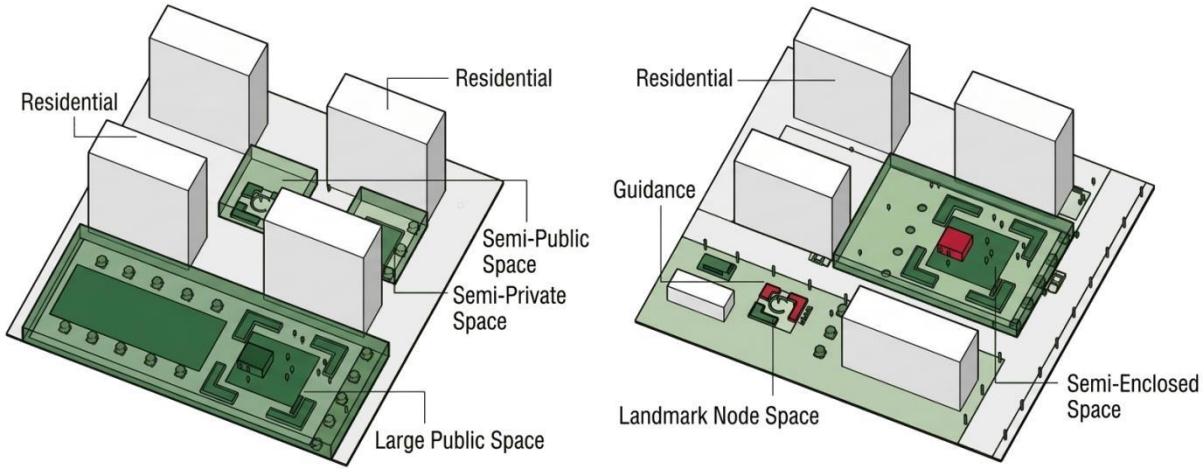


图 5- 6 分级社交空间体系

来源：笔者自绘

（2）组织动静分区

在以促进交往与增强社区归属感为目标的社交类公共空间中，合理组织动区与静区的空间关系，是提升使用效率、减少行为干扰的关键设计策略。基于对老年人行为模式的观察与分析，动主要指散步、健身、接送孙辈等具有一定移动性或身体活动强度的行

为；静则涵盖闲坐、聊天、晒太阳、看护等低强度、长时间停留的社交或休憩行为。二者在空间需求上存在显著差异：动区强调路径连续性、通行安全性与适度开阔性，而静区则更注重环境私密性、视觉舒适性与微气候宜人性。利用自然与人工界面柔性分隔。

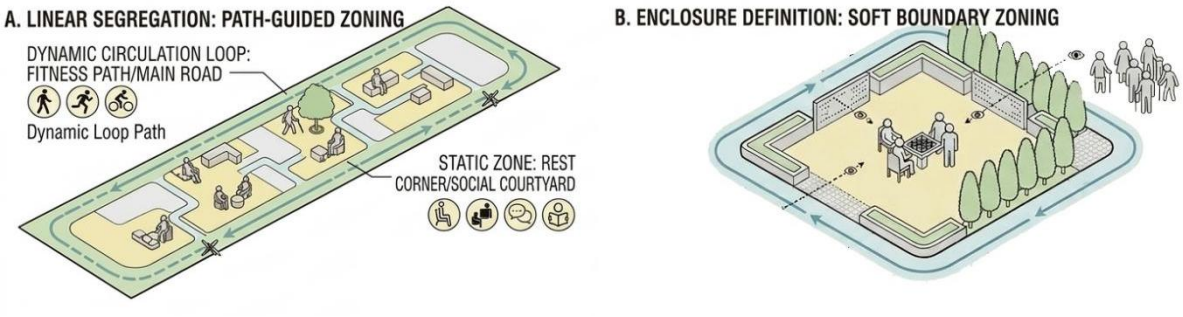


图 5- 7 动静分区设计策略示意图

来源：笔者自绘

为此，建议采取以下动静分区设计策略：空间布局上实现物理分隔与视觉通透并存，通过绿化带、矮墙、花池、高差或铺装材质变化等柔性边界手段，将动区与静区进行适度隔离，避免穿行干扰，如图 5-3 所示；同时保持视线通透，确保静区使用者对周边环境的感知与安全感，尤其利于老年人对孙辈的看护。在条件允许的场地，可采用“外圈为环形步道，内核为休憩花园的布局模式；在狭长或线性空间中，则宜沿一侧布置动线，另一侧嵌入多个静区节点，实现动静并置而不相扰。考虑到部分空间在不同时段承担不同功能（如清晨为锻炼高峰，午后转为社交聚集），可通过可移动家具、模块化铺装或多功能设施（如带储物功能的座椅）提升空间灵活性，实现动静功能的时段转换与兼容。社交类公共空间的动静分区通过柔性分隔、功能适配、流线引导与弹性设计，提升公共空间的利用率。

（3）步行系统连续性优化，强化人车分流

作为社区中老年人日常出行可达的高频节点，在商铺前区应明确划定独立、连续的人行通行带，结合《商店建筑设计规范》中在联营商场或沿街商铺的公共通道设计中相关规定各公共通道的安全出口及其间距应符合防火规范，且公共通道最小净宽度应满足疏散与日常通行双重需求，布置完休憩座椅后保障仍留有 1.5m 的步行空间。在铺设方面，可采用差异化铺装与旁边人行空间加以区分。对于位于社区主要出入口的临街商铺，在人车交汇处设置抬升式过街平台、减速丘或绿化岛，实现物理降速与视觉缓冲。严禁机动车临时占道停车，保障步行流线全天候畅通，尤其满足老年人、轮椅使用者对安全、平稳路径的多种需求。

综上，设施可达性改造应以节点联系强化和服务支持前置为重点，通过构建连续、安全、便捷的空间联系体系，将分散的公共服务设施转化为老年人可持续使用的日常活动网络。

5.4.2 行人基础设施因素改造策略

前文调研表明中兴社区内部部分道路存在通道净宽不足、杂物与车辆侵占、边界组织模糊和节点衔接不连续等问题，削弱了老年人的出行便捷性与空间识别性。行人基础设施因素是影响老年人步行体验与空间使用的重要基础条件，可从步行空间构成与人行道物理特征两个维度进行分析。其中，步行空间构成主要涉及路径组织、功能分区以及与绿化、建筑界面及休憩设施等要素之间的空间关系，直接影响步行环境的连续性与使用效率；人行道物理特征则包括铺装材质、空间宽度、高差处理、无障碍设施及边界界定等内容，对老年人通行的安全性与舒适性具有关键作用。两者共同作用，决定了步行空间的可达性水平与整体体验质量。基于上述分析，提出以下三条针对性的设计策略。

(1)复合配置休憩设施

在传统高密度的城市社区里，公共空间数量、面积、基础设施都是有限的，很难满足老年人多样化的需求。因此，推动休憩设施一物多用，是当下解决空间不足问题的有利之举。所谓复合配置，即通过功能整合、空间协同与感官适配，在有限的设施体量或节点内，融合休息、社交、观景、储物、微锻炼等多重用途，从而在不增加占地的前提下，更精准、高效地支撑老年人的日常活动需求。



图 5- 8 上海绿毯公园基础设施

图片来源：谷德设计网

如图 5-8 所示，将休憩设施与自然地面形成贴合人体工程学躺椅的角度，有效减少了休憩设施数量不足的问题，同时增加了空间的整体协调感。因此在社交型公共空间内，

休憩设施应突破单一坐凳模式，推广一些模块化、可移动式座椅单元，如带轮木凳、组合花池座，以满足不同老年人对空间的活动需求。同时，在休憩区边缘嵌入代际互动元素，如矮滑梯、涂鸦板，便于陪伴后代的需求。



图 5- 9 泰国 Suan San 口袋公园

图片来源：谷德设计网

(2)激活灰空间潜力，打造多功能复合型前场界面

充分利用建筑屋檐下的灰空间，嵌入带靠背扶手的适老座椅、小型服务台，如共享雨伞、信息屏，可移动花箱及遮阳构件，形成弹性活动带；鼓励商户参与微更新，通过统一导则引导外摆家具、绿植与照明的协调布置，在提升商业可视性的同时，增强空间的社会包容性与停留品质。

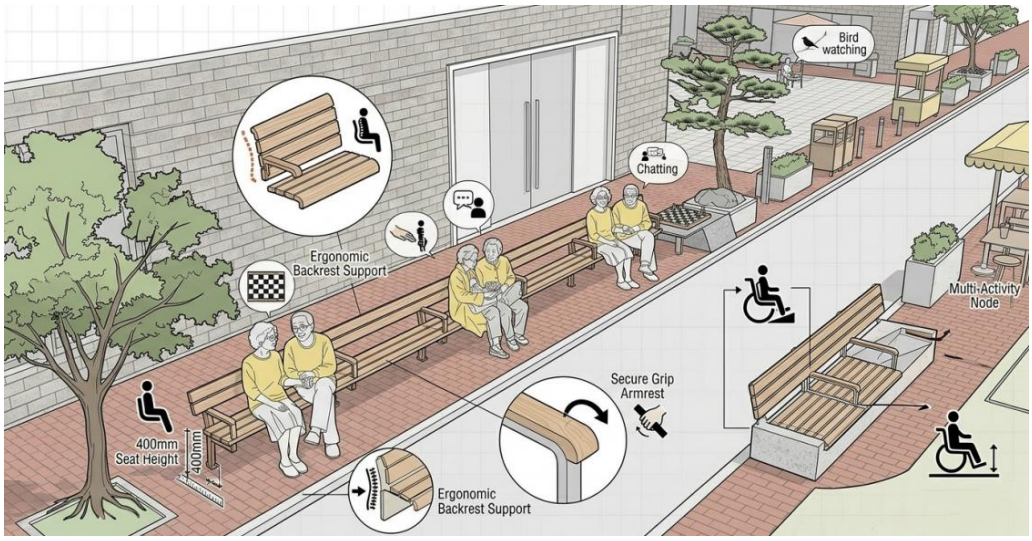


图 5- 10 商业前区公共座椅

图片来源：笔者改绘自[42]

(3)缓坡连续化处理

在社区公共空间适老化改造中，针对原有场地存在的高差问题，可采用缓坡连续化

的方式进行优化处理。该策略通过控制坡度、延长路径长度，将原本突变的高差转化为连续、平缓的步行体验，从而满足老年人对无障碍通行与安全行走的需求。同时，在缓坡路径中结合分段式休憩节点与景观要素设置，可有效缓解行走疲劳，提升空间使用的舒适性与连续性。



图 5- 11 缓坡连续化（图片来源：笔者改绘[42]）

缓坡连续化不仅强调通行功能的完善，还通过路径组织强化空间引导作用，使高差转化为具有引导性与参与感的步行系统。在具体设计中，应合理控制不大于 1:12 的坡度，并在必要位置设置平台进行过渡，以保障使用安全。

综上，行人基础设施改造应构建连续、安全、清晰的慢行系统，通过优化步行界面、完善路径组织与提升通行品质，为老年人提供更加稳定和舒适的日常出行环境。

5.4.3 美学与环境质量因素改造策略

在设计实施层面，美学与环境质量往往通过绿化、材料、界面整治和灰空间营造等手段共同作用于老年人的空间感知，因此本文将二者结合讨论。

通过前期调研与行为分析发现，社区公共空间在环境品质方面普遍存在绿化层次单一、遮荫设施不足及空间景观缺乏变化等问题，导致整体环境较为单调，难以满足老年人对舒适性与观赏性的需求。从行为特征来看，老年人在公共空间中的活动具有明显的环境依赖性，更倾向于选择具备良好遮荫条件、视野开阔且景观丰富的空间进行停留与交流。同时，其活动多以低强度、长时间停留为主，对微气候条件（如遮阳、通风）及空间氛围具有较高要求。当环境舒适性不足时，往往会缩短停留时间或转移至条件更优的区域。

因此，美学与环境质量优化应从空间整体环境营造入手，通过提升绿化层次、完善遮荫系统及丰富景观要素，改善空间的视觉体验与微气候条件；同时结合节点空间设计，增强空间的层次感与识别性，从而提升公共空间的吸引力与使用活力。基于上述分析，提出以下针对性设计策略。可从以下三个方面提出系统性优化策略：

(1)步道网络优化

交通道路作为城市肌理中的主要通行网络，其公共空间的设计核心在于平衡机动车运行效率与非机动车及行人安全需求。在住宅出入口、社区公园、颐康中心、商业前区等关键功能节点之间，设置独立、连续的人行通道，避免穿越车行道；必要交叉口采用抬升式过街平台、彩色铺装或减速带等设置。同时，应沿主步行路径设置清晰、连续的地面标识（如盲道、色彩导向线），提升空间认知效率，尤其辅助高龄或认知能力下降者自主出行。

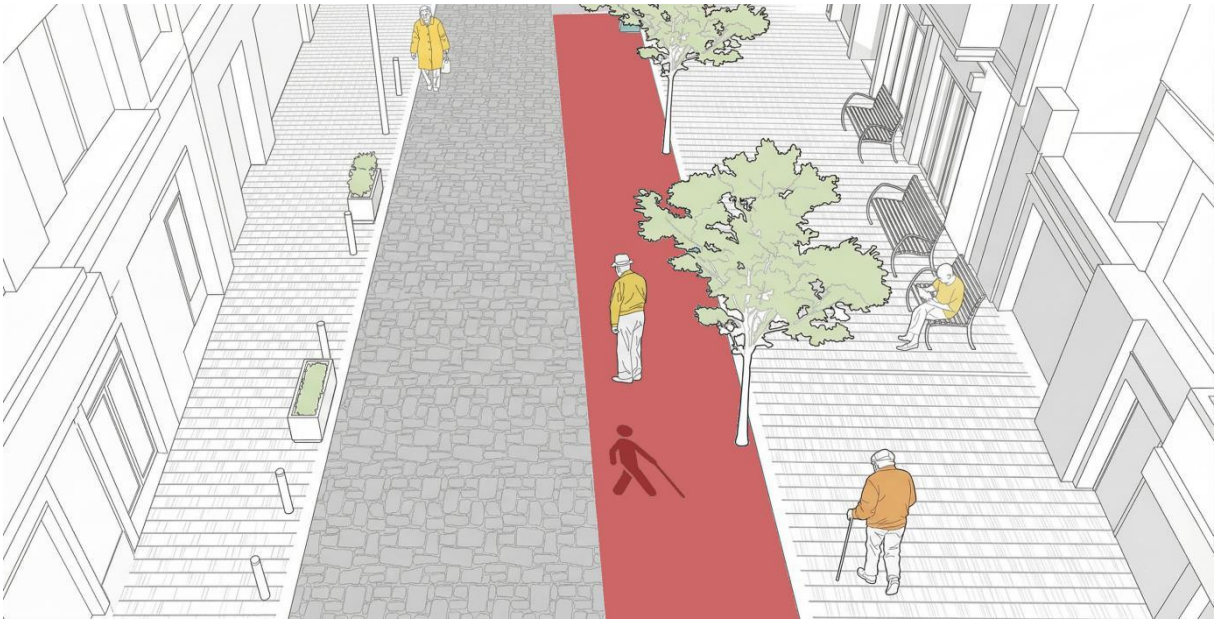


图 5- 12 街道地面色彩导向线

图片来源：笔者自绘

(2)结合绿植嵌入适老型节点休憩体系

调研发现，社区内座椅的布局在位置选择与数量配置上均存在不合理之处。座椅的设置不应以图面形式或视觉效果为导向，而应基于系统性的规划设计，优先回应老年人的生理特征与心理需求—如就近休息、视线通达、便于社交及安全感等，确保其在日常使用中的实用性与舒适性[36]。

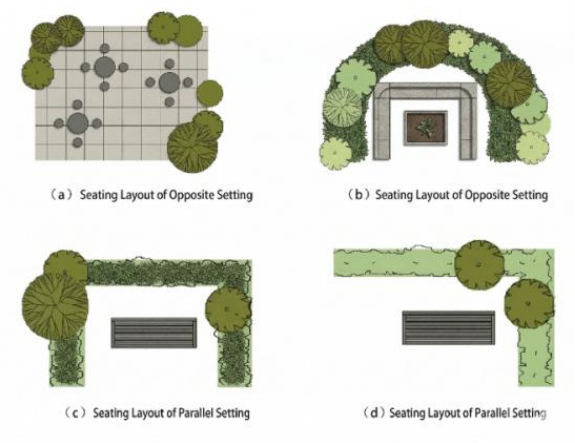


图 5- 13 座椅的布置形式

图片来源[36]

应在步行网络的关键节点，如道路转角、交叉口及长直路段中点，合理布局休憩设施，以缓解老年人因体力有限而产生的疲劳。休憩点宜按 50–80 米的间距设置，契合老年人每步行 3–5 分钟即需短暂休息的生理节奏。

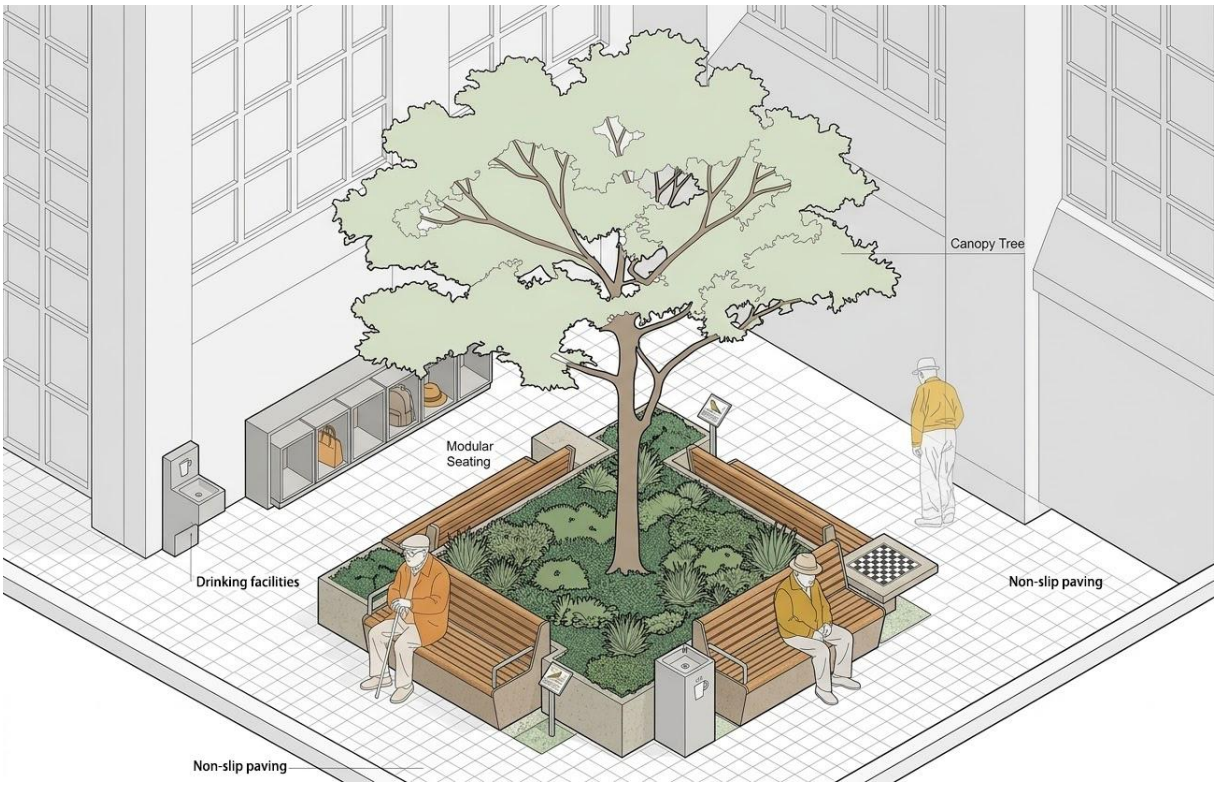


图 5- 14 融合绿化的公共座椅

图片来源：笔者自绘

设施应采用多功能复合座椅设计，配备靠背、扶手，座高控制在 40–45 厘米，并可结合遮阳棚、小型绿植围合或储物格，灵活支持休息、照看孙辈、邻里社交等多元行为；同时，休憩区应通过花池、矮墙或铺装材质变化与主通行流线适度分离，形成半围

合的停留空间，在避免干扰行人通行的前提下，保障使用者对主路径的视线通透性与环境安全感，如图 5-14 所示。

(3)结合绿化，改善微气候与环境舒适度

绿化在道路空间形态生成中扮演着关键角色。在设计中可运用绿篱、行道树与草坪的组合，配合曲线型、直线型或有机形态的道路线形，塑造具有节奏感与方向性的街道界面。该手法不仅强化空间秩序，还实现硬质铺装与自然环境的柔和过渡，提升视觉层次与场所亲和力，如图 5-15 所示。同时，在合理利用街道空间开展一些居民自发的社区种植，增强空间与使用者的互动，同时改善道路环境。在空间受限区域，优先采用单侧绿化、窄幅绿带或草灌交替种植方式；在临时改造或硬质条件严苛的场景下，可灵活运用模块化盆栽、移动花箱或垂直绿墙作为替代方案，提升空间环境质量。也可在人行道路宽度适宜的路口将传统的绿化设施铺装变为居民的菜园，如图 5-15 右图所示。



图 5- 15 街道绿化

图片来源：谷德设计网

避免服务空间孤立设置，优先将其嵌入活力界面或灰空间中；结合休憩座椅、遮阳棚、绿植围合及小型社交元素，将纯功能性节点转化为兼具休息、看护、交流潜力的微交往场所；同时通过统一材质、绿化风格与照明氛围，使其自然融入社区肌理，增强归属感与使用意愿。现有颐康服务中心旁连廊处于闲置状态，可将其与颐康中心功能组合，通过植入适老化休憩设施、小型社交节点，将原本消极的交通性灰空间转化为功能复合型服务延伸空间，增强老年人对社区养老服务设施的可达性与停留意愿。

