

华南理工大学

South China University of Technology

专业学位硕士学位论文

基于织补理论的广州国际金融城北部片区更新设计研究

作 者 姓 名	郑泽楠
学 位 类 别	建筑学硕士
指 导 教 师	导师组
所 在 学 院	建筑学院
论文提交日期	2026 年 4 月

Urban Regeneration Design Research of The District North of Guangzhou International Finance City Based on Weaving Theory

A Dissertation Submitted for the Degree of Master

Candidate：Zheng Zenan

Supervisor：SCUT-POLITO co-supervisors

South China University of Technology

Guangzhou, China

分类号：TU98 **学校代号：10561**

学　号：202321006464

华南理工大学硕士学位论文

基于织补理论的广州国际金融城北部片区更新设计研究

作者姓名：郑泽楠　　指导教师姓名、职称：导师组

申请学位级别：建筑学硕士　　学科专业名称：建筑学

研究方向：城市更新

论文提交日期：　2026 年　4 月　17 日　　论文答辩日期：　2026 年　5 月　21 日

学位授予单位：华南理工大学　　学位授予日期：　　年　　月　　日

答辩委员会成员：

主席：田瑞丰讲师

委员：王静教授、莫浙娟副教授、邱杰华教授级高工、Federico Dell'Anna 副教授

华南理工大学
学位论文原创性声明

本人郑重声明：所呈交的论文是本人在导师的指导下独立进行研究所取得的研究成果。除了文中特别加以标注引用的内容外，本论文不包含任何其他个人或集体已经发表或撰写的成果作品。对本文的研究做出重要贡献的个人和集体，均已在文中以明确方式标明。本人完全意识到本声明的法律后果由本人承担。

作者签名：郑泽楠　　日期：2026年 5月 25日

学位论文版权使用授权书

本学位论文作者完全了解学校有关保留、使用学位论文的规定，即：研究生在校攻读学位期间论文工作的知识产权单位属华南理工大学。学校有权保存并向国家有关部门或机构送交论文的复印件和电子版，允许学位论文被查阅（除在保密期内的保密论文外）；学校可以公布学位论文的全部或部分内容，可以允许采用影印、缩印或其它复制手段保存、汇编学位论文。本人电子文档的内容和纸质论文的内容相一致。

本学位论文属于：

□保密（校保密委员会审定为涉密学位论文时间：___年__月__日），于___年__月__日解密后适用本授权书。

☑不保密，同意在校园网上发布，供校内师生和与学校有共享协议的单位浏览；同意将本人学位论文编入有关数据库进行检索，传播学位论文的全部或部分内容。

（请在以上相应方框内打“√”）

作者签名：郑泽楠　　日期：2026.5.25

指导教师签名：　　日期：2026.5.25

作者联系电话：18776706026　　电子邮箱：jamezheng1995@icloud.com

联系地址（含邮编）：广州市天河区五山路381号建筑学院（510640）

摘　要

存量更新背景下，广州高密度城市中心区的更新困境展现复杂的结构性矛盾：超高层现代建筑、混合居住社区等多元空间逻辑在同一片区内并置共存，各自形成孤立内向的空间秩序，缺乏有效的整合机制，形成典型的拼贴格局。该格局不仅导致公共空间系统碎裂、交通联系受阻与内部可达性不足，也使不同人群的日常生活轨迹相互隔离，难以形成有机联系的城市整体。现有织补理论研究多以单一逻辑失序场景为主要对象，其在城市更新中的适用边界仍有待拓展。

研究以广州天河区金融城北部片区及其周边高密度城市环境为对象，以文献梳理与系统性实地调研为主要方法，将织补理论引入广州高密度混合街区更新语境，以功能有机整合的混合街区为目标状态，构建“拼贴格局—织补干预—混合街区”的核心设计逻辑链。研究从城市与街区两个尺度识别出四类核心问题：一是各肌理单元内部自洽运作、交界处缺乏任何过渡性衔接，形成“各自封闭、整体失序”的城市结构碎片化；二是设施按地块独立配建，文化体育与养老服务设施全面缺位，业态高度集聚于城中村内部，三板块交叠地带不存在任何共享型设施节点的公共功能失衡；三是东亚磁性厂闲置空地、权属交界余地与低效停车用地系统性积累、街道 D/H 比值全面失衡，致使公共空间在数量、品质与分布三个层面均无法支撑自发性与社会性活动持续发生的空间活力缺失；四是围合片区的干道路权向机动车严重倾斜（占路幅比例 77% 至 90%）、内部路网单通道依赖且东西向断裂的交通可达性低下。上述问题相互叠加、彼此强化，构成难以依靠单一维度干预加以破解的系统性困境。

针对上述问题，研究提出空间织补、交通织补、城市结构织补与功能织补四条策略，在“两轴一带”的整体空间骨架下加以统筹整合：以社区服务轴与产业转型轴形成南北向支撑，以贯通棠下涌至中央公园的活力带建立东西向联结；通过激活失落空间、重组慢行系统、缝合碎片化肌理、补足设施短板，逐步推动封闭边界向可渗透界面转化，促进公共空间网络、交通联系、城市结构与功能配置的协同修复；并以东亚磁性厂、棠下钟氏祠堂、科新路社区客厅及中央公园等核心节点设计为落地支撑，将碎裂的拼贴格局重新整合为功能有机联系的混合街区。

本研究表明，织补理论的适用边界可延伸至高密度混合街区语境，通过系统性置入公共空间、建立整合性空间骨架，将长期割裂的各类人群整合进共享的城市生活系

统。相关研究可为广州及同类高密度城市混合街区的存量更新提供一定的理论参考与设计借鉴。

关键词： 织补理论；高密度城市；混合街区；城市更新

Abstract

Against the backdrop of stock-based urban renewal, regeneration challenges in Guangzhou high-density urban core areas have shifted to complex structural contradictions. Commercial development, enclosed residential compounds, urban villages, and industrial remnants coexist within the same district, each operating according to its own spatial logic yet lacking effective integration mechanisms — giving rise to a characteristic collage condition. This condition not only fragments the public space system, disrupts circulation, and undermines internal accessibility, but also isolates the everyday trajectories of different populations, precluding the formation of an organically connected urban whole. Existing weaving theory research has predominantly addressed scenarios of single-logic disorder; its applicability within urban renewal contexts remains to be expanded.

This study takes the northern precinct of Guangzhou Tianhe Financial City and its surrounding high-density urban environment as its subject, employing literature review and systematic field investigation as primary methods. It introduces weaving theory into the regeneration context of Guangzhou high-density mixed-use neighborhoods, positing a functionally integrated mixed-use neighborhood as the target condition, and constructs a core design logic chain of "collage condition — weaving intervention — mixed-use neighborhood." From both urban and neighborhood scales, four categories of core problems are identified: first, individual fabric units operate in internal coherence while their boundaries lack any transitional articulation, producing urban-structural fragmentation characterized by "local order, systemic disorder"; second, facilities are independently provisioned by plot, cultural, sports, and elderly care facilities are comprehensively absent, commercial uses are heavily concentrated within the urban village, and no shared facility nodes exist at the overlapping edges of the three sectors, constituting a public function imbalance; third, idle land at the East Asia Magnetic Factory, residual ownership-boundary land, and inefficient parking accumulate systematically while street D/H ratios are comprehensively out of balance, resulting in a public space deficit — in quantity, quality, and distribution — that cannot sustain spontaneous and social activities; fourth, arterial roads encircling the precinct allocate 77–90% of road width to motor vehicles,

the internal network suffers from single-route dependency, and east–west connectivity is severed, producing critically low circulation accessibility. These problems are mutually reinforcing, constituting a systemic condition that cannot be resolved through single-dimensional intervention.

In response, the research proposes four weaving strategies — spatial, circulatory, urban-structural, and functional — integrated under a spatial framework of "two axes and one belt": a Community Service Axis and an Industrial Transformation Axis provide north–south support, while a Vitality Belt connecting Tangxia Canal to Central Park establishes east–west continuity. Through activating lost spaces, reorganizing the slow-traffic system, suturing fragmented fabric, and supplying missing facilities, closed boundaries are progressively transformed into permeable interfaces, advancing coordinated repair across the public space network, circulation, urban structure, and functional configuration. The East Asia Magnetic Factory, Tangxia Zhong Clan Ancestral Hall, Kexin Road Community Living Room, and Central Park serve as key node designs providing implementation support, reintegrating the fragmented collage condition into a functionally interconnected mixed-use neighborhood.

This study demonstrates that the applicable boundary of weaving theory can be extended to the high-density mixed-use neighborhood context: through systematic insertion of public space and establishment of an integrative spatial framework, long-segregated populations are drawn into a shared urban life system. The findings offer theoretical reference and design guidance for stock-based renewal of mixed-use neighborhoods in Guangzhou and comparable high-density cities.

Keywords：Weaving Theory; High-Density Urban Areas; Mixed-use Neighborhood; Urban Renewal

Contents

Chapter 1 Introduction 1
1.1 Research Background 1
1.1.1 Urban Stock Renewal and Sustainable Development Orientation 1
1.1.2 High-Density Urban Development Trends and Practical Dilemmas 2
1.1.3 Proposition of Urban Weaving-Based Renewal Concepts Under Stock Renewal Contexts 4
1.2 Research Objectives and Significance 6
1.2.1 Research Objectives 6
1.2.2 Research Significance 7
1.3 Core Concept Definition 8
1.3.1 High-Density Cities 8
1.3.2 "Urban Weaving" Theory 9
1.3.3 Mixed-Use Neighborhoods 11
1.4 Research Scope and Design Scope Definition 12
1.4.1 Research Scope: Multi-Type High-Density Coexisting Chebei-Tangxia-Finance City District 12
1.4.2 Design Scope: High-Density Environment Mixed-Use Neighborhood in the District North of Guangzhou International Finance City 12
1.5 Research State of the Art 13
1.5.1 International Research State 13
1.5.2 Domestic Research State 15
1.5.3 Summary of Research State of the Art 18
1.6 Research Methods and Framework 19
1.6.1 Research Methods 19
1.6.2 Research Framework 20
Chapter 2 Related Theoretical Foundations and Practical Research 22
2.1 Characteristics, Problems, and Renewal Practices of High-Density Cities 22
2.1.1 Density Concept 22

2.1.2 Development Background of High-Density Cities 24
2.1.3 Typical Characteristics of High-Density Cities 25
2.1.4 Typical Problems in High-Density Cities 31
2.1.5 Practice Cases of High-Density Urban Renewal 36
2.2 Urban Weaving Theory's Development, Operational Framework, and Applicability 49
2.2.1 Urban Weaving Theory Development Trajectory 49
2.2.2 Urban Weaving Theory Core Elements 51
2.2.3 Urban Weaving Theory Update Practice Cases 52
2.2.4 Urban Weaving Strategy Applicability in High-Density Neighborhood Renewal 58
2.3 Mixed-Use Neighborhood Vitality Mechanisms and Collage Pattern Dilemmas . 59
2.3.1 Mixed-Use Neighborhood Vitality Mechanisms 59
2.3.2 Collage and Mixing in High-Density Environments 62
2.4 Chapter Summary 64
Chapter 3 Existing Conditions and Problems of District North of Guangzhou International Finance City 65
3.1 Urban Development and Planning Background 66
3.1.1 High-Density Context of Guangzhou 66
3.1.2 Urbanization Development in Guangzhou 69
3.1.3 Upper-Level Planning for the District 72
3.2 Urban perspective: Tangxia-Chebei-Financial City area under the high-density pattern 75
3.2.1 Current High-Density Status of Research Area 75
3.2.2 Historical Evolution and Layering of High-Density Pattern 78
3.2.3 Urban Structure and Urban Fabric 80
3.2.4 Public Facility Configuration Analysis 86
3.2.5 Imbalance in Road Space Right-of-Way Allocation 94
3.3 Block perspective: The collage pattern of inward stagnation in the northern area of Guangzhou International Financial City 98

3.3.1 Overview of Basic Conditions 99
3.3.2 Material Entity: Block Boundaries and Street Network Structure..... 102
3.3.3 Spatial Quality: Lost Spaces and Street Spaces 107
3.3.4 Public life: Population Activities and Demand Analysis 113
3.4 Summary of Existing Problems 116
3.4.1 Fragmentation of Urban Structure 117
3.4.2 Public Function Imbalance 118
3.4.3 Absence of Spatial Vitality..... 118
3.4.4 Low Traffic Accessibility..... 119
3.5 Chapter Summary 121
Chapter 4 Urban Weaving: Design Strategies for District North of Guangzhou International Finance City..... 122
4.1 Design Objectives and Positioning 122
4.1.1 Design Objectives 122
4.1.2 Design Positioning..... 124
4.2 Overall Planning 125
4.2.1 Design Principles 125
4.2.2 Master Plan Design..... 128
4.2.3 Spatial Structure..... 129
4.2.4 Land Use Layout and Functional Zoning 131
4.3 Urban Weaving Strategies..... 133
4.3.1 Spatial Weaving: Establishing an Excellent Public Space System 136
4.3.2 Traffic Weaving: Reorganizing Road Networks and Slow Mobility Systems 143
4.3.3 Urban Structure Weaving: Suturing Fragmented Fabric..... 148
4.3.4 Functional Weaving: Balancing Public Facility Distribution 151
4.4 Node Design..... 156
4.4.1 East Asia Magnetic Factory: Shared Activation of Public Life 156
4.4.2 Tangxia Zhong's ancestral hall: Supplement the community public space 160

4.4.3 Kexin Road: The opening of the junction of multiple plots 163
4.4.4 Central Park: All-Day Mixed-Use Vitality 166
4.5 Chapter Summary 169
Conclusion 171
References 173

Figure & Table Lists

Figure 1-1 China's Urbanization Rate Over Time 3
Figure 1-2 Global Distribution of High-Density Cities 9
Figure 1-3 Research Scope and Design Scope 13
Figure 1-4 Research Framework 21
Figure 2-1 Spacemate Coordinate Diagram 23
Figure 2-2 Figure-Ground Relationship Comparison of Parna (left) and Saint-Dié (right) 27
Figure 2-3 Urban Form with Different Block Scales 28
Figure 2-4 Analysis of Different Street Network Structure 29
Figure 2-5 Yokohama Convention Center 24-Hour Functional Mixing Diagram 31
Figure 2-6 Environmental Resource Restorative Benefit Model 35
Figure 2-7 Barcelona Urban Renewal 37
Figure 2-8 Standard Unit Renewal 39
Figure 2-9 Street Space Renewal 40
Figure 2-10 Rooftop Platforms Renewal 41
Figure 2-11 Pedestrian System indoor and out door of HongKong 43
Figure 2-12 Hong Kong Central Pedestrian System 44
Figure 2-13 Parco Dora 47
Figure 2-14 The Industrial Heritage of Parco Dora 49
Figure 2-15 Zhuzhou Old City Spatial Structure Planning 53
Figure 2-16 Ring-Mode Transportation Diagram 54
Figure 2-17 Urban Construction Land Demolition-Preservation Classification Diagram 55
Figure 2-18 Ganjiang Road Point-Line-Surface Weaving Strategy 56
Figure 2-19 Evaluation of mixed-use land development in central Nanjing neighborhoods 61
Figure 2-20 Spatial distribution of mixed-use land in the rapid growth phase of Nanjing neighborhoods 62
Figure 3-1 Distribution map of high-density cities in China 67
Figure 3-2 Location map of research area 67
Figure 3-3 Guangzhou population data 2019-2024 69
Figure 3-4 Guangzhou urban space evolution map 70

Figure 3-5 Guangzhou core district functional planning 72
Figure 3-6 Tianhe District national land and space overall pattern planning 73
Figure 3-7 Illustration of Tianhe District public service facility system planning 74
Figure 3-8 Research scope 76
Figure 3-9 Research scope functional pattern 76
Figure 3-10 Research scope population heat map 77
Figure 3-11 Research scope residential population heat map 78
Figure 3-12 Research scope spatial pattern evolution (1945-2025) 80
Figure 3-13 Rome city map by Nolli—Nolli Map 81
Figure 3-14 Research scope urban fabric types 82
Figure 3-15 100m Block Pattern and Current Status Comparison 85
Figure 3-16 15-Minute Life Circle Facility Configuration Mode 87
Figure 3-17 Study Area Complementary Facilities and Commercial Distribution 88
Figure 3-18 Chebei Road Right-of-Way Allocation Diagram 96
Figure 3-19 Zhongshan Avenue Right-of-Way Allocation Diagram 97
Figure 3-20 Huangpu Avenue Right-of-Way Allocation Diagram 97
Figure 3-21 Design Area 99
Figure 3-22 Design Area Functional Pattern 100
Figure 3-23 Design Area Boundary Distribution 104
Figure 3-24 Design Area Road Classification Map 106
Figure 3-25 Design Area Road Traffic at Different Times 107
Figure 3-26 Design Area Lost Space Distribution 109
Figure 3-27 D/H and feelings 110
Figure 3-28 Activity and Material Environment Quality Relationships 113
Figure 3-29 Activity Distribution in Design Area During Workdays 115
Figure 3-30 Activity Distribution in Design Area During Weekends 116
Figure 3-31 High-Density Problem System Identification in Design Scope 120
Figure 4-1 Overall Framework of Urban Weaving Strategies 125
Figure 4-2 Master Plan 128
Figure 4-3 Pattern of Design and Research Scope 130
Figure 4-4 Two-Axis, One Belt 131
Figure 4-5 Functional Planning 132
Figure 4-6 Functional Module Pattern 133

Figure 4-7 Four Steps of Urban Weaving Strategies 135
Figure 4-8 Specific Operations of Urban Weaving Strategies 136
Figure 4-9 Renovation of Three Types of Lost Spaces 137
Figure 4-10 Public Space Insertion 139
Figure 4-11 Street Space Design Elements 141
Figure 4-12 Road space 142
Figure 4-13 Road Network Weaving 145
Figure 4-14 Road Network System Reconstruction 145
Figure 4-15 Slow-Mobility Corridor Configuration 147
Figure 4-16 Slow-Mobility Space 147
Figure 4-17 Road Right-of-Way Restructuring of Urban Arterials 148
Figure 4-18 Three types of boundries 150
Figure 4-19 Optimization of Block Boundaries 150
Figure 4-20 Public Space Weaving of Different Scales Mediating Different Fabrics 151
Figure 4-21 Integration of Public Facility System 153
Figure 4-22 Supporting Facility Schedule (15-Minute Living Circle) 154
Figure 4-23 All-Day Functional Mixed-Use 155
Figure 4-24 Node1 Location 157
Figure 4-25 Node One Current Conditions 157
Figure 4-26 Node One Functional Distribution 158
Figure 4-27 Tangxia Village Supporting Livelihood Street District (left) and Finance City Supporting Commercial Street District (right) 159
Figure 4-28 Relationship with Central Park 159
Figure 4-29 Node2 Location 160
Figure 4-30 Node Two Current Conditions 160
Figure 4-31 Zhong Clan Ancestral Temple Renovation Effect Diagram 161
Figure 4-32 Zhong Clan Ancestral Temple Forecourt 162
Figure 4-33 Children's Activity Area (left) and Basketball Court (right) 162
Figure 4-34 Node Three Location 163
Figure 4-35 Node Three Current Conditions 164
Figure 4-36 Node Three Functional Distribution 165
Figure 4-37 Community Living Room 166
Figure 4-38 Waterside Space (left) and Central Court Space (right) 166

Figure 4-39 Node Four Location 167
Figure 4-40 Node Four Current Conditions 167
Figure 4-41 Central Park (left) and All-Day Plaza (right) 168
Table1-1 International Research State of the Art 14
Table1-2 Domestic Research State of the Art 16
Table 2-1 Demographic Density-Related Indicators of Asian High-Density Cities 24
Table 3-1 Guangzhou population and land construction data 68
Table 3-2 Guangzhou urban land-use intensity 71
Table 3-3 Research scope urban fabric types 84
Table 3-4 Study Area Public Complementary Facilities Comparison 92
Table 3-5 Study Area City Trunk Road Cross-Section Comparison 96
Table 3-6 Design Area Overview 101
Table 3-7 Design Area Boundary Types 105
Table 3-8 Design Area Typical D/H Identification 112

Chapter 1 Introduction

1.1 Research Background

1.1.1 Urban Stock Renewal and Sustainable Development Orientation

Currently, China's urbanization has entered a mid-to-late stage of development, with urban development quality becoming a focal point. By 2022, China's urbanization rate has approached 65%, marking the comprehensive entry into the "urban China" phase. Following over 40 years of reform and opening-up, from the perspective of urban construction and development, the period of incremental growth has become history, and the majority of work has shifted to urban stock renewal.[1]

Since reform and opening-up, China's urbanization has accelerated continuously, with long-term reliance on land incremental expansion models for urban construction. This extensive development path, while creating economic miracles, has also brought a series of problems including spatial functional mismatch, negative space proliferation, and fragmentation of historical context. Entering the 21st century, as developable land resources became depleted, high-speed growth cities exemplified by Shenzhen first faced the predicament of unsustainable expansionist development, propelling the agenda of urban stock renewal to the core position of urban construction.[2]

Against this backdrop, policy orientation at the national level has undergone fundamental transformation. The 19th Party Congress explicitly proposed the strategic goal of "optimizing allocation of existing resources and expanding supply of quality increments." In 2021, the Ministry of Housing and Urban-Rural Development issued a notice emphasizing the prevention of large-scale demolition and rebuilding in urban renewal actions, explicitly restricting large-scale demolition and reconstruction while emphasizing the protection and continuation of existing urban fabric and historical context. Guangzhou has also continuously promoted the revitalization and renewal of old townships, old factories, and old villages under the "Three Old Transformations" policy framework. In 2026, Guangzhou further promulgated the "Guangzhou Low-Efficiency Land Redevelopment Special Plan (2023-2035)," which as the first such specialized plan among super-large cities nationally, explicitly proposed the goal of revitalizing

the city's 622 square kilometers of low-efficiency land, marking Guangzhou's entry into the stage of deep potential unlocking for urban stock renewal. The focus of urban construction has thus shifted from the extensive expansion of spatial quantity to the enhancement of built environment quality.