参考圣约瑟夫老年公寓“感官花园”经验，设置芳香植物角与色彩季相区，并嵌入可触摸材料墙与安全水景，供认知症老人进行感官训练；服务附属空间座椅采用 L 型或背靠背布局，形成半围合布局，设置双人并排长椅，边界采用通透绿篱或疏林草地，避免封闭围墙带来的压抑感。



图 5- 16 连廊改造

来源：日比野设计 + 福祉设施研究所

综上，美学与环境质量改造应通过材料、绿化、色彩与空间界面的整体优化，提升公共空间的识别性、亲和力与场所感，从而增强老年人的停留意愿与心理认同。

5.4.4 安全性因素改造策略

服务功能附属公共空间作为与特定服务设施（如养老院、社区卫生中心、康复机构等）紧密关联的外部或内部空间，其设计通常以提升服务可达性、增强使用者舒适度与促进身心康复为目标。前文现状调研和节点分析表明，社区内部仍存在高差处理不连续、铺装破损、人车混行、照明不足及边界控制不清等问题。针对这些问题，可从以下三个方面进行适老化改造。

(1)设置分级的导引系统



图 5- 17 社区导视牌

来源：百度百科

为提升服务附属空间的可识别性与可达性，应构建层级清晰、连续衔接的三级导视系统：在社区主出入口、公园入口及主要交叉路口设置综合信息牌，作为一级导引，清

晰标注颐康中心、无障碍卫生间等关键服务设施的位置与步行距离。

沿老年人高频活动路径（如通往健身广场、宅前屋后的动线），每隔 30－50 米设置地面嵌入式箭头或小型立杆指示牌作为二级导引，可采用黄底黑字等高对比度配色，在临近服务设施 10 米范围内，通过灯光标识、特色铺装或景观小品，如彩色地砖、主题花箱等设置形成三级导引，让居民精准识别，提高空间的可达性。在社区内居民楼口处，也可与社区内步行指引线相衔接，有助于人车分流，如图 5-18 所示。

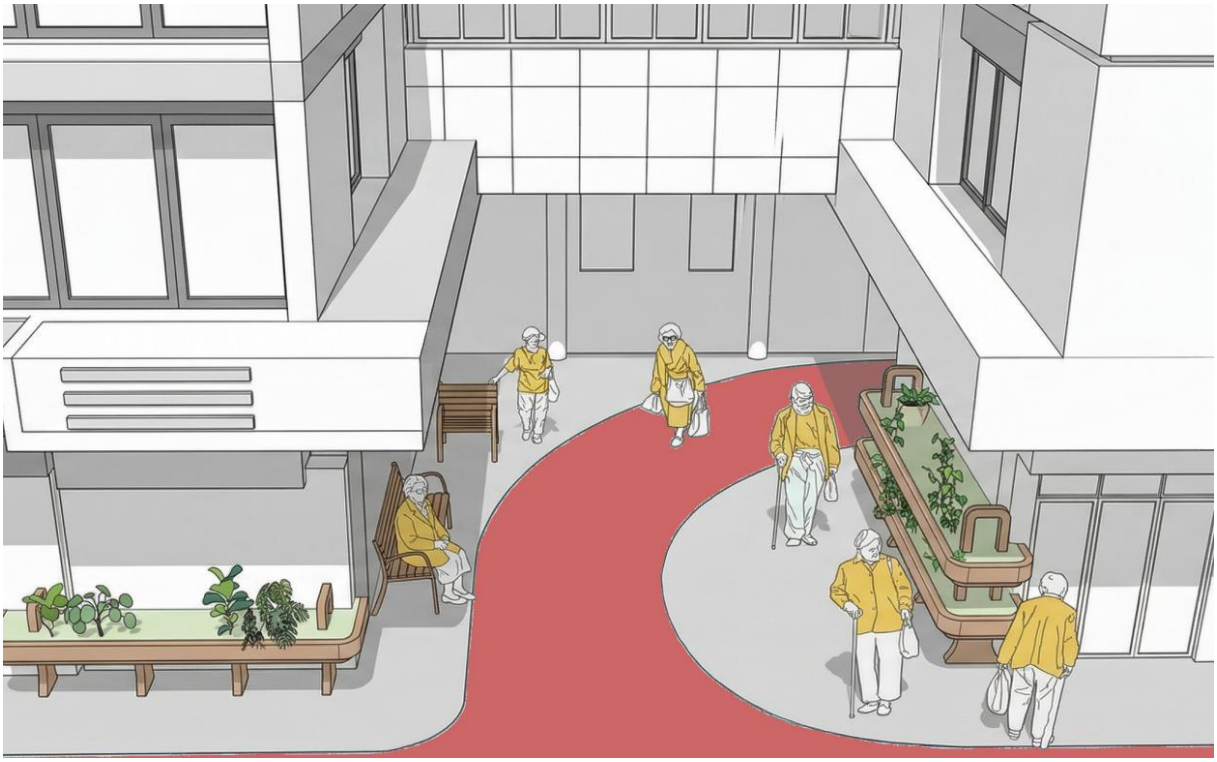


图 5- 18 单元入口彩色指引线（来源：笔者自绘）

(2)优化现有社区道路规划，提升可达性



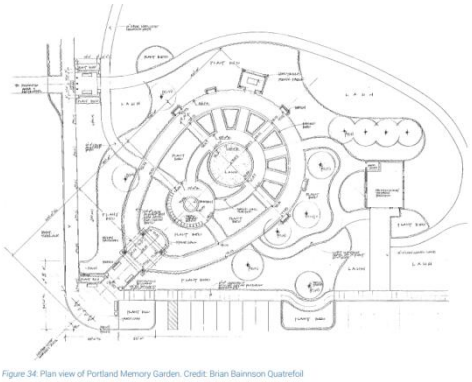


Figure 34: Plan view of Portland Memory Garden. Credit: Brian Bainnson Quatrefoil

图 5- 19 荷兰记忆花园

来源：PLACEMAKING FOR AN AGING POPULATION[38]

基于老年人真实行为轨迹，在高频次活动节点与服务设施之间增设直连步行捷径，人车交叉口采用抬升式过街或减速措施，确保安全、便捷、无阻通行。参考多摩平之森推窗见绿、出门入园的设计逻辑，打破室内外硬性边界：将服务设施主出入口改造为可全开敞式玻璃门廊，使室内与户外空间视觉连通；门前设置半遮蔽灰空间，如带顶棚的木质平台，提供遮阳避雨的过渡停留区。

(3)出入口设置无障碍坡道

结合中兴社区现状可知，部分出入口仍存在台阶高差明显、坡道缺失或衔接不连续等问题，导致老年人在进出过程中需要绕行，甚至依赖他人协助，显著削弱了其独立出行能力。因此，在改造中应优先对社区主出入口、公共服务设施门前、临街商铺入口及高频活动节点周边进行无障碍坡道补建与优化。针对部分楼栋出入口因场地条件限制而存在难以消除的台阶高差，导致老年人通行受阻、跌倒风险增加的问题，增设无障碍坡道，实现平缓过渡，如图 5-20 所示。

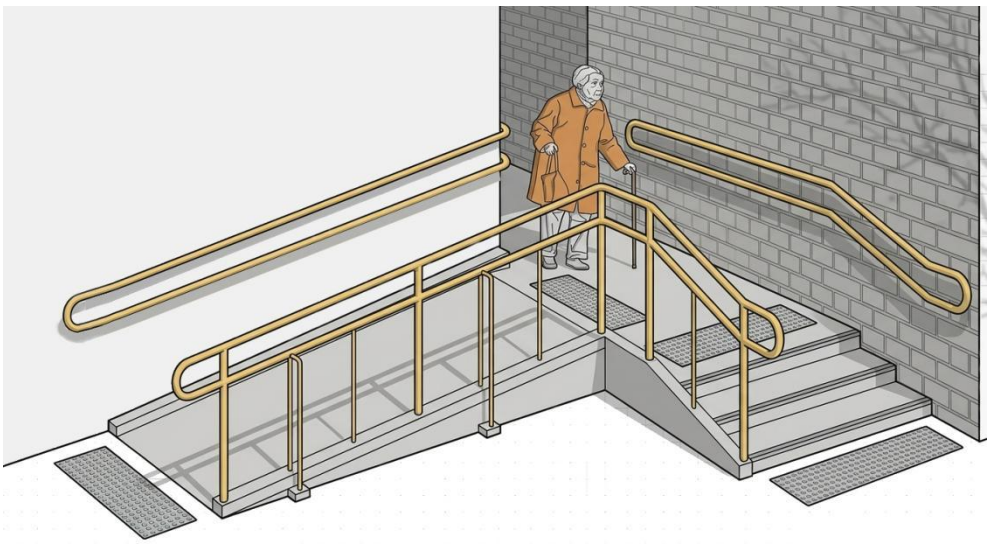


图 5- 20 楼栋出入口适老化台阶和坡道

来源：改绘自参考文献[50]

综上，安全性改造应通过强化人车分流、消除物理隐患、完善照明与风险预警系统，构建清晰、可控、连续的安全空间环境，为老年人日常出行与停留提供基础保障。

5.5 本章小结

本章在第二章现状调研、第三章行为活动分析及第四章案例研究的基础上，构建了评价-策略-设计的转译机制，从问题识别走向空间生成逻辑。针对中兴社区公共空间中存在的步行连续性不足、设施支持薄弱、环境品质不稳定及社交支撑不足等问题，提出

了安全保障、无障碍可达、环境舒适和社交支持四项适老化改造原则。围绕设施可达性、行人基础设施等五大维度，构建面向中兴社区实际适老化问题的更新策略体系。与前文侧重问题发现和案例归纳不同，本章的重点在于将分析结果进一步转译为可用于总体规划与节点设计的策略语言，强调老年友好型公共空间的营造不应局限于单一设施的增补，而应整体规划，从路径连续性、功能复合性、导引系统性、微气候舒适性与环境情感认同等多维度协同介入。在此基础上，将第五章的策略转化为第六章的图纸给予一定基础。

上述策略为后续空间改造提供了理论依据与方法支撑。在此基础上，下一章将聚焦于具体基地的现状条件与使用特征，结合前文提出的设计原则，开展场地诊断与潜力分析，并据此生成具有针对性、可实施性的中兴社区适老化公共空间更新方案。

第六章　中兴社区公共空间适老化改造方案

6.1 基地分析

6.1.1 区位分析



广东省　　广州市　　荔湾区

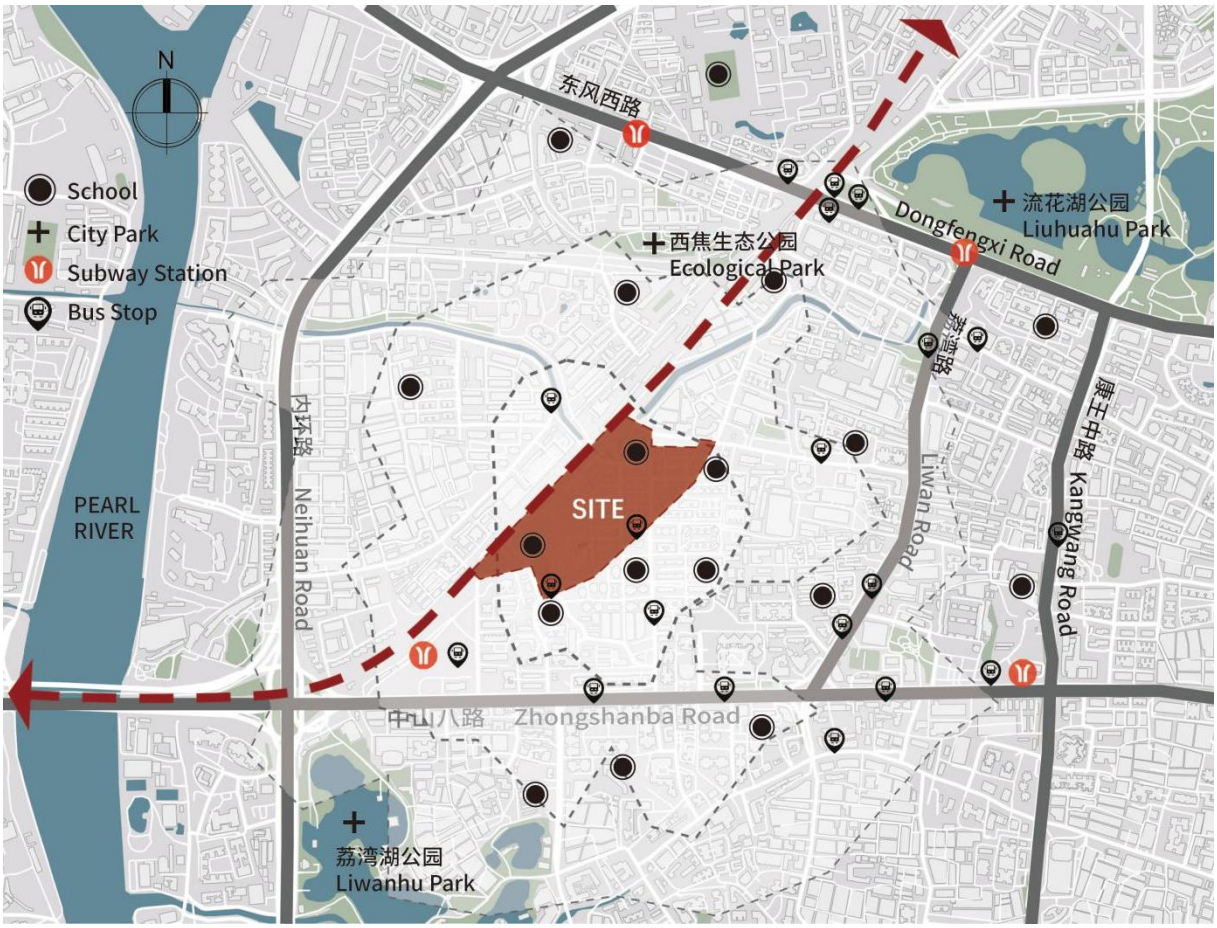


图 6- 1　中兴社区区位分析图

来源：笔者自绘

中兴社区位于广州市荔湾区彩虹街道，东临广茂铁路，西靠周门南路，南北介于石桂里和周门路之间（如图 6-1），约 0.117 平方公里，绿化率达 30.8%。社区内有彩虹街综合养老服务中心、荔湾区疾病预防控制中心、荔湾区图书馆(周门馆)、广州市西关外国语学校、西关幼儿园等，紧邻荔湾区彩虹街社区卫生服务中心和周门市场，基础设施配套较为齐全。因此中兴社区在高老龄化、高密度和空间老化的复合背景下具有典型的老旧社区适老化改造研究价值，可作为广州乃至华南地区同类社区的代表性样本。因此，中兴社区在高老龄化、高密度和空间老化的复合背景下具有典型的老旧社区适老化改造研究价值，可作为广州乃至华南地区同类社区的代表性样本。因此，中兴社区不仅具有高密度与高老龄化叠加特征，同时呈现出公共空间老化、慢行系统断裂与服务设施错配等典型问题，其空间特征与老旧城区适老化改造的关键矛盾高度契合，具有明确的研究代表性与问题指向性。

6.1.2 功能分区

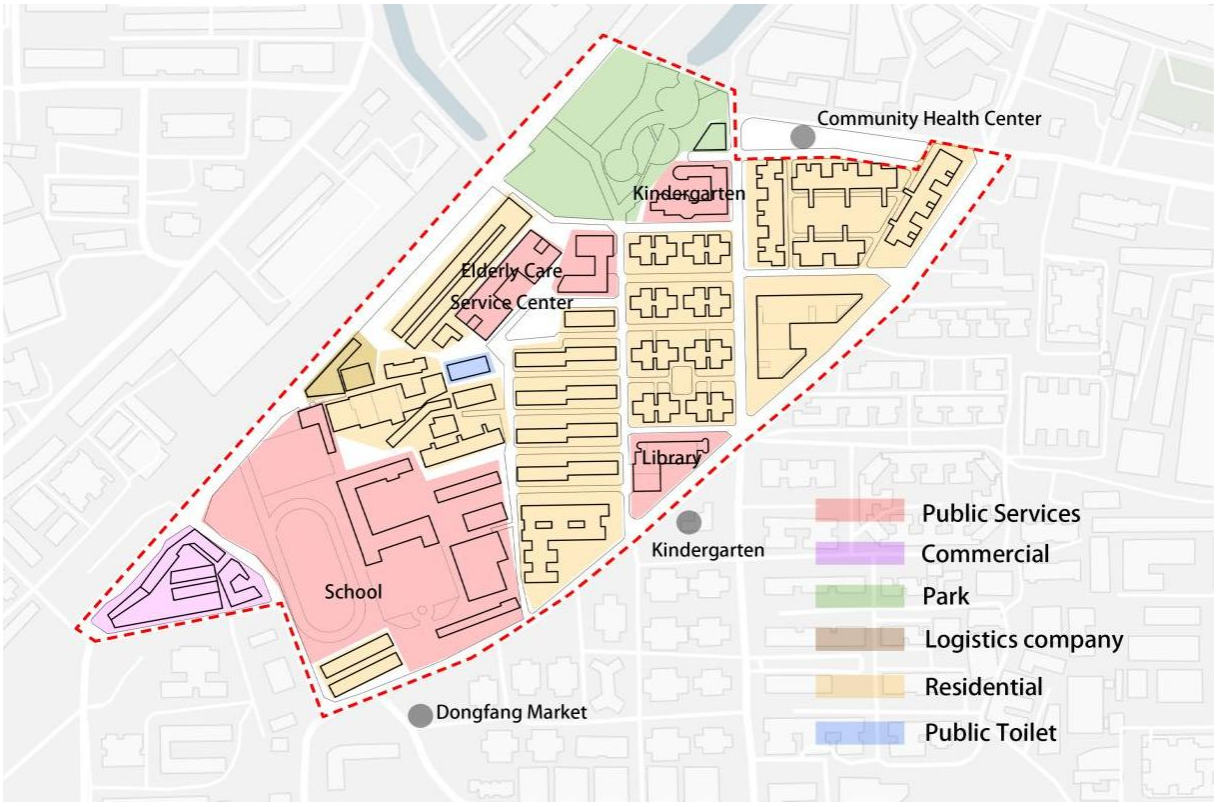


图 6- 2 中兴社区功能分区和公共服务设施图

来源：笔者自绘

中兴社区以住宅为主，临街底层有部分商业用房，社区内商业以棋牌店、理发店和

商超为主。其中住宅区由中兴苑小区、周门小区、周门大院组成，以高层建筑为主，有6-9层高住宅大楼69栋。此外还配套高中，幼儿园等。在空间组织上，公共设施沿主要街道及中心区域集中布置：幼儿园、图书馆、社区健康中心等公共服务设施分布在社区北部与中部，服务半径覆盖大部分居民；学校位于西南角，独立设置并设有专用出入口；商业设施（如东方市场）分布于街角或人流交汇处，承担日常购物功能；公园绿地虽面积有限，但作为社区级开放空间，成为老年人晨练、社交的重要节点。此外，物流仓储单位嵌入住宅区边缘，反映出功能混杂的现实问题。整体来看，社区具备较为完善的配套服务网络，但公共空间系统性不足、步行连续性差、无障碍衔接薄弱等问题突出，亟需通过微更新提升老年群体的可达性与使用舒适度。



图 6- 3 中兴社区内部商业现状

来源：笔者自绘

商业用房以餐饮、药店、理发店等小型商业为主。图6-3呈现了中兴社区内部商业空间的典型现状，整体体现出高密度、小尺度、功能复合且高度生活化的特征。调研所摄四张照片分别记录了便利店、理发店及街角杂货铺等小微商业单元的实际使用场景：商铺普遍沿街布设，门前空间常被用于临时停车、货物堆放或设置等候座椅，导致商业前区域功能混杂。同时，人行道宽度有限，电动车穿行频繁，人车流线交织，公共通行

空间受到明显挤压。尽管此类商业形态有效支撑了居民日常高频次、短距离的生活服务需求，但其在环境秩序、步行安全、设施老化及空间品质等方面仍存在显著短板。中兴社区由于老年人口占比较高从而导致社区范围内商业服务空间使用频率高，因此侧面反映出商业前区公共空间亟待通过适老化改造设计对商业前区进行功能梳理、界面优化与步行环境提升的必要性。

从空间结构看，当前社区呈现出空间混合、慢性断裂的特征，这一结构问题直接影响老年人日常活动的连续性与安全性。

6.1.3 交通关系

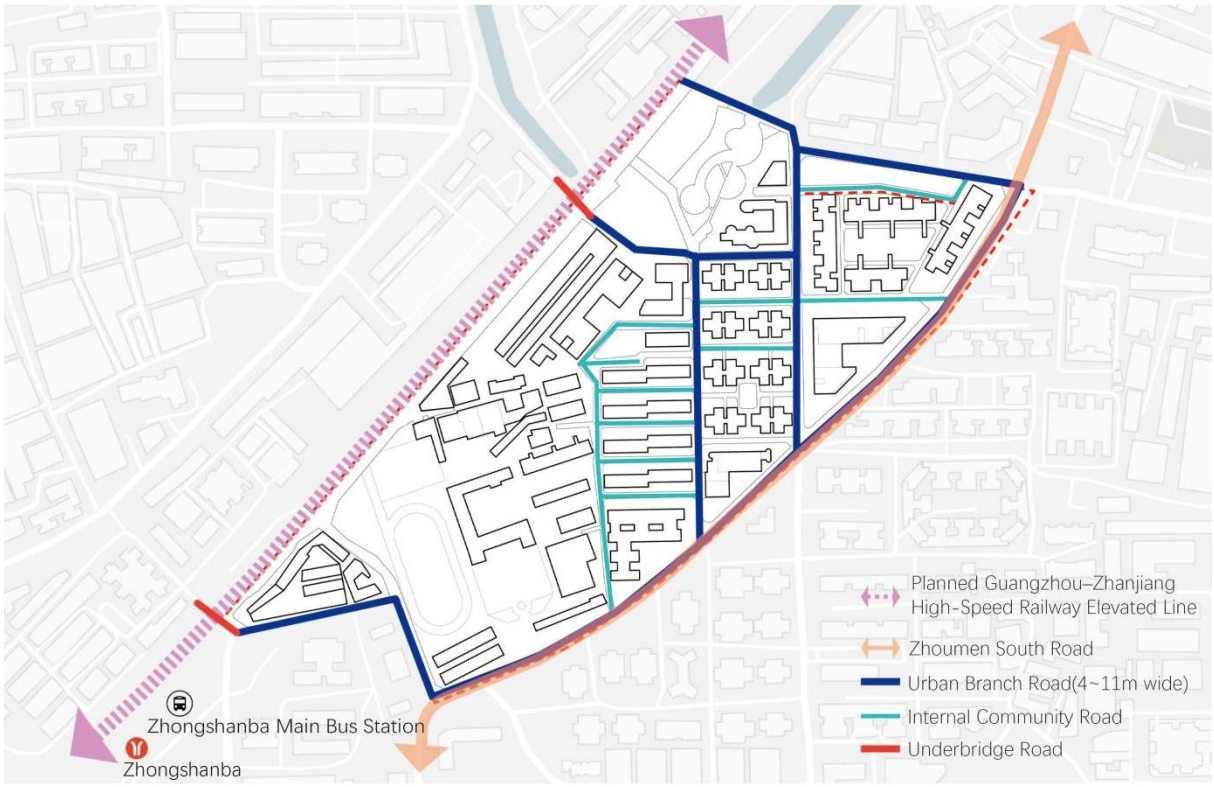


图 6- 4 中兴社区道路交通现状图

来源：笔者自绘

（1）交通路网

中兴社区与其他社区没有明确的围墙边界与出入口，交通组织没有做到人车分流，一定程度上难以保证老年人出行的安全。由于人行系统不完善和部分步行道路宽度不足1.2m，甚至在石路基段缺少人行空间，有些地方老年人不得不占用机动车道；私家车数量的增多导致停车位数量不足而占用道路空间，通车面积减小，这些都会为老年人出行带来潜在的安全风险。

从工作日来看，老年人的活动更偏向日常事务性与规律性使用，表现为围绕买菜、取快递、候车、就医、接送孙辈等需求展开，活动路径更稳定，服务设施和交通联系空间的使用更为频繁。根据第三章调研中对公共交通设施的观察显示，老年人利用公交车站和周边交通空间的高峰主要集中在上午 7:00—8:30 和傍晚 16:30—18:30，活动类型以接送孙辈和候车为主，说明工作日人流具有更明显的生活事务导向特征。第三章针对高频节点分析表明，社区公园承载了休息、散步、社交、锻炼、一般休闲和陪伴孙辈等多种活动，体现出显著的复合使用特征；健身广场除锻炼外，也容纳休息、社交、晒太阳和陪伴孙辈等行为，这些活动通常更符合休息日的空间使用特点。

（2）公共交通



图 6- 5 中兴社区停车位现状

中兴社区附近有地铁 5 号线中山八路站和 1 号线陈家祠站，步行 10 分钟左右可达。公交线网密集，附近有中山八路总站，接驳便利。社区内道路多为 6-8 米宽支路或巷道，如中兴后街、周门东街，缺乏明确人车分流与连续盲道、无障碍坡道；非机动车穿行频繁，安全风险高。部分路段存在尽端路，微循环不畅。社区内停车问题也较为严重，车位缺口大，无地下车库，12 个地面划线车位位于社区南部，归属于彩虹街道办事处，周门西街 17 号楼有停车库 10 个，难以满足附近居民私家车停车需求，导致占道停车普遍。

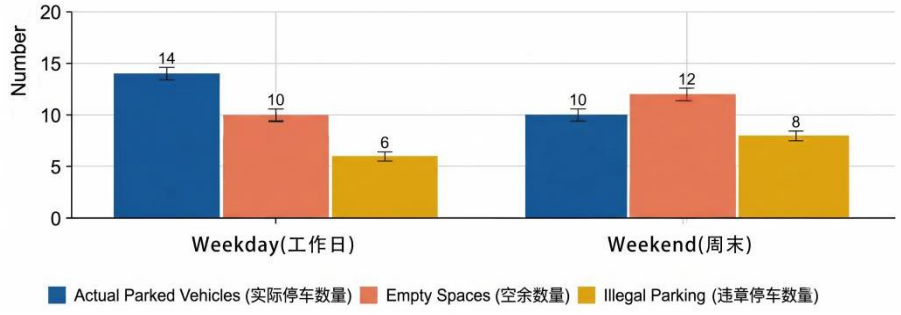


图 6- 6 中兴社区停车位使用现状

来源：笔者自绘

6.1.4 中兴社区公共空间布局

经过实地调研，中兴社区现有公共空间呈现出功能集中、分布不均、以点状节点为主的布局特征。如图 6-6 所示，社区内公共空间主要集中在三个核心区域：一是位于社区东北部的健身公园，作为居民日常锻炼的主要场所；二是中部偏南的健身广场，结合周边住宅形成开放性活动空间；三是西北部的颐康服务中心及其附属服务设施，构成社区养老服务的核心节点。整体呈现点状分布，弱连接、低网络化的空间特征。



图 6- 7 中兴社区公共空间分类

来源：笔者自绘

此外，商业前区、公厕及党群服务中心等服务设施多沿主干道或次要道路布置，形成若干点状布局的小型零散空间。整体来看，公共空间虽有一定覆盖，但存在空间碎片化、连接性不足、步行网络衔接弱等问题，且多数节点孤立分布，缺乏连续的慢行系统支撑，难以有效串联老年人日常活动路径，制约了公共空间的整体可达性与使用效率。

如图 6-8 所示，中兴社区老年人日常活动主要沿社区内部主要慢行路径和边界道路展开，并集中分布于社区公园、健身设施周边、商业前空间、住宅附属空间及服务设施节点等高频活动区域。行为类型以步行/散步、休息、社交/闲聊、锻炼、购物、陪伴后

代、晒太阳和取快递为主，呈现出明显的复合性与节点集聚特征。其中，社区公园及其周边是老年人活动最为密集的核心区域，商业前空间和住宅附属空间则更多承担日常停留、邻里交往和生活服务功能。该图反映了老年人行为活动与社区空间结构之间的耦合关系，可为后续慢行系统优化与重点节点改造提供依据。



图 6- 8 中兴社区老年人行为活动空间分布图
来源：笔者自绘

6.1.5 中兴社区老龄化现状

中兴社区位于荔湾区彩虹街道，荔湾区 60 岁以上居民占比达 25.56%。与荔湾区内主要街道相比属于高龄化严重的几个区域之一，见表 6-1 所示。目前该社区内居住人口共有 6000 多人，其中老年人口比例约为 33.6%，60 岁及以上老年人口占比显著高于广州市平均水平，属于高度老龄化社区。部分楼栋呈现“纯老户”或“高龄独居”集中现象。高龄独居比例的增加，使得公共空间在安全性、可达性与邻里支持方面承担更多替代家庭功能的角色。

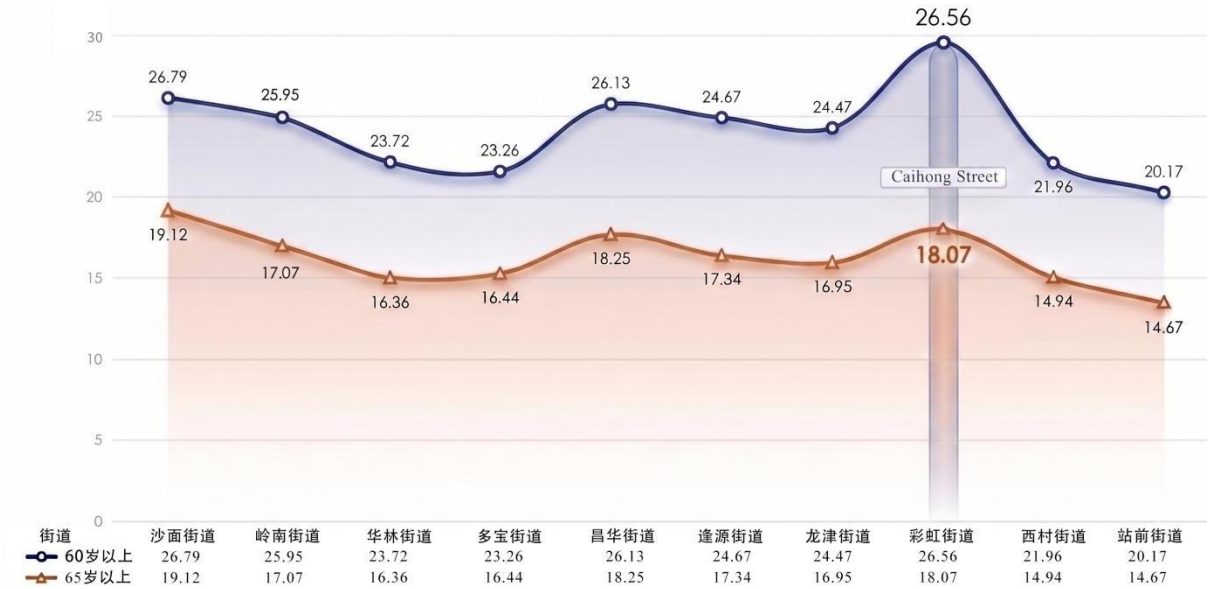


图 6- 9 荔湾区主要街道老年人口比例

数据来源：广州市荔湾区第七次全国人口普查公报[39]

在此背景下，老年人对公共空间的依赖性更强，日常活动高度集中在住区内部及周边步行可达范围内，其出行频率、停留时长与空间使用方式均呈现出鲜明的适老特征。因此，开展系统性的适老化现状调研，不仅有助于精准识别当前公共空间在无障碍通行、休憩支持、社交促进、安全防护及微气候舒适性等方面存在的短板，更能深入理解老年人在生理、心理与社会交往层面的真实需求。

6.1.6 广州市适老化社区建设导则

表 6- 1 广州市适老化社区建设相关政策汇总表

文件名称	主要内容	设计启示
《广州市城乡规划技术规定》及《居住区公共服务设施设置标准》	明确居住区应配置养老服务设施，如老年人服务中心、日间照料中心等	提供养老设施配置与规模的基础标准，是社区空间配置的重要依据
《广州市养老服务条例》	构建覆盖城乡的养老服务体系，推动居家、社区、机构“三位一体”发展	明确社区养老服务体系建设方向，强调嵌入式养老服务
《广州市开展全国示范性老年友好型社区创建实施方案》	从居住环境、出行环境、健康服务、社会参与等方面提出建设要求	构建“老年友好型社区”综合导则，直接指导公共空间适老化改造
《广州市养老服务体系建设“十四五”规划》	推进颐康中心和社区养老服务站建设，形成三级服务网络	明确“颐康中心+服务站”体系，是设施布局的重要依据

来源：笔者自绘

根据广州市相关政策文件，可以看出其适老化社区建设并未形成单一技术导则，而是通过规划标准、养老服务体系规划及老年友好型社区创建等多类政策共同构建导向体

系。从内容上看，广州适老化社区建设主要围绕养老服务设施配置、无障碍出行环境优化、社区空间品质提升以及社会参与支持等方面展开，强调通过“颐康中心+社区服务站”的分级服务体系，实现养老服务与社区公共空间的融合发展。同时，通过推进居家与社区适老化改造，逐步完善老年人生活环境的安全性、可达性与舒适性，形成具有综合性与实践导向的适老化社区建设路径。

基于上述政策，本研究将其转译为五类空间设计控制要点。一是 5 分钟生活圈设施配置，二是连续无障碍慢行系统，三是多层级社交空间，四是安全防护体系，五微气候优化。

6.1.7 中兴社区老年人服务设施

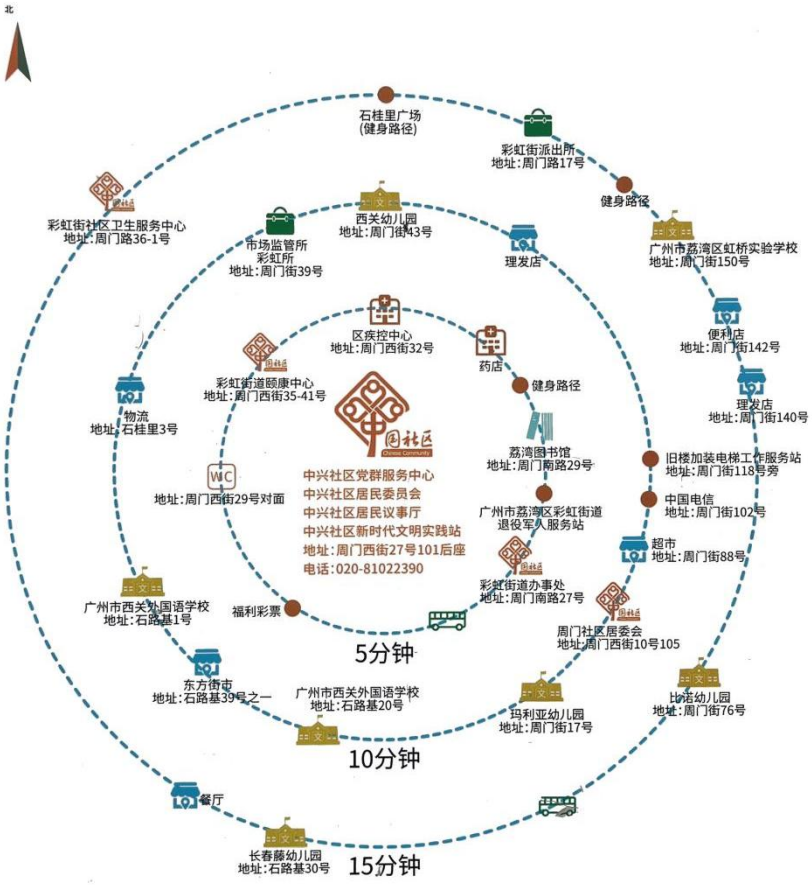


图 6- 10 中兴社区 15 分钟生活圈服务设施分布图

来源：笔者

如图 6-10 所示，中兴社区已构建以步行可达为基础的 15 分钟生活圈。从设施类型来看，社区周边涵盖了医疗卫生、文化教育、商业服务及公共服务等多种功能类型，基本满足居民日常生活需求。其中，5 分钟生活圈内主要分布社区服务中心、卫生服务站

及基础商业设施等，满足老年人高频使用需求；10 分钟生活圈进一步覆盖教育设施及综合服务功能；15 分钟生活圈则扩展至更高等级的公共服务资源。

现有服务体系虽在空间分布上满足 15 分钟生活圈要求，但未能满足高龄老年人 5 分钟可达的实际使用要求。因此，在后续改造中，有必要强化 5 分钟生活圈内的养老服务与公共活动空间配置，并优化步行路径系统，以提升老年人日常生活的可达性与安全性。

如图 6-11 所示，中兴社区周边现状养老服务设施主要包括颐康中心、社区养老服务中心等，类型较为丰富，能够在一定程度上满足老年人日常照护与健康管理等多层次需求。然而，从适老化使用需求来看，现有设施在空间布局、服务层级衔接及步行可达性方面仍存在一定不足。部分较高等级的医疗养老资源分布于社区外围，老年人在实际到达过程中仍受到道路环境复杂、慢行系统不连续及无障碍设施不足等因素制约。

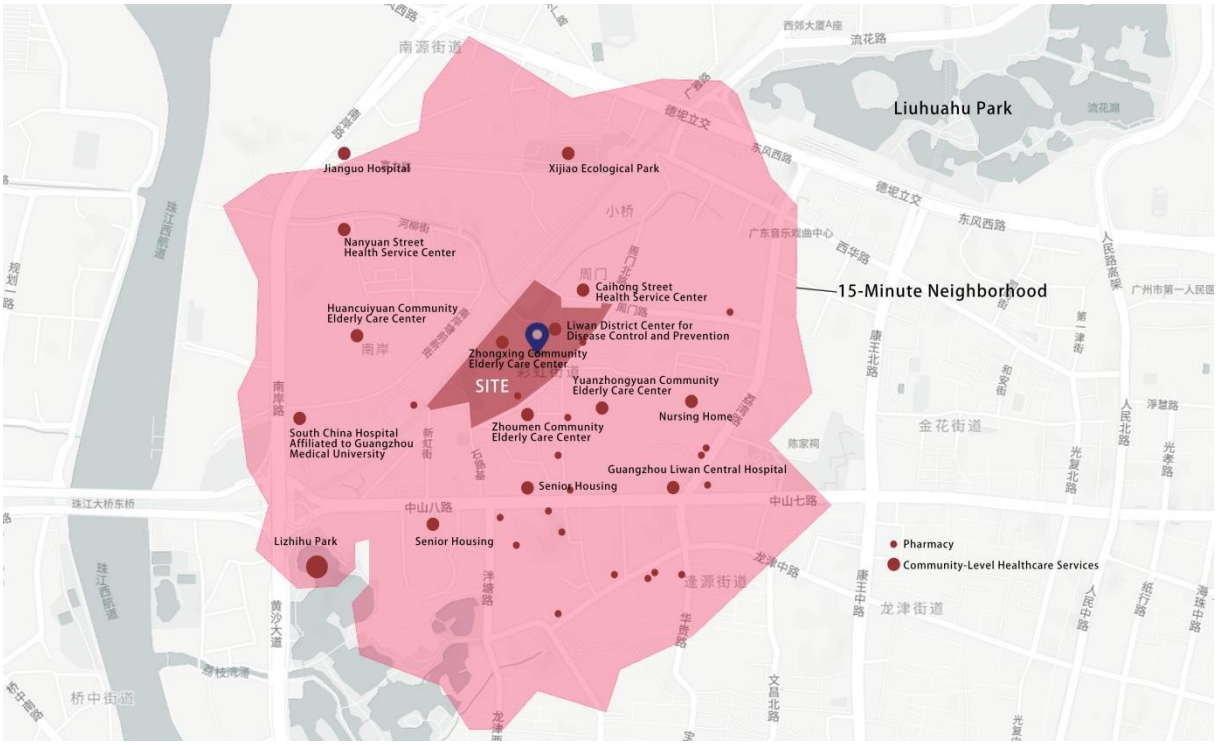


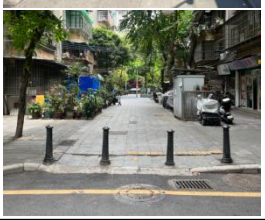
图 6- 11 养老服务设施分布图

来源：笔者自绘

6.1.8 中兴社区适老化问题归纳

基于本文 6.1 中对区位、交通、空间结构及老龄化特征的综合分析，并结合第三章问卷与行为调研结果，将中兴社区公共空间适老化问题归纳为以下四类核心问题，见表 6-2 所示。

表 6- 2 中兴社区适老化问题归纳

一级问题	二级问题	空间表现	现状照片
可达性不足	路网不连续	存在断头路、绕行、人行道侵占	
	座椅密度不足	沿路与节点处休憩设施不足	
	无障碍缺失	台阶、无坡道	
步行安全不足	人车混行	巷道无分流	
	停车侵占	占用人行道	
空间品质不足	商业前区混乱	堆放杂物、材料堆砌	
	绿化不足	缺乏遮阳设施	
社交支持不足	节点孤立	公园广场未串联	

来源：笔者自绘

其中，可达性与安全性问题为制约老年人日常活动的首要因素，环境品质与社交支持问题为次级优化方向。如图 6-12 所示，中兴社区适老化问题在空间上呈现出明显的集聚特征，步行断点主要集中于社区与城市道路衔接的关键过渡地带，尤其是石路基—新虹街—周门南路一线，以及周门南路与周门街交叉口周边人车混行问题广泛分布于内部支路系统。从安全性问题来看，人车混行现象主要分布于社区内部支路系统及主要出入口周边，尤其在社区中部南北向通道和南部出入口一带更为突出；同时，停车占道问题在社区南部及沿街空间表现尤为集中。从基础设施问题来看，步道宽度不足、铺装破损、休憩设施缺失等问题多出现在高频活动路径沿线及节点边缘地带，其中社区中部和南部的住宅附属空间、商业前空间以及部分服务附属空间表现较为明显。从环境品质问题来看，绿化薄弱、遮荫不足与噪声干扰等问题主要集中于交通界面较强、开放度较高的空间边缘，而无障碍设施缺失则更多集中在公共服务节点、住宅出入口及路径衔接位置，说明当前中兴社区在服务设施可达性和连续无障碍通行方面仍存在较大短板。整体来看，问题空间分布与老年人高频活动路径高度重合，说明中兴社区适老化更新应优先围绕慢行系统连续化和重点节点优化展开。



图 6- 12 中兴社区适老化问题空间分布图

来源：笔者自绘

6.2 适老化评价指标体系

为增强适老化改造策略的系统性与可操作性，本文在前期现状调研、行为分析及案例研究基础上，构建老旧社区公共空间适老化评价指标体系。该体系从功能设施、步行友好、环境品质、无障碍和材质安全五个维度出发，对社区公共空间的适老化水平进行综合评价，并为后续设计策略与空间改造提供依据。

表 6- 3 适老化评价指标体系

一级指标	二级指标	评价内容
功能设施	设施密度	5、10、15 分钟覆盖范围
	设施类型适配性	日间照料中心、颐康服务站
	座椅配置	座椅数量、间距、朝向及组合形式是否满足停留、交流和中途休息需求
步行友好	道路连续性	是否存在断点、绕行、死角、尽端路，节点之间是否形成连续慢行联系
	宽度	≥1.5m
	人车分流	是否存在人车混行，是否有明确步行边界、慢行优先组织和分流措施
环境品质	绿化遮荫	覆盖率
	噪音控制	是否临近铁路、公路，是否具备绿化缓冲和安静停留空间
无障碍	坡道是否连续	是否连续设置，坡度、高差衔接和转折处理是否满足老年人及轮椅通行需求
	盲道是否完整	盲道是否连续、清晰，是否存在中断
材质安全	防滑性	铺装类型
	平整度	高差控制