At the same time, the concept of sustainable development has penetrated deeply into the field of urban planning, further reshaping the value coordinates of stock renewal. Sustainable urban construction not only requires responding to the spatial needs of the current generation, but also seeking a long-term balance between economic benefits, social equity and ecological capacity. [3]How to achieve the restoration of urban functions and the improvement of quality with minimal intervention in high-density built environments has become the core proposition of urban design research in the new era.

1.1.2 High-Density Urban Development Trends and Practical Dilemmas

With the continuous advancement of China's urbanization process, large populations have concentrated in urban core areas, making high-density development a universal characteristic of major Chinese cities. Urban development over the 37 years since reform and opening-up not only reflects growth in urban economies and the quantity of cities, but also exponential increases in urban built-up areas and building floor areas. Between 1981 and 2014, the national number of cities increased from 233 to 653, urban population grew from 93 million to 445 million—roughly a 5-fold increase. Built-up area increased from 7,438 km^2 to 49,772.63 km^2 —roughly a 7-fold increase. Building floor area increased from 1.54 billion m^2 to 35.628 billion m^2 — approximately a 23-fold increase.[4]

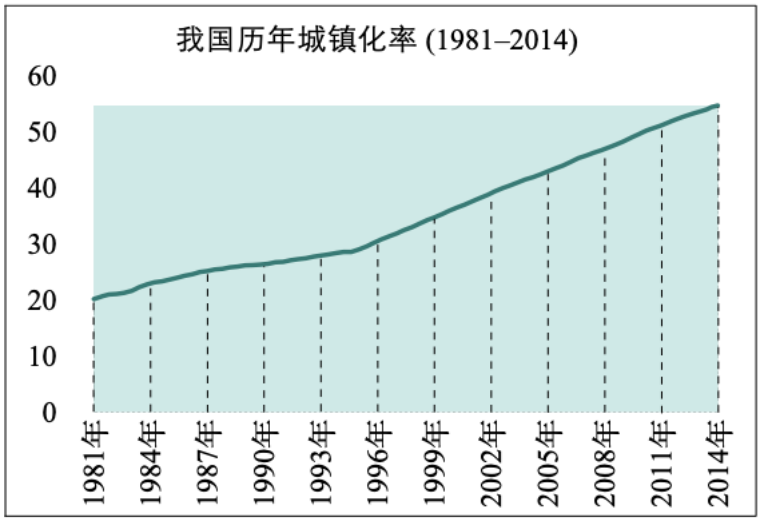


Figure 0-1 China's Urbanization Rate Over Time
(Source: References[4])

For a country with dense population and limited arable land, compact and intensive urban development models are objectively inevitable—"considering only population size and limited arable land, there is no other choice but to adopt compact urban forms and high-density development modes."[4]

However, high-density development does not automatically equate to high-quality urban environments. As the core megacity in South China, Guangzhou's urbanization process typically presents the evolution trajectory of this contradiction. From 1980 to 2000, the built-up area of Guangzhou expanded from 161.54 km^2 to 297.50 km^2, and the population density in the core area remained at a high level of about 40,000 people/km^2 for a long time. [5]In this process of rapid expansion, the construction land formed in different historical periods is superimposed and accumulated without systematic coordination, and high-end commercial development, mature residential communities, urban villages and industrial heritage exist coexist in the same geographical range, but there is a lack of effective spatial stitching and functional connection between them. Problems such as insufficient public green space, high concentration of population, traffic congestion and declining ecological environment quality continue to affect the quality of urban living environment. [6]

China's rapid urbanization process, while fostering a "golden development period" of construction, simultaneously entered a "period of compounded contradictions." As urban fabric continuously evolved, problems of uncontrolled sprawl, declining aging central areas, and

fragmented urban context intertwined, gradually transforming certain areas into fragmented, incomplete "zones of local death" characterized by spatial isolation, functional deficiency, and disrupted urban context—becoming difficult-to-name "scars" and "islands" on the urban body[7]. Rapid construction prioritizing efficiency under high-density development conditions typically comes at the cost of compressing public space and weakening spatial connections. Enclosed residential neighborhoods, large commercial complexes, and industrial land parcels mutually isolate from each other, and when further overlaid with the spatial organization of oversized closed blocks, the structural fragmentation characteristics within the district are further reinforced. Fragmented road networks result in severe deficiency of pedestrian and non-motorized transportation systems; smooth daily connections between different functional areas are difficult to establish. Public green spaces and open areas suffer not only from total scarcity but also highly imbalanced distribution, with existing public space resources excessively concentrated in a few nodes, making it difficult to construct continuous public life networks covering entire districts or effectively accommodate the daily interaction and outdoor activity needs of diverse populations. Under this spatial configuration, despite diverse social composition of multiple population types in proximate physical space, their daily life connections remain relatively weak, making it difficult to form urban living communities with holistic identity.

How to achieve organic repair of urban structure through minimal intervention under stock renewal orientation has become a core proposition urgently demanding response from contemporary urban design, providing the practical basis for introducing the Urban Weaving Theory framework in this research.

1.1.3 Proposition of Urban Weaving-Based Renewal Concepts Under Stock Renewal Contexts

In response to the dilemmas of spatial disorder, fabric fragmentation, and declining public environmental quality faced by high-density cities in the stock era, the academic community has gradually formed a progressive renewal approach distinct from "large-scale demolition and rebuilding," namely the urban space repair concept centered on "weaving and mending" as its core image. The Western intellectual origins of this concept can be traced to Colin Rowe and

Fred Koetter's 1978 co-authored work "Collage City" [8].The book conducted fundamental reflection on the comprehensive transformation logic of post-war modernist urban planning, arguing that cities are not unified wholes dominated by a single order but "collage" entities formed by overlapping coexistence of space fragments from different periods and types. Based on this understanding, rational urban renewal should not comprehensively replace existing urban fabric with entirely new spatial order, but rather coordinate relationships between new and old spaces through local intervention, gradual mending, and fragment integration, repairing overall urban structure. This thinking established important methodological foundations for the subsequent development of urban weaving theory.

At the practical level, Western cities initiated exploration of urban fabric weaving paths relatively early. At the end of the 1970s, Berlin seized the opportunity of the International Building Exhibition (IBA) to re-integrate the urban fabric dissected by post-war modernist architecture by encouraging exploration of urban building types adapted to local traditions. In 2001, Paris explicitly proposed the goal of "weaving the city" when bidding for the 2008 Olympics, treating fragment integration as an important strategy for urban renewal. From the developmental trajectory of urban construction theory since the late 1970s, "through urban construction projects of various scales, to functionally improve municipal facilities, stimulate urban vitality, in form to explore urban building types with sense of enclosure, reconstruct urban streets, plazas and clearly defined open spaces, and weave the urban fabric dissected by post-war modern urban construction, has become a trend in contemporary Western urban development."[9]

Domestically, the systematic advancement and localization of this concept is closely related to research work continuously conducted by Professor Zhang Jie since the mid-1990s. Using Jinan's ancient city as an important experimental site, Zhang Jie and colleagues proposed core principles including "height control and high-density urban fabric protection," "exploration of new urban building types," and "creation of distinctive urban places" in response to issues of lost urban character and fragmented spatial fabric in rapid urbanization. They conducted practical validation at multiple levels including historic district organic renewal and industrial district remediation, advancing localized application of weaving concepts in the Chinese urban context.

To this day, as China's urban construction comprehensively enters the stock optimization stage, the applicability of weaving concepts becomes increasingly prominent. Compared to renovation modes relying on large-scale comprehensive spatial reconstruction, weaving-based renewal emphasizes achieving urban structure repair, functional improvement, and environmental enhancement through minimal intervention. Its refined, progressive, and sustainable renewal logic highly aligns with urban construction development requirements in the stock era, becoming an important research direction with significant theoretical value and practical significance in contemporary urban design.

1.2 Research Objectives and Significance

1.2.1 Research Objectives

Against the backdrop of urban development shifting from incremental expansion to stock optimization, problems of structural fragmentation, loss of public space, weak slow-traffic connections, and inefficient vacant industrial heritage commonly existing in high-density cities have become important factors restricting overall district quality improvement. Compared to traditional renewal approaches characterized by comprehensive demolition and rebuilding, urban weaving theory emphasizing gradual repair and systematic integration provides new research perspectives and methodological pathways for addressing these issues. However, existing research and practices regarding urban weaving have concentrated on historic district protection and renewal or specific functional district remediation. For high-density mixed-use neighborhoods — complex urban spaces combining complicated functional composition, coexistence of diverse actors, and intertwined spatial contradictions — the applicable mechanisms and design methods remain to be further deepened.

Based on this, taking the District North of Guangzhou International Finance City as the research object, this study, on the basis of systematically reviewing the development trajectory of urban weaving theory and related practical experiences, systematically identifies high-density problems in the district, explores weaving renewal strategies, and validates their feasibility through concrete urban design practice, providing replicable pathways and methods for renewal of similar-type districts.

1.2.2 Research Significance

1.2.2.1 Practical Significance of High-Density Mixed-Use Neighborhood Renewal

In China's rapid urbanization process, high-density urban centers have universally experienced multiple rounds of construction activities by different actors and following different logics, resulting in spatial configurations where heterogeneous urban fabric from different functions and construction periods is highly compressed and coexist within the same geographic area. Guangzhou is particularly typical in this process: numerous urban villages have been retained within the urban built-up area, neighboring high-rise commercial clusters, enclosed residential communities, and low-efficiency land in extremely small ranges, forming a multi-logic coexistence pattern rare among super-large cities nationwide, becoming the most intractable spatial type for Guangzhou's stock renewal. Unlike historic districts or single-function abandoned sites, the renewal difficulties of such districts do not lie in the decline of any particular function, but in the lack of integration mechanisms among multiple coexisting logics—road networks systematically fracture at closed block boundaries, public spaces are continuously encroached by building masses, and various functional zones operate independently without forming organic connections—these problems are rooted in overall structural fragmentation of the district, and localized renewal of single blocks cannot address the root causes.

However, existing urban renewal practices have inadequately responded systematically to this spatial type. Existing practices mostly focus on single blocks, lacking district-wide design pathways for establishing integrative public structures. Although policy levels have clearly restricted large-scale demolition, how to achieve organic integration of multi-logic coexisting districts through gradual intervention under stock constraints remains an urgent practical proposition requiring exploration.

This research, taking the District North of Guangzhou International Finance City as the object, through systematic current state investigation, problem identification, and weaving strategy construction, formulates a set of renewal and design pathways for high-density multi-logic coexisting districts. The resulting strategic framework and design methods can not only

provide direct evidence for subsequent renewal of this district but also serve as operable design references for Guangzhou and similar high-density urban neighborhoods' stock renewal.

1.2.2.2 Expansion of Applicable Boundaries of Weaving Theory

In addition to the above practical significance, this study also has theoretical exploratory value. Since its introduction into China at the beginning of the 21st century, urban weaving theory has formed a relatively rich research accumulation in the fields of historical district protection, old city texture restoration, and industrial abandonment land revitalization - Huang Chuncan and Gong Wei found through CiteSpace visualization analysis that the research hotspots of weaving and patching theory in China from 2006 to 2025 are concentrated in the fields of old city renewal, urban design, historical districts, and landscape weaving[10]However, its applicable mechanism in the scenario of coexistence of multiple spatial logics such as high-density mixed blocks has not yet been systematically constructed. This study explores the operation path of weaving and patching strategy in this context from four dimensions: space, transportation, urban structure and function, which is helpful to expand the applicable boundaries of weaving and repair theory, and provides theoretical basis and case support for its extension from existing application scenarios to high-density multi-logical juxtaposition scenarios.

1.3 Core Concept Definition

1.3.1 High-Density Cities

The term "density" originates from physics and in urban planning and design contexts is used to describe the quantity of building capacity (floor area), building height, open spaces, and built coverage conditions on defined-scale land as well as population concentration on the land[11]. High-density cities refer to urban forms where these various indicators significantly exceed general levels and where population and construction activities are highly concentrated within limited geographic space. With the continuous advancement of global urbanization, for China and most high-population-density Asian countries, intensive urban structure "is not merely a choice for future urban development, but rather an experience and reality that has long existed historically and contemporarily." High-density urban environments have become an inescapable practical premise for urban planning and design research. [12]

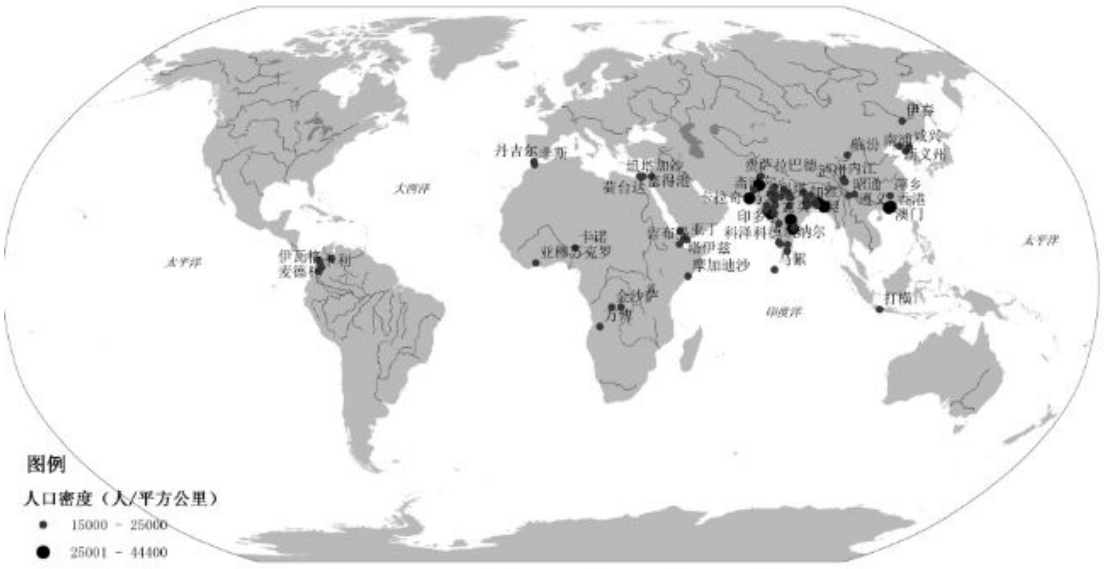


Figure 0-2 Global Distribution of High-Density Cities
(Source: References[13])

Regarding identification standards for high-density cities, the international academic community has not yet formed consensus. Existing research typically uses typical case cities like Hong Kong, Macau, and Tokyo as references, with population densities of approximately 25,000-30,000 people/km² . Simultaneously, the world average is 13,000-15,000 people/km² . Based on this, Li Minping and Ye Changdong, through statistical analysis of 1,513 cities with over 500,000 people globally, established 15,000 people/km² as the international threshold standard for high-density cities, identifying 76 high-density cities globally as of 2012, concentrated mainly in developing countries in Asia, Africa, and South America [13].In the Chinese context, combined with the per capita construction land index (85.1~105m² /person) in the "Urban Land Classification and Planning and Construction Land Standard" (GB50137-2011), the reasonable range of urban population density planning control is about 9500~11750 people/km² , and the academic community suggests that 10000 people/km² and urban gross floor area ratio of 0.5 are used as the domestic basic dividing line to identify high-density cities. [4]

1.3.2 "Urban Weaving" Theory

The intellectual origins of urban weaving theory can be traced to Colin Rowe and Fred Koetter's co-authored "Collage City." The work describes post-war modernist cities as highly "fragmented" collages—cities no longer possess unified overall structures but rather represent

juxtaposition of various group interests and values. They criticized the comprehensive transformation logic of modernist planning guided by the Athens Charter, which resolved social problems through rational functional zoning and "urban machine" logic yet fractured internal urban associations, diversity, and dynamism, creating numerous fragmented urban segments and lost spaces. In response, they proposed contextualism as strategy, integrating buildings and spaces from different periods and categories, enabling fragmented urban fabric to reconnect into wholeness.[8]

On this intellectual foundation, urban weaving theory gradually developed into a systematic urban design methodology. Its core operational logic can be summarized as "recognition—interpretation—weaving—mending," advocating repair of damaged and declining urban spaces through microscale selective intervention, restoring historical context and spatial continuity[14]. "Weaving" and "mending" each emphasize different aspects in spatial operations: "weaving" refers to systematic integration and connection, namely connecting isolated urban fragments through establishing transportation networks, ecological corridors, or functional axes, enhancing urban coherence and permeability. "Mending" refers to localized detail filling and restoration, analogous to original urban fabric's warp and weft structures, conducting refined mending of damaged building units, street interfaces, or landscape nodes, improving urban functions and restoring characteristic appearance. [15]

Compared to related theories like urban weaving and organic renewal, the essential distinction of weaving theory lies in its systematic emphasis on "continuity" and "wholeness." Urban weaving emphasizes point-like, localized subtle intervention to activate overall environment. Organic renewal emphasizes gradual evolution conforming to original urban fabric. Weaving theory not only focuses on localized activation but endeavors to reintegrate new and old elements through "warp-weft networks," achieving systematic integration of form, function, and context. This characteristic determines that weaving theory is particularly suited to mid-scale urban design—targeting urban fabric fragmentation, functional monotony, and fragmented public space systems, conducting targeted structural repair rather than comprehensive reconstruction through demolition and rebuilding. This characteristic makes weaving theory particularly well-suited to the mid-scale of urban design — addressing problems such as fabric fragmentation, functional monotony, and the breakdown of public space systems through

targeted structural repair, rather than comprehensive reconstruction through large-scale demolition and rebuilding.

1.3.3 Mixed-Use Neighborhoods

The concept of mixed blocks originated from the systematic reflection of functional zoning in the Western planning circles in the middle of the 20th century. Jane Jacobs, in The Death and Life of Big American Cities (1961), argues that diversity is the nature of cities, and that the high degree of functional zoning cuts off the intrinsic ties of urban life, leading to the decline of neighborhood vitality. She proposed four necessary conditions for rich diversity: mixed basic functions, small-scale neighborhoods, coexistence of buildings of different eras, and sufficient population density[16]. The 1977 Machu Picchu Charter further emphasized the comprehensive development of urban functions, promoted the renewed attention of the concept of mixed use in planning theory, and gradually became an important development direction of urban planning.

At the conceptual definition level, mixed-use neighborhoods are typically understood as street blocks where two or more major urban functions—such as residential, commercial, office, cultural uses—coexist in relatively comparable proportions within a defined spatial range, with direct or indirect internal connections among functions, presenting organic integration rather than simple superposition. China's "Basic Terminology Standards for Urban Planning" (GB/T 50280-98) expresses this as "districts that can accommodate multiple different use functions according to planning," namely "comprehensive zones." In identification dimensions, the core characteristics of mixed-use neighborhoods include: diversity and compatibility of functional composition, refined urban fabric (short street intervals and dense interfaces), multi-demographic concentration at different time periods, and completeness of daily activities within walkable-accessible ranges.

1.4 Research Scope and Design Scope Definition

1.4.1 Research Scope: Multi-Type High-Density Coexisting Chebei-Tangxia-Finance City District

The research scope extends from Tangde Road in the north, Linjiang Avenue in the south, Tangxiachong in the west, and Chepeichong in the east, covering the complete urban structural unit of the Chebei-Tangxia area. There are a variety of typical high-density texture types in the range: Tangxia Village, Chebei Village and other urban villages form a very high-density self-built residential texture with a building coverage rate of more than 80%; Junjing Garden and other closed residential areas form a residential form with a high floor area ratio with a high-rise determinant layout; The starting area of Guangzhou International Financial City gathers high-intensity business development with super-large-scale plots; the wholesale market area on the northeast side operates according to the logic of freight and commerce; Along the Tangxiachong line, limited ecological corridor resources are retained.

The spatial problems in the central area of high-density cities are often rooted in the larger-scale urban pattern, and it is difficult to reveal the structural causes of the current situation of a single lot. The delineation of the research scope aims to grasp the relationship between the design scope and the surrounding area in terms of spatial structure, functional organization and population activities from the overall level, and provide a complete background vision for subsequent problem identification and strategy construction.

1.4.2 Design Scope: High-Density Environment Mixed-Use Neighborhood in the District North of Guangzhou International Finance City

The design scope extends to the west of Zhongshan Avenue in the north, Huangpu Avenue in the south, Tangxiachong in the west, and Chebei Road in the east, with a total area of about 1.21km², which constitutes the spatial carrier of the updated design of this study. Within the scope, Junjing Garden in the north forms a closed large-scale residential community with continuous walls, Tangxia Village in the central and northern parts retains a high-density self-built living texture and spontaneous commercial form, Yangcheng Creative Industry Park in the

south forms a relatively independent creative office area, and the industrial remains of the East Asia Magnetic Factory in the southeast corner retain relatively complete historical structures. The functions are highly juxtaposed and coexist, and have the basic identification characteristics of mixed blocks.

The current functional plates within the design scope operate in a closed manner with walls or roads as boundaries, and there is neither spatial transition nor functional connection between the plates, and the daily life trajectories of different groups of people are isolated from each other.