来源：笔者自绘

6.3 设计理念与策略转译

本章设计内容对应第一章技术路线中问题识别、策略提取、空间转译阶段，是对前期调研与案例分析结果的综合应用。基于前期调研与分析结果，本次中兴社区公共空间适老化改造的设计主题确立为康养疗愈，旨在通过连续、便捷、安全且富有体验感的空间环境，使老年群体能够在社区中实现自主活动、社交互动及身心愉悦。在设计过程中，以安全与可达性为首要目标，通过无障碍坡道、平滑步道及合理路径设计，保障轮椅及

助行器通行的连续性；同时注重环境舒适性，通过合理的休憩设施布局、充足的遮阳与防风设计、清晰可识别的导视系统及丰富的绿化景观，提升空间的宜居性与体验感；通过动静分区、功能复合和活动节点优化，激活社交空间与康养空间；结合老旧社区空间碎片化和既有建筑结构的特点，以低成本、渐进式微改造为主，实现空间功能逐步完善与可持续更新，从而为老年群体创造安全、舒适、便利且富有活力的社区公共空间环境。

本研究构建慢行路径-节点网络-界面支撑的三维空间组织模型，明确了每项策略在不同空间对象上的具体实现方式，为后续改造设计提供直接指导。

表 6- 4 中兴社区公共空间类型-问题-设计策略对应表

策略（第 5 章）	空间对象	设计手段
提升可达性	道路	设置无障碍坡道，消除高差，保证轮椅及助行器通行
	公共服务附属空间	优化节点间路径，增设捷径，强化导视标识
行人基础设施优化	道路与步行路径	连续铺设人行道，划定人车分流区域，增设防滑地面
	社交型空间	布置连续步道，增设分段休憩座椅与遮阳设施
美学与环境优化	商业前空间	丰富绿化布局，增设景观节点，提升视觉识别性
	社区公园、健身广场	设置动静分区景观，兼顾康养与代际互动
安全性提升	道路与出入口	增设照明、防滑地面及缓坡处理，降低跌倒风险
	社区公园、健身广场	增设护栏、防撞设施，规范器材布局

来源：笔者自绘

6.4 中兴社区改造总平面

基于前文对中兴社区公共空间现状、老年人行为活动特征及高频节点环境评价的分析，本文认为该社区适老化更新的关键不在于孤立提升单个节点品质，而在于重构社区内部公共空间的整体组织逻辑。因而，总平面设计以老年人高频活动范围和日常步行路径为基础，以社区公园、健身广场、颐康中心、商业前公共空间等节点为核心，构建连续的慢行联系系统与分级活动网络。通过对路径、节点、界面及微环境的整体整合，将原本零散、碎片化的公共空间转化为安全、可达、舒适且具有社交支持能力的适老活动体系。

因此，本次总平面设计以构建连续慢行系统、串联高频活动节点、完善分级停留空间、提升整体环境品质为总体目标，在空间结构上形成由主要慢行联系轴、核心活动节点、次级停留节点和沿线支持界面共同构成的社区适老化公共空间体系。其中，主要慢行联系轴承担社区内部高频出行与节点串联功能，活动节点承载休憩、锻炼、社交与服务获取等复合活动，次级停留节点则作为居住单元与核心节点之间的过渡空间，为老年人提供短暂停留、观望与邻里交往的机会。

6.4.1 总体空间结构

据前期调研第三章中行为地图与活动频率统计表明，中兴社区老年人日常活动主要集中于社区公园，占比 32%，颐康中心附属空间占比 28%，商业前区 21%等节点，因此本研究选取上述高频节点作为改造重点。考虑到中兴社区老年人活动半径主要集中于居住地周边 500 米范围内，总平面以社区内部及邻近生活服务空间作为重点优化范围，通过强化节点之间的横向与纵向联系，提升老年人日常活动路径的连续性与便利性。原有空间中各节点分散存在、路径联系薄弱，改造后的总体结构更强调网络化组织，即由一条承担主要联系功能的核心慢行路径串联多个高频节点，并通过若干支路延伸至楼栋入口、宅前屋后空间及边缘服务设施。

在这一总体结构中，主路径不仅承担通行功能，同时也是日常活动发生的空间载体。因此，总平设计并未将路径仅视为交通线，而是将其作为具有停留、识别和社交潜力的复合公共空间来组织。沿主路径布置休憩设施、遮荫绿化、导向系统与低位照明，并结合路径转折、节点过渡和界面开口设置次级停留空间，使老年人在步行过程中能够根据身体状态、活动需求和交往意愿灵活选择停留或继续前行。

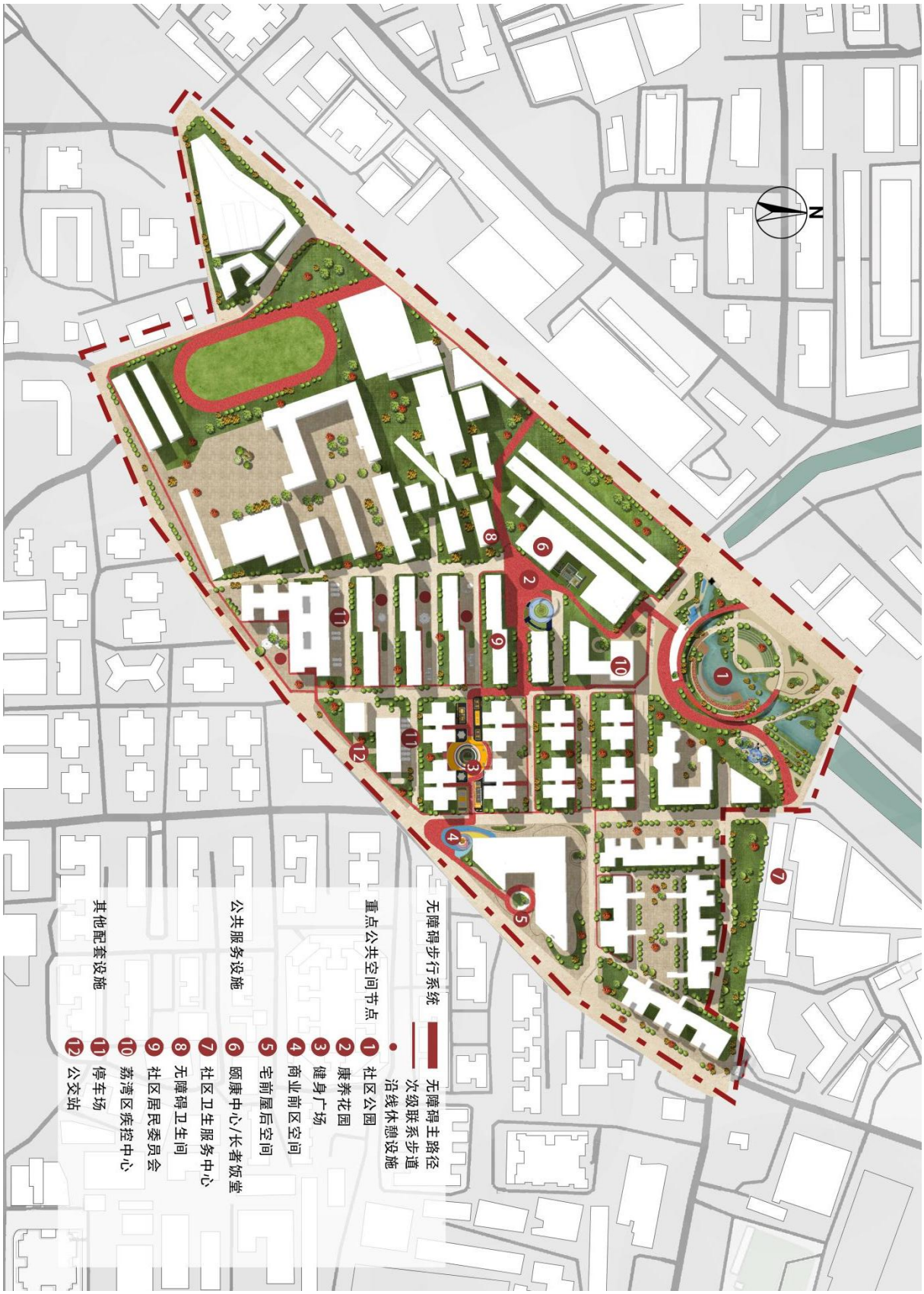


图 6- 13 总体改造平面图

来源：笔者自绘

6.4.2 适老化步道与节点分级组织

在总体空间结构基础上，本次改造进一步围绕高频活动节点构建分级化的活动网络。核心节点主要包括社区公园、颐康中心附属空间、健身广场及商业前公共空间等，这些空间直接承载老年人日常休憩、锻炼、交往、候留与服务获取等复合活动。次级节点则主要分布于楼栋入口、宅前屋后等过渡地带，承担核心节点与居住单元之间的衔接功能。通过核心节点与次级节点的分层组织，社区公共空间由原本零散的点状使用方式转化为具有层级关系和连续联系的活动体系。



图 6- 14 中兴社区适老化改造方案

来源：笔者自绘

在此框架下，每个节点亦根据其功能属性进行针对性提升。社区公园强化动静分区与休憩复合性，健身广场优化器材配置与地面防滑处理，颐康中心激活闲置连廊作为服务延伸空间，商业前区植入灰空间休憩带并实现人车分流，无障碍卫生间则通过捷径接入主环并增设引导标识。

总平面改造以连续步行网络为纽带，对高频活动节点、次级停留空间与沿线环境支持系统进行系统整合。该设计不仅回应了中兴社区老年人对安全通行、就近休憩、便捷服务与社交互动的复合需求，也将原本碎片化、低效使用的社区公共空间转化为结构清晰、功能互补的老年友好型公共空间体系。基于这一总体框架，以下将进一步选取使用频率高、空间代表性强且改造潜力突出的社区公园作为重点节点，展开具体的适老化改

造设计。

6.4.3 中兴社区改造前后对比

基于前文对中兴社区公共空间现状问题、老年人行为特征及空间环境要素的综合分析，本次适老化改造以“行为特征—空间要素—设计策略”为核心逻辑，围绕设施可达性、行人基础设施、安全性、美学及环境质量五大评价要素，对社区公共空间进行系统优化。改造内容重点聚焦于慢行系统连续性、公共活动节点品质提升及服务设施空间衔接等方面，通过低成本、渐进式更新方式改善老年人日常活动环境。通过构建“社区公园—健身广场—颐康中心—商业前空间”多节点联动的适老化公共空间体系，优化慢行路径组织与公共服务设施衔接关系，形成连续、安全且具有停留性的老年友好型公共空间网络。步行系统连续性得到提升，公共活动节点之间的可达性明显增强。

表 6- 5 中兴社区改造前后对比表

对比维度	改造前现状	评改造后
设施可达性	公共服务设施联系性较弱，老年人步行绕行距离较长，休憩设施不足	强化 15 分钟生活圈联系，增设座椅、休息节点及导视设施，提高公共设施可达性
行人基础设施	铺装老化破损，高差处理不连续，缺乏连续缓坡及无障碍设施	更新防滑铺装，优化坡道与路缘衔接，完善无障碍通行系统
安全性	夜间照明不足，视线遮挡较多，机动车侵占公共空间现象明显	增设照明设施，优化空间视线关系，规范停车区域，提高空间安全性
美学	空间界面杂乱，缺乏统一景观语言与空间识别性	统一铺装与景观元素，增强空间层次感与场所识别性
环境质量	遮阴不足，绿化率较低，部分空间通风条件较差	增设绿化与遮阴设施，优化微气候环境，提高空间舒适性

来源：笔者自绘

改造后，中兴社区在步行连续性、空间舒适性、环境安全性及社交支持性等方面均得到明显改善，公共空间逐渐由原本功能单一、停留性不足的状态，转变为兼具通行、休闲、社交与康养功能的复合型老年友好空间。同时，本研究验证了“行为特征—空间要素—设计策略”转译路径在高密度老旧社区中的适用性，可为类似社区的适老化更新提供参考。

6.5 社区公园适老化改造

6.5.1 现状问题与行为特征总结

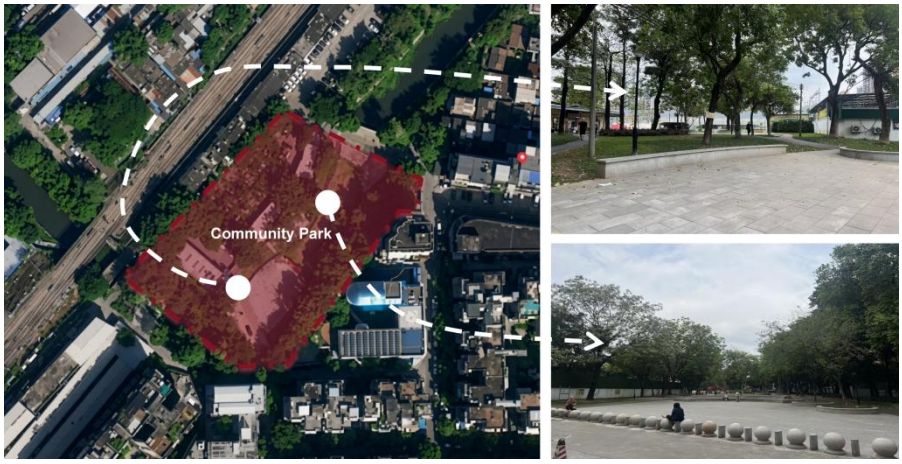


图 6- 15 社区公园现状问题

来源：笔者自绘

中兴社区北侧的社区公园作为主要社交型公共空间，其现状暴露出多方面适老化不足。在行人基础设施方面，公园内部步道虽然布局较为完整，但宽度较窄，部分区域铺装以硬质材料为主，存在轻微不平和局部高低差，增加了老年人行走和轮椅通行的安全风险。同时，休憩设施数量不足，主要集中在树池边缘的少量石凳，无法满足老年人群体的多样化停留和社交需求。在安全性方面，公园为开放式布局，缺乏完整的边界隔离，一侧通道需与驾校共用，存在潜在的交通安全隐患。在设施可达性方面，尽管公园步行距离在 5 分钟以内可达周边小区，但内部健身器材数量有限，缺乏适老化配置，难以满足不同年龄段和身体状况老年人的康体需求。

行为观察显示，老年人在公园内活动呈现显著规律：高频使用区域集中在社区主要入口及邻近住宅节点，活动类型以散步、晨练、棋牌娱乐和社交交流为主，活动时间呈晨间和傍晚双高峰分布；在空间选择上，老年人偏好可达性高、视线开阔、休憩设施完善的节点，而对地面不平、步道狭窄或缺乏休憩点的区域主动避开。由此可见，老年人的空间使用受可达性、安全性、环境舒适性与设施完善度影响显著，其行为轨迹与空间功能之间存在密切耦合关系。

因此，针对于社区公园的现状问题与老年人行为特征呈现出相关问题，社区公园内部高频节点集中且活动类型单一，但受空间环境限制存在功能不足和安全隐患；低频使用区域多因设施缺失、通行不便或环境舒适度低而被忽略。

6.5.2 策略应用

基于前述社区公园现状问题及老年人行为特征分析，本研究将适老化策略在公园中

具体应用，旨在实现可达性、安全性、舒适性与社交支持的综合优化。通过策略转译，将第 5 章提出的空间更新原则落实到公园具体节点与路径中，使设计既符合老年人的行为规律，也兼顾空间功能性与环境体验。

表 6- 6 社区公园设计策略转译

策略（第 5 章）	空间对象	设计手段
提升可达性	步道及主要节点	设置无障碍坡道和缓坡，消除高差，优化节点间路径
优化基础设施	步道及休憩区域	连续铺设防滑地面，增设分段休憩座椅和遮阳设施
美学与环境优化	公园整体空间	丰富植被层次，设置景观节点，形成动静分区，提高视觉识别性
安全性提升	活动节点与休憩区域	增设照明、护栏、防撞设施，合理布局休憩和活动空间，鼓励棋牌、健身及交流活动

来源：笔者自绘

通过上述策略应用，社区公园在空间结构、功能布局和环境体验方面得到有效优化。一方面，步道无障碍处理及节点优化提升了老年人活动的可达性和安全性；另一方面，休憩设施、景观节点及动静分区满足了老年人对舒适性、社交互动及康体锻炼的多样化需求。整体策略的实施，使公园从原本的碎片化、低效使用状态转变为安全、便利、舒适且充满活力的老年友好型空间，为后续具体改造方案的设计提供了直接依据。

6.5.3 方案呈现

基于前期现状问题与老年人行为特征分析，本次社区公园改造引入驷马涌河涌景观，对整体空间进行系统性重构。改造方案通过环形步道组织空间结构，串联各功能节点，形成连续、安全且富有层次的活动网络。



图 6- 16 社区公园改造总平面图

来源：笔者自绘

在功能布局上，公园划分为康养花园、草坪剧场、环形步道、台地花园、儿童乐园、亲水平台及休闲廊架等功能空间。其中，康养花园与台地花园强化生态与康养体验，提供安静舒适的休憩环境；草坪剧场与儿童乐园构建代际互动空间，增强社区活力；亲水平台与环形步道结合，形成连续的滨水活动界面；环形步道通过缓坡设计实现无障碍通行，同时丰富空间层次；休闲廊架满足老年人日常休憩与交流需求。



图 6- 17 社区公园轴测图

来源：笔者自绘



图 6- 18 草坪剧场（来源：笔者自绘）

草坪剧场通过顺应场地高差形成阶梯式台地空间，将原有高差转化为可参与的公共活动场所。整体空间采用缓坡的处理方式，在保证无障碍通行的基础上，塑造连续的观演界面与开放的活动场地。此外，草坪剧场兼具社交与活动功能，可承载社区文娱活动、小型演出及日常交流等多种场景，有助于增强社区空间活力，促进老年人与其他群体之间的互动交流，如图 6-18 所示。



图 6- 19 儿童乐园（来源：笔者自绘）

通过设置抬升式环形步道，不仅实现了步行流线的连续与安全，更在垂直维度上巧妙进行功能分层，上层为专属老年人的无障碍散步通道，保障通行效率的同时使老年人在漫步过程中可自然形成微俯瞰视角，清晰观赏驷马涌；下层则自然形成半遮蔽的灰空间，可灵活布置休憩座椅、儿童游戏设施，如图 6-20 所示。

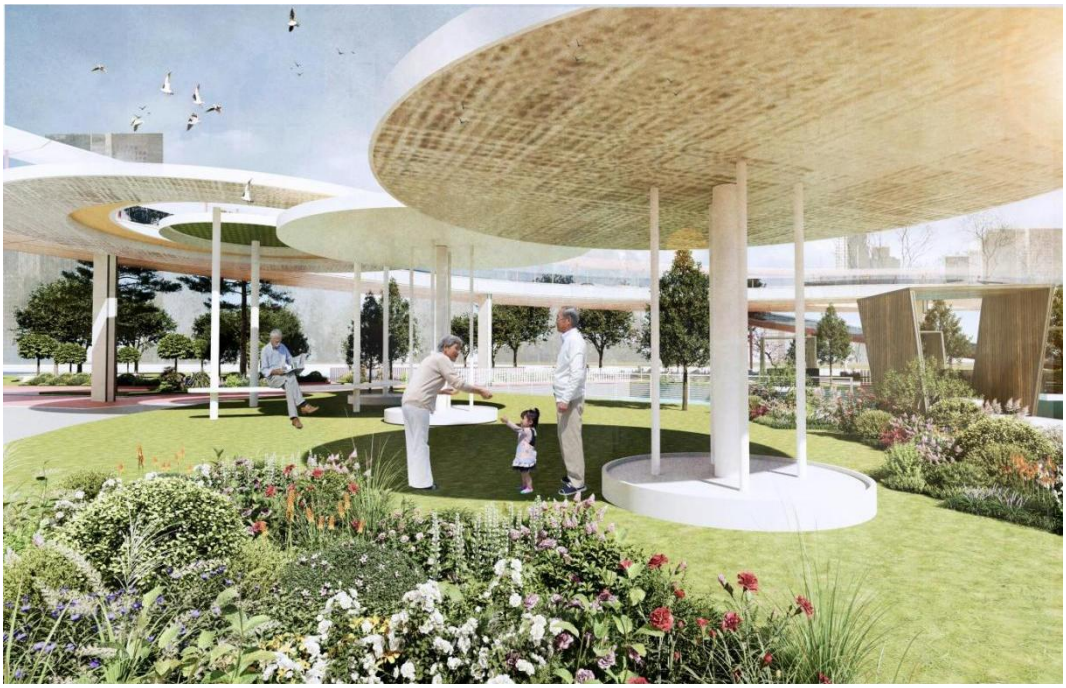


图 6- 20 廊下空间

来源：笔者自绘



图 6- 21 疗愈空间（来源：笔者自绘）



图 6- 22 环形步道

来源：笔者自绘

6.6 颐康中心附属公共空间适老化改造

6.6.1 现状问题与行为特征总结



图 6- 23 颐康中心附属公共空间现状环境

来源：笔者自绘

颐康中心作为社区养老服务的重要节点，其附属空间在实际使用过程中呈现出一定的功能与环境不足。在空间可达性方面，颐康中心与周边居住区之间的步行联系不够直

接，部分路径存在绕行现象，且局部铺装不连续或存在高差，对行动能力较弱的老年人造成一定阻碍；在空间利用方面，连廊及附属空间虽具备基本的遮阳避雨功能，但由于缺乏休憩设施及活动载体，整体使用率较低，空间活力不足；环境品质方面存在绿化单一、停留空间不足等问题，同时导视系统不完善，降低了空间的可识别性与使用便捷性。