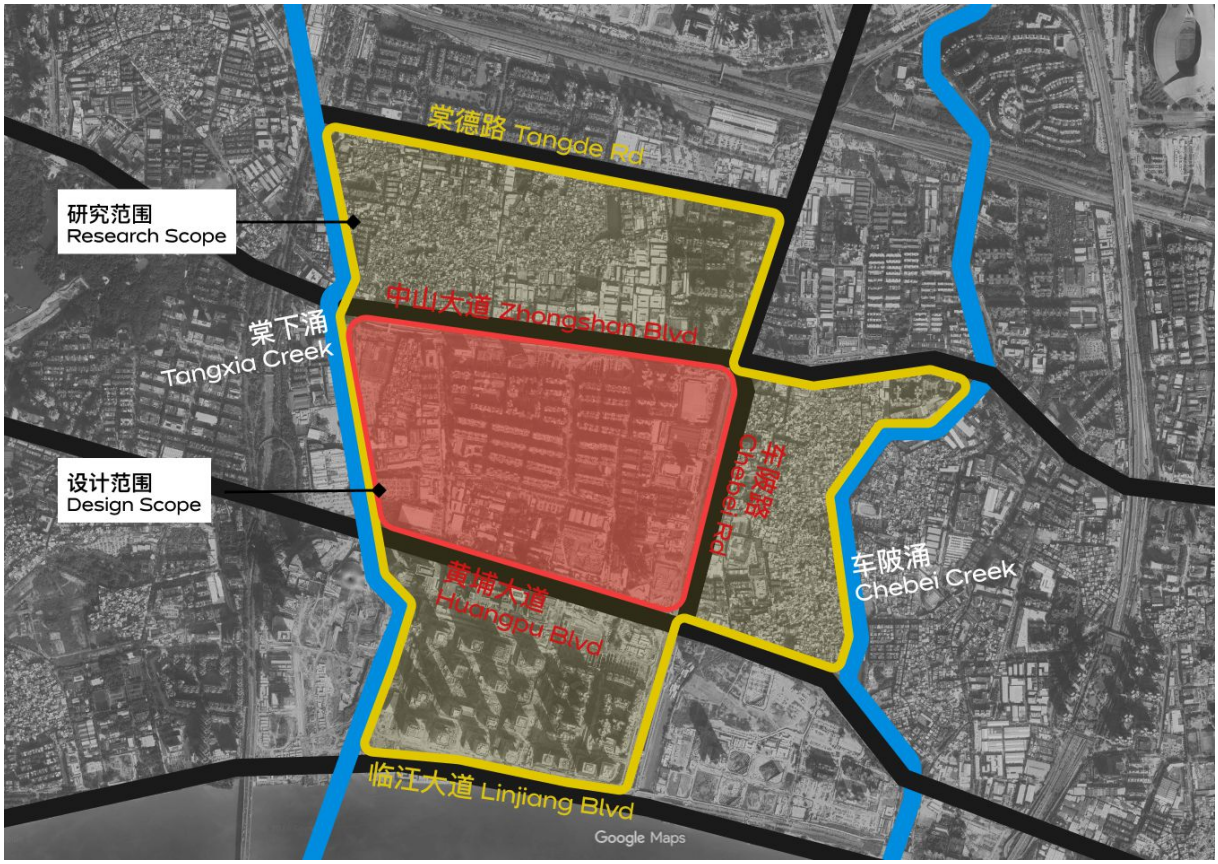


Figure 0-3 Research Scope and Design Scope
(Source: Author)

1.5 Research State of the Art

1.5.1 International Research State

In the field of urban stitching and spatial repair, Western academic research has evolved from morphological restoration toward the urban systems level. Turner et al. employed space syntax models to examine the cumulative effects of micro-scale connectivity on regional networks, arguing that existing studies still lack a sufficient understanding of the interdependent

relationships between urban centers and peripheral areas[17]; Martinez Perez criticizes the limitations of existing studies that characterize urban vacant spaces as "missing" or "non-place", and calls for the exploration of a patch of ways to reconnect infrastructure with daily collective life[18]. In terms of public space and urban vitality, Gehl systematically demonstrated the relationship between outdoor activity types and material environment quality, divided outdoor activities into three categories: necessity, spontaneity, and sociality, and pointed out that high-quality public space is the material prerequisite for spontaneous and social activities to occur[19]. For the topic of high density and mixed functions, Rowley established a conceptual model of mixed function development and analyzed its spatial elements and layers[20], while Hoppenbrouwer and Louw further refined the model and verified the development strategy and implementation effect using the Eastern Docklands in Amsterdam as an example[21]. A relatively complete theoretical framework for hybrid function development has been formed.

Table0-1 International Research State of the Art

Research topics	Research topics	Core Perspective
Urban Weaving and Spatial Syntax	Turner	the cumulative effect of micro-connectivity on the regional network; Existing research still has an inadequate understanding of the interdependence between urban centers and peripheral areas
Urban vacant space is patched	Martinez Perez	criticizing the limitations of existing studies that characterize urban vacant space as "missing" or "non-place"; It calls for exploring a patch path that reconnects infrastructure with everyday collective life
Public space and urban vitality	Gehl（1971）	Outdoor activities are divided into three categories: necessity, spontaneity and sociality. High-quality public space is the material prerequisite for spontaneous and social activities
High density and sustainable form	Jenks et al.（1996）	High-density mixing capabilities are a core element for compact cities and sustainability

Research topics	Research topics	Core Perspective
Hybrid functional development theory	Rowley（1996）; Hoppenbrouwer & Louw（2005）	establish a conceptual model of hybrid functional development and analyze its spatial elements and levels; The model is further improved and the development strategy and implementation effect are verified by taking the Eastern Docklands in Amsterdam as an example

(Source: Author)

1.5.2 Domestic Research State

Since the beginning of the 21st century, the research team of Tsinghua University represented by Zhang Jie has laid the basic framework of localized textile repair theory. Zhang Jie, Deng Xiangyu, et al. put forward the core principles of weaving and supplementing the urban fabric using historical locations as experimental sites, and explored new building types that adapt to local traditions using the ancient city of Jinan as an example [9]. Since then, this framework has been extended to the overall scale of the city, and a systematic weaving strategy covering six dimensions: ecology, transportation, industry, facilities, texture, and society has been constructed for the old city of Zhuzhou [22]. In recent years, the research on open blocks with people as the core has been further shifted, emphasizing the comprehensive weaving logic of street texture stitching, functional integration, and cultural inheritance [23]. At the level of specific operation techniques, Zang Jiaming et al. combined with the theory of "passive plug-in" proposed an embedded weaving and patching strategy to activate linear space with functional nodes implanted [24]. Xu Jing discussed the renewal path of urban texture fault zones from the dual dimensions of morphological weaving and functional embedding [7]. Wang Xinyang focuses on the multi-dimensional weaving strategy of street space in the old city [14]. Wang Luyuan et al. took the ancient city of Quanzhou as the object and constructed a complete community weaving path of "point-line-surface" by excavating the traditional "paving" path [25]。 The above studies jointly present the evolution trajectory of weaving theory from macro texture repair to refined intervention of blocks, facilities, and nodes, and from physical space restoration to humanities, ecology, and functional system integration.

In terms of high-density city research, Li Heping and others established a framework for identifying high-density cities and analyzing spatio-temporal evolution [4]. Zhuang et al. focused on the renewal of the pedestrian system of public activity centers in high-density environments and discussed the repair efficiency of 3D connectivity networks on pedestrian accessibility [26]. He Wenbin et al. systematically sorted out the design problems of public space in high-density built environments, and pointed out that the single design concept and insufficient space utilization are the main shortcomings [27]. In terms of mixed block research, Shi Beixiang et al. pointed out that most of the existing studies focus on qualitative theoretical discussions, and there is a lack of quantitative verification for the central areas of high-mix cities [28]. Wang Xuanqing et al. discussed the formation mechanism of mixed land use in the central area from the perspective of vitality and found that there is a significant positive spatial correlation between land mixing and population vitality, but the relevant research has not yet formed a systematic theoretical framework [29].

Table0-2 Domestic Research State of the Art

Research topics	Research topics	Core Perspective
Construction of urban weaving theory	张杰、邓翔宇等	The core principle of weaving and supplementing the urban fabric is put forward using the historical area as the experimental site, and the ancient city of Jinan is used as an example to explore new building types that adapt to local traditions
	张杰等	The framework of weaving and repairing is extended to the overall scale of the city, and a systematic strategy covering six dimensions of ecology, transportation, industry, facilities, texture and society is constructed with the old city of Zhuzhou as the object
	张杰等（近年）	Shifted toward people-centered research on open urban blocks, emphasizing an integrated stitching logic of street-texture repair, functional integration, and contextual continuity.
Weaving and repairing operation techniques	臧佳明等	Drawing on the theory of “passive plug-ins,” it proposes an embedded stitching strategy that activates linear spaces through the insertion of functional nodes.

Research topics	Research topics	Core Perspective
	许晶	Explores renewal pathways for fractured urban texture areas from the dual perspectives of morphological repair and functional embedding.
	汪馨杨	Focuses on multidimensional stitching strategies for street spaces in old urban districts.
	王露媛等	Taking Quanzhou Ancient City as the case, it constructs an integrated community-repair path of “point–line–plane” by excavating the traditional “Pujing” routes.
High-Density Urban Studies	李和平等	Establishes identification criteria and a spatiotemporal analytical framework for high-density cities.
	庄宇等	Focuses on the renewal of pedestrian systems in public activity centers under high-density conditions, exploring the restorative effect of three-dimensional connectivity networks on pedestrian accessibility.
	何文斌等	Systematically reviews the design issues of public space in high-density built environments, pointing out that monotonous design concepts and insufficient spatial utilization are the main shortcomings.
Mixed Block Studies	史北祥等	Points out that existing studies are largely centered on qualitative theoretical discussions and lack quantitative validation for highly mixed-use urban central districts.
	王暄晴等	Examines the formation mechanism of mixed land use in central districts from the perspective of urban vitality, finding a relationship between land-use mix and human vitality.

(Source: Author)

1.5.3 Summary of Research State of the Art

Based on the above combing, it can be seen that academic circles have accumulated in three topics: urban weaving, high-density cities and mixed blocks, but the intersection between the three has not been systematically discussed so far.

In terms of weaving research, domestic research hotspots are concentrated in the fields of old city renewal, urban design, historical districts, and landscape weaving [10]. The practical research of Xu Jing, Wang Xinyang, Wang Luyuan and others also focuses on texture fault areas, old urban streets, and traditional villages. The root cause of the fragmentation faced by the above studies all points to the disorder dominated by a single logic—either decay, or abandonment, or the destruction of the original texture by a certain round of development—and the task of weaving is to repair the lost spatial continuity or functional diversity [30].

In terms of high-density urban research, Li Heping's analysis of density indicators and spatio-temporal evolution, and Zhuang Yu's discussion on the renewal of pedestrian systems have formed a relatively in-depth understanding of the morphological characteristics and typical problems of high-density built environments, but this direction has not yet formed an effective docking with the weaving methodology, and there is a lack of weaving operation paths for high-density scenarios. In terms of mixed block research, Shi Beixiang, Wang Xuanqing and others have studied the vitality mechanism and land use mixing, but they have stayed at the level of description of morphological characteristics and vitality laws, and the exploration of how to establish an integrated renewal path under the condition of multi-functional juxtaposition is obviously insufficient.

The structural dilemma presented by high-density urban mixed blocks is fundamentally different from the objects targeted in the above study. Its fragmentation is not a single failure of a system, but arises from the boundary where multiple spatial logics coexist in the same geographical range, and each forms an internal order but lacks an integration mechanism. This means that the task of weaving is no longer to repair the loss, but to establish a new integrated public structure between multiple coexisting orders—an operational scenario that lacks sufficient theoretical responses in existing studies. How to introduce the weaving theory into this

context, and explore its application mechanism and design path under the condition of multi-logical juxtaposition, constitutes the core problem awareness of this study.

1.6 Research Methods and Framework

1.6.1 Research Methods

(1) Literature Review Method

The literature review method runs throughout the entire research process, applied primarily at two levels. At the theoretical level, systematic review of domestic and international academic literature on urban weaving theory, high-density urban development, mixed-use neighborhood planning, and public space vitality clarifies the developmental trajectory of urban weaving theory from Colin Rowe's Collage City to contemporary localized practice, and maps the current state of research and methodological advances in high-density mixed-use neighborhood renewal, providing the theoretical foundation for this study's analytical framework. At the policy level, collection and analysis of the Guangzhou Tianhe District Territorial Spatial Master Plan (2021–2035), Tianhe District regulatory detailed plans, and relevant Finance City planning documents serves as background support for understanding the site's development positioning and policy constraints, while providing official grounding for problem identification and the establishment of design objectives.

(2) Field Investigation Method

Field investigation method is the core means through which this research obtains primary materials. Research conducted multiple systematic site investigations of the District North of Guangzhou International Finance City, with investigation content spanning the following dimensions: First, spatial form level, conducting on-site surveying and photographic recording of district road network structure, block division, building fabric, and skyline characteristics. Second, public space level, systematically observing distribution, usage, and spatial quality of existing public green areas, plazas, street interfaces, and industrial heritage. Third, human activity level, selecting different time periods on weekdays and weekends, recording daily activity trajectories and spatial use preferences of three types of people—Finance City office workers, Junjing Garden residents, and urban village residents. Fourth, sociocultural level,

through interviews with residents and workers, understanding actual needs and usage pain points of various populations regarding public facilities, open spaces, and community services. The primary investigation materials collected above constitute the main content sources for current state analysis in Chapter Three, directly supporting problem-oriented construction of design strategies in Chapter Four.

(3) Case Analysis Method

Case analysis is applied at two distinct stages. During the theoretical construction stage, systematic review of representative domestic and international urban weaving practice cases enables comparative analysis across dimensions of renewal strategy type, modes of spatial intervention, and implementation outcomes, from which replicable design logic and methodological pathways are extracted. During the design strategy development stage, cases specifically relevant to industrial heritage revitalization, mixed-use function insertion, and public space node design are examined in depth, providing direct methodological references for the construction of each weaving strategy.

1.6.2 Research Framework

This research proceeds according to the logical progression of "problem discovery — theoretical construction — current condition investigation — strategy generation — design practice." Starting from the structural dilemmas of high-density urban mixed-use neighborhoods, through literature review and case study establishing theoretical frameworks centered on urban weaving theory, systematic current condition investigations identify specific manifestations of high-density problems within the district, construct weaving renewal strategies responsive to these problems, and verify feasibility through concrete urban design practice.

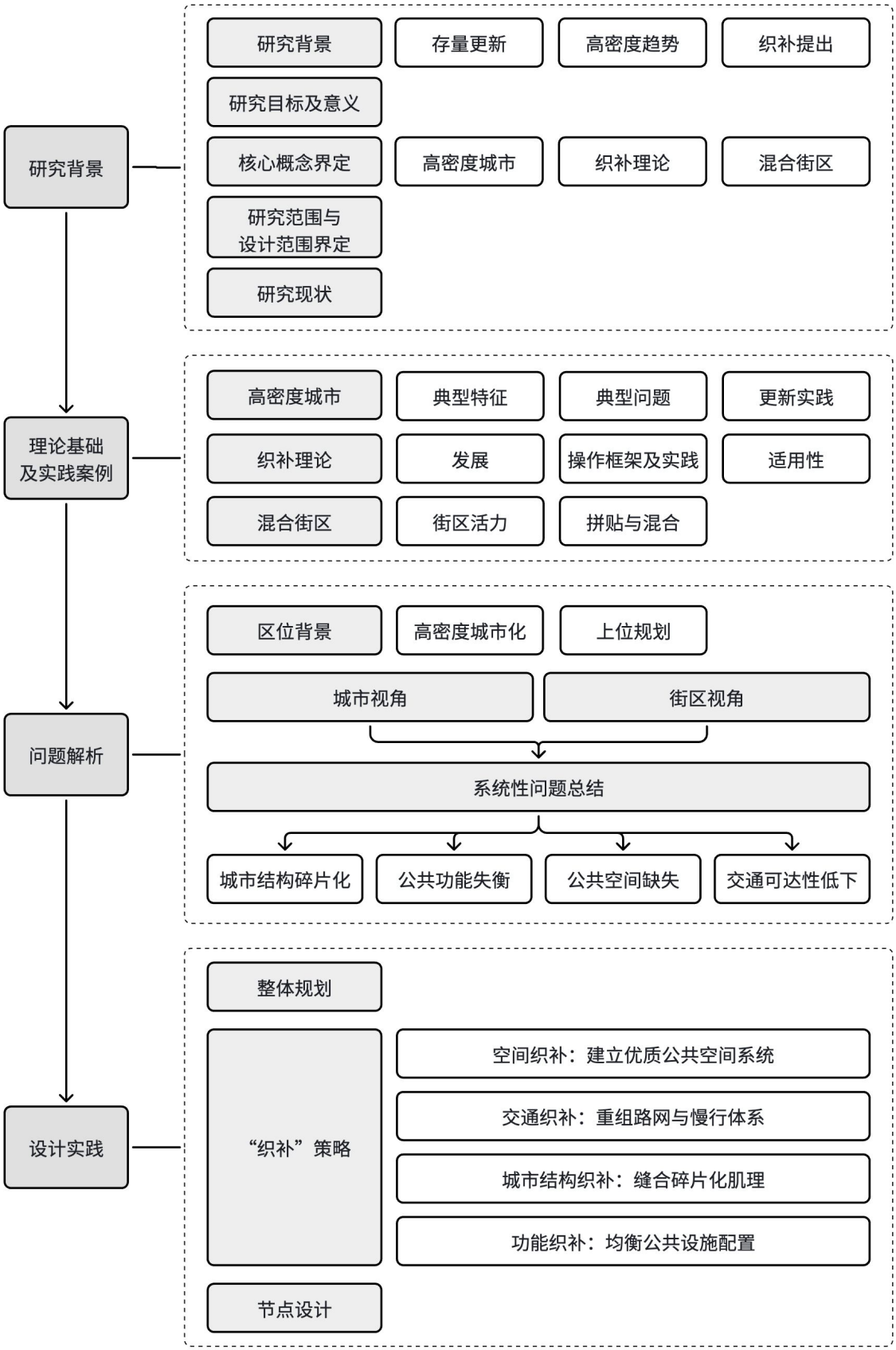


Figure 0-4 Research Framework
(Source: Author)

Chapter 2 Related Theoretical Foundations and Practical Research

High-density cities, urban weaving theory, and mixed-use neighborhoods together form the theoretical framework for this chapter. Rather than parallel relationships, they form a progressive logic of "problem context—operational tools—target carrier." The typical problems of high-density cities reveal the practical background of urban structural fragmentation at the stock renewal stage, providing spatial context for problem formulation. Urban weaving theory, as a methodological tool responding to above problems, with its development trajectory, core elements, and practical cases constituting the theoretical foundation for this research's design strategies. Mixed-use neighborhoods serve both as the basic functional organization type of the research object and as the spatial quality objective toward which weaving intervention is directed. For this research, the transformation from collage patterns of functional coexistence lacking mutual connections toward functional integration in mixed-use neighborhoods represents the core operational proposition of weaving theory in high-density renewal contexts. These three elements together form the complete analytical framework for Chapter Three's research of high-density mixed-use neighborhood practical problems and establish theoretical foundations for subsequent strategy propositions.

2.1 Characteristics, Problems, and Renewal Practices of High-Density Cities

2.1.1 Density Concept

As a core indicator of urbanization, density has evolved from a single physical measure to a multi-dimensional perceptual experience. Physical density is an objective and quantitative spatial index, which mainly involves two dimensions: population density and building density, the latter is usually expressed as the urban gross floor area ratio [4]。 Meta Berghauser Pont and Per Haupt of Delft University in the Netherlands proposed the "Spacemate" evaluation method, which integrates the building floor area ratio (FSI), coverage ratio (GSI), average number of floors (L), and open space rate (OSR) into a unified coordinate system, effectively avoiding the

limitations of a single index and realizing the correlation evaluation between density state and morphological characteristics [31]。 Amos Rapoport further proposed the concept of perceived density in 1975, pointing out that the experience of density not only depends on physical indicators, but is also affected by factors such as individual sociocultural background and the frequency of social interactions in space [31].

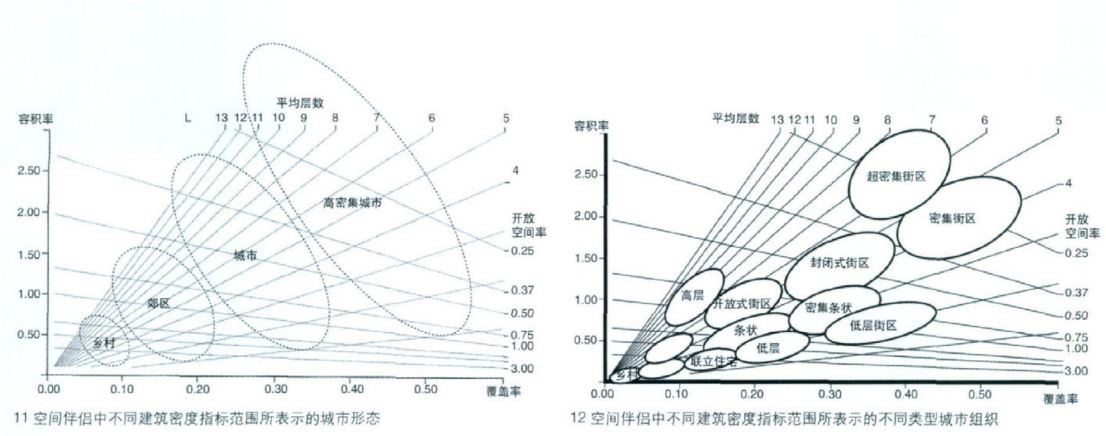


Figure 0-1 Spacemate Coordinate Diagram
(Source: References[31])

In terms of identification standards for high-density cities, the academic community has formed a dual judgment system of population density and building density. In terms of population density, based on the statistical distribution point of 5%, 15,000 people/km² is usually used as the identification threshold for high-density cities [13]. Combined with the planning control requirements of China's Urban Land Classification and Planning and Construction Land Standards (GB50137-2011) on per capita construction land, the researchers suggested that 10,000 people/km² should be used as the identification boundary in the Chinese context [4]. In terms of building density, the urban gross floor area ratio of 0.5 was recognized as the auxiliary cut-off value for high-density built environments [4]. It is worth noting that there is a significant gap between the high-density standards of the East and the West - the population density of the Barbican area in London is only about 406 people/ha, while the population density in China's high-density urban centers is often several times or even dozens of times higher [32]This gap determines that the spatial problems faced by China's high-density cities far exceed the scope of application of Western experience in terms of intensity and complexity, and also constitute the practical basis for this study to focus on the context of China's high-density urban renewal. Wang Hui and Yang Mei (2023) further pointed out that high building floor area ratio, high building

density, and high population density are the determinants of high density, and the three can be considered together, but in some cases, high individual indicators can define high density [33].