从行为特征来看，老年人在颐康中心周边的活动以短时停留、等候交流及低强度社交为主，多发生于入口附近或具有遮蔽条件的空间节点，表现出明显的“就近停留”与“依附设施”活动特征。由于现有空间缺乏明确的停留节点与舒适的休憩环境，老年人活动呈现出停留时间短、空间分布分散的特点；同时，部分老年人对路径复杂或导向不清的区域存在回避行为，进一步降低了空间使用效率。

综上，颐康中心附属空间的现状问题与老年人行为特征之间呈现出明显的对应关系，即空间可达性不足与路径不清晰限制了老年人的通行与使用范围，设施配置缺失与环境舒适性不足削弱了停留与社交行为的发生。这一分析为后续适老化策略的制定提供了明确依据，即通过优化路径系统、激活附属空间、完善休憩设施及强化导视系统，提升空间的可达性、可识别性与使用活力，从而更好地满足老年人的日常活动与交往需求。

6.6.2 策略应用

颐康中心作为社区养老服务的重要节点，其空间改造应重点围绕老年人日常停留、交流与康复活动需求展开。针对前文分析中存在的可达性不足、空间利用率低及环境舒适性欠缺等问题，本次设计从可达性、安全性、环境舒适性及行人基础设施四个方面进行策略应用，通过优化路径组织、完善设施配置及激活附属空间，提升颐康中心整体使用效率与空间品质。

表 6- 7 颐康中心附属公共空间设计策略转译

设计策略	空间对象	设计手段
可达性提升	入口空间、路径导引	优化入口动线，增设无障碍坡道
安全性优化	步行通道	防滑铺装，减少高差
环境舒适性提升	连廊空间、庭院空间	丰富绿化层次
增设行人基础设施	休憩节点	设置交流空间，布置围合式座椅

来源：笔者自绘

6.6.3 方案呈现

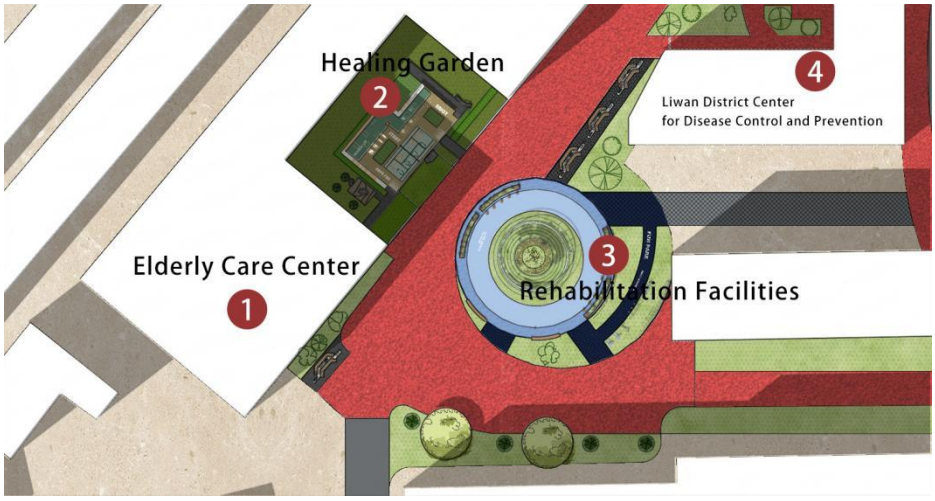


图 6- 24 颐康中心附属空间平面图

来源：笔者自绘

针对调研中发现的颐康中心前公共空间存在导引缺失、路径绕行、缺乏休憩设施与社区中其他活动节点割裂等问题，本次改造以“无缝衔接、友好过渡、功能复合”为设计导向，将原本消极、孤立的附属前区，转化为集无障碍通行、健康等候、社交休憩与社区服务延伸于一体的活力界面。



图 6- 25 颐康中心附属空间

来源：笔者自绘

设计通过延伸步行导向线，打通颐康中心与周边住宅出入口、社区公园之间的步行

路线，形成闭合式适老环路。主通道宽度不小于 2.4 米，采用红色步行导引线，全程消除高差，并在关键转弯与交叉口设置地面引导标识与低位照明，确保视力退化者亦可独立通行，如图 6-19 所示。

结合前期调研发现，颐康中心东侧原设有封闭式廊架，因建筑材料堆砌无人清理导致长期闲置。研究表明，植物种类的多样性不仅营造出宁静、自然的微环境，降低环境噪音与热岛效应，其色彩与气味还能刺激认知功能，唤起积极记忆，缓解孤独与焦虑[20]。因此，本次改造摒弃原有封闭结构，释放沿侧边绿带空间，转而植入一个开放的半围合式社交角与疗愈花园，通过增加植物种类来促进老年人身心放松与情绪疗愈，如图 6-20 所示。



图 6- 26 颐康中心附属空间局部透视图

来源：笔者自绘

通过上述策略，能够有效回应第三章调研中老年人对晒太阳等需求。颐康中心东侧原本封闭、消极的空间被有效激活，回应在问卷中社区老年人反应休息座椅太少的问题，半围合式社交角与疗愈花园，既满足了老年人对安全感与私密性的需求，又连续衔接的红色步行导向线也有效提升了该空间的可达性。

6.7 健身广场公共空间适老化改造

6.7.1 现状问题与行为特征总结



图 6- 27 健身广场现状环境

来源：笔者自摄

健身广场作为社区中重要的开放性活动空间，是老年人进行日常锻炼与社交交流的主要场所之一[59]。然而，通过实地调研与行为观察发现，其在适老化方面仍存在一定不足。首先，在空间环境方面，广场铺装以硬质地面为主，部分区域存在老化或不平整现象，增加了老年人活动过程中的安全风险；健身器材配置较为单一，缺乏针对不同身体条件老年人的分级设计，使用效率有待提升。其次，在设施配置方面，休憩设施数量不足且分布不均，缺乏遮阳与防护设施，难以满足老年人长时间停留及间歇休息的需求。此外，部分区域照明不足，夜间使用存在一定安全隐患。

根据第三章实地调研可知，从行为活动特征来看，老年人在健身广场中的活动以低强度身体锻炼、器械使用及社交交流为主，活动时间呈现出明显的晨间与傍晚高峰特征。行为分布上呈现出围绕健身器材及遮荫区域的集聚现象，器材周边为高频使用区域，而空间边缘或缺乏设施的区域使用率较低。

设施配置不足与环境舒适性欠缺限制了老年人停留时间与活动质量，空间组织不合理导致使用分布不均，而安全性问题则在一定程度上影响了老年人参与活动的积极性。因此，有必要通过适老化改造优化器材配置、完善休憩设施、提升环境舒适度及安全性，从而提高健身广场的整体使用效率与空间活力。

6.7.2 策略应用

针对健身广场当前存在的器材类型单一、休憩设施缺失、出入口衔接不畅及环境舒适性不足等问题，结合第三章中对老年人行为活动分析，本文从可达性、安全性、环境舒适性与增设基础设施四个方面对健身广场进行策略转译，以提升场地的连续使用能力

与适老化水平。该策略并非仅针对单一设施进行补充，而是围绕老年人进入场地、参与活动、短暂停留与邻里交流的完整使用过程，对空间组织方式进行系统优化。

表 6- 8 健身广场设计策略转译

设计策略	空间对象	设计手段
可达性提升	广场出入口、步行路径	优化入口衔接，完善无障碍通道，提升路径连续性
安全性优化	活动场地、器材区	采用防滑铺装，规范器材布置，完善夜间照明
环境舒适性提升	健身区域、边缘空间	增设遮阳设施与乔木绿荫，配置分段座椅
增设行人基础设施	器材集中区、休憩节点	设置交流空间，布置围合式座椅

来源：笔者自绘

6.7.3 方案呈现



图 6- 28 健身广场改造图

来源：笔者自绘

基于实地调研发现，中兴社区现有健身广场虽具备一定使用基础，但仍存在现存器械与老年人使用需求不匹配、地面防滑性不足、缺乏遮荫与休憩支持、动静混杂、无障碍衔接薄弱等问题，难以满足老年人对安全、舒适、可持续锻炼环境的需求。为此，本

次改造遵循安全保障、无障碍可达等原则，将健身广场优化为集低强度运动、健康监测、邻里交往与微气候调节于一体的复合型公共空间。

在功能布局上，采用动静分区与流线优化策略，动态区集中布置适老化健身器材，如腰背按摩器、太极推手器、慢速漫步机，地面采用高弹性、防滑橡胶垫，如图 6-26 所示。静态区环绕布置带靠背休憩座椅、遮阳廊架及饮水设施，满足运动前后拉伸、休息与社交需求。同时通过绿篱、花池或铺装变化实现软性分隔，避免穿行干扰，同时保持视线通透，增强安全感。此外，在健身广场增设小型球场区域以满足缺乏合适场地空间的问题，如图 6-23 所示。



图 6- 29 健身广场改造图

来源：笔者自绘

6.8 其他公共空间适老化改造

6.8.1 商业前公共空间适老化改造设计

商业前区作为老年人日常活动频次较高的公共空间，不仅承载着购物、社交、等候、短暂停留等复合生活行为，同时也承担着社区与城市主要的衔接出入口。同时，基于前文调研发现，老年人在该类空间中的行为选择受到多维环境要素的共同影响。因此本研

究针对中兴社区东侧临街商铺前区存在的人行道狭窄、非机动车侵占等问题，提出拓宽步行空间，优化非机动车停放以释放公共空间的方式等进行系统性改造。



图 6- 30 商业前公共空间现状(来源：笔者自摄)

如图 6-30 所示，通过设置圆形景观装置不仅有效提高了步行空间的宽度，其微喷雾功能可辅助降温，营造清凉氛围。同时周边环绕连续休憩座椅，供老人驻足交谈。在空间组织上，设计通过开敞的铺地界面与周边步行系统相衔接，确保人流集散的便捷性与通行连续性。整体场地视线通透，周边乔木形成适度遮荫，可有效提升空间的安全感与环境舒适度。该设计不仅回应了商业前区原有步行空间不足、停留设施缺乏及环境品质单一等问题，也使该区域由单纯通行空间转变为兼具景观展示、日常休憩与邻里交往功能的老年友好型公共节点。



图 6- 31 商业前空间改造图

来源：笔者自绘

6.8.2 宅前屋后公共空间适老化改造



图 6- 32 宅前屋后空间现状

来源：笔者

针对前期调研中发现的宅前屋后类公共空间被非机动车占用等问题，对原有宅前屋后空间进行了系统优化。改造前，该空间功能布局零散、交通秩序混乱，地面硬化，车辆停放无序，缺乏休憩及社交设施，对老年人存在明显的安全隐患。改造后，通过开辟中心活动区并在地面设计趣味性图案，同时结合绿化景观，为老年人开展健身、太极、舞蹈等日常活动提供了便利条件。同时，引入适宜的小型树木和盆栽花卉，以增加遮阴与视觉舒适感；在活动区周边增设座椅，便于休息与邻里互动，如图 6-31 所示。

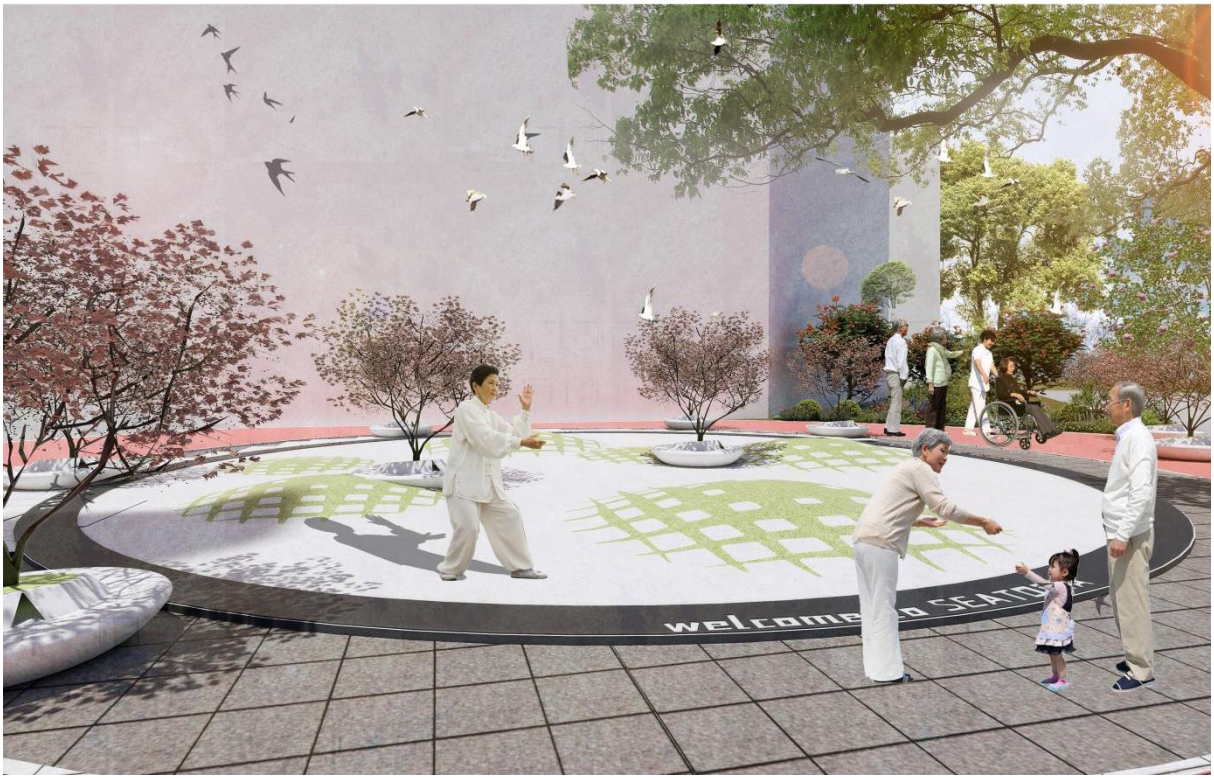


图 6- 33 宅前屋后改造图(来源：笔者自绘)

6.9 本章小结

本章在前期对中兴社区公共空间的实地调研及老年人行为特征分析基础上，结合国内外典型适老化改造案例的系统研究，提出并完成了一套针对性适老化改造方案。方案围绕可达性、安全性、行人基础设施、美学与环境质量五大核心维度展开，对场地内老年人高频使用的社交类、道路类、服务附属及宅前空地四类公共空间进行了系统优化。

在具体设计中，方案通过合理规划空间布局、完善步行及休憩设施、引入景观元素、改善道路与无障碍通行条件，将前文调研中高频被选择的节点进行串联，有效提升了空间的可达性、安全性和使用舒适度。同时，在满足功能性需求的基础上，注重环境美学与邻里互动的优化，使老年人日常活动、社交交流与休憩需求能够得到充分满足。

此外，本章方案不仅对中兴社区现有公共空间进行了切实可行的改造设计，也总结出了一套可推广的适老化设计思路和方法，为类似社区公共空间的适老化改造提供了实践参考和理论支撑。整体来看，本章工作实现了空间功能优化、使用安全保障、环境品质提升和社区互动促进的有机结合，体现了适老化设计的综合价值和可操作性。

结论与展望

研究总结

在当前中国社会老龄化进程持续深化的背景下，提升城市公共空间对老年群体的包容性与支持性已成为建设老年友好型城市的核心议题。本研究以广州市荔湾区中兴社区为实证对象，聚焦高密度老旧社区老年人日常行为活动的实际需求，通过系统性的理论梳理、多维度的实地调研、典型街区的行为观察与空间评估，得到以下几点成果：

（1）识别中兴社区公共空间的现状问题

通过对中兴社区公共空间的系统性实地调研与居民访谈，结合空间测绘与环境评估，识别出以下五大类环境要素的现状问题，集中反映了高密度老旧社区在适老化公共空间供给方面的问题。一是步行网络不连续，通行安全性不足；二休憩设施严重短缺且布局不合理；三是高频活动节点孤立，缺乏系统串联；四是公共空间被侵占，环境秩序混乱；五是环境舒适度不足。

（2）构建老旧社区公共空间适老化评估框架

本研究通过运用行为跟踪法、问卷调查，对中兴社区的公共空间现状进行了全方位的诊断分析。研究细致剖析了社交类公共空间、街道空间及重要节点空间的特征，识别出步行环境不连续、休憩设施布局失衡、适老设施匮乏以及无障碍系统断裂等典型问题。这些空间缺陷在广州夏季高温多雨的气候环境下被进一步放大，显著降低了老年人在户外活动时的安全感与便捷度，限制了其社交频率。

（3）提出了针对性的适老化改造设计策略与方案

基于积极老龄化理论，提出安全保障、无障碍可达、环境舒适、社交支持的改造设计原则，并完成了中兴社区的整体适老化改造提升方案。通过对重点节点的精细化设计，如优化口袋公园现状布局、改造社区入口、增设休憩节点等，不仅能提升物质空间的适老化水平，更能通过空间媒介激发社区老年人的社交活力，促进代际融合。

不足与展望

（1）反思

尽管本文在策略制定与方案设计方面进行了系统的探索，但受限于客观条件，仍存在以下不足之处，有待后续深化：

第一，适老化评估体系构建存在局限性。在构建评价指标清单时，所选取的文献参

考及案例对比具有一定的局限性，部分核心理论主要源于少数几位重点学者，实例引证的数量也相对不足。这可能导致评价体系中的相关维度及细分指标涵盖不够全面，进而使得该评估框架在应对不同特征的老旧社区时，其适用性与普适性仍需通过更多实证研究进一步验证。

第二，研究方法尚未形成完善的定量化评估方案。本文构建评价体系的主要目的是发掘中兴社区空间环境中有待改善的适老化要素，并据此展开定性的改造策略设计。该方法目前侧重于现状问题的发掘与定性分析，缺少对空间步行友好性或适老化程度的精确定量评分系统。这导致研究结果无法对不同街道或同类型社区进行直观的横向对比，评价结果的客观化程度有待提升。

第三，调研数据对老年真实需求的捕捉精度有待强化。为了尽可能全面地回应老年群体的生理与心理需求，本研究结合了文献分析与现场问卷调研。然而，由于调研周期的限制以及老旧社区部分高龄居民沟通配合度较低等现实因素，获取的有效问卷样本数量相对较少。这可能导致调研结果在反映全体社区老年人的多元化、差异化需求时存在信息覆盖不全的风险。

（2）展望

在老旧社区公共空间适老化研究这一层面上，本文以行为—空间耦合这一视角切入社区公共空间更新研究，为高密度老旧社区适老化改造提供了新的研究思路。相较于既有研究多侧重于空间环境整治、设施补充与物质空间优化，本文从老年人日常行为活动特征及空间需求出发，将行为观察、问卷调研与空间评估相结合，识别出影响老年人出行、停留、交往与休憩的环境要素，并建立了行为特征、空间要素与改造策略之间的关联。总体而言，本文在一定程度上丰富了老旧社区适老化更新的理论与实证内容，也为社区公共空间的系统化适老设计提供了参考路径。

在此基础上，未来老旧社区公共空间适老化研究仍有进一步深化的空间。一方面，可在更广泛的社区类型与城市情境中开展比较研究，进一步检验和完善现有评估框架与设计方法，增强研究结论的普适性与适用性；另一方面，可结合更精细的数据采集与量化分析手段，提升对老年人真实需求、行为差异及空间感知的识别精度。同时，也应加强多学科视角的引入，关注心理感知、健康支持与智慧养老等内容，推动老旧社区公共空间适老化更加完善。

参考文献

[1] 王泽夏, 张晓明, 廖顺意, 等. 全龄友好城市目标下广州市适老化交通对策[J]. 城市交通,2022,20(04):18-27.

[2] 杨雪莲, 刘波. 广州市社区居家养老问题及对策[J]. 城市观察,2013,(04):53-61.

[3] 周岚, 丁志刚. 面向积极老龄化的城市空间治理[J]. 城市规划,2025,49(09):43-46+102.

[4] 黎均文, 陈诺思, 袁媛, 等. 积极老龄化背景下的大城市养老设施规划研究——以广州市社区嵌入式养老服务机构规划为例[J]. 上海城市规划,2024,(06):55-61.

[5] 郑宇, 方凯伦, 何灏宇, 等. 老幼友好视角下的健康社区微改造策略研究——以广州市三眼井社区为例[J]. 上海城市规划,2021,(01):31-37.

[6] 李海洲. 老年友好视域下老旧小区公共空间更新设计研究[J]. 建筑与文化,2025,(02):253-255.

[7] Liu T ,Zhu C ,Zhou D , et al.Research on Planning Strategy for Urban Community Living Environment for the Elderly That Promotes “Living Mutual Aid”[J]. Buildings,2024,14(6):1575-1575.

[8] 贺舒雅. 人与环境匹配理论视角下城市老旧社区景观适老性设计研究[J]. 中国住宅设施,2025,(01):16-18.

[9] 张剑敏. 适宜城市老人的户外环境研究[J]. 建筑学报,1997,(09):11-15+65.

[10] 林文洁, 于喆, 杨绪波. 居住区老年人户外活动及其空间特征研究——夏季户外活动实态调查[J]. 建筑学报,2011,(02):73-77.

[11] 李健红, 郝飞, 白小鹏. 适宜老年人活动的城市公共户外空间特征分析[J]. 华中建筑,2011,29(09):83-85.

[12] 周燕珉, 刘佳燕. 居住区户外环境的适老化设计[J]. 建筑学报,2013,(03):60-64.

[13] 董贺轩, 刘乾, 王芳. 嵌入 •修补 •众规:城市微型公共空间规划研究——以武汉市汉阳区为例[J]. 城市规划,2018,42(04):33-43.

[14] 司海涛, 李超, 王亚娜. 旧城区社区微公共空间适老性更新策略研究——以铁岭旧城区为例[C]// 中国城市规划学会,重庆市人民政府.活力城乡 美好人居——2019 中国城市规划年会论文集(20 住房与社区规划). 沈阳建筑大学;,2019:607-618.

[15] 周博, 刘石磊, 申威. 基于行为差异性的社区公共空间适老化调查研究——以大连市为例[J]. 上海城市规划,2020,(06):22-29.

[16] 孙旭阳, 汪丽君 ,廖攀 ,等. 旧城区街角小微公共空间老年人自发参与性研究[J]. 建筑学报,2021,

(S1):65-69.

[17] Mika M , Jelle C V , Rachel H , et al.Understanding the relationships between the physical environment and physical activity in o’lder adults: a systematic review of qualitative studies. [J].The international journal of behavioral nutrition and physical activity,2014,11(1):79.

[18] 陈友华. 适老化改造的多维度理论剖析与实践思考[J].老龄科学研究,2025,13(08):1-12.

[19] 王淑芬, 王瑶, 黄思齐. 景观叙事视角下老旧社区公共空间更新研究——以北京朱家坟社区为例[J]. 中国勘察设计,2020,(08):38-42.

[20] 姜玉培, 甄峰, 孙鸿鹄, 等. 健康视角下城市建成环境对老年人日常步行活动的影响研究[J]. 地理研究,2020,39(03):570-584.

[21] 赵立志, 丁飞, 李晟凯. 老龄化背景下北京市老旧小区适老化改造对策[J]. 城市发展研究,2017,24(07):11-14.

[22] 何凌华, 魏钢. 既有社区室外环境适老化改造的问题与对策[J]. 规划师,2015,31(11):23-28.

[23] 胡惠琴, 胡志鹏. 基于生活支援体系的既有住区适老化改造研究[J]. 建筑学报,2013,(S1):34-39.

[24] 程晓青, 张华西, 尹思谨.既有建筑适老化改造的社区实践——北京市大栅栏社区养老服务驿站营建启示[J]. 建筑学报,2018,(08):62-67.

[25] 裘知, 楼瑛浩, 王竹.国内老旧住区适老化改造文献调查与综述[J]. 建筑与文化,2014,(02):86-88.

[26] 于一凡, 陈金平. 上海既有住宅区适老化改造意愿和需求分析[J]. 上海城市规划,2014,(05):98-101.

[27] 窦永佳. 既有住宅区公共空间适老化可持续性更新方法研究[D]. 东南大学,2017.

[28] 姚栋, 徐蜀辰, 李华. 住宅适老化改造的目标与内容——国际经验与上海实践[J]. 城市建筑,2017,(14):9-13.

[29] 谢青. 基于适老化的老旧社区公共空间微改造——以广州市白云区交电新村微改造为例[J]. 城市住宅,2019,26(01):69-72.

[30] 赵之枫, 巩冉冉. 老旧小区室外公共空间适老化改造研究——以北京松榆里社区为例[C]//中国城市规划学会,沈阳市人民政府.规划 60 年:成就与挑战——2016 中国城市规划年会论文集(06 城市设计与详细规划).北京工业大学;,2016:301-316.

[31] 张文阁, 李兢兢, 田永英. 老旧小区适老化改造策略研究[J]. 建筑经济,2023,44(08):99-104.

[32] 黄文炜, 王涵, 王紫熙. 基于结构方程模型的既有住区适老化改造研究——以湖北省宜昌市为例[J]. 南方建筑,2021,(04):138-144.

[33] 张如彬, 孔德博, 李昊. 社区居家养老模式下老旧小区适老化改造策略[J]. 规划师,2024,40(S2):6

1-68.

[34] 张纯, 柴彦威, 李昌霞. 北京城市老年人的日常活动路径及其时空特征[J]. 地域研究与开发,2007,(04):116-120.

[35] 姚时章, 王江萍. 城市居住外环境设计[M]. 重庆:重庆大学出版社,2001

[36] 高岳. 社区养老模式下西安市住区公共空间适老化改造设计研究[D].西安建筑科技大学,2018.

[37] 林正财等. 香港住宅通用設計指南[M].香港:香港房屋協會,2005

[38] PLACEMAKING FOR AN AGING POPULATION,UCLA,2014

[39] 广州市荔湾区第七次全国人口普查公报.广州市荔湾区统计局.2021.

[40] WenBing M ,CheYu H ,ShengJung O .Research on the Evaluation Index System of the Construction of Communities Suitable for Aging by the Fuzzy Delphi Method[J].Environments,2020,7(10):92-92.

[41] 周燕珉. 我国老年居住建筑的发展现状与矛盾问题分析[J].建设科技,2019,(13):14-17.

[42] 国内外城市社区居家适老化改造典型案例集[M]. 北京: 中国城市规划设计研究院, 2023.

[43] 刘佳燕, 邓翔宇. 北京清河阳光社区三角地改造[J]. 城市建筑,2018,(25):68-71.DOI:10.19892/j.cnki.csjz.2018.25.016.

[44] 孙伟, 王莉静. 养老社区规划与设计[M]. 天津: 凤凰空间 / 江苏凤凰科学技术出版社, 2023.

[45] 黄建中, 胡刚钰, 李敏. 老年视角下社区服务设施布局适宜性研究——基于步行指数的方法[J]. 城市规划学刊,2016,(06):45-53.

[46] 李楠, 文佳. 城市老旧社区公共空间微更新策略研究[M]. 云南大学出版社:202107:212.

[47] 薛丰丰. 城市社区邻里交往研究[J]. 建筑学报,2004,(04):26-28.

[48] Towards Lifetime Neighborhoods: Designing sustainable communities for all[J]. A discussion paper,2007(11):20.

[49] 韩继文, 王墨晗, 李晋琦, 等. 国外老年友好社区评价体系的比较研究综述[J]. 建筑学报, 2024,(02):56-62.DOI:10.19819/j.cnki.ISSN0529-1399.202402009.

[50] 梁玮男,曹阳.基于社区养老模式的公共空间设计研究[J].城市发展研究,2012,19(11):132-134.

[51] 广州市规划和自然资源局. 广州市无障碍环境设计导则[Z]. 广州市规划和自然资源局, 2023.

[52] 黄慧明, 周岱霖, 王烨. 基于居住形态类型的社区生活圈空间组织模式研究——以广州为例[J]. 城市规划学刊, 2021,(02):94-101.DOI:10.16361/j.upf.202102015.

[53] Singapore Building and Construction Authority. Universal design guide for public places[M]. Singapore Building and Construction Authority, 2016.

[54] Pan Z, Liu Y, Liu Y, et al. Age-friendly neighbourhood environment, functional a bilities and life satisfaction: A longitudinal analysis of older adults in urban China[J]. Social Science & M edicine, 2024, 340: 116403.

[55] BUFFEL T, et al., eds. Age-Friendly Cities and Communities: A Global Perspective [M/OL]. 1 st ed. Bristol: Bristol University Press, 2018.

[56] Golant, S.Conceptualizing time and behavior in environmental gerontobgy:Apair of old issuedes erving new thought[J]. The Gerontologist, 2003(43):638-648

[57] Wang T. Study on the Outdoor Activity Space for Older People in Residential Areas[J].Shanxi Architecture, 2009, 3(2)：19-25.

[58] Karin J ,Lena B ,Margareta L .Older persons' navigation through the service system towards h ome modification resources.[J].Scandinavian journal of occupational therapy,2009,16(4):227-37.D OI:10.3109/11038120802684307.

[59] 吴斌, 许剑峰. 老旧社区公共空间适老化调查研究[C]//中国城市规划学会,贵阳市人民政府.新常态：传承与变革——2015 中国城市规划年会论文集（16 住房建设规划）.重庆大学建筑城规学院;博建建筑设计有限公司;,2015:370-383.

[60] 扬·盖尔.交往与空间[M]. 何人可,译. 北京: 中国建筑工业出版社，2002.

[61] 裘知, 楼瑛浩, 王竹. 国内老旧住区适老化改造文献调查与综述[J]. 建筑与文化,2014,02:86-88.

[62] 林勇强, 史逸. 城市老年人室外休闲行为初探——以老年人室外活动场地设计为例[J]. 规划师，2002,07

[63] Marcus C C,Francis C.People Places:Design Guidelines for Urba Open Space[J]. E & Fn Spon, 1998(5)：213-243.

[64] 吴岩. 重庆城市社区适老公共空间环境研究[D].重庆大学,2015.

[65] 金俊, 齐康, 白鹭飞, 等. 基于宜居目标的旧城区微空间适老性调查与分析——以南京市新街口街道为例[J]. 中国园林, 2015,31(03):91-95.

[66] 许广通, 何依, 毕瑜菲. 基于 PSPL 调研法的社区微空间评价与优化策略——以武汉钢花 120 社区为例[J]. 华中建筑, 2018,36(11):108-115.DOI:10.13942/j.cnki.hzjz.2018.11.022.

[67] 张亦凡. 我国城市微空间研究与实践综述[J]. 城市建筑空间, 2022,29(S2):89-93.

[68] 胡惠琴, 畅流. 老旧住区文娱活动设施规划布局适老性改造研究——以北京红北社区为例[J]. 建筑学报, 2016,(02):22-27.

[69] 李伟, 寒梅. 基于“积极老龄化”理念下的城市适老空间设计探究[J]. 建筑学报,2014,(11):84-89.

[70] Cao R ,Wang L .The Elderly-Oriented Design Strategy of Urban Slow Space in China[J].Journal of Social Science and Humanities,2023,5(11):DOI:10.53469/JSSH.2023.5(11).28.

[71] Zhao Y ,Zeng W ,Zhou Y , et al.Elderly-oriented Reconstruction Plans of Outer Public Space in Small Town Communities[J].E3S Web of Conferences,2019,13604079.DOI:10.1051/e3sconf/201913604079.

[72] van Hoof J, Marston H R. Age-friendly cities and communities: State of the art and future perspectives[J]. International journal of environmental research and public health, 2021, 18(4): 1644.

[73] Xu Y .Research on Aging Adaptation of Urban Residential Environment Design in the Era of Artificial Intelligence[J]. Applied Mathematics and Nonlinear Sciences,2024,9(1):DOI:10.2478/AMNS.2023.2.01606.

[74] 李文君, 公伟. 基于 Kano 模型的城市老旧社区公共空间适老化更新研究——以北京双榆树社区为例[J]. 工业设计, 2023,(03):50-52.

[75] 杨赟. 老旧社区“适老化口袋公园”改造模式探索——以武汉市新洲区北壕社区为例[J]. 现代园艺,2021,44(21):138-140.DOI:10.14051/j.cnki.xdyy.2021.21.059.

[76] 徐素雅. “积极老龄化”视角下的社区空间营造研究——以北京市海淀区社区菜园现象为例[J]. 北京规划建设, 2017,(05):67-70.

[77] 周燕珉, 赵子敬. 养老设施中适老化标识的设计要点[J]. 当代建筑, 2022,(10):20-23.

[78] 张秋瑶, 张伟郁. 积极老龄化背景下既有社区“适老化”改造设计策略研究[J]. 建筑与文化, 2023,(03):176-178.DOI:10.19875/j.cnki.jzywh.2023.03.054.

[79] 吴岩, 赵科科. 基于老年人健康与生活状况差异的住区公共空间及环境设计研究[J]. 城市住宅, 2020,27(11):8-10.

[80] 姜洪庆, 尹心桐, 梁伟研, 等. 广州市越秀区既有城市住区公共服务设施适老化评价研究[J]. 城市发展研究, 2020,27(10):125-133.

[81] 丁魁礼, 贺静. 城市老旧小区适老化微更新的政策创新研究[J]. 广州大学学报(社会科学版),2020,19(01):109-116.

[82] World Health Organization. Global age-friendly cities: A guide[M]. Geneva: World Health Organization, 2007.

附录 1 中兴社区老年人行为路径跟踪记录表

序号	路径	活动信息							
		交通型	行为	社交型	行为	商业型	行为	服务型	行为
7	节点 6a-节点 7b-节点 4b-节点 7c-D-节点 6b	主干道 1	轮椅	健身广场（4b）/宅前屋后（6a，6b）	休息/散步或步行/休息	临街商铺（7b，7c）	休息/购物	-	-
8	节点 6a-k-L-J-节点 3-A-d-节点 7c-节点 4b-d-c-节点 8-a-j-节点 7b-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a）	散步或步行/取快递/闲聊	临街商铺（7b，7c）	购物/购物	颐康中心（8）	散步或步行
9	节点 4b-j-节点 5a-a-节点 8-a-节点 3-A-节点 7c-节点 4b-节点 7b-节点 6a-k-节点 4a	主干道 1，2	步行	社区公园（3）/健身广场（4b,4a）/小型绿地（5a）/宅前屋后（6a）	锻炼身体/购物/晒太阳/锻炼身体/晒太阳	临街商铺（7b，7c）	晒太阳/购物	颐康中心（8）	休闲娱乐
10	节点 4b-d-c-节点 9-节点 8-a-节点 3-A-i-节点 7b-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a）	横跨马路/购物/散步或步行	临街商铺（7b）	购物	颐康中心（8）/公共卫生间（9）	闲聊/上厕所
11	节点 6a-节点 7b-节点 4b-d-a-节点 8-a-节点 3-A-节点 7c	主干道 1，2	骑自行车	社区公园（3）/健身广场（4b）	横跨马路/陪伴后代/晒太阳	临街商铺（7b，7c）	购物/购物	颐康中心（8）	闲聊
12	节点 4b-d-c-节点 8-a-节点 3-A-i-节点 7b-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a）	休闲娱乐/购物/休息	临街商铺（7b）	散步或步行	颐康中心（8）	休闲娱乐

序号	路径	活动信息							
		交通型	行为	社交型	行为	商业型	行为	服务型	行为
13	节点 6b-h-c-节点 8-a-节点 3-d-节点 7c-d-节点 4b--节点 7b-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a，6b）	休息/散步或步行/闲聊/休息	临街商铺（7b，7c）	陪伴后代/购物	颐康中心（8）	散步或步行
14	节点 6b-D-f-节点 6c-g-节点 9-节点 8-a-节点 3-节点 7c-节点 4b-节点 7b-节点 6a-k-节点 4a	主干道 1，2	步行	社区公园（3）/健身广场（4b，4a）/宅前屋后（6a，6b，6c）	丢垃圾/散步或步行/锻炼身体/购物/休息	临街商铺（7b，7c）	散步或步行/购物	颐康中心（8）/公共卫生间（9）	休息/上厕所
15	节点 6a-节点 7b-节点 4b-d-a-节点 3-H-G-节点 7d	主干道 1	骑自行车	社区公园（3）/健身广场（4b）/宅前屋后（6a）	闲聊/购物/休息	临街商铺（7b，7d）	晒太阳/购物	-	-
16	节点 4b-d-a-节点 8-a-节点 3-J-i-k-i-节点 7a-节点 7b-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a）	休闲/取快递/散步或步行	临街商铺（7b，7a）	购物/购物	颐康中心（8）	散步或步行
17	节点 8-a-节点 3-J-L-k-节点 7a-j-d-节点 7c-节点 4b-节点 7b-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a）	散步或步行/散步或步行/晒太阳	临街商铺（7b，7a，7c）	休息/购物/购物	颐康中心（8）	晒太阳
18	节点 6c-f-节点 7c-节点 3-A-a-节点 8-节点 9-e-节点 7c-节点 4b-节点 7b-节点 6a-C-节点 5b	主干道 1，2	步行	社区公园（3）/健身广场（4b）/小型绿地（5b）	丢垃圾/闲聊/晒太阳/购物/休息	临街商铺（7b，7c）	散步或步行/购物	颐康中心（8）/公共卫生间（9）	休息/上厕所

序号	路径	活动信息							
		交通型	行为	社交型	行为	商业型	行为	服务型	行为
19	节点6a-C-D-E-F-G-H-节点3-a-节点8-c-d-节点7c-节点4b-节点7b	主干道1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a）	休闲娱乐/晒太阳/散步或步行	临街商铺（7b，7c）	散步或步行/购物	颐康中心（8）	闲聊
20	节点4a-i-节点7a-节点7b-节点6a	主干道1	轮椅	健身广场（4a）/宅前屋后（6a）	锻炼身体/休息	临街商铺（7b，7a）	散步或步行/购物	-	-
21	节点5b-D-d-节点4b-d-节点3-a-节点8-节点9-d-节点7c-节点7b-节点6a-C-节点6b	主干道1，2	步行	社区公园（3）/健身广场（4b）/小型绿地（5b）/宅前屋后（6a，6b）	休息/散步或步行/晒太阳/闲聊/休息	临街商铺（7b，7c）	休息/购物	颐康中心（8）/公共卫生间（9）	散步或步行/上厕所
22	节点4b-d-c-节点8-a-节点3-A-i-节点7b-节点6a-C-D-6c	主干道1，2	轮椅	社区公园（3）/健身广场（4b）/宅前屋后（6a）	休闲娱乐/闲聊/散步或步行	临街商铺（7b）	休息	颐康中心（8）	闲聊
23	节点6a-节点7b-节点4b-d-a-节点8-a-节点3-A-节点7c	主干道1，2	轮椅	社区公园（3）/健身广场（4b）/宅前屋后（6a）	休闲娱乐/休息/散步或步行	临街商铺（7b，7c）	休息/购物	颐康中心（8）	晒太阳
24	节点4b-d-c-节点9-节点8-a-节点3-J-j-节点7b-节点6a	主干道1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a）	陪伴后代/闲聊/闲聊	临街商铺（7b）	散步或步行	颐康中心（8）/公共卫生间（9）	晒太阳/上厕所

序号	路径	活动信息							
		交通型	行为	社交型	行为	商业型	行为	服务型	行为
25	节点 4b-d-c-节点 9-节点 8-a-节点 3-A-i-节点 7b-节点 6a	主干道 1，2	骑自行车	社区公园（3）/健身广场（4b）/宅前屋后（6a）	休息/锻炼身体/闲聊	临街商铺（7b）	闲聊	颐康中心（8）/公共卫生间（9）	休息/上厕所
26	节点 8-节点 9-e-节点 7c-d-节点 3-J-j-节点 5a-j-节点 4b-节点 7b-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b）/小型绿地（5a）/宅前屋后（6a）	散步或步行/散步或步行/晒太阳/晒太阳	临街商铺（7b，7c）	休息/购物	颐康中心（8）/公共卫生间（9）	晒太阳/上厕所
27	节点 6b-h-c-节点 8-a-节点 3-A-B-j-节点 4b-节点 7b-节点 6a	主干道 1，2	轮椅	社区公园（3）/健身广场（4b）/宅前屋后（6a，6b）	陪伴后代/陪伴后代/闲聊/休息	临街商铺（7b）	散步或步行	颐康中心（8）	晒太阳
28	节点 5b-C-节点 4b-节点 7c-节点 3-a-节点 8-a-i-节点 7a-节点 7b-节点 6a-节点 5b	主干道 1，2	步行	社区公园（3）/健身广场（4b）/小型绿地（5b）/宅前屋后（6a）	丢垃圾/散步或步行/晒太阳/休息	临街商铺（7b，7c，7a）	散步或步行/购物/购物	颐康中心（8）	休息
29	节点 7b-节点 4b-d-c-节点 8-a-节点 3-A-B-C-节点 7a-节点 7b-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a）	休息/锻炼身体/购物	临街商铺（7b，7a）	休息/购物	颐康中心（8）	散步或步行

序号	路径	活动信息							
		交通型	行为	社交型	行为	商业型	行为	服务型	行为
30	节点 4b-d-节点 3-J-i-4a	主干道 1	轮椅	社区公园（3）/健身广场（4b）	锻炼身体/休息	-	-	-	-
31	节点 6b-D-节点 7c-a-节点 8-a-节点 3-d-节点 4b-节点 7b-节点 6a-k-节点 4a	主干道 1，2	步行	社区公园（3）/健身广场（4b，4a）/宅前屋后（6a，6b）	闲聊/取快递/锻炼身体/散步或步行/休息	临街商铺（7b，7c）	购物/购物	颐康中心（8）	闲聊
32	节点 6a-节点 7b-C-节点 5b-D-节点 7c-节点 4b-d-a-节点 8-a-节点 3-A-节点 7c	主干道 1，2	骑自行车	社区公园（3）/健身广场（4b）/小型绿地（5b）/宅前屋后（6a）	锻炼身体/购物/晒太阳/闲聊	临街商铺（7b，7c）	购物/购物	颐康中心（8）	休闲娱乐
33	节点 6a-节点 7b-j-5a-d-节点 7c-节点 4b-j-a-节点 8-a-节点 3	主干道 1，2	骑自行车	社区公园（3）/健身广场（4b）/宅前屋后（6a）	休闲娱乐/休息/购物	临街商铺（7b，7c）	晒太阳/购物	颐康中心（8）	晒太阳
34	节点 9-e-节点 7c-A-节点 3-A-a-节点 8-a-d-节点 4b-节点 7b-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a）	锻炼身体/闲聊/散步或步行	临街商铺（7b，7c）	购物/购物	颐康中心（8）/公共卫生间（9）	休闲娱乐/上厕所
35	节点 6a-C-B-A-节点 3-a-节点 8-c-d-节点 7c-节点 4b-节点 7b	主干道 1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a）	横跨马路/购物/散步或步行	临街商铺（7b，7c）	休息/购物	颐康中心（8）	晒太阳