2.1.2 Development Background of High-Density Cities

The emergence and development of high-density cities have profound multiple motivations. Population expansion is the most fundamental driving force - human demand for space is not only reflected in direct living space, but also includes all indirect spaces necessary for survival [12]. The limited and scarcity of land resources are the practical constraints that force cities to move towards a high-density model, and for China and most countries with large population bases, compact urban forms and high-density development models are almost the only alternatives [11]. From the economic perspective, the level of industrialization and the stage of economic growth constitute the fundamental driving force of urbanization, and the rapid agglomeration of urban population has given rise to the rise of high-density cities in countries in this stage [13]. In addition, China's public land ownership system makes it relatively easy for urban state-owned land to be developed in agglomeration, and social institutional factors further strengthen the trend of high-density development [13].

From global distribution perspective, with 15,000 people/km² as threshold, 76 high-density cities globally exist, with 76% concentrated in Asia, particularly India (31) and China (9). These cities fall primarily into three categories: cities with inherently small land areas such as Hong Kong and Macau; regional central cities; and primarily commercial, industrial, and port cities.[13]

Table 0-1 Demographic Density-Related Indicators of Asian High-Density Cities

Range	City	Population (10,000 persons)	Area (km²)	Average Population Density (persons/km²)	Peak Population Density (persons/km²)	Metro Network Length (km)
2	Singapour	569	724	7855	70749	203.8
3	HongKong	752	1106	6799	11606	278.3
4	Tokyo	1396.4	2194	6365	27630	316.3

Range	City	Population (10,000 persons)	Area (km^2)	Average Population Density (persons/km^2)	Peak Population Density (persons/km^2)	Metro Network Length (km)
7	Shanghai	2428.1	6341	3830	125478	773
8	Beijing	2153.6	16411	1312	93971	727

(Source: Compiled from materials[34])

The spatio-temporal evolution of urban density in China presents a unique trajectory. From 1981 to 2014, the average building density (gross floor area ratio) of cities in China increased from 0.22 to 0.66, while the average population density decreased from 12,800/km^2 to 9,100/km^2, showing a special trend of rapid increase in building density and continuous decline in population density [4]. This dislocation reflects the structural problem that the expansion rate of urban built-up areas far exceeds the rate of population absorption. In terms of spatial pattern, high-density provinces are mainly concentrated east of the "Yaohuan-Tengchong" line, and are polarized in Beijing-Tianjin-Hebei, Yangtze River Delta, Chengdu-Chongqing and other regions [4]. In terms of international comparison, the compact city theory proposed by Dantzig & Saaty in 1973 is mainly used as a planning goal to curb the spread of suburbs in the West, while China's high-density development is an objective result of more people and less land rather than an active choice [32]. The path suitable for China's national conditions should be the "high-density compact city" model, that is, to achieve intensive sustainable development through high-intensity land development and mixed use under the premise of maintaining the overall compact form[32].

2.1.3 Typical Characteristics of High-Density Cities

The study of high-density urban morphology is not only related to the layout of urban physical space, but also reveals the internal patterns of urban development and its evolution over time [35]. Under extremely high-intensity land use conditions, buildings, roads, open spaces and other morphological elements interact violently within a limited geographical range, and together constitute the physical skeleton that supports the operation of the city. The research significance of urban morphology is to reveal the internal logic between these elements through quantitative means, and to provide a typological reference for urban design in the stock

optimization stage [35]。 The morphological characteristics of high-density cities cannot be summarized in a single dimension: at the macro texture and bottom level, high-density development continues to compress virtual space and reconstruct the balance between physical and open space. At the level of meso-block and road network, the tension between scale control and connectivity determines the conditions for public life. At the level of coping strategies, three-dimensionalization and functional compounding have become typical paths for expanding spatial efficiency in high-density environments under land saturation conditions [36]. The three levels together constitute a complete framework for understanding the spatial logic of high-density built environment, which is discussed in this section.

2.1.3.1 Urban Fabric and Figure-Ground Relationships

The completeness of urban spatial morphology depends on organic combination of tangible and intangible elements. In morphological contexts, building mass constitutes "the muscle" of space while streets, plazas, and green spaces function as "void spaces" forming urban morphology's "skeleton." The two cooperate to create favorable "figure-ground completion." [34]Traditional urban fabric typically exhibits homogeneous and continuous characteristics. Taking the typical low-rise high-density example of Shanghai Yuyuan neighborhood, its spatial organization follows existing urban scales, displaying flat, dense fabric states reflecting how traditional cities balanced land utilization and spatial order in specific historical stages. [35]

With the evolution of urbanization, the relationship between the map and the bottom in the high-density environment has undergone profound changes. Due to the extreme scarcity of land resources, the building volume gradually shifted from horizontal extension to vertical deep excavation, and the traditional balance point at the bottom of the map was migrated [12]. In extremely dense urban areas, the attribute of architectural entities as "bottoms" is constantly enhanced, and their squeezing of public space as "maps" has reached a critical state. Although high-density building clusters can form a coherent and unified morphological interface at the macroscopic level, the original organic order between entities and virtual bodies is being reconstructed at the medium and micro scales, showing a morphological pattern in which entities are absolutely dominant and virtual spaces are highly limited [12].

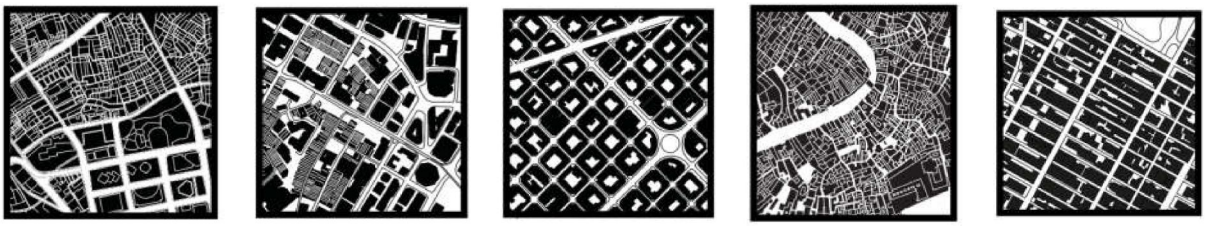


Figure 0-2 Figure-Ground Relationship Comparison of Parna (left) and Saint-Dié (right)
(Source: References[8])

2.1.3.2 Block Scale and Road Network Configuration

As a collection of land enclosed by urban roads, the scale of blocks directly determines the spatial organization efficiency and connectivity of high-density cities [35]. Traditional urban design tends to bring people and activities together on streets and squares through intimate spatial distances, encouraging pedestrian traffic and outdoor stay [19]. In order to bear the huge travel demand, modern high-density cities generally form a spatial pattern of "small block dense road network". The average size of the block in the central area of Tokyo in Japan is only 0.64 hectares, and the block in Macau is usually controlled within 300 m × 300 m, and there are even a large number of smaller block units [13].

The reduction of block scale has a significant positive effect in high-density environments, with smaller block sizes and dense intersections providing extremely high connectivity, promoting pedestrian activity and stimulating commercial agglomeration along the route [37]. However, when the block scale is too large, the opposite is true. The area of new blocks in some major cities in China is often between 50 and 100 hectares, which is 5 to 10 times that of Macao [13]. In super-large-scale blocks, the layout of functional facilities is scattered and the spacing is too large, the outdoor experience becomes boring, and people and activities are effectively isolated in space and time, which seriously inhibits the occurrence of public life [19].



日本，东京　　新加坡，Telok Ayer　　西班牙，巴塞罗那　　意大利，威尼斯　　美国，纽约

Figure 0-3 Urban Form with Different Block Scales
(Source: References[38])

The road grid bureau is the skeleton of high-density urban form, and its density reflects the intensity of urban land development and the complexity of transportation demand [5]. One of the distinguishing features of high-density cities is the high density of street networks. The average density of the road network in Macao is 13.9 km/km², and the maximum density of the Macao Peninsula is 21.5 km/km², far exceeding the maximum limit of 7 km/km² in mainland China [13]. This high-density road network cuts urban land into very small units through the hierarchical interspersion of main roads, secondary roads, and branch roads, and the minimum road unit scale is maintained between 40 and 50 m on average [38].

The changes in the urban spatial pattern are also profoundly contrary to the choice of road grid bureau. The spatial morphology of Guangzhou has undergone an evolution from cluster and star shape to ribbon clustering and multi-group semi-network type, accompanied by the transformation of the road network from checkerboard to "checkerboard + belt + double ring" mode [5]. Due to the superposition of extreme terrain and ultra-high density in Central, the east-west traffic arterial roads and the north-south step pedestrian streets together form a hierarchical three-dimensional network [37]. The dense road system not only provides traffic capacity, but also acts as a cutting force for the land, and the boundaries of the plots are restricted by the geometry of the road, and the building form has to be cut and adjusted accordingly, which objectively changes the continuous logic of the urban fabric[38].

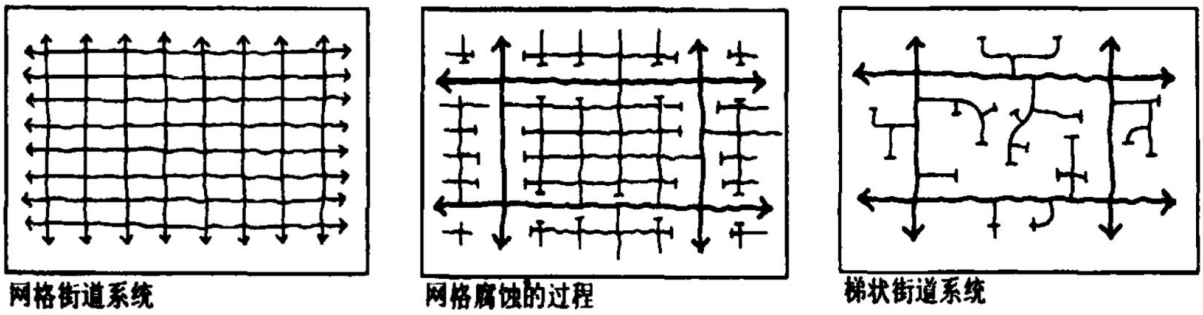


Figure 0-4 Analysis of Different Street Network Structure
(Source: References[39])

2.1.3.3 Three-Dimensionality and Functional Mixing

In high-density environments, the extreme scarcity of surface land resources has become the fundamental driving force forcing buildings to expand into three-dimensional space. The evolution of construction technology and the elevator industry has enabled cities to seek incremental spatial capacity from high altitude and underground[38]. In this context, three-dimensionalization is no longer a simple vertical replication of isolated buildings, but manifests itself as a multi-level organization model that includes architectural entities, external open spaces, and urban transportation systems[34].

The specific manifestation of vertical space has significant characteristics of deep development. As a representative of extreme underground, super-high-rise buildings often maximize land performance through extremely large aspect ratios[34]. At the same time, the integrated utilization of underground space has become an important fulcrum of the three-dimensional model, which is manifested in the vertical superposition of underground transportation hubs, large commercial streets, and municipal pipelines, which provides the necessary resource space for releasing public pressure on the surface layer[38].In the early twentieth century, Eugene Hernard's theory of "secondary ground" in "The City of the Future" demonstrated the possibility of creating a spatial base with the quality of a ground environment in the air, effectively compensating for the lack of public open space due to the occupation of the surface by setting up sky gardens, roof platforms and pedestrian bases.

The three-dimensional connection network is the core expression of three-dimensional features in spatial association. Yan Xunqi observed that in an ultra-high-density environment, the city is a three-dimensional network composed of platforms, overpasses, underground passages, etc., and this "urban connector" weaves the originally isolated building monoliths into

a highly fluid whole, which is of positive significance for improving the urban structure and improving the quality of life of citizens[40]. The three-dimensional logic is also reflected in the access of the vertical walking system, which connects with transportation facilities at different elevations through the air corridor, allowing the public to complete cross-block movement in a multi-dimensional space, which greatly improves the accessibility of high-density core areas[38].

The high degree of functional mixing is the logical core of the operation of high-density environments. In high-density urban central areas, single-function buildings are difficult to balance high land value with complex social needs, and "mixed land use" has become a fundamental feature of sustainable development in such environments[38]. In this model, urban functions are no longer satisfied with proximity on a two-dimensional plane, but turn to three-dimensional "vertical urbanism", that is, the hybridization and symbiosis of different attribute functions within the same architectural entity[41].

Under this compound logic, an organic synergistic relationship is formed between functional elements. Business office, public culture, and retail functions are organically integrated through shared public space, forming a complex type with highly integrated functions[34]. Rem Koolhaas's theory of "crowded culture" in "Crazy New York" further clarifies that density itself is the source of urban vitality, and that buildings can greatly improve the efficiency of space use through the full-time juxtaposition and dynamic alternation of functional elements[42]. This symbiotic relationship allows the urban environment to maintain full-time operation and carry more high-quality life content in a limited space[32].

Functional compounding brings significant comprehensive benefits to high-density environments. At the economic level, highly mixed industries and service institutions are conducive to the efficient concentration of resources and facility sharing, reducing the additional commuting costs and municipal infrastructure investment caused by the separation of functions[32]. At the social level, dense public activity facilities increase opportunities for informal public interaction, enhancing community vitality and safety[36]. Wu Yihao and Liu Yang (2023) also pointed out from the perspective of urban morphology research that three-dimensional and composite development in compact and high-density environments has transcended single physical spatial planning and deeply integrated the three dimensions of

society, economy, and ecology, which is the mainstream direction of contemporary high-density urban spatial governance[43].

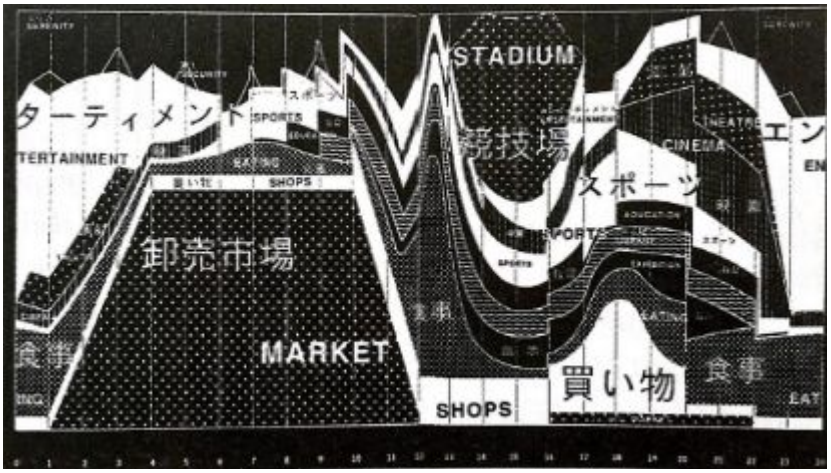


Figure 0-5 Yokohama Convention Center 24-Hour Functional Mixing Diagram
(Source: References[42])

2.1.4 Typical Problems in High-Density Cities

2.1.4.1 Urban Fabric Fragmentation

The fragmentation of the texture of high-density cities stems from the superposition of multiple spatial pressures and the deviation of planning logic. In the context of rapid urban expansion, the saturation of land supply has prompted developers to ignore the internal connection between urban fabric and the surrounding environment, and arbitrary placement of large building volumes is considered to be the core cause of the "urban texture dilemma"[26,34]. In addition, modern planning's over-reliance on automobile traffic has led to the continuous expansion of roadways, and mechanical and indifferent spatial design has inadvertently dismembered the otherwise coherent public living environment[19].

Fragmentation manifests itself as a series of negative material representations in terms of spatial morphology. The first is the emergence of a large number of "lost spaces", that is, "vacuum zones" that are forgotten on the edge of architecture and cities due to the lack of approachable scale, which cut off the continuity of space[34]. Secondly, the relationship between architectural entities and the city as a whole is becoming looser, showing the characteristics of "islanding" that are not connected to each other. In addition, urban green open spaces are also

severely fragmented in form, and the systematization and connectivity of various scattered green spaces are low, making it difficult to exert large-scale ecological benefits[44].

The fragmented pattern has had a profound impact on urban public life. When public living spaces are dismembered, the streets are often reduced to empty places, and public activities are reduced to a minimum[19]. The fragmentation of space directly leads to the breakage of pedestrian continuity, and walkers have significant perceptual obstacles and behavioral resistance when facing a network blocked by wide roads or giant plots[26]. The lack of outdoor experience has greatly reduced people's willingness to stop, take a nap, and socialize in public spaces, and spontaneous and social activities tend to disappear, and the function of cities as carriers to support public life and social interaction is seriously damaged[19].

2.1.4.2 Public Space Shortage and Privatization

In the context of high-density urbanization and the high intensification of the built environment, the problem of public space is no longer just a simple representation of insufficient quantity, but has gradually evolved into a comprehensive problem of multiple contradictions such as total shrinkage, accessibility imbalance, weakening of publicity and scarcity of restorative resources. As an important medium to regulate the relationship between humans and nature, carry daily interactions and improve the well-being of residents, the survival state and mechanism of public space in high-density built environments show more complex characteristics. Researchers' attention to high-density urban public space has gradually shifted from the early index accounting to a comprehensive examination of space quality, ecological performance and social psychological effects.

First, the fundamental dilemma faced by high-density urban public space is the continuous contraction of its total volume and the significant imbalance in accessibility. Under the guidance of land development income, limited urban land is often prioritized for high-output functions such as residential, office and industrial functions, while green space and open space continue to shrink under the continuous squeeze of high-intensity construction. Studies have shown that densely populated urban areas usually have fewer green open spaces, and there is a significant negative correlation between the level of greenery in residential areas and residents' psychological stress[36]. Taking the high-density neighborhood of Guangzhou as an example, the

green space system shows obvious fragmentation characteristics, and there is a lack of systematic organization at the mesoscale, making it difficult to form an overall ecological effect[45]. At the same time, pedestrian space is also seriously encroached upon, and sidewalks are heavily occupied by bus stop kiosks and non-motor vehicle parking facilities, resulting in a continuous decline in the quality of the slow travel environment[26].

The problem of insufficient supply of public space is further manifested in the spatial imbalance of accessibility. Studies have shown that only 19.47% of the built-up areas in Shenyang can easily reach urban parks on foot, and large-scale green spaces are mainly concentrated in the suburbs, making it difficult for residents in the central area to enjoy high-quality public spaces on a daily basis[46]. Relevant studies in Shenzhen also pointed out that there is obvious inequality in the distribution of quantity, location, and accessibility of public leisure space, which seriously restricts the performance of public service functions[36]. Therefore, the problem of high-density urban public space is not only "less", but also the imbalance of spatial distribution of limited resources, making it difficult to truly serve the daily life of high-density people.

Secondly, while the total amount of public space continues to shrink, its nature has also changed significantly, that is, public space has shown a certain degree of privatization. Gale pointed out that in recent years, a large number of "plausible public spaces" have emerged in cities, such as private shopping arcades, underground shopping mall systems, and indoor "plazas" in hotels, which are formally open to the public, but their openness, stay, and public attributes are significantly limited[19]. From the overall urban level, this trend will lead to the shift of crowd activities to semi-private and controlled spaces, and the streets and squares that originally carried the function of open communication will gradually lose their attractiveness, and the public living space will continue to be dismembered, and the streets will become deserted and boring [19]. In the context of Chinese cities, public spaces also have the problems of insufficient openness, single function, and weak effectiveness [36]. This shows that the problem of public space in high-density environments is not only insufficient physical quantity, but also involves the substantial weakening of publicity.

Further, the dual pressure of lack of public space and privatization also directly leads to the scarcity of restorative environmental resources. The so-called restorative environment refers to

the environmental system that can help individuals recover from psychological fatigue and negative emotions [46]. This theory is mainly based on Ulrich's stress reduction theory and the attention recovery theory proposed by the Kaplan couple: the former emphasizes the positive effect of the natural environment on stress relief, while the latter points out that an environment with characteristics such as "distant, charming, extended, and compatible" can promote cognitive recovery and psychological recovery [47]. However, in high-density cities, such restorative spatial resources are often extremely limited. Empirical studies show that the green coverage of built-up areas in many megacities does not increase with the expansion of urban scale, and the per capita natural resources are insufficient for a long time [48]. Taking Shenyang as an example, less than 20% of the areas are easily accessible on foot to high-quality restorative spaces such as parks, and the visual landscape that most residents come into contact with on a daily basis is difficult to effectively relieve psychological stress or promote attention recovery [46].

It can be seen that in high-density urban environments, the lack of public space and privatization are not simply physical space problems, but structural dilemmas that affect ecological benefits, mental health and social communication quality at the same time. On the one hand, the total amount of public space is insufficient and the accessibility is unbalanced, making it difficult for high-density residents to continue to obtain basic open space resources. On the other hand, the privatization and weakening of public space have further compressed the reality carrier for daily communication and psychological repair. Therefore, high-quality public space is not only a landscape complement in a high-density urban environment, but also an important basic condition for maintaining residents' well-being, social vitality and urban public life. This also shows that in a high-density built environment, the restoration and reconstruction of public space is not only related to the improvement of environmental quality, but also an important entry point to respond to urban structural problems. The low open space density in high-density built environments not only reduces the space for residents' leisure and physical activities, but also fundamentally reduces the opportunities for individuals to come into close contact with the natural environment, which has a lasting impact on residents' physical and mental health [49].