序号	路径	活动信息							
		交通型	行为	社交型	行为	商业型	行为	服务型	行为
36	节点 7b-C-D-节点 7c-节点 4b-d-c-节点 8-a-节点 3	主干道 1，2	骑自行车	社区公园（3）/健身广场（4b）	锻炼身体/休息	临街商铺（7b，7c）	闲聊/购物	颐康中心（8）	闲聊
37	节点 5a-j-节点 7a-B-A-节点 3-a-节点 8-a-d-节点 7c-节点 4b-节点 7b-节点 6a-C-D-节点 6b	主干道 1，2	骑自行车	社区公园（3）/健身广场（4b）/小型绿地（5a）/宅前屋后（6a，6b）	丢垃圾/闲聊/晒太阳/晒太阳/休息	临街商铺（7b，7a，7c）	购物/购物/购物	颐康中心（8）	休息
38	节点 6a-C-D-节点 6b-h-e-节点 7c-节点 3-a-节点 8-c-d-节点 4b-节点 7b-节点 5b	主干道 1，2	步行	社区公园（3）/健身广场（4b）/小型绿地（5a）/宅前屋后（6a，6b）	横跨马路/购物/晒太阳/散步或步行/休息	临街商铺（7b，7c）	休息/购物	颐康中心（8）	晒太阳
39	节点 6a-节点 7b-节点 4b-d-节点 7c-e-节点 8-a-节点 3	主干道 1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a）	锻炼身体/闲聊/晒太阳	临街商铺（7b，7c）	闲聊/购物	颐康中心（8）	休息
40	节点 4a-i-B-A-节点 3-B-j-节点 7b-节点 4b-f-g-c-节点 8-a-i-k-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b，4a）/宅前屋后（6a）	散步或步行/取快递/锻炼身体/闲聊	临街商铺（7b）	购物	颐康中心（8）	休息
41	节点 8-a-节点 3-J-j-节点 4b-节点 7c-D-节点 7b-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b）	休息/闲聊/购物	临街商铺（7b，7c）	购物/购物	颐康中心（8）	散步或步行

序号	路径	活动信息							
		交通型	行为	社交型	行为	商业型	行为	服务型	行为
42	节点 7d-E-c-节点 8-a-节点 3-A-节点 7c-节点 4b-节点 7b-节点 6a	主干道 1，2	轮椅	社区公园（3）/健身广场（4b）/宅前屋后（6a）	陪伴后代/休息/购物	临街商铺（7b，7c，7d）	陪伴后代/陪伴后代/购物	颐康中心（8）	散步或步行
43	节点 6a-k-L-J-节点 3-A-B-j-节点 4b-d-c-节点 8-a-j-节点 7b-节点 6a-k-节点 4a	主干道 1，2	骑自行车	社区公园（3）/健身广场（4b，4a）/宅前屋后（6a）	丢垃圾/闲聊/锻炼身体/晒太阳	临街商铺（7b）	购物	颐康中心（8）	闲聊
44	节点 6a-节点 7b-节点 4b-d-a-节点 8-a-节点 3-A-节点 7c	主干道 1，2	轮椅	社区公园（3）/健身广场（4b）/宅前屋后（6a）	陪伴后代/陪伴后代/散步或步行	临街商铺（7b，7c）	休息/购物	颐康中心（8）	陪伴后代
45	节点 4a-m-J-节点 3-B-j-节点 7b-节点 4b-d-c-节点 8-a-i-k-节点 6a-C-节点 5b	主干道 1，2	步行	社区公园（3）/健身广场（4b，4a）/小型绿地（5a）/宅前屋后（6a）	丢垃圾/锻炼身体/晒太阳/闲聊	临街商铺（7b）	晒太阳	颐康中心（8）	闲聊
46	节点 7a-i-B-A-节点 3-J-j-节点 7b-节点 4b-d-c-节点 8-a-i-j-节点 7b-节点 6a-D	主干道 1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a，6b）	丢垃圾/锻炼身体/闲聊/休息	临街商铺（7b，7a）	晒太阳/购物	颐康中心（8）	休闲娱乐
47	节点 7b-节点 4b-d-c-节点 8-a-节点 3	主干道 1，2	轮椅	社区公园（3）/健身广场（4b）	横跨马路/陪伴后代	临街商铺（7b）	晒太阳	颐康中心（8）	闲聊

序号	路径	活动信息							
		交通型	行为	社交型	行为	商业型	行为	服务型	行为
48	节点 7b-节点 4b-d-节点 7c-D-E-F-G-H-节点 3-a-节点 8-a-A-B-C-节点 7a-节点 7b-节点 6a	主干道 1，2	骑自行车	社区公园（3）/健身广场（4b）/宅前屋后（6a）	休闲娱乐/晒太阳/休息	临街商铺（7b，7c，7a）	散步或步行/购物/购物	颐康中心（8）	休闲娱乐
49	节点 6c-f-节点 7c-节点 3-A-a-节点 8-c-d-节点 4b-节点 7b--节点 7a-k-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a，6c）	散步或步行/锻炼身体/休息/闲聊	临街商铺（7b，7c，7a）	闲聊/购物/购物	颐康中心（8）	休息
50	节点 4a-i-B-A-节点 3-B-j-节点 7b-节点 4b-节点 7c-f-g-c-节点 8-a-j-节点 7b-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b，4a）/宅前屋后（6a）	休息/锻炼身体/晒太阳/购物	临街商铺（7b，7c）	闲聊/购物	颐康中心（8）	休息
51	节点 7d-E-h-节点 6b-D-A-节点 3-A-a-b-节点 8-c-d-节点 7c-节点 4b-节点 7b-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a，6b）	休闲娱乐/休息/散步或步行/晒太阳	临街商铺（7b，7c，7d）	陪伴后代/购物/购物	颐康中心（8）	陪伴后代
52	节点 7b-节点 6a-C-节点 4b-节点 7c-d-c-节点 8-a-3	主干道 1，2	步行	社区公园（3）/健身广场（4b）	闲聊/晒太阳/休息	临街商铺（7b，7c）	购物/购物	颐康中心（8）	散步或步行
53	节点 5a-a-节点 8-a-节点 3-A-节点 7c-节点 4b-节点 7b-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b）/小型绿地（5a）/宅前屋后（6a）	陪伴后代/休息/晒太阳/购物	临街商铺（7b，7c）	陪伴后代/购物	颐康中心（8）	散步或步行

序号	路径	活动信息							
		交通型	行为	社交型	行为	商业型	行为	服务型	行为
54	节点 9-节点 8-a-节点 3-J-j-节点 4b-节点 7b-节点 6a-k-节点 4a	主干道 1，2	步行	社区公园（3）/健身广场（4b，4a）/宅前屋后（6a）	锻炼身体/闲聊/休息/晒太阳	临街商铺（7b，7c）	闲聊/购物	颐康中心（8）/公共卫生间（9）	休息/上厕所
55	节点 8-a-节点 3-d-节点 7c	主干道 1，2	轮椅	社区公园（3）	休闲娱乐	临街商铺（7c）	购物	颐康中心（8）	陪伴后代
56	节点 6a-节点 7b-节点 4b-d-a-节点 8-a-节点 3-A-节点 7c	主干道 1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a）	闲聊/购物/休息	临街商铺（7b，7c）	晒太阳/购物	颐康中心（8）	散步或步行
57	节点 4b-d-a-节点 8-节点 9-g-节点 6c-f-节点 3-J-i-节点 7a-节点 7b-节点 6a-C-节点 5b	主干道 1，2	步行	社区公园（3）/健身广场（4b）/小型绿地（5a）/宅前屋后（6a，6c）	闲聊/晒太阳/晒太阳/休息/晒太阳	临街商铺（7b，7a）	散步或步行/购物	颐康中心（8）/公共卫生间（9）	休息/上厕所
58	节点 6b-h-c-节点 9-节点 8-a-节点 3-d-节点 7c-d-节点 4b--节点 7b-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a，6b）	休闲娱乐/休息/购物/晒太阳	临街商铺（7b，7c）	晒太阳/购物	颐康中心（8）/公共卫生间（9）	陪伴后代/上厕所
59	节点 5a-a-节点 3-A-节点 7c-e-节点 8-a-d-节点 7c-节点 4b-节点 7b-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b）/小型绿地（5a）/宅前屋后（6a）	散步或步行/锻炼身体/休息/晒太阳	临街商铺（7b，7c）	闲聊/购物	颐康中心（8）	晒太阳

序号	路径	活动信息							
		交通型	行为	社交型	行为	商业型	行为	服务型	行为
60	节点 4b-d-节点 7c-e-节点 8-a-节点 3-J-j-节点 7b-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a）	陪伴后代/陪伴后代/散步或步行	临街商铺（7b，7c）	休息/购物	颐康中心（8）	陪伴后代
61	节点 7b-节点 4b-d-c-节点 8-a-节点 3-A-B-C-节点 7a-节点 7b-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a）	横跨马路/陪伴后代/散步或步行	临街商铺（7b，7a）	晒太阳/购物	颐康中心（8）	闲聊
62	节点 4a-i-节点 7a-节点 7b-节点 6a-C-节点 4b-节点 7c-d-c-节点 8-a-节点 3	主干道 1，2	步行	社区公园（3）/健身广场（4b，4a）/宅前屋后（6a）	闲聊/休息/锻炼身体/休息	临街商铺（7b，7c，7a）	散步或步行/购物	颐康中心（8）	休息
63	节点 5b-C-节点 7b-节点 4b-d-a-节点 8-a-节点 3-A-B-节点 7a-k-节点 6a-C-D-f-节点 6c	主干道 1，2	步行	社区公园（3）/健身广场（4b）/小型绿地（5b）/宅前屋后（6a，6c）	休息/散步或步行/晒太阳/购物/晒太阳	临街商铺（7b，7a）	购物/购物	颐康中心（8）	散步或步行
64	节点 4b-d-a-节点 8-a-节点 3-J-i-节点 7a-节点 7b-节点 6a-k-节点 4a	主干道 1，2	步行	社区公园（3）/健身广场（4b，4a）/宅前屋后（6a）	锻炼身体/休息/晒太阳/散步或步行	临街商铺（7b，7a）	闲聊/购物	颐康中心（8）	闲聊
65	节点 6b-D-A-节点 3-A-节点 7c-节点 4b	主干道 1	轮椅	社区公园（3）/健身广场（4b）	散步或步行/锻炼身体/晒太阳	临街商铺（7c）	购物	-	-

序号	路径	活动信息							
		交通型	行为	社交型	行为	商业型	行为	服务型	行为
66	节点 7b-节点 6a-C-D-节点 7c-节点 4b-d-c-节点 8-a-节点 3	主干道 1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a）	锻炼身体/休息/散步或步行	临街商铺（7b，7c）	闲聊/购物	颐康中心（8）	闲聊
67	节点 7b-节点 4b-d-节点 7c-e-节点 8-a-节点 3-A-B-C-节点 7a-节点 7b-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a）	横跨马路/晒太阳/散步或步行	临街商铺（7b，7c，7a）	晒太阳/购物/购物	颐康中心（8）	晒太阳
68	节点 7d-E-h-节点 9-节点 8-a-节点 3-J-j-节点 4b-节点 7b-节点 6a	主干道 1，2	步行	社区公园（3）/健身广场（4b）/宅前屋后（6a）	陪伴后代/陪伴后代/散步或步行	临街商铺（7b，7d）	休息/购物	颐康中心（8）/公共卫生间（9）	陪伴后代/上厕所

附录 2 中兴社区公共空间使用状况调研问卷

广州市中兴社区公共空间老年人使用状况调研问卷

尊敬的社区老年居民： 您好，我是华南理工大学的学生，为了解老年人对居住小区公共活动空间的使用状况及需求，完善社区适老化改造，特邀您填写此次调查问卷。此次调查我们采用不记名的方式，请在您认为合适的答案上打 √，谢谢！

基本信息

1.您的性别：男□女□

2.您的年龄：

□60-69 岁 □70-79 岁 □80 岁及以上

3.您在中兴社区居住的时间：

□少于 5 年 □5-10 年 □10 年以上

4.您日常出行的主要方式：（可多选）

□步行 □自行车/电动车 □公交车 □私家车 □其他（请注明）

空间使用行为

5.您通常会在哪些地方活动？（可多选）

□社交广场 □健身广场 □服务附属空间（如颐康中心前）

□宅前屋后（楼栋附近） □其他（请注明）

6.您每天在户外活动的时间大约为：

□少于 30 分钟 □30 分钟至 1 小时 □1 小时至 2 小时 □2 小时以上

环境感知评价（请根据您的实际感受选择最符合的选项）

7. 节点 3-社区公园

您是否在此处停留过？□是 □否（跳过此部分评价）




可达性

7.1 我能轻松到达这里。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

7.2 此处步行道连接良好，方便我从一处走到另一处。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

安全性

7.3 夜晚，此处的照明条件让我感到安全。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

7.4 我觉得此处交通状况安全，适合行走、停留。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

行人基础设施

7.5 此处有足够的休息座椅供我使用。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

7.6 此处有桌椅，方便我和别人聊天、娱乐。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

美学

7.7 此处绿化和景观设计美观，让我心情愉悦。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

7.8 此处设计让我觉得舒适，愿意停留。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

环境质量

7.9 此处空气质量好，让我感觉舒适。

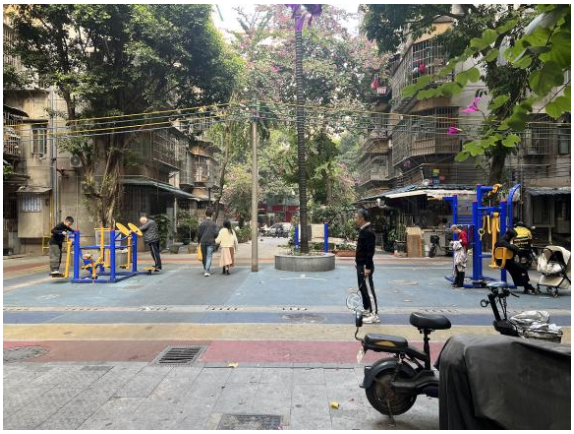
☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

7.10 夏季时，此处有充足的遮荫设施，避免阳光直射。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

8. 节点 4b-健身广场

您是否在此处停留过？☐是 ☐否（跳过此部分评价）




可达性

8.1 我能轻松到达这里。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

8.2 此处步行道连接良好，方便我从一处走到另一处。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

安全性

8.3 夜晚，此处的照明条件让我感到安全。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

8.4 我觉得此处交通状况安全，适合行走、停留。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

行人基础设施

8.5 此处有足够的休息座椅供我使用。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

8.6 此处健身器材多样，我经常来用。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

美学

8.7 此处绿化和景观设计美观，让我心情愉悦。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

8.8 此处健身器材布局、周边绿植让我感受舒适。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

环境质量

8.9 此处空气质量好，让我感觉舒适。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

8.10 夏季时，此处有充足的遮荫设施，避免阳光直射。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

9. 节点 6a-住宅区附属空间

您是否在此处停留过？☐是 ☐否（跳过此部分评价）





可达性

9.1 我能轻松到达这里。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

9.2 此处步行道连接良好，方便我从一处走到另一处。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

安全性

9.3 夜晚，此处的照明条件让我感到安全。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

9.4 我觉得此处交通状况安全，适合行走、停留。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

行人基础设施

9.5 此处有足够的休息座椅供我使用。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

美学

9.6 此处绿化和景观设计美观，让我心情愉悦。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

环境质量

9.7 此处空气质量好，让我感觉舒适。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

9.8 夏季时，此处有充足的遮荫设施，避免阳光直射。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

10.节点 8-颐康中心前

您是否在此处停留过？☐是 ☐否（跳过此部分评价）





可达性

10.1 我能够较方便地从住处或社区主要步行路线到达这里。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

10.2 从周边道路、出入口到该空间的步行联系较清晰，寻找路径较容易。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

安全性

10.3 我认为该空间步行过程较安全，不容易发生跌倒、碰撞等情况。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

10.4 该空间的人车关系、边界秩序及环境管理较好，停留时让人感到安心。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

行人基础设施

10.5 座椅、遮阴、铺装等基础设施能够满足日常停留需求。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

10.6 该空间周边的步行道、休息设施及配套设置较为完善，使用起来比较方便

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

美学

10.7 该空间的景观、绿化、色彩和界面环境给人较为舒适、整洁的视觉感受。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

环境质量

10.8 该空间的采光、通风、遮阴、噪声等环境条件总体较为舒适。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

10.9 该空间整体氛围较好，适合老年人进行等候、休息或简单交流活动。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

11.节点 7b-临街商铺前

您是否在此处停留过？☐是 ☐否（跳过此部分评价）



可达性

11.1 我能轻松到达这里。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

11.2 此处步行道连接良好，方便我从一处走到另一处。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

安全性

11.3 夜晚，此处的照明条件让我感到安全。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

11.4 我觉得此处交通状况安全，适合行走、停留。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

行人基础设施

11.5 此处有足够的休息座椅供我使用。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

美学

11.6 此处绿化和景观设计美观，让我心情愉悦。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

环境质量

11.7 此处空气质量好，让我感觉舒适。

☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

11.8 夏季时，此处有充足的遮荫设施，避免阳光直射。

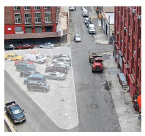
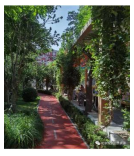
☐非常不同意 ☐不同意 ☐一般 ☐同意 ☐非常同意

1. 您认为社区公共空间还有哪些方面需要改进？

2. 您有什么其他建议或意见？

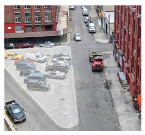
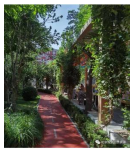
附录 3 适老化案例做法统计表

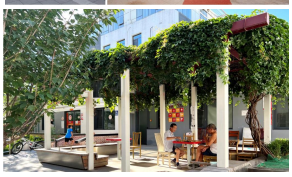
表 4-1 设施可达性-案例做法统计（续表）

案例		社交空间	商业前空间	交通道路空间	服务功能附属空间
11.美国，退休人员协会老年友好公园建设策略	  	绿化+休闲座椅。休息区的可达性高	墙面彩绘+灯光装置+醒目的颜色的家具。日常目的地/休息区的可达性高	网格式。交通的可达性高	绿化+休闲座椅。休息区的可达性高
12.中国-北京，清河阳光社区三角地改造	 	蜂巢形遮阳构筑物+绿化。休息区的可达性高	不存在显著做法	环通式车道。交通的可达性中上	墙面彩绘+休闲座椅。日常目的地/休息区的可达性高
13.中国-北京，劲松街道综合整治试点示范区环境改造	  	传统框架形遮阳构筑物+绿化。日常目的地/休息区的可达性高	采用与建筑立面同材质的铺地，限定空间。休息区的可达性高	尽端式车行道。交通的可达性稍低。	入口处增加盒子式空间。休息区可达性高
14.中国-上海，江川路街道环境改造	 	醒目铺地+绿化。休息区的可达性高	醒目铺地+绿化。休息区的可达性高	尽端式车行道。交通的可达性稍低。	醒目铺地+绿化。休息区的可达性高
15.法国-约讷，河畔养老院		屋顶平台+直达首层的楼梯。日常目的地/休息区的可达性高	不存在显著做法	环通式车道。交通的可达性中上	围绕建筑中庭布置，用醒目颜色涂料限定空间+休闲座椅。日常目的地/休息区的

案例		社交空间	商业前空间	交通道路空间	服务功能附属空间
					可达性高
16.法国-诺曼底，奥尔贝克老人之家	 	屋顶平台+屋顶绿化。休息区的可达性高	不存在显著做法	尽端式车行道。交通的可达性稍低。	围绕建筑中庭布置，用醒目颜色涂料限定空间+休闲座椅。日常目的地/休息区的可达性高
17.法国-米尔库，米尔库养老院	 	屋顶平台+直达首层的楼梯。日常目的地/休息区的可达性高	不存在显著做法	尽端式车行道。交通的可达性稍低。	建筑中庭广场+绿化。休息区的可达性高
18.中国-长沙，广厦新苑 A 区适老化改造	 	传统框架形遮阳构筑物+绿化。休息区的可达性高	不存在显著做法	环通式车道。交通的可达性中上	滑梯+绿化小山坡。日常目的地/休息区的可达性高
19.中国-北京，西城区大栅栏街道厂甸 11 号院适老化改造	 	传统框架形遮阳构筑物+绿化。休息区的可达性高	不存在显著做法	环通式车道。交通的可达性中上	醒目铺地+绿化。休息区的可达性高
20.中国-杭州，和睦新村老旧小区适老化改造项目		绿化+健身器材。运动机会/休息/日常目的地区的可达性高	长屋檐形成的灰空间+小广场+绿化。休息区可达性高	网格式。交通的可达性高	绿化。休息区的可达性高

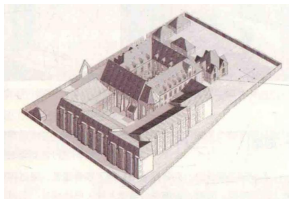
表 4-2 行人基础设施-案例做法统计（续表）

案例		社交空间	商业前空间	交通道路空间	服务功能附属空间
美国，退休人员协会老年友好公园建设策略	  	绿化+休闲座椅	墙面彩绘+灯光装置+醒目的颜色的家具	直线型步行道+圆形广场空间	绿化+休闲座椅。
中国-北京，清河阳光社区三角地改造	 	蜂巢形遮阳构筑物+绿化	不存在显著做法	直线型步行道+圆形广场空间	墙面彩绘+休闲座椅。
中国-北京，劲松街道综合整治试点示范区环境改造	  	传统框架形遮阳构筑物+绿化	采用与建筑立面同材质的铺地，限定空间	有机形步行道+有机形广场空间	入口处增加盒子式空间
中国-上海，江川路街道环境改造	 	醒目铺地+绿化	醒目铺地+绿化	有机形步行道+有机形广场空间	醒目铺地+绿化
法国-约讷，河畔养老院		屋顶平台+直达首层的楼梯	不存在显著做法	不规则型道路+不规则型广场空间+矩形屋顶平台空间	围绕建筑中庭布置，用醒目颜色涂料限定空间+休闲座椅