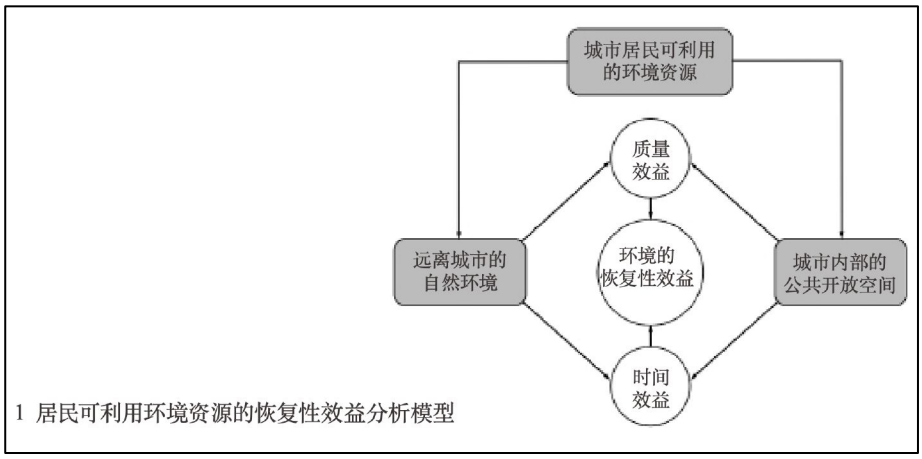


Figure 0-6 Environmental Resource Restorative Benefit Model
(Source: References[46])

2.1.4.3 Imbalanced Public Function Configuration

The imbalance of public service facilities in high-density cities is concentrated in the dual superimposition effect of administrative boundary segmentation and enclosed block development patterns. At the administrative level, public activity centers with favorable locations often cannot achieve unified planning, construction, and management due to administrative divisions, resulting in situations of "relatively backward economy, uncoordinated urban morphology, and insufficient functional performance," which overall constrains the effective implementation of city public service functions[26]. At the spatial organization level, the walled residential district enclosure model prevents internal supporting facilities from opening and sharing with the city, each functional block operates independently, with neither spatial transitions nor facility coordination between blocks, forming extensive public service vacuums. These two mechanisms superimposed make the actual service efficacy of public facilities in high-density cities maintain long-term significant misalignment with population density, making it difficult to construct integrated public service systems covering entire neighborhoods.

2.1.4.4 Low Transportation Accessibility

The traffic dilemma of high-density cities is rooted in the structural contradiction between development intensity and transportation land. Taking Guangzhou as an example, transportation land accounted for only 5.24% of urban construction land in 1995, which is far from the foreign average。 This structural contradiction is directly manifested at the road network level as

insufficient density and connectivity breakage: the highest density of the road network in the current normative urban areas in Chinese mainland is only 7 km/km², while the average density of the road network in high-density cities such as Macao is 13.9 km/km² [13], and the cutting of urban plots by wide arterial roads further leads to "difficulty in connecting various functional zones and greatly affecting the continuity of pedestrians' activities" [26] 。

On this basis, the street space allocation method dominated by motor vehicles further compresses the living space of the slow travel system. The roadway continues to expand and occupy the center of the street, and the sidewalk space is encroached upon by various municipal facilities, "causing the current situation of difficult walking and poor quality for citizens"; The motorized transportation network tends to be saturated, the waiting time for crossing the street is extended, and the spacing between crosswalks is expanded, which damages the spatial experience and traffic efficiency of pedestrians [26]. At the same time, the walled enclosure mode of the closed residential area makes the internal road network unshareable, further cutting off pedestrian connectivity within the area. The above multiple mechanisms are superimposed on each other, so that the slow travel accessibility in the central area of high-density cities continues to deteriorate, and it is difficult to form a pedestrian continuity network on which public life depends.

2.1.5 Practice Cases of High-Density Urban Renewal

2.1.5.1 Barcelona, Spain: Fragmented Urban Renewal Based on Public Space Revival

Barcelona is one of the most densely populated cities in Europe, with a local density of 36,000 people/km² in the extension area (L'Eixample) [50], and the spatial skeleton of the city was laid by the 19th-century engineer Ildefonse Cerda. About 9 square kilometers are covered by about 550 approximately square streets with a side length of 113.3 meters, separated by 20 meters wide urban roads. At the beginning of the planning, Seda emphasized that the density of neighborhood buildings should not exceed 50%, and the remaining land should be reserved as urban gardens to form an open, low-density urban environment [51]。 However, with the influx of immigrants at the end of the 19th century, the urban population grew rapidly, and the government had to gradually relax the restrictions on urban development density。By the middle of the 20th century, each street was like a rectangular building filler, and most of the buildings

in the center could only be lit by skylights or narrow patios. Only extremely rare streets have public activity spaces, and most of these activity spaces cannot meet the activity needs of residents in several nearby streets in terms of area and form. All streets have a single function and lack space for people to communicate and move, so they become crowded spaces that serve urban development and human settlements [52].



Figure 0-7 Barcelona Urban Renewal
(Source: References[52])

In 1976, the new government began addressing urban decay problems. To develop the city into one suitable for resident living, the municipal government adopted Chief Planner Oriol Bohigas' suggestion for "fragmented renewal" of the city: starting with small public spaces, employing "weaving tactics" with point-entry interventions, conducting public space construction using original neighborhoods as basic units, converting occupied courtyard interiors into small parks or squares, allowing old neighborhoods to gain new vitality and vigor. This small-scale public space development decomposed complex old city renovation into individual problems with strong pertinence and flexibility, effectively avoiding the blindness and destructiveness of large-scale renovations. From 1981 onward, Barcelona's government has completed renovation and construction of over 450 public spaces, with early phases achieving the renovation of approximately 200 different types of squares in a short period. [53]

(1) City Scale: Public Space Insertion

An important part of the expansion block improvement project is to clean up the inner courtyard of the street area occupied by the open space, and this huge project has continued to work hard to this day, which has played a great role in improving the living environment [52]. According to the land property rights policy in the early stage of the construction of the expanded

block, the land occupied by each new block may be owned by several capital privates, and the government not only needs to negotiate with private landowners but also resettle residents who have been demolished from the block when reclaiming land for reconstruction of public space, which is a very complex process [52].

Taking the ProEixample project launched in 1996 as an example, the project is organized by the municipal government and operates in the mode of multi-party joint investment, and the internal space of the neighborhood is renovated under the principle of creating positive civic space. It is planned to complete the renovation of 104 neighborhood courtyards with a total area of 163,000 square meters in the expansion area by 2008, so that every 9 neighborhoods have a high-quality public inner courtyard space, forming a community service radius of 200 meters [51]. As of 2011, 44 street courtyards in the expansion area have been renovated and renovated, with a total area of 93,000 square meters, which have quickly become oases of tranquility in the urban grid and the focus of citizens' lives, injecting new vitality into the expansion area [52].

The renovated inner courtyard space is partially combined with buildings of historical significance to form a place that not only has ornamental and protective significance but also provides space for social activities, so that the activities of travelers and local residents are intertwined, and the vitality in the ancient community is increased. The inner courtyard space of the other part of the street has been renovated and opened up as a public square, providing a place for citizens to carry out various cultural activities. In addition, some street-side buildings with courtyards, such as luxury residences or hotels, have adopted the method of regularly opening the courtyards in the street contours, allowing the public to use their own courtyards during the day, which not only meets the public's demand for public space, but also ensures their own private rights and interests [52].

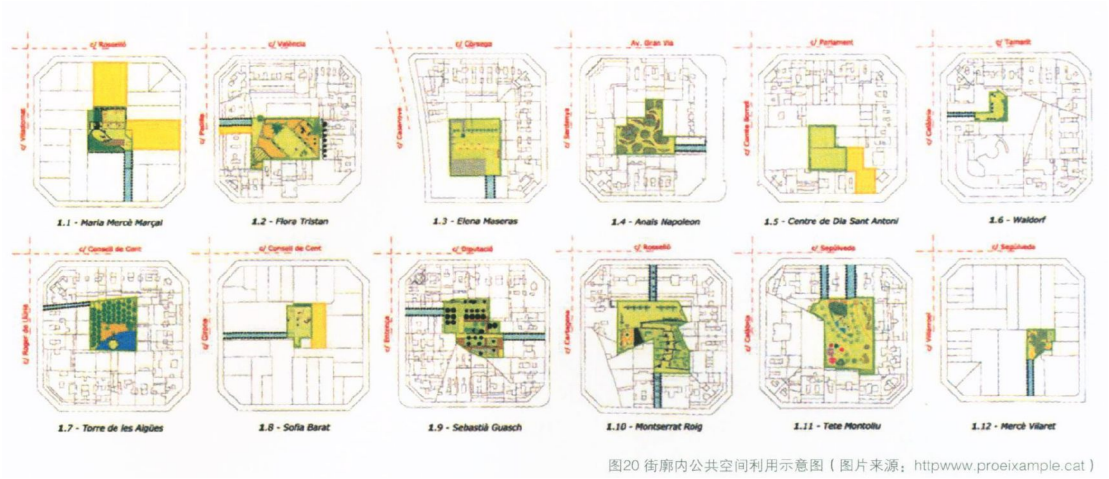


Figure 0-8 Standard Unit Renewal
(Source: References[52])

(2) Neighborhood Scale: Street and Streetside Plaza Design Renovation

Barcelona's expansion district space between blocks is divided into two systems: roads and roadside plazas. Following district renovation, roads reduced motor lanes while increasing pedestrian space on both sides; narrower walkways were widened, with added space becoming roadside plazas where ground-floor businesses could use such spaces for product display, attracting people's attention, substantially expanding public street space and significantly improving usage rates with greater humanization. The most special and vital roadside plazas are the angled plazas at the four corners of intersections—these corner spaces originally accommodated streetcar turning radius, deliberately preserved in subsequent road renovations to relieve traffic pressure at block intersections. During expansion district renovation, these angled plazas were completely preserved while deliberately increasing connections with other public activity spaces; corner shops arranged their displays with rich variety and added leisure facilities, making angled plazas become interesting spaces for street gatherings. [52]

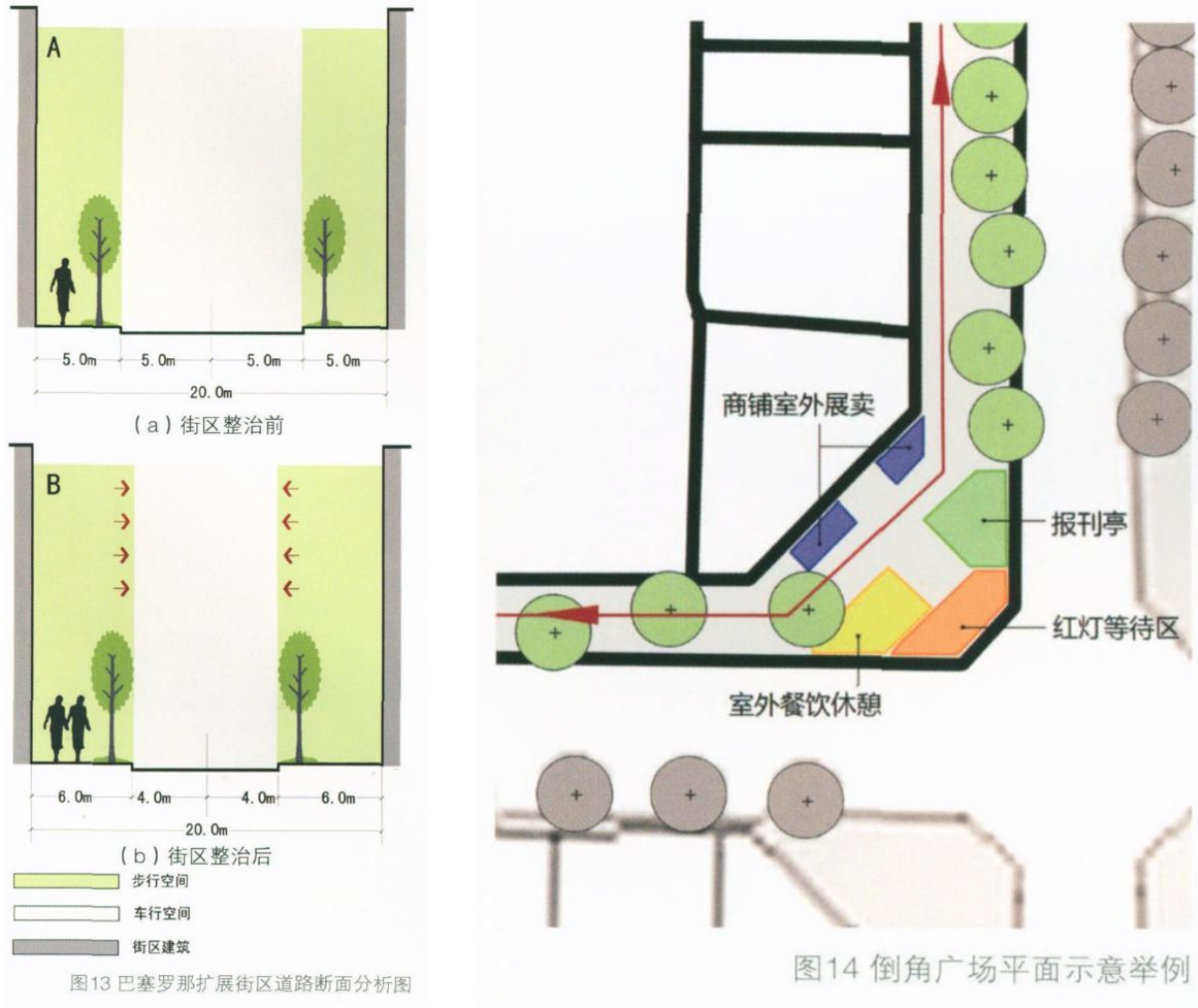


Figure 0-9 Street Space Renewal
(Source: References[52])

(3) Building Scale: Rooftop Platform Utilization

Blocks without internal space renovation also found ways of opening public spaces—Barcelona residents successfully created diverse outdoor activity sites using building rooftop platforms, breaking the overcrowded block situation. They assigned different functions to added rooftops in block interiors, either planting green roofs to create rooftop gardens or arranging leisure facilities to create activity platforms; the height variations of these rooftops fully demonstrated the richness of rooftop public spaces. Taking the Batlló apartment block as example, its entire rooftop platform system comprises open and private spaces, forming a complete three-dimensional public space system: the large department store roof on the block's east side provides open platforms where people can directly ascend via escalators regardless of shopping needs, completely open activity spaces; the Batlló apartment's second-floor inward-

facing platform is private space for visitors and apartment residents only, yet remains unenclosed, visible from other block platform spaces; residential rooftops between comprise neat lawns and various shrubs, forming the private portion of the block's rooftop public space for residents' various outdoor activities. Viewing from the block's rooftops across all directions, public spaces display rich colors and varied heights, with residents fully exercising creativity and wisdom to create comfortable environments within crowded cities. This rooftop-focused advocacy elevates public space usage from two-dimensional to three-dimensional, not merely maximizing spatial utilization but also enriching and innovating public activity approaches.[52]

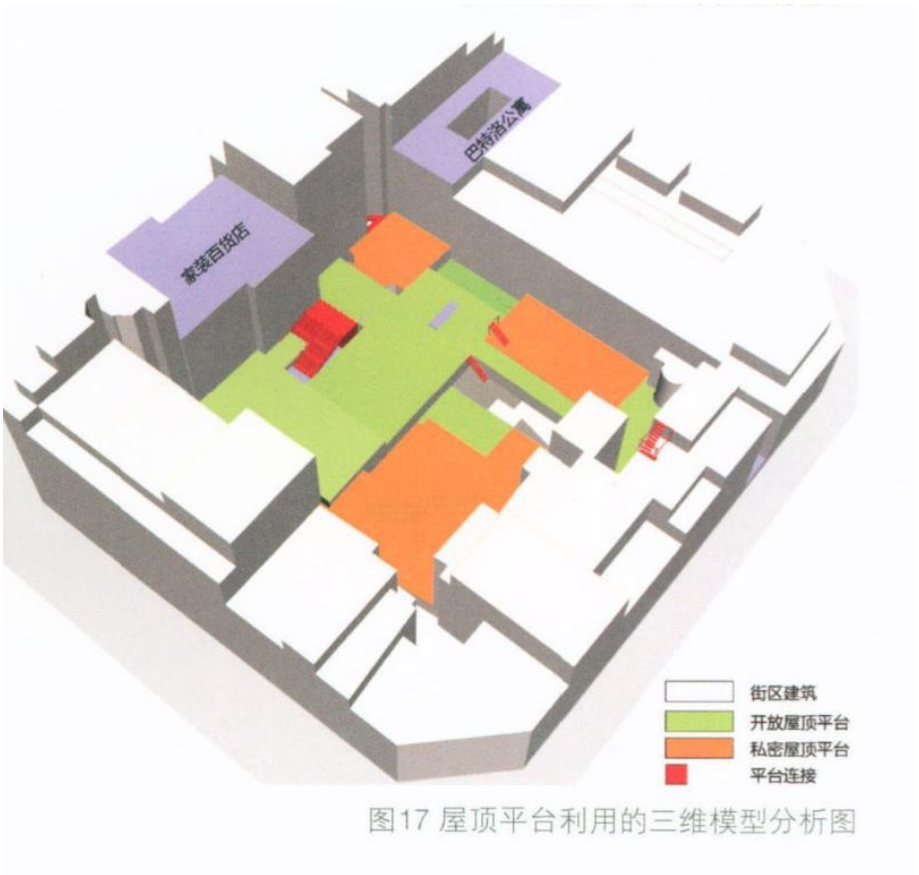


Figure 0-10 Rooftop Platforms Renewal
(Source: References[52])

(4) Case Insights

Barcelona's Extended District renewal practice demonstrates that supplementing public space in high-density built environments does not necessarily depend on large-scale demolition-reconstruction, but rather can progressively convert scattered negative spaces into shareable public life places through multi-level intervention methods—clearing occupied courtyards,

optimizing road cross-sections, activating rooftop platforms—within basic unit neighborhoods while respecting existing urban fabric and community structure, progressively reconstructing the district's public space system. The Finance City's northern district similarly faces long-term public space erosion by walls, enclosed blocks, and single-function boundaries, with insufficient integration structures between different sectors. Barcelona's case, embodying layered insertion logic, provides crucial insights for this research in identifying interventable public space nodes within districts and establishing public space networks transcending sectoral boundaries.

2.1.5.2 Hong Kong: Three-Dimensional Connectivity and Pedestrian Vitality in High-Density Environments

Hong Kong is one of the most densely populated cities in the world. Due to the mountainous terrain and port coastline, only about 25% of the land in the whole area is suitable for construction, and urban development is highly concentrated within this limited range, with a population density of 43,000 people/square kilometer in some areas of Kowloon, and more than 50,000 people/square kilometer in high-density areas such as Kwun Tong and Yau Tsim Mong, with an upper limit of 10 residential plot ratios in the central area and 15 for non-residential development[54].

Under this extreme constraint, the evolution of Hong Kong's urban space is not entirely dominated by top-down official planning, but by commercial interests, survival pressures, and high-density environments that have given rise to a set of bottom-up spatial operation logic。 At the planning level, this spontaneous trend is guided by two structural mechanisms: one is density zoning, which concentrates high-intensity development in the urban core with strong public transportation accessibility, and the area between the high-density construction belt is mainly mountainous and country parks, accounting for about 65% of the total area, so that the city maintains a macro-level balance between high-density and large-scale open space [37]; The second is spatial three-dimensionalization, which uses a three-dimensional pedestrian network to meet the connectivity needs that cannot be met by the ground road network, and achieves spatial efficiency far beyond the flat area on limited land [54].

(1) Central—Three-Dimensional Pedestrian Network and Public Connectivity in High-Density Environments

The Central area is the most concentrated experimental site for Hong Kong's three-dimensional spatial strategy. The pedestrian system in this area is composed of pedestrian walkways, overpasses, underpasses, building sharing halls, rooftop gardens, and pocket parks, forming a continuous three-dimensional pedestrian network, where underground rapid transit, ground conventional transportation, and aerial walkways are connected [37]。 According to Article 233 of Hong Kong's Practice Note for Authorized Persons, private developers can receive five times the floor area ratio compensation for every area of public open space they provide[55]。

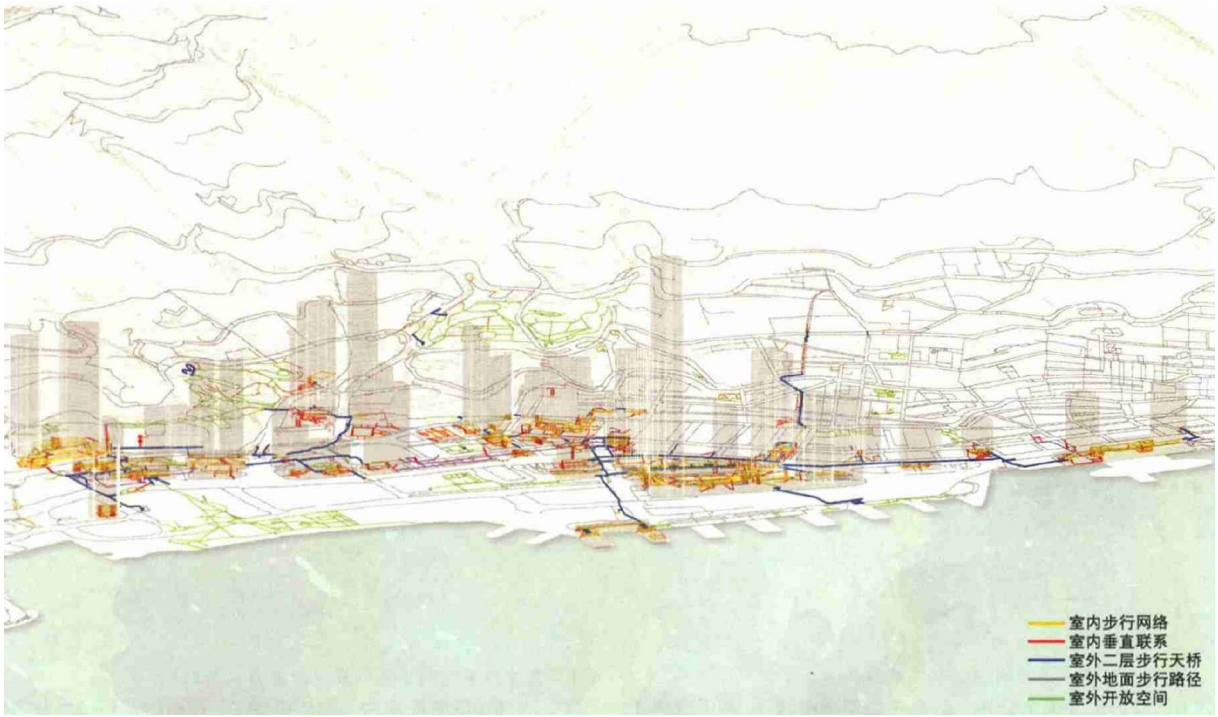


Figure 0-11 Pedestrian System indoor and out door of HongKong
(Source: References [56])

The flyover system is the backbone of this network. The Connaught Road Pedestrian Bridge, designed by Parmadana & Co., is about 1 km long and is the longest pedestrian bridge in Asia at the time of its completion, passing south through the buildings in the financial district from the Victoria Bay Ferry Terminal to the residential area of Mid-Levels, and maintaining continuous connections to commercial and recreational facilities along the route, transforming the path originally intended for passage into a residential layer with lingering properties [55]。 The Central-Mid-Levels escalator system built in 1993 is a typical case of vertical weaving: the system is attached to the corridors of two historic stone steps, Curley Street and Xieli Street,

spanning all the horizontal streets between Central and Mid-Levels, stitching together two functional areas that have been separated by the terrain for a long time in the vertical direction, and giving birth to the spontaneous gathering of characteristic commercial formats in the SOHO area along the line. The relationship between walking vitality and three-dimensional connectivity quality has been quantitatively verified at the spatial analysis level. The R^2 correlation between the traverse index and the measured pedestrian flow based on the ground 2D road network alone is 0.29, while the 3D model incorporating flyovers and underpasses increases this value to 0.64, which means that the correlation between the spatial distribution of pedestrian vitality and three-dimensional connectivity far exceeds the influence of ground road network density [37]. In the context of stock renewal, where the ground road network is difficult to reconstruct on a large scale, the precise layout of vertical connection nodes has a repair effect on the overall pedestrian accessibility of the area, and has the effect of encrypting the super-horizontal road network.

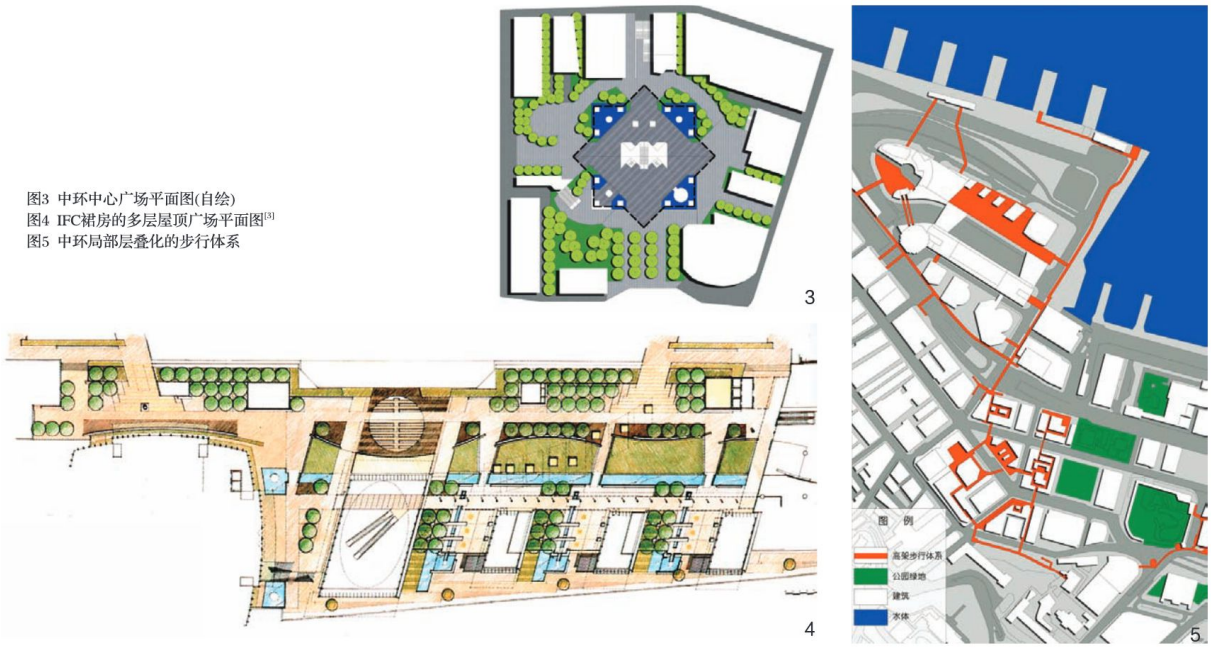


Figure 0-12 Hong Kong Central Pedestrian System
(Source: References[55])

(2) Mong Kok/Sheung Wan—Small Block Scale and Bottom-Level Interface Continuity Supporting Street Vitality

The traditional streets of Mong Kok and Sheung Wan provide a completely different dimension of reference from the Central three-dimensional system - how the street form itself continues to produce urban vitality through scale characteristics without systematic top-level intervention.

The width of traditional streets in Hong Kong is mostly kept between 10 and 30 meters, and it has not experienced the destructive widening that is common in the mainland. From Sheung Wan MTR Station to HSBC Bank Tower, there are more than 70 independently named streets within a square kilometre, most of which are within 200 metres, and there are many short streets within 300 metres in Mong Kok, Kowloon[57]。 This block scale controls how often users encounter different functions and crowds in their daily paths—the shorter the block, the more corners, and the greater the likelihood of contact. When the D/H ratio is close to 1, the width of the street forms a harmonious and symmetrical spatial ratio between the building height, and the pedestrians' attention is completely attracted by the continuous commercial interface on the ground floor, and the perception of the building height itself takes a back seat [57].

The continuity of the underlying interface is the material basis of this dynamic mechanism. The ground floor of the building on both sides is dominated by small-scale diversified commerce, closely arranged and rarely left blank, forming a continuous and closed interface, and the commodity display, pedestrian activities and street space are highly integrated. Due to the narrow road surface in the Central and Sheung Wan area, the streets are often combined with the market, further enhancing the activity of the interface. The same material space carries different user groups and activity types at different times, and replaces space expansion with time substitution, which is a low-intervention and high-efficiency method developed under extreme space constraints [57].

This set of street vitality mechanisms is highly consistent with the four principles of urban diversity summarized by Jane Jacobs: retaining old buildings to provide low-cost places for small and medium-sized businesses, maintaining residential density to form complex needs, increasing small shops along the streets, and reducing the scale of blocks to increase contact.

(3) Case Insights

The two cases in Hong Kong show that in the context of high-density urban renewal, the connectivity efficiency and vitality of the street system do not mainly depend on the incremental expansion of the road network, but more on the optimization of the connection structure and the organizational quality of the underlying interface. The case of Central shows that in the built environment where the ground road network has tended to be solidified, the improvement of

pedestrian connectivity can be achieved through the intervention of nodes at the vertical level, and the key is not to add new roads, but to identify the location of connection breaks and establish effective connection relationships between different levels. The traditional streets of Mong Kok and Sheung Wan show that the scale of small blocks, frequent corners and continuous underlying interfaces can continue to support street vitality in a high-density environment. The practice of improving the carrying efficiency of limited street space through time-sharing use further shows that flexible use can also become an important supplementary path to activate street vitality under the condition of limited space resources. The two types of experience are consistent in the renewal logic, that is, the focus of high-density urban street renewal is not simply to increase the number of roads, but to improve the overall accessibility and vitality level of the street system through precise intervention in connection nodes, interface continuity and space usage. This understanding has direct implications for this study: in the renewal of high-density mixed blocks, the focus of street system restoration should be on the precise intervention of the connecting structure and the creation of vitality of the underlying interface, rather than relying on large-scale road network reconstruction.

2.1.5.3 Turin, Italy: Post-Industrial Abandoned Sites to Urban Public Space Nodes

Turin is one of the largest and most systematic examples of post-industrial urban transformation in Europe, and its core spatial challenges - the lost space formed by large areas of industrial wasteland, the fragmentation of urban structure and the vacuum of public life - are highly similar to the current dilemma of the East Asia Magnetic Factory plot in the northern area of the Financial City. As the headquarters of Fiat Automobiles, Turin historically produced 80% of all Italian cars every year, and the city's economic and spatial structure is highly dependent on a single industrial system [58]. After the 1980s, with the comprehensive decline of the manufacturing industry, a large number of factories were forced to close, and after the evacuation of industrial production, more than 5 million square meters of industrial waste land was left in the urban center, of which the four largest key renovation areas (Le 4 Spine) covered a total area of about 3 million square meters [59]. As a result, a large public function vacuum has emerged in the center of the city, and the space that originally carried urban life has become an unused

negative ruin, and unemployment, population outflow, and the collapse of community vitality are superimposed on each other [60].

(1) Parco Dora: Linear Skeleton Stitching Fragmented Blocks

Parco Dora is the largest single project in Turin's urban renewal. The project site "Spinner No. 3" covers an area of 45 hectares, formerly known as the superposition of multiple heavy industrial plants, commissioned in 2004 and completed in 2013, with a total construction area of about 39 hectares.



Figure 0-13 Parco Dora
(Source: References[61])

The central spatial challenge of the site is structural fragmentation: the five subdivisions – Vitali, Ingest, Valdocco, Michelin and Mortara – are independent along the boundaries of the original factory plots, with terrain height differences, industrial remains and the Dora River forming an internal physical barrier, and the five plots are spatially separated from each other, which is typical of "closed and disordered as a whole" fragmentation pattern [58]. The core response of the design strategy is to use a 700-meter-long elevated steel pedestrian bridge as the linear backbone, starting from the covered promenade of Mortala Road, passing through Vitaly, crossing the 6-meter height difference of Huadao Corner, and finally reaching Ingister Gardens, stitching together three originally separated sections in the north into a continuous walking experience at the aerial level [60]。 The significance of the linear flyover lies not only in the

physical connection, but also in the fact that it establishes a common spatial reference system for the fragmented plots—the individuality of each zone is transformed into a level of the overall park experience under the continuation of a unified path, and the lost space is transformed from isolated ruins to public spaces with an overall narrative.

(2) Industrial Remains Functional In-Situ Conversion

Industrial remains functional treatment represents Parco Dora's most instructive operational dimension. The project neither adopted 'blank slate' demolition-reconstruction, nor treated remains as static museum exhibits, but rather conducted functional conversion of industrial components in place, enabling material remains to directly assume new space-use roles—precisely urban weaving theory's core operational logic in industrial abandoned-land contexts. Vitali Steel Plant's outer skin and most roof removed, exposing 30-meter-high red steel columns; lush vegetation grows among columns; massive concrete foundations convert to play grounds; industrial-scale structures, losing production function, form 'future jungle' semi-open public spaces. [61]

These three treatment modes jointly embody Urban Weaving Theory's core judgment: industrial remains' value lies not in exhibition significance as historical artifacts, but in conversion potential as spatial material. Remains' material scale and formal characteristics acquire new functional roles in new use contexts—steel columns convert from production support to elements defining public domains, concrete foundations from mechanical bases to children's exploration terrain, cooling towers from industrial facilities to ecological infrastructure. This in-situ conversion strategy effectively avoids two common extreme tendencies in industrial heritage functional renewal: complete removal causing lost public space regeneration opportunities, and over-protection causing functional insertion spatial rigidity.

Additionally, Parco Dora's ecological restoration dimension equally constitutes spatial stitching components. Design removed concrete slabs covering the Dora River, allowing the obstructed riverway to reappear, utilizing original concrete riverbeds and architectural crevices to create dynamic water features, re-weaving the natural water system once completely suppressed by industrial production into public space systems. River reappearance re-weaves land parcels originally severed by industrial facilities through continuous natural elements into

city regions with integral character, exemplifying natural systems' participation in space stitching operations. [61]



Figure 0-14 The Industrial Heritage of Parco Dora
(Source: References[61])

(3) Case Insights

Parco Dora's practice provides explicit methodological judgment for industrial remains handling: remains' regeneration value lies not in historical exhibition significance, but in conversion potential as spatial material—industrial components can assume public activity space use demands through functional role reassignment, without depending on large-scale demolition-reconstruction. This operational premise's precondition is in-situ conversion rather than removal or static protection; its effectiveness lies in retaining place's industrial memory and spatial characteristics as differentiation attractors, while avoiding functional insertion space rigidification caused by remains-protection logic.

2.2 Urban Weaving Theory's Development, Operational Framework, and Applicability

2.2.1 Urban Weaving Theory Development Trajectory

The Western ideological origins of weaving theory can be traced back to the Austrian architect Camilo Sitter in the late 19th century. In "The Art of Urban Construction", he opposed the fragmentation of urban space caused by the mechanical grid layout after the industrial revolution, and advocated the continuation of the humanized space of traditional cities through the organic organization of streets and buildings, laying the aesthetic and humanistic foundation

for the weaving theory of later generations. In the 60s of the 20th century, John Portman proposed the "urban weaving theory", emphasizing the integration of architectural form and scale with coordination units, and the elimination of urban fragmentation. During the same period, Christopher Alexander, Aldo Rossi, Jane Jacobs, Kevin Lynch, and others further deepened the understanding of the city as a carrier of history, culture, and memory, and laid the theoretical cornerstone of respecting texture and context. In the late 1970s, Colin Rowe and Fred Cotter proposed the "collage" methodology in "Collage City", which used map analysis to reconcile the contradiction between old and new spaces, and advocated the coexistence of diversity; Although it is a static collage paradigm, it provides a key transition for dynamic weaving. By the 1980s, IBA Berlin International Architecture Exhibition took "critical reconstruction" and "careful renewal" as its program, and provided an empirical model for the theory of weaving and repair through texture fusion experiments such as embedded houses and courtyard renovation [10].

In China, the localization process of this theory is carried out simultaneously with the transformation of urbanization. Wu Liangyong proposed the idea of "organic renewal" in 1991, exploring a renewal system that not only adapts to the requirements of modern life but also integrates the urban context and the texture of the old city, which is similar to the theory of weaving and patching [10]. At the beginning of the 21st century, Zhang Jie et al. used the ancient city of Jinan as an experimental field to propose the core principle of weaving the urban fabric [9], which was later extended to the systematic renewal practice of Zhuzhou Old City [22], and in recent years, it has further shifted to the study of open neighborhoods with people as the core [23], which fully presents the localized reconstruction process of the evolution of weaving and patching theory from a static repair tool to a dynamic system integration methodology. Zhang Jingwei et al. (2023) have shown that the connotation of weaving theory has extended from repairing urban fabric to systematic concerns at multiple levels, such as ecological environment, transportation system, and community culture [62].

Through the visual analysis of relevant literature from 1980 to 2025 by CiteSpace, the research hotspots of weaving and patching theory in China have successively experienced phased leaps such as old city renewal, urban design, historical districts, and landscape weaving, and after 2019, they have fully expanded to four fields: traditional villages, historical districts,

landscape weaving, and urban renewal driven by stock renewal policies [10]。 This evolution trajectory presents a triple transmutation characteristic: in terms of operational logic, it has developed from static spatial texture repair based on the analysis of the bottom of "Collage City" to a dynamic system weaving that emphasizes sustainability. In terms of goal orientation, from the repair of old and new textures in the stage of incremental expansion of services, to the activation and quality improvement of stock space driven by the adaptation of stock renewal policies. In terms of value focus, the protection of historical context has been highly emphasized from the early stage, and gradually deepened to use historical context as a background or medium, and more actively intervene and shape public spaces and places that serve residents' daily lives[10].

2.2.2 Urban Weaving Theory Core Elements

The word "weaving repair" means to repair the damaged parts according to the original warp and weft weaving laws of the fabric [15]. In the context of urban renewal, the core of this concept is to treat the city as an organic whole, repair the broken spatial elements in a delicate way, and restore the continuity of historical context and space [14]. In terms of theoretical evolution, weaving has gradually expanded from the initial focus on micro-architectural integration and contextual connection to the intervention of urban systems and citizens' lives at all levels, becoming a broad urban renewal strategy [15], aiming to reduce the impact of fragmented construction on old areas and achieve a dynamic balance between the style and function of the old and new urban areas [22].

The core operating elements of weaving theory are manifested as several action groups with clear directions at the practical level. "Stitching" and "connection" point to the continuity of physical structures, forming a systematic skeleton by linking broken elements, and eliminating the gap between geographic space and texture [7,14]. "Implantation" and "embedding" point to the compound shift of functions, introducing modern functions or cultural elements into historical relics or idle spaces, forming a catalytic effect to stimulate the intrinsic vitality of the area [30]. "Integration" and "retention" coordinate the balanced development of the whole, part, and individual on the basis of cognizing the internal laws of the urban fabric, and build a continuous and organic urban network [63].

At the implementation level of spatial operations, the weaving and complementing theory follows the hierarchical progressive logic of "point-line-surface". The point space dimension focuses on the selection and activation of key nodes, and enhances the vitality of nodes through the catalytic effect of core points [14]. The linear spatial dimension focuses on structural stitching, and enhances the coherence and mobility of the city by reconstructing the street scale or optimizing the traffic flow [14]. The planar spatial dimension refers to network integration, which constructs a comprehensive urban network covering physical space, socio-economic, and cultural values on a broader scale [14]. Mao Huasong et al. (2023) verified this operation logic in a practical study of the old city of Beibei, Chongqing, pointing out that "'weaving' refers to the collection of elemental fragments with different characteristics into a whole through weaving connections, while 'supplementing' is to repair the original defects and loopholes by inserting media on the basis of following the original urban spatial laws", and proposed an operation path of "patching" and then "weaving" along the "point-line-net" step [64].

In the process of localization, domestic research has further expanded the connotation boundary of weaving and repairing, extending it from material form restoration to the level of social life. The concept of "weaving life" emphasizes that weaving should first point to the way of life on which people live and the social structure of the neighborhood behind it, and then to the restoration of buildings and landscapes[15].

2.2.3 Urban Weaving Theory Update Practice Cases

Urban Weaving strategies in urban renewal practice are not single local patching techniques, but rather present different intervention logics and operation methods with differences in renewal object's space hierarchy and problem type. This section analyzes Zhuzhou Old City and Suzhou Ganjiang Road cases: the former reveals through city-scale six-dimensional systematic framework how weaving strategies form causal-progression intervention systems under conditions of coexisting multiple-type space problems; the latter presents through street-scale 'point-line-surface' hierarchical strategies how weaving theory translates from node activation to overall fabric repair in single street spaces. Both cases jointly point toward core judgment: Urban Weaving Strategy effectiveness depends on precise problem-hierarchy identification and systematic progression between strategies, rather than isolated node local intervention. This

judgment constitutes methodological foundation for subsequent high-density mixed-use neighborhood weaving strategies proposed in this research.

2.2.3.1 Zhuzhou Old City: Systematic Weaving Practice

Zhuzhou is a typical "industrial town carried by the railway", and in the rapid expansion of the old city for decades, due to the double barrier between the Xiangjiang River and the railway, a highly divided "sandwich" urban structure has been formed, and the space has been compressed into a long and narrow strip for a long time. Affected by the superposition of policy systems and hilly terrain in different periods, the land use, ecology, texture and community are seriously fragmented: industrial clusters are self-contained, the internal connection with the city is weak, and the density of the core area is too high and the traffic is poor, which has become a strategic problem restricting the healthy development of the city.

In view of the above dilemma, a six-dimensional systematic weaving framework is constructed, and the six dimensions are: ecological weaving, transportation infrastructure weaving, industrial land adjustment, public service facilities weaving, texture and context weaving, and social textile supplementation. The six are not juxtaposed, but follow the progressive logic of "leading → key → opportunities→ driving →breakthrough →goals", starting from the restoration of the natural background, by breaking physical bottlenecks, optimizing the spatial pattern, improving the living network, and reshaping the quality of places, and finally pointing to the integration of social structure [22].



Figure 0-15 Zhuzhou Old City Spatial Structure Planning
(Source: References[22])

As a pilot dimension, ecological weaving is proposed to prohibit the arrangement of new polluting industries along the river, plan to rectify and replace the current polluting enterprises, sort out the landscape environment, strengthen the connection between structural water bodies and mountains, and transform the existing ecological elements such as ponds and mountains into positive resources for sustainable urban development.

The core task of transportation weaving is to break the bottleneck between the railway and the Xiangjiang River and establish multi-level cross-river and cross-rail connections, including rail transit. The strategy introduces a circle model with a small grid as the core, forms a "five horizontal, three vertical and three circle layers" main road system, builds a three-level system composed of tracks, BRT, regional buses and community buses, and focuses on improving the density of the riverside branch road network, and reconstructing the publicity of the riverside space with a pedestrian network.