案例		社交空间	商业前空间	交通道路空间	服务功能附属空间
法国-诺曼底，奥尔贝克老人之家	 	屋顶平台+屋顶绿化	不存在显著做法	不规则型道路+不规则型广场空间+矩形屋顶平台空间	围绕建筑中庭布置，用醒目颜色涂料限定空间+休闲座椅
法国-米尔库，米尔库养老院	 	屋顶平台+直达首层的楼梯	不存在显著做法	直线型步行道+三角形广场空间	建筑中庭广场+绿化。
中国-长沙，广厦新苑A区适老化改造	 	传统框架形遮阳构筑物+绿化	不存在显著做法	曲线形步行道+矩形广场空间	滑梯+绿化小山坡
中国-北京，西城区大栅栏街道厂甸11号院适老化改造	 	传统框架形遮阳构筑物+绿化	不存在显著做法	曲线形步行道+矩形广场空间	醒目铺地+绿化
中国-杭州，和睦新村老旧小区适老化改造项目	 	绿化+健身器材	长屋檐形成的灰空间+小广场+绿化	直线型步行道+圆形广场空间	绿化

来源 笔者自绘

表 4-3 美学-案例做法统计（续表）

案例		社交空间	商业前空间	交通道路空间	服务功能附属空间
日本-千叶县柏市，丰四季台社区	 	木色铺地+绿化	倾斜大挑檐+大片玻璃幕墙+绿化	曲线型步行道，用绿化划分道路	绿化
日本-东京，结缘·多摩平之森老年公寓	 	木平台+绿化+统一木色	木色墙面（灰空间），融入自然	曲线型步行道，用绿化划分道路	绿化+木平台
丹麦-哥本哈根，圣约瑟夫老年公寓与护理院	 	红砖立面+绿化	红砖立面+文化建筑立面（新旧结合）	曲线形步行道，用绿化划分道路	利用场地象征性元素（十字架形的座椅）
荷兰-海尔德兰，德本灵青老共居公寓	 	绿化+宽阔视野	绿化+宽阔视野	直线型步行道，用绿化划分道路	绿化+宽阔视野
中国-北京，大栅栏街道银鹤苑养老译站	 	木平台+绿化+统一木色	仿制中国传统建筑的挑檐形式+统一的木色	传统村落的不规则道路形状	木平台+绿化+统一木色

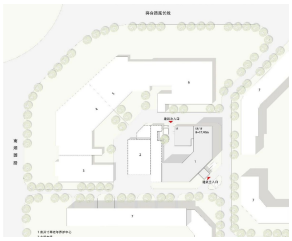
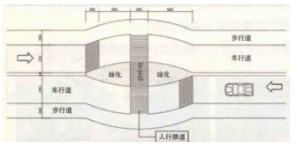
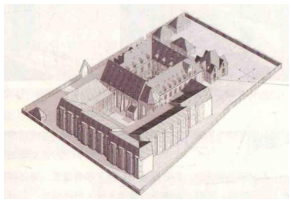
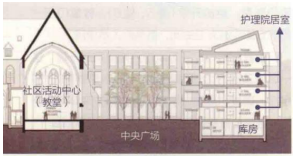
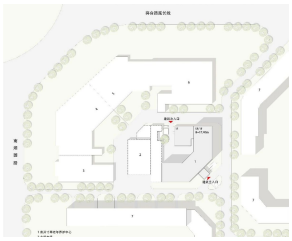
案例		社交空间	商业前空间	交通道路空间	服务功能附属空间
中国-北京，首开寸草望京老年介护中心	 	木平台+绿化+统一木色	绿化	直线型步行道，用绿化划分道路	木色+白色（室内）
中国-上海，南丹邻里汇	 	绿化+统一木色	绿化+宽阔视野	直线型步行道	木色+白色+绿色（室内）
中国-上海，江川路社区悦享食堂	 	木平台+绿化+统一木色	红砖立面+绿化	直线型步行道，用绿化划分道路	红砖立面+绿化
新加坡，乐龄安全区改造项目	 	绿化	绿化	眼型与蛇形车行道	绿化
新加坡，公园互联系统	 	有机形遮阳构筑物	木平台+绿化+统一木色	曲线形步行道，用绿化划分道路	红色涂料（地面）

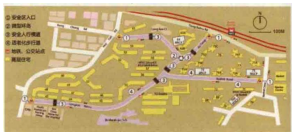
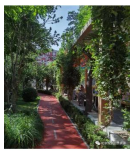
表 4-4 环境质量-案例做法统计（续表）

案例		社交空间	商业前空间	交通道路空间	服务功能附属空间
日本-千叶县柏市，丰四季台社区	 	用绿化提升空气质量	倾斜大挑檐，增加光照	双侧布置草坪+树	用绿化提升空气质量
日本-东京，结缘·多摩平之森老年公寓	 	建筑之间设置足够日照间距	灰空间，通风效果好	双侧布置草坪+灌木，单侧布置树	敞廊，通风好
丹麦-哥本哈根，圣约瑟夫老年公寓与护理院	 	屋顶倾斜送光装置，增加光照	建筑中庭的拔风效果好，通风好	双侧布置草坪+灌木，单侧布置树	利用围墙和建筑形成冷巷，通风好
荷兰-海尔德兰，德本灵青老共居公寓	 	用绿化提升空气质量	用绿化提升空气质量	单侧布置草坪+灌木+树	用绿化提升空气质量
中国-北京，大栅栏街道银鹤苑养老译站		利用屋顶平台，获得充足光照	遮阳板构件之间保持间距，增加光照	单侧布置盆栽	利用屋顶平台，获得充足光照

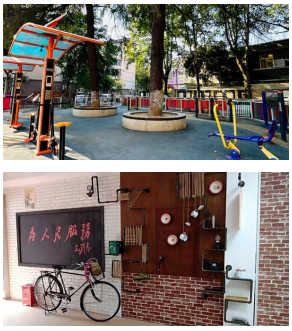
案例		社交空间	商业前空间	交通道路空间	服务功能附属空间
中国-北京，首开寸草望京老年介护中心	 	利用屋顶平台，获得充足光照	用绿化提升空气质量	单侧布置草坪+灌木+树	室内大空间+多开窗户，获得充足光照
中国-上海，南丹邻里汇	 	绿化提升空气质量	建筑中庭的拔风效果好，通风好	单侧布置草坪+灌木+树	室内大空间+多开窗户，获得充足光照
中国-上海，江川路社区悦享食堂	 	利用屋顶平台，获得充足光照	利用河水，调节微气候	双侧布置草坪+树	利用河水，调节微气候
新加坡，乐龄安全区改造项目	 	绿化提升空气质量	绿化提升空气质量	双侧布置草坪+灌木+树	绿化提升空气质量

来源 笔者自绘

表 4-5 安全-案例做法统计（续表）

案例		社交空间	商业前空间	交通道路空间	服务功能附属空间
新加坡，乐龄安全区改造项目	 	设置醒目标识	大面积玻璃幕墙，为夜间提供足够光线与热闹感	设置特殊道路形状以降低车速	设置醒目标识
新加坡，公园互联系统	 	视线通透，犯罪空间小	视线通透，犯罪空间小	设置特殊道路形状以降低车速	用红涂料铺地分隔车行道和步行区，实现人车分流
美国，退休人员协会老年友好公园建设策略	 	增加人行道面积	将车行道改为人行道，增加热闹感	增加人行道面积	将车行道改为人行道，增加热闹感
中国-北京，清河阳光社区三角地改造	 	场地边界放置废弃轮胎，用作软性分割与缓冲	不存在显著做法	场地边界放置废弃轮胎，用作软性分割与缓冲	场地边界放置废弃轮胎，用作软性分割与缓冲
中国-北京，劲松街道综合整治试点示范区环境改造	  	用绿化分隔车行道和步行区，实现人车分流	大面积玻璃幕墙，为夜间提供足够光线与热闹感	用绿化分隔车行道和步行区，实现人车分流	大面积玻璃幕墙，为夜间提供足够光线与热闹感

案例		社交空间	商业前空间	交通道路空间	服务功能附属空间
中国-上海，江川路街道环境改造	 	用绿化分隔车行道和步行区，实现人车分流	用绿化分隔车行道和步行区，实现人车分流	用绿化分隔车行道和步行区，实现人车分流	用红涂料铺地分隔车行道和步行区，实现人车分流
法国-约讷，河畔养老院	 	将活动空间设置在屋顶平台，隔绝车辆	不存在显著做法	用绿化分隔车行道和步行区，实现人车分流	大面积玻璃幕墙，为夜间提供足够光线与热闹感
法国-诺曼底，奥尔贝克老人之家	 	将活动空间设置在屋顶平台，隔绝车辆	不存在显著做法	用绿化分隔车行道和步行区，实现人车分流	大面积玻璃幕墙，为夜间提供足够光线与热闹感
法国-米尔库，米尔库养老院	 	将活动空间设置在屋顶平台，隔绝车辆	不存在显著做法	用绿化分隔车行道和步行区，实现人车分流	大面积玻璃幕墙，为夜间提供足够光线与热闹感
中国-长沙，广厦新苑A区适老化改造	 	用绿化分隔车行道和步行区，实现人车分流	不存在显著做法	用绿化分隔车行道和步行区，实现人车分流	用绿化分隔车行道和步行区，实现人车分流

案例		社交空间	商业前空间	交通道路空间	服务功能附属空间
中国-北京，西城区大栅栏街道厂甸11号院适老化改造		用绿化分隔车行道和步行区，实现人车分流	不存在显著做法	用红涂料铺地分隔车行道和步行区，实现人车分流	用红涂料铺地分隔车行道和步行区，实现人车分流
中国-杭州，和睦新村老旧小区适老化改造项目		用绿化分隔车行道和步行区，实现人车分流	大进深灰空间，实现人车分流	用绿化分隔车行道和步行区，实现人车分流	用绿化分隔车行道和步行区，实现人车分流

来源 笔者自绘

表 4- 6 案例做法汇总统计（续表）

因素	社交类公共空间	数量	商业前公共空间	数量	交通道路类公共空间	数量	服务功能附属空间	数量
设施可达性	1.休息区	10	1.休息区	8	2.尽端式车行道（低交通可达性）	9	1.休息区	8
	3.休息/日常目的地区	7	3.休息/日常目的地区	3	4.环通式车道（中交通可达性）	7	3.休息/日常目的地区	8
	5.运动机会/休息/日常目的地	3	6.运动机会/休息区	2	7.网格式车行道（高交通可达性）	3	6.运动机会/休息区	2
			8.运动机会/日常目的地	1	9.混合式车道，分区设计	1	8.运动机会/日常目的地	2
行人基础设施	10.屋顶平台+屋顶绿化	4	11.长屋檐形成的灰空间	3	12.曲线形步行道+矩形广场空间	5	13.室内大空间	4

因素	社交类公共空间	数量	商业前公共空间	数量	交通道路类公共空间	数量	服务功能附属空间	数量
	14.传统框架形遮阳构筑物	3	15.建筑中庭广场+绿化	2	16.直线型步行道+圆形广场空间	3	17.花园步道	2
	18.绿化+健身器材	2	19.绿化	2	20.组团式步行道（被车行道分成多个步行区）	2	19.绿化	2
	19.主题花园/绿化	2	21.滨水平台+滨水走道	2	22.直线型步行道+矩形广场空间	2	23.醒目铺地+绿化	2
	24.种植园/绿化+休息座椅	2	25.小型种植菜园+健身房	1	26.有机形步行道+有机形广场空间	2	27.配备全套服务的灰空间	1
	28.屋顶平台+直达首层的楼梯	2	29.大遮阳板形成灰空间	1	30.不规则型道路+不规则型广场空间+矩形屋顶平台空间	2	11.长屋檐形成的灰空间	1
	31.木平台+休息座椅	1	32.墙面彩绘+灯光装置+醒目的颜色的家具	1	33.直线型步行道+矩形屋顶平台空间	1	34.屋顶平台与半室内空间	1
	15.建筑中庭+绿化	1	35.铺地（与立面相同）限定空间	1	36.直线型步行道+矩形广场空间+矩形屋顶平台空间	1	21.滨水广场+滨水走道	1
	37.有机形遮阳构筑物	1	23.醒目铺地+绿化	1	38.直线型步行道+三角形广场空间	1	39.高架桥下的慢行空间	1
	40.蜂巢形遮阳构筑物	1			41.矩形屋顶平台空间+不规则广场空间	1	42.绿化+休闲座椅（公园边界）	1
	23.醒目铺地+绿化	1					43.墙面彩绘+休闲座椅	1

因素	社交类公共空间	数量	商业前公共空间	数量	交通道路类公共空间	数量	服务功能附属空间	数量
							44.入口处增加盒子式空间	1
							15.建筑中庭广场+绿化	1
							45.滑梯+绿化小山坡	1
美学	46.木平台+绿化+统一木色	7	47.红砖立面	3	48.曲线形步行道，用绿化划分道路	8	19.绿化	3
	14.传统框架形遮阳构筑物	3	49.绿化+宽阔视野	2	50.直线型步行道，用绿化划分道路	3	51.红色+白色几何色块（室内）	2
	52.木色铺地+绿化	1	19.绿化	2	53.直线型步行道	2	52.绿化+木平台	1
	47.红砖立面	1	54.倾斜大挑檐+大片玻璃幕墙	1	55.有机形步行道	2	56.利用场地象征性元素（十字架形的座椅）	1
	49.绿化+宽阔视野	1	57.木色墙面（灰空间）	1	58.不规则型道路（顺应地形等高线）	2	49.绿化+宽阔视野	1
	19.绿化	1	59.红砖立面+文化建筑立面（新旧结合）	1	60.传统村落的不规则道路形状	1	46.木平台+绿化+统一木色	1
	37.有机形遮阳构筑物	1	61.仿制中国传统建筑的挑檐形式+统一的木色	1	62.眼型与蛇形车行道	1	63.木色+白色（室内）	1
	64.用绿化塑造对称的同心圆平面图案	1	46.木平台+绿化+统一木色	1	65.直线+圆形步行道	1	66.木色+白色+绿色（室内）	1
	40.蜂巢形遮阳构筑物	1	67.灰砖纹理（铺地）	1			47.红砖立面	1

因素	社交类公共空间	数量	商业前公共空间	数量	交通道路类公共空间	数量	服务功能附属空间	数量
	68.红色+白色涂料（地面）	1	68.红色+白色涂料（地面）	1			69.红色涂料（地面）	1
	70.绿色立面+木平台	1					71.绿色涂料（地面）	1
	72.圆形树池+圆形地面图案	1					73.墙面彩绘	1
环境质量	19.用绿化提升空气质量	7	19.用绿化提升空气质量	5	78.双侧布置草坪+灌木+树	12	19.用绿化提升空气质量	10
	10.利用屋顶平台，获得充足光照	6	11.灰空间，通风效果好	2	79.单侧布置草坪+灌木+树	3	15.利用中庭空间，获得充足光照	3
	14.遮阳构筑物，增加微环境舒适度	4	15.建筑中庭，拔风效果好，通风好	2	80.双侧布置草坪+树	2	81.室内大空间+多开窗户，获得充足光照	2
	82.足够日照间距	1	83.利用河水，调节微气候	2	84.双侧布置草坪+灌木，单侧布置树	2	85.敞廊，通风好	1
	86.屋顶倾斜送光装置，增加光照	1	87.倾斜大挑檐，增加光照	1	88.单侧布置盆栽	1	89.利用围墙和建筑形成冷巷，通风好	1
	83.利用河水，调节微气候	1	90.遮阳板构件之间保持间距，增加光照	1			83.利用河水，调节微气候	1
			91.利用巷道空间的冷巷效应，增强通风效果	1			92.大片玻璃幕墙，提供充足光照	1
							10.利用屋顶平台，获得充足光照	1

因素	社交类公共空间	数量	商业前公共空间	数量	交通道路类公共空间	数量	服务功能附属空间	数量
安全	93.将活动空间设置在屋顶平台（人车分流）	6	92.大面积玻璃幕墙，提供光线与热闹感	4	94.用绿化分隔车行道和步行区（人车分流）	8	94.用绿化分隔车行道和步行区	6
	94.用绿化分隔车行道和步行区	5	94.用绿化分隔车行道和步行区	3	95.步行区集中在建筑中庭（人车分流）	4	92.大面积玻璃幕墙，提供光线与热闹感	4
	96.视线通透，犯罪空间小	3	11.大进深灰空间（人车分流）	2	97.用围墙实现人车分流	3	69.用红涂料铺地分隔车行道和步行区	3
	98.用木材铺地分隔车行道和步行区	1	96.视线通透，犯罪空间小	2	99.设置特殊道路形状以降低车速	2	100.室内空间配备消防楼电梯	2
	101.抬高室外地面，减少高差	1	102.增设出入口，减少拥挤和步行距离	1	103.增加人行道面积	1	97.用围墙实现人车分流	1
	97.用围墙实现人车分流	1	97.用围墙实现人车分流	1	104.场地边界放置废弃轮胎（缓冲）	1	93.将活动空间设置在屋顶平台（人车分流）	1
	105.设置醒目标识	1	106.将车行道改为人行道，增加热闹感	1	69.用红涂料铺地分隔车行道和步行区	1	105.设置醒目标识	1
	103.增加人行道面积	1					106.将车行道改为人行道，增加热闹感	1
	104.场地边界放置废弃轮胎（缓冲）	1					104.场地边界放置废弃轮胎（缓冲）	1

来源 笔者自绘

攻读硕士学位期间取得的研究成果

一、已发表（包括已接受待发表）的论文，以及已投稿、或已成文打算投稿、或拟成文投稿的论文情况**（只填写与学位论文内容相关的部分）：**

序号	作者（全体作者，按顺序排列）	题　　目	发表或投稿刊物名称、级别	发表的卷期、年月、页码	与学位论文哪一部分（章、节）相关	被索引收录情况

注：在“发表的卷期、年月、页码”栏：
1 如果论文已发表，请填写发表的卷期、年月、页码；
2 如果论文已被接受，填写将要发表的卷期、年月；
3 以上都不是，请据实填写“已投稿”，“拟投稿”。
不够请另加页。

二、与学位内容相关的其它成果（包括专利、著作、获奖项目等）

获奖项目：省级一等奖，第三获奖人，2024

致谢

行文至此，窗外的木棉花又开了一季。回望这三年的研究生时光，脑海中浮现的并不只是无数张图纸与论文修改记录，而是一幅幅鲜活而具体的生活片段：是研一时和同学一起熬夜赶图的疲惫与热血；是研二在异国街头一起刷新地图、感受不同城市空间与文化时的自由与快乐；也是研三面对毕业、论文与未来时，那些不断咬牙坚持的日子。那些看似平凡的瞬间，最终共同构成了我关于研究生阶段最深刻的记忆。

而也正是在这些平凡而真实的经历中，我逐渐理解了建筑与生活之间的关系，并在一次次学习、调研与思考中，慢慢完成了这篇论文。首先要感谢汤朝晖老师、李彬彬老师以及各位帮助过我的师兄师姐。在工作室的时光充实而温暖，是你们让我真切体会到一个建筑项目从调研到落地的全过程，也让我在专业能力上不断获得成长与启发。那些一起讨论方案、熬夜改图、外出调研的日子，早已成为我研究生阶段最珍贵的回忆之一。特别感谢王世福老师、魏宗财老师、刘铮老师、陈昌勇老师在论文选题与研究框架上的悉心指导。每一次讨论与修改，都让我不断重新思考研究真正需要回应的问题。老师们严谨的学术态度、耐心的指导与始终如一的鼓励，使我能够一步步完成这篇论文。同时，感谢李春老师在毕业流程中的耐心协助，为我的学业收尾提供了重要支持。

感谢我的同门挚友陈大齐，在研究生阶段始终给予我莫大的鼓励。无论是学习任务重时的互相打气，还是面对压力与迷茫时的倾听与安慰，你总是那个最可靠的同行者。很多觉得快坚持不下去的时刻，也因为有你的陪伴而变得没有那么难熬。能够在人生这一阶段遇见志同道合的朋友，是一件非常幸运的事情。也感谢我的室友们，那些一起生活、一起做饭、一起深夜聊天的时光，让远离家乡的日子多了许多温暖与归属感。异国他乡彼此陪伴、相互扶持的经历，早已成为我人生中难以忘怀的珍贵记忆。

最后，想特别感谢我的家人。求学这些年，你们始终给予我无条件的支持与包容。长大之后才慢慢明白，原来所谓“底气”，很多时候不过是知道无论走多远，身后始终有人牵挂你、等着你。家人永远是我前行路上最大的避风港，也是我能够勇敢向前的原因。

追风赶月莫停留，平芜尽处是春山。感谢所有在我奔赴春山途中递水送杖的人，是你们让崎岖之路有了温度。论文终会落笔，但人生刚刚启程。愿我们带着这份对日常的感知，继续在建筑与生活的交汇处，寻找属于这个时代的答案。

四、答辩委员会决议书

答辩委员会对学位（毕业）论文的评语（主要内容包括：1.论文选题与综述；2.学术水平与创新性；3.论文综合能力表现；4.学位（毕业）论文答辩情况；5.存在的不足之处和建议等）

该论文以高密度老旧社区公共空间适老化改造为研究对象，紧密结合我国人口老龄化持续加深以及城市更新由增量建设转向存量优化的发展背景，聚焦老年人“原居安老”需求，具有现实意义与社会价值。以广州市中兴社区为案例，围绕社区公共空间中存在的设施老化、空间碎片化、无障碍系统不足及公共活动支持性较弱等问题展开研究，回应了当前“健康老龄化”与“老年友好型社区”建设的发展需求。

论文结构基本完整。论文在行为数据样本量、不同年龄层老年人行为差异分析及后期运营管理研究等方面仍有进一步深化空间。答辩过程中，作者汇报较完整，能够较好回答答辩委员会提出的问题。

根据投票结果，答辩委员会一致同意常新玥通过硕士学位论文答辩，同意其毕业，并建议授予建筑学硕士学位。

论文答辩日期：2026 年 5 月 21 日　　答辩委员会委员 5 人

毕业表决票数：通过（5）票；不通过（0）票

学位表决票数：通过（5）票；不通过（0）票

答辩委员会决议（打“√”）：

毕业：通过（√）；不通过（　）

学位：通过（√）；不通过（　）

答辩成员签名	（主席）　　Mauro Berta（谢浚代）
答辩秘书签名	