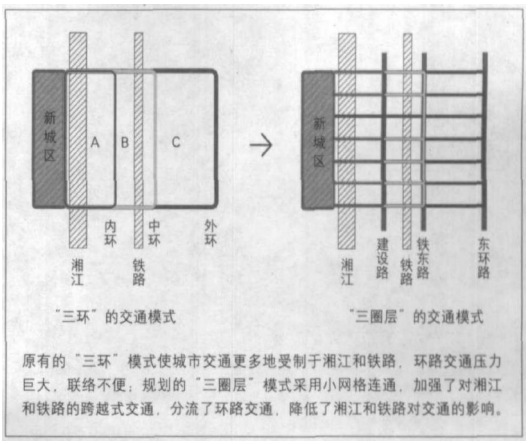


Figure 0-16 Ring-Mode Transportation Diagram
(Source: References[22])

Industrial land adjustment tightly grasps 'withdrawing secondary-industry advancing tertiary-industry' historical opportunity, advancing industrial-land transformation through systematic urban design control, constraining crude tertiary-industry blind expansion, instead injecting cultural, leisure, and specialty-commerce new formats, subdividing old city into six function-guidance zones, achieving good land-structure and ecology-restoration and facility-perfection coupling.



Figure 0-17 Urban Construction Land Demolition-Preservation Classification Diagram
(Source: References[22])

Public service facility weaving targets service vacuum caused by factory relocation-aftermath community-structure dissolution, dividing facilities by residential-population scale into district, street, residents-committee, and neighborhood four-level configuration, constructing '10-minute life circles'; public-welfare facilities adopt rigid-location planning, market facilities guide gathering along newly planned roads.

Public service facilities are woven to fill the service vacuum caused by the disintegration of the community structure after the relocation of the factory, and the facilities are divided into four levels of configuration according to the size of the residential population: district, street, neighborhood committee and neighborhood, and a "10-minute living circle" is built. Public welfare facilities adopt a rigid fixed-point layout, and market facilities are guided to gather along the newly planned road.

Focusing on reversing the trend of increasingly loose and fragmented urban forms in large-scale transformation, the construction mode of small plots is encouraged by strengthening the systematic connection between decentralized green space and open space, controlling the height of buildings as a whole, encouraging the construction mode of small plots, exploring building types suitable for local climate and living habits, and combining functional adjustment with the creation of local cultural characteristic places.

As the ultimate goal of the six-dimensional framework, social weaving responds to the current situation that the population and the unit system are too closely related and the community is not integrated, and ensures that different groups get their place in the renewal of

the old city by creating multi-level employment opportunities, making affordable housing land arrangements, and adopting the community model of "large mixing and small separation". The six-dimensional strategy thus constitutes a systematic intervention framework that extends from physical space restoration to social structural restructuring [22].

2.2.3.2 Suzhou Ganjiang Road Historic District: Point-Line-Surface Progressive Weaving

Ganjiang Road is Suzhou's ancient city important traffic artery, with history traceable to the Spring and Autumn Period, with numerous historical and cultural remains distributed along its length including the Chen Family House and Pan Zuyin Former Residence. In 1993, Ganjiang Road widened into a major east-west traffic artery, with the 50-meter-wide surface physically dividing the ancient city into north and south sections, triggering three types of spatial problems: point-level historical building damage, linear traffic scale dysfunction, and plane-level public space scarcity and fabric fragmentation. [14]

The research used weaving theory's hierarchical progressive logic of "point-level node activation, linear structure stitching, and plane-level network integration" as framework, constructing mutually corresponding renewal strategies addressing the above three problem types. [14]

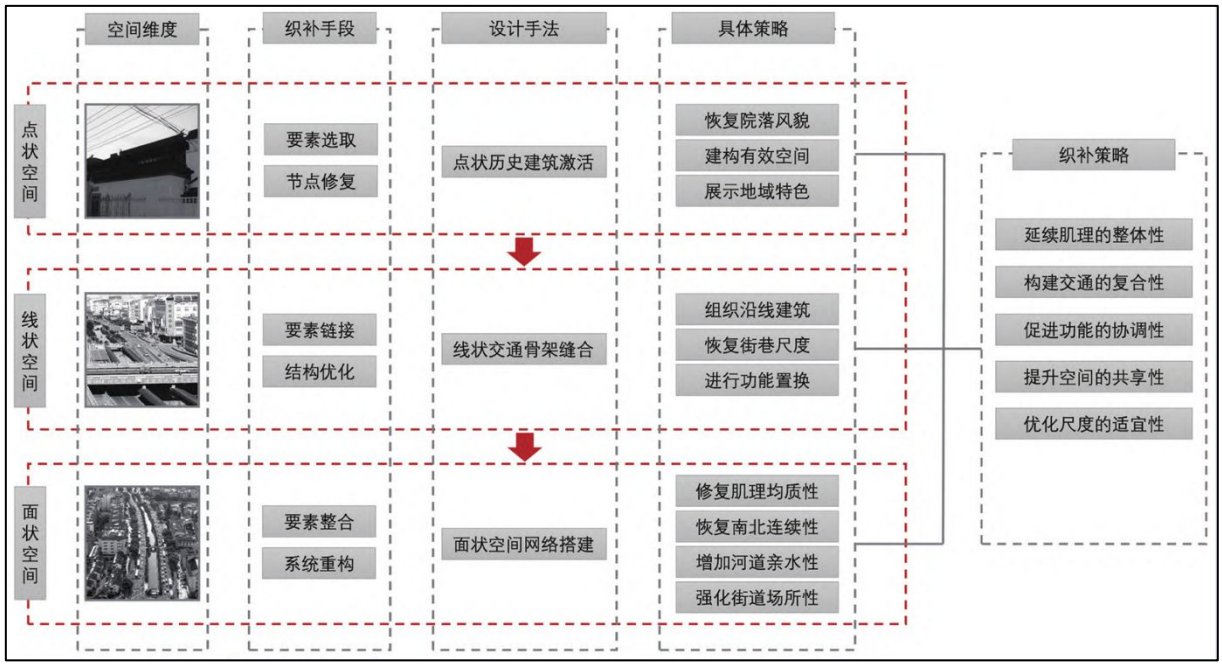


Figure 0-18 Ganjiang Road Point-Line-Surface Weaving Strategy
(Source: References[14])

At the point-level spatial dimension, strategies focused on historical building element selection and node restoration. Using the Chen Family House as example, priority restoration of landmark components like entrance gates and sedan halls with embedded complex functions forming catalytic effects—the Chen Family House after 1:1 original restoration by Xiangshan craftsmen established cultural experience halls in cooperation with Guizhou Moutai Enterprise, preserving historical heritage while activating the building and surrounding area through functional substitution; for historically-displaced buildings like Pan Zuyin's Former Residence already functionally repurposed, research proposed further enhancement of spatial sharing through courtyard and terrace additions, making them neighborhood cultural catalysts. [14]

At the linear spatial dimension, strategies reconstructed Ganjiang Road traffic flow through skeleton stitching approaches. Research recommended adjusting road width from 50 to 30 meters, adding street trees and pedestrian lanes, optimizing building height to road proportion to 1:1.2, restoring humanized pedestrian environments; at traffic congestion points, proposing three-dimensional pedestrian systems separating pedestrian and motor flows; combining Ganjiang River geography, recommending waterfront paths and viewing platforms, transforming the river from traffic-obstructed negative element to positive street landscape constituent. [14]

At the plane-level spatial dimension, strategies repaired neighborhood fabric severed by roads through network integration. Research proposed cross-road pedestrian corridors stitching Ganjiang Road's north-south sides, connecting Guanqian Street and Shiquan Street, forming north-south pedestrian networks; constructing continuous public space networks centered on Ganjiang Plaza, through increased leisure facilities and cultural activity spaces, revitalizing underutilized plazas long isolated by traffic obstructions back into daily urban activities. [14]

Ganjiang Road case's significance lies in proposing street-space renewal's 'point-line-surface' hierarchical strategy framework based on Urban Weaving Theory. Research did not stop renewal at singular historic-building repair, but extending from point-node activation progressively to line-space-scale street-skeleton repair and traffic stitching, finally rising to face-space public-space-network integration and north-south-fabric-continuity reconstruction. Thereby, weaving ceased being understood as local patching design action, but transformed into systematic renewal pathway triggered by nodes, unfolding along streets, and completing district-level integration.

2.2.4 Urban Weaving Strategy Applicability in High-Density Neighborhood Renewal

Based on the above literature and cases, it can be found that the core operating logic of weaving and repairing theory—"cognition-interpretation-weaving-patching"—emphasizes the repair of damaged space through microscopic and selective intervention on the basis of fully identifying the existing spatial structure and the crux of the problem, rather than relying on overall reconstruction [14]。 This logic is highly consistent with the practical constraints of high-density built environments: high-density blocks usually face the characteristics of space saturation, high construction intensity, and social cost sensitivity, and the weaving and repair strategy does not need to increase development intensity, but improves spatial continuity and overall efficiency on the basis of retaining the original built pattern through accurate identification and repair of fault interfaces, missing nodes, and inefficient land [2].

From the perspective of theoretical evolution, the focus of weaving has expanded from the early emphasis on the integration of local buildings and the connection of historical contexts to the multi-dimensional system integration of ecology, transportation, industry, facilities, textures, and social relations [22] 。 The methodological framework of multi-dimensional system integration of theory is woven and supplemented, which provides a methodological basis for the comprehensive response to complex problems. In addition, there is an intrinsic relationship between the mixed block and the weaving theory in terms of ideological origin: both are born from the criticism of the modernist logic of functional zoning, the former points to the spatial quality goal of organic coexistence of functions, and the latter provides the means to promote the transformation of collage pattern to organic integration, and there is a natural method correspondence between the two.

The fragmentation faced by existing weaving and supplementing research points to the disorder dominated by a single logic. In high-density cities, the structural fragmentation of multiple spatial logics coexists and forms internal order but lacks integration mechanisms, which constitutes a different type of problem. The operational framework of "cognition-interpretation-weaving-patching" of weaving theory is based on identifying existing spatial structures and establishing connections between them, which is also true in the context of multi-logical

juxtaposition—the only difference is that the object of intervention changes from the fracture repair of a single system to the establishment of a new integrated public structure between multiple coexistence orders—this shift in the focus of operation constitutes the core adaptation of weaving theory in the context of high-density mixed blocks, and is also a substantive expansion of its application boundaries in this study.

2.3 Mixed-Use Neighborhood Vitality Mechanisms and Collage Pattern Dilemmas

2.3.1 Mixed-Use Neighborhood Vitality Mechanisms

The concept of mixed-use neighborhoods and Urban Weaving Theory share the same intellectual origins. Both stem from the critique of modernist functional zoning logic in the second half of the 20th century: Jacobs argued from the perspective of urban vitality that diversity is the essential nature of cities, while Colin Rowe revealed from the perspective of urban morphology that cities inevitably present themselves as a collage pattern with multiple fragments juxtaposed. Both reflections point to the same conclusion—the healthy operation of cities depends on the coexistence of functions and integration between fragments, rather than clear zoning and unified order. This creates an inherent progressive relationship: the collage pattern describes the objective reality of cities, and mixed-use neighborhoods point toward the quality target that such juxtaposition should achieve at the level of functional integration, while weaving provides the operational means to drive the transition from the former to the latter. The following reviews existing research on mixed-use neighborhoods from the dimensions of vitality mechanisms and high-density environments.

Urban diversity is the internal logic of urban space operation. Jacobs pointed out that the main function of mixing can ensure that people appear in the block at different times and for different reasons, so as to achieve the coordinated use of public facilities, and this effective integration of diversity is the basis for maintaining urban civilization and economic vitality [16]. Through long-term observation of public life, Gale divides outdoor activities into three categories: necessity, spontaneity, and sociality, pointing out that when the neighborhood has high-quality public space, the frequency of spontaneous activities and social activities will

increase significantly, and direct communication between people will occur, which is the source of vitality of urban public space [19]. By providing a variety of content and forms in a limited space, the hybrid function not only facilitates residents' daily lives, but also reduces motor vehicle traffic by encouraging pedestrian travel, creating a safe, comfortable, and vibrant street environment [65].

The impact of mixed functions on vitality is not one-dimensional but encompasses three levels: the generation, enhancement, and sustainability of vitality. Research shows that the characteristics of land-use mixing affecting neighborhood vitality can be evaluated from three dimensions: functional driving capacity, functional correlation, and functional diversity. Functional driving capacity determines the rate of vitality enhancement — neighborhoods dominated by retail and commercial uses with strong driving capacity can attract large crowds in a short time, with significantly higher rates of vitality enhancement than residential-dominated neighborhoods. Functional correlation affects the stability of vitality — complementary functional combinations (such as dining and retail, education and culture) have positive synergistic effects, while incompatible functions placed adjacent to each other produce NIMBY effects that reduce neighborhood vitality. Functional diversity determines the duration of vitality sustainability—the more diverse the types of land-use functions in a neighborhood and the more coordinated their area proportions, the longer the duration of vitality. Empirical research further found that neighborhoods with high-duration vitality typically exhibit a mix of 2 to 4 types of land-use functions, with the "residential + retail +" combination model being most typical. Residential functions provide stable baseline foot traffic for neighborhoods at night, while paired retail, education and research, and commercial functions satisfy residents' diverse daily needs, together maintaining neighborhood vitality throughout the day.[29]

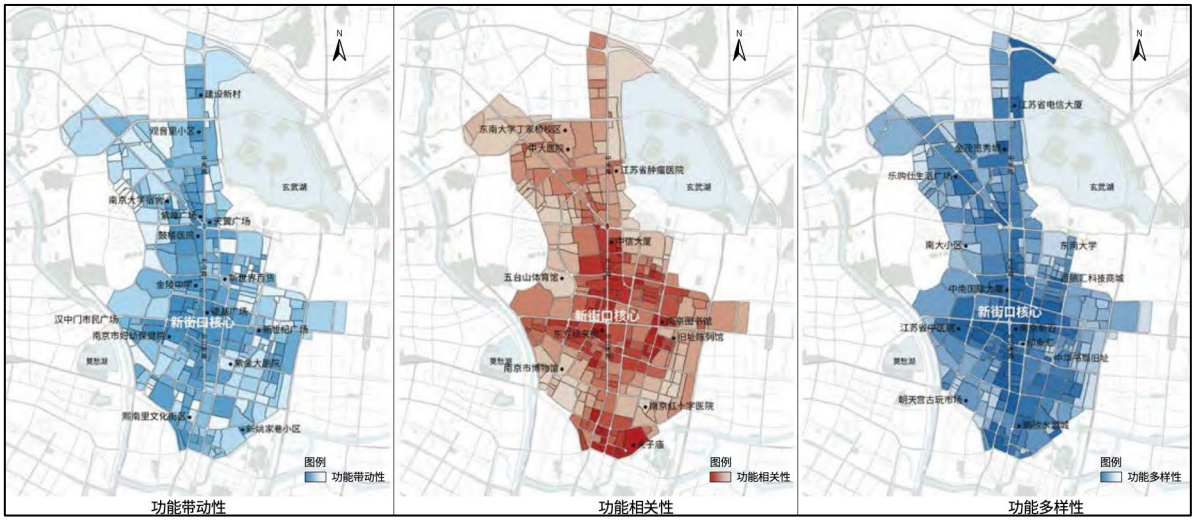


Figure0-19 Evaluation of mixed-use land development in central Nanjing neighborhoods
(Source: References)

However, the promoting effect of mixed functions on vitality is not a one-time solution. In high-density environments, excessive density may lead to spatial congestion and environmental quality degradation; an excessive number of mixed functions may also reduce functional correlation, thus producing negative effects that make public space vitality unsustainable.[29]

There is a strong positive spatial correlation between land-use mixing and crowd vitality. Quantitative analysis shows that the bivariate Moran's I index between land-use mixing and crowd vitality in central Nanjing neighborhoods reaches 0.801, demonstrating extremely high coupling between the two. Specifically, the functional type of dominant land uses directly influences the manifestation pattern of vitality: mixed neighborhoods dominated by retail and commercial uses typically show higher rates of crowd vitality enhancement; while mixed modes containing residential functions can, by providing stable nighttime baseline foot traffic, significantly extend the duration of vitality, thus forming all-day vibrant urban environments spatially.[29]

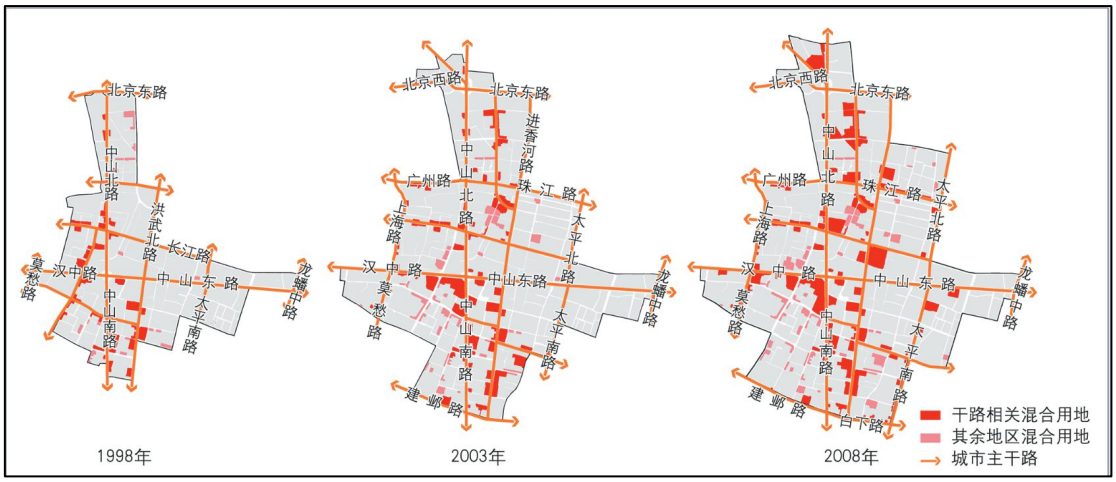


Figure 0-20 Spatial distribution of mixed-use land in the rapid growth phase of Nanjing neighborhoods (Source: References[28])

2.3.2 Collage and Mixing in High-Density Environments

Inherent associations exist between mixed functions and high-density environments. On one hand, mixed functions typically require certain space scale and population density as support to form stable agglomeration effects and sustain development; on the other hand, in high-density areas with extremely tight land resources, multi-function complex layout itself constitutes important method for achieving high-efficiency intensive land utilization[65]. Related empirical research shows mixed land-use often exhibits significant high-intensity development characteristics. Taking Nanjing's Xinjiekou central district as example, mixed land-use building density has remained stable at 58.3%, clearly exceeding the district's 44.0% average; over 30 years average FAR increased from 1.3 to 5.6, approximately 2.5 times the district's average FAR, with average stories reaching 9.8, continuously exhibiting high-height, high-density, high-intensity development trends[28]. This indicates mixed neighborhoods are not loose combinations in low-density environments but often represent intensive space organization under high-density conditions.

However, high-density does not necessarily lead to organic mixing. During rapid urbanization, construction activities from different periods, subjects, and development logics continuously accumulate within the same geographic range, often causing urban space to exhibit functional juxtaposition yet lacking integration mechanisms, a collage pattern. As Colin Rowe noted in "Collage City," modern cities are not unified wholes dominated by single order but

often present composite structures with multiple fragments juxtaposed under different forces. In this sense, "mixing" in high-density environments does not naturally equal genuine integration; when different functions merely physically adjoin without spatial contact, facility sharing, and public exchange support, such mixing may remain superficial accumulation, degrading into fragmented collage states lacking mutual connection.[66]

The key causing this situation lies in structural obstacles universally present in high-density built environments. First, large-block and enclosed development patterns prevent internal roads from opening to cities, with road networks systematically fracturing at block boundaries, severing pedestrian connections between functional zones, making functional juxtaposition incapable of transforming into real daily-life contact. Second, public facilities typically configure per single block rather than integrate by living districts, resulting in each block's self-sufficient internal facilities incapable of cross-block sharing, exacerbating public service supply insufficiency under high-density conditions while causing repeated facility resource configuration and efficiency losses. Third, in capital-led renewal processes, high-FAR development often sacrifices compressed public open space, making block interface zones—originally most likely to generate daily exchange and spatial transition—degenerate into depopulated, vitality-lacking negative spaces[65]. Meanwhile, as residential density continuously increases, some enclosed district internal facilities struggle to externally share, with insufficient public space provision and residential environment stratification coexisting, social distance between different residential groups deepening, further weakening mixed neighborhoods' potential for forming organic social networks. [67]

Therefore, the core contradiction of high-density mixed-use neighborhoods does not lie in insufficient types of functions but in the lack of public space structures and connection mechanisms that integrate juxtaposed functions into an organic whole. In other words, the problem is not "whether there is mixing" but "whether mixing can be transformed into true integration through spatial organization." Moving from a collage pattern toward organic mixing, the key lies in systematic spatial intervention: repairing broken connections, supplementing missing public structures, and establishing new integration relationships among multiple coexisting orders. This is precisely the practical basis for Urban Weaving strategies to intervene in high-density mixed neighborhood renewal.

2.4 Chapter Summary

This chapter focuses on the three core topics of high-density cities, urban weaving theory and mixed blocks, and forms a progressive relationship between the three from problem context, theoretical tools to research objects. Firstly, the study of high-density cities reveals that in the context of stock renewal, high-intensity spatial agglomeration does not necessarily lead to high-quality public life, but is often accompanied by structural problems such as texture fragmentation, insufficient public space, imbalance of functional allocation, and limited transportation accessibility. Secondly, the urban weaving theory provides important methodological inspiration for dealing with the above fractures, and its core is to repair urban structure, rebuild spatial connections, and take into account the integration of social relations through multi-scale and gradual spatial intervention. Thirdly, the study of mixed blocks shows that functional compounding itself does not naturally generate vitality, and only when diverse functions are organically integrated under the support of spatial organization, interface connection and public space can the mixing be transformed into continuous urban vitality.

On the whole, the existing studies have provided a sufficient theoretical basis from the aspects of problem identification of high-density cities, the construction of weaving theory and the vitality mechanism of mixed blocks, but there is still a lack of systematic response to the specific application path of weaving theory for the scenario of multi-logical juxtaposition and complex spatial relationship of high-density mixed blocks. In particular, there is still a need to further deepen how to reintegrate fragmented texture, broken traffic, unbalanced functions and weak public life into a continuous and complex block structure through spatial weaving. Based on this, this paper will carry out the current situation diagnosis and strategic response in combination with specific sites in the following chapters.

Chapter 3 Existing Conditions and Problems of District North of Guangzhou International Finance City

The high-density context is the key thread for systematically understanding the contradictions presented by the research area. The previous section identified from a theoretical perspective that high-density cities have typical problems such as fragmented urban fabric, weak public space, and imbalanced traffic and circulation rights. This section takes these typical problems of high-density cities as the entry point and through field investigation systematically restores their specific manifestations, considering and addressing the following questions:

a. How are the structural problems of high-density cities manifested in the research area?

b. How do these problems compound with the site's own problems within the design scope, and how do they systematically reproduce the problems brought about by high-density environments?

According to the theoretical review in the previous section, in order to effectively summarize renewal strategies for the design scope, the research will be conducted at two levels: urban perspective and block perspective, with different perspectives conducting targeted problem discovery:

a. Urban perspective: The research area, as a typical carrier of high-density city problems, cuts in from Guangzhou's high-density development context and urbanization process to establish the macro context of the area. Then from three dimensions—spatial urban fabric, public facility provision, and road transportation—it systematically examines the area's problem manifestation at the urban structure level under high-density conditions;

b. Block perspective: focusing on the interior of the design area, from three progressive levels—material form, spatial quality, and social activities—reveals the concrete manifestation of high-density structural problems at the neighborhood scale, ultimately focusing on the specific impacts on people.

3.1 Urban Development and Planning Background

3.1.1 High-Density Context of Guangzhou

In the 21st century, the continuous agglomeration of population and industry has made high-density development a common feature of large cities around the world. With 15,000 people/km² as the international identification threshold, 10,000 people/km² as the dividing line in the Chinese context, and the gross floor area ratio of 0.5 as the auxiliary index of construction density [4], Guangzhou, as the core megacity in South China, has exceeded the above thresholds in terms of population density and construction density in its central urban area, which is a typical representative of the development of high-density cities in China.

Guangzhou is located on the northern edge of the Pearl River Delta, adjacent to Hong Kong and Macao, and is the central city of South China and the core component of the high-density urban cluster in the Pearl River Delta. Since the reform and opening up, Guangzhou has gradually developed into a typical representative of high-density cities in China by virtue of its superior geographical location and continuous industrial agglomeration, and the characteristics of high-density urban development are prominent among domestic cities [5]。 From the perspective of the overall size of the city, the permanent population of Guangzhou will reach 18.978 million in 2024, with an urbanization rate of 87.24%; As of 2020, the city's built-up area is about 1,350 square kilometers, and the construction land area is 742 square kilometers, and the urban construction intensity continues to be at a high level. From the perspective of spatial agglomeration, high-density construction in Guangzhou is mainly concentrated in the core areas of central urban areas such as Zhujiang New Town, Tianhe Sports Center, and Pazhou West District, and the floor area ratio of typical blocks is usually between 6 and 10, and the building density and space utilization intensity are at a high level among domestic cities [6].

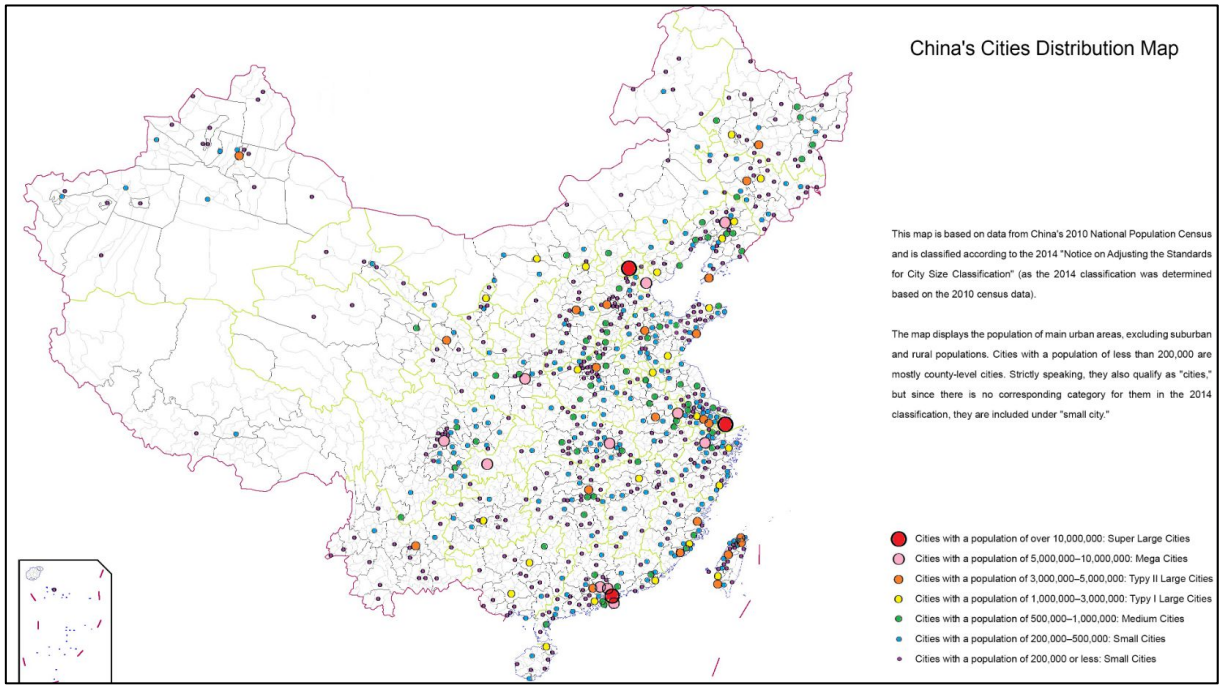


Figure 0-1 Distribution map of high-density cities in China
(Source: References[68])

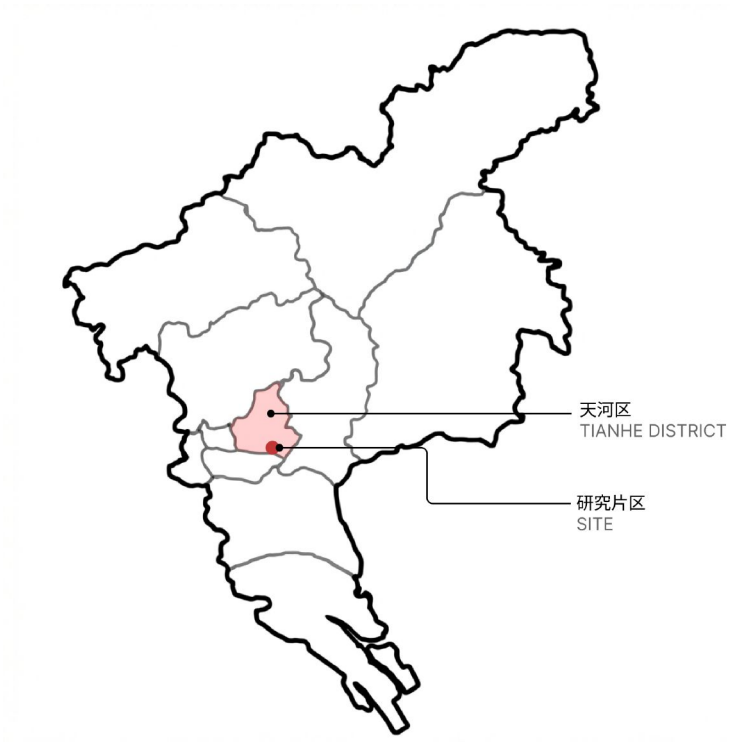


Figure 0-2 Location map of research area
(Source: Author)

Table 0-1 Guangzhou population and land construction data

类别	指标名称	2010 年	2020 年	变化量	增幅
土地建设	建成区面积（平方公里）	952	1,350.00	398	41.80%
	建设用地面积（平方公里）	673	742	69	10.30%
人口	常住人口（万人）	1,270.90	1,874.00	603.1	47.50%
	户籍人口（万人）	806.14	985.11	178.97	22.20%

(Source: Author)

The formation of Guangzhou's high-density pattern is the result of three concurrent forces: sustained industrial clustering, large-scale influx of migrant populations, and continuously increasing land development intensity since the reform and opening-up. In the early period of reform and opening-up, Guangzhou capitalized on its proximity to Hong Kong and Macau to lead in absorbing industrial transfer, with rapid expansion of manufacturing and commerce attracting large flows of migrant workers and creating acute demand for urban construction land. Entering the 2000s, as Tianhe New City, Zhujiang New City, and other new districts were developed, Guangzhou's urban spatial pattern evolved from monocentric to polycentric cluster form, with land development intensity in the central districts continuing to rise. From the data, between 2010 and 2020, Guangzhou's built-up area increased from 952 to 1,350 square kilometers, a growth of approximately 42%; construction land area increased from 673 to 742 square kilometers; during the same period, the permanent population grew from 12.709 million to 18.74 million, an increase of approximately 47%. Construction space expansion and population agglomeration reinforced each other, driving Guangzhou's central districts to form high-density, high-intensity, functionally highly overlapping spatial characteristics. Notably, during this process, land urbanization speed and population urbanization speed advanced roughly in tandem, but available land in central districts became saturated, and construction land increment space narrowed increasingly, marking a profound transformation in the spatial logic of urban development.

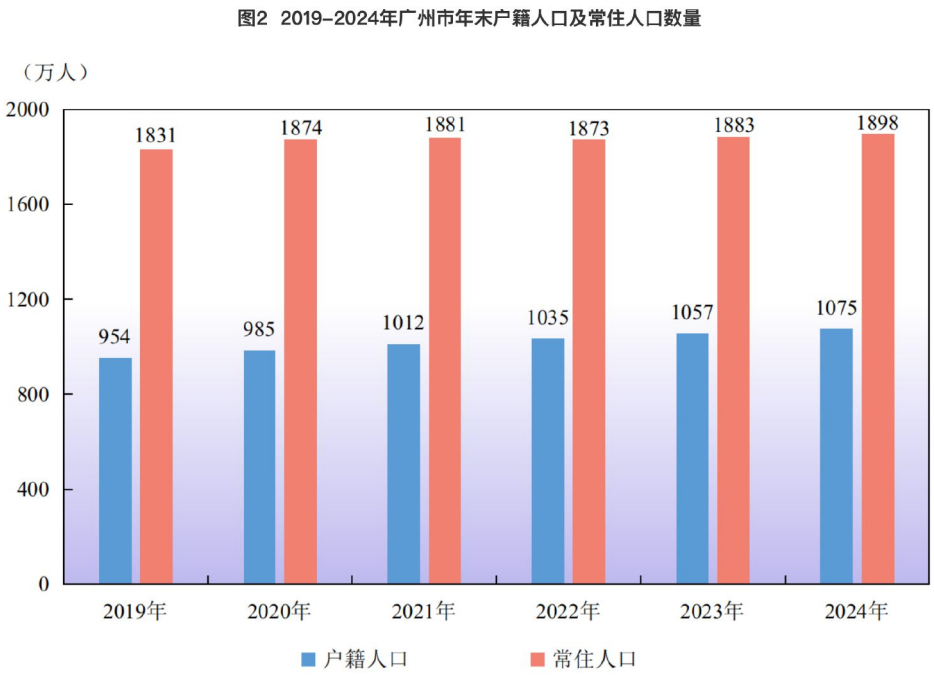


Figure 0-3 Guangzhou population data 2019-2024
(Source: 《2024 年广州市国民经济和社会发展统计公报》)

As the core urban district where Guangzhou's modern service industry is highly concentrated, Tianhe District has approaching saturation in increment expansion space, and urban development has comprehensively transitioned to a stage of stock optimization. The complexity of its spatial structure and the concentration of renewal pressure constitute the direct macro background for this study's site selection.

3.1.2 Urbanization Development in Guangzhou

Guangzhou's urbanization process exhibits staged characteristics evolving from outward expansion to structural adjustment to stock optimization, with urban spatial morphology undergoing a complete sequence from "clustered" to "star-shaped," "dispersed clusters," "strip clusters," and finally evolving into a "polycentric semi-networked" pattern[69]. The high-density built environment presented in the research area, the urban fabric pattern of coexisting urban villages and commodity housing, and the idle decay of industrial heritage all represent historical accumulations at specific spatial nodes from decades of Guangzhou's urbanization process—especially during the implementation of the "exit secondary, enter tertiary" policy, where functional vacating of original industrial land preceded the systematic implantation of new

functions, creating a spatial pattern with multiple construction logics juxtaposed yet lacking integration.

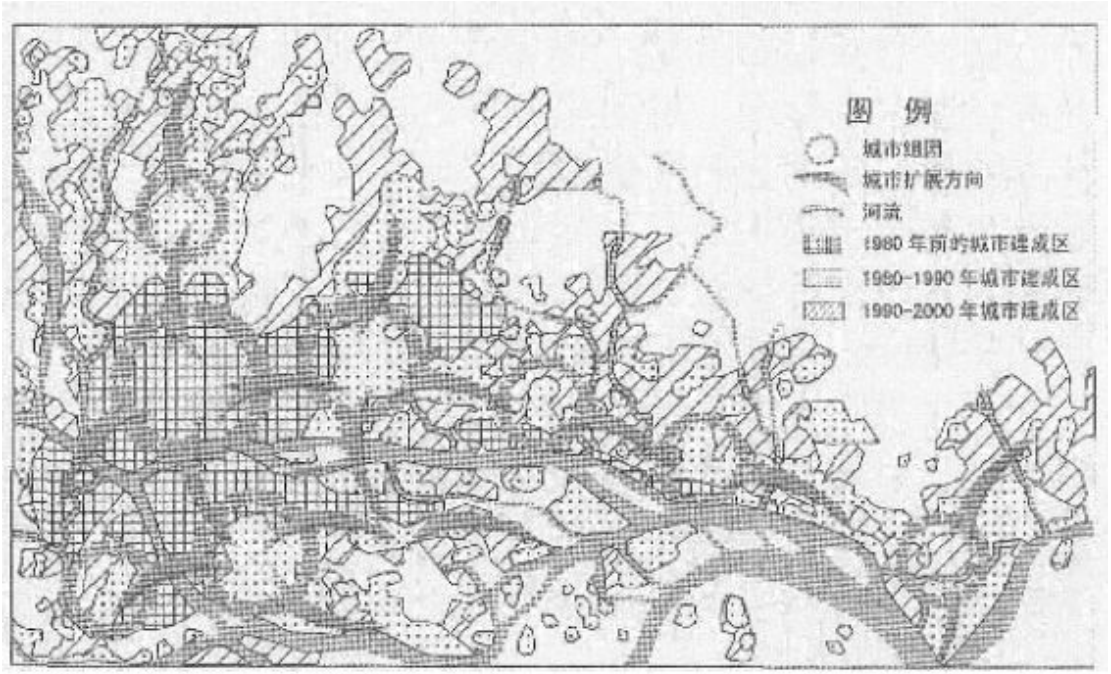


图 1 广州城市空间形态演化图

(资料来源：根据广州城市规划局，2000[24]资料修改绘制)

ournal Electronic Publishing House. All rights reserved. ht

Figure 0-4 Guangzhou urban space evolution map

(Source: References[5])

3.1.2.1 Pattern Establishment Pre-Reform and Opening-Up (1949 – 1979)

The 1954 master plan established a "grid + ring + radial" road network skeleton, and urban construction began to break out of the traditional old city, with traffic conditions in Haizhu, Tianhe, and other districts subsequently improving. Urban form evolved from a compact monocentric to a star-radiating pattern. The 1989 master plan further established a three-group structure of central, east, and north districts, formalizing the city's shift to a polycentric layout. During this period, numerous unit-based residential areas and state-owned industrial facilities concentrated in the central districts, constituting the primary targets for subsequent urban stock renewal. [69]

3.1.2.2 Rapid Urbanization and Outward Expansion (1980 – 2000)

After the reform and opening up, Guangzhou took the lead in undertaking industrial transfer, and the area of urban built-up areas expanded from 136 square kilometers in 1980 to 182 square

kilometers in 1989, and further increased to 259 square kilometers in 1995, with a net increase of more than 100 square kilometers in 20 years [5]。 The population size has also increased from 5.193 million in 1982 to 9.942 million in 2000, and urbanization and suburbanization have advanced in parallel: the average annual growth rate of the permanent registered population in the central area is -3.20%, while the average annual growth rate of the total population in the suburbs is as high as 8.87%. [70]

From the perspective of land use intensity, the population density in the core area reached a peak of 41,472 people/square kilometer in 1990, and the GDP output intensity of the built-up area increased from 35.12 million yuan/square kilometer in 1980 to 472.8 million yuan/square kilometer in 2000, an increase of about 13.5 times. The vehicle density increased from 380 vehicles/square kilometer to 2,285 vehicles/square kilometer in the same period, and the contradiction between transportation and land use became increasingly prominent.

Table 0-2 Guangzhou urban land-use intensity

表 2 1980-2000 年广州市城市土地利用强度演化

年份	核心区人口密度（人/km²）	车辆密度（辆/km²）	客流密度（人/km²）	货流密度（t/km²）	建成区 GDP 产出（万/km²）
1980	—	—	—	—	3512
1985	37029	380	80722	126302	6580
1990	41472	1348	65538	123594	13955
1995	41324	2181	111575	186977	34596
2000	40790	2285	152445	170303	47280

(Source: 《广州统计年鉴》(1980-2000))

3.1.2.3 Strategic Adjustment and Structural Optimization (2000－2015)

In 2001, Guangzhou proposed "south expand, north optimize, east advance, west connect" strategy, guiding urban development focus to the southeast, with Zhujiang New City, Pazhou, and other areas becoming core functional zones of the new central axis. In 2006, "central adjustment" was added to the strategy, shifting urban spatial governance logic from scale expansion to functional enhancement. The 2008 "Opinions on Promoting City District Industrial

'Exit Secondary, Enter Tertiary' Work" (Guangzhou Municipal Government [2008] No. 8) pushed industrial land-use transformation in central districts onto an institutionalized track, providing explicit policy basis for industrial heritage renewal.



Figure 0-5 Guangzhou core district functional planning
(Source: References[71])

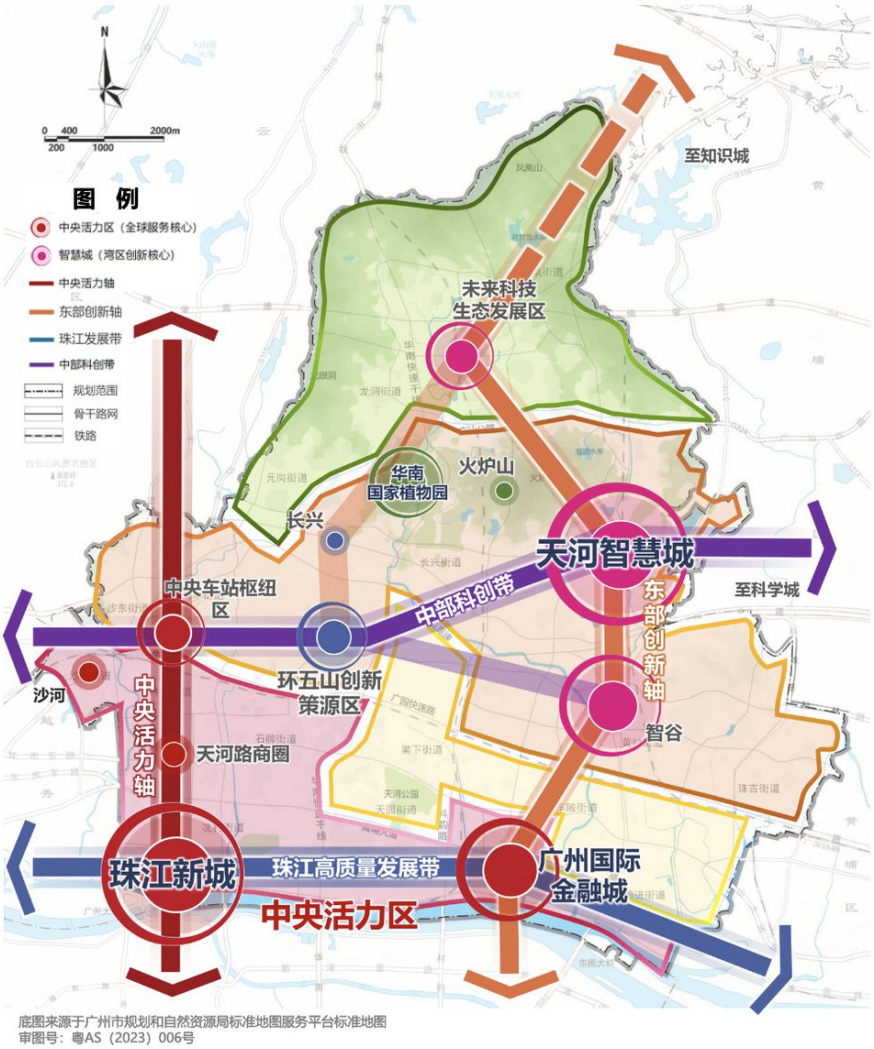
3.1.2.4 Stock Integration and High-Quality Renewal (2015-Present)

According to the Tianhe District "Fourteenth Five-Year Plan," as construction land in central districts approaches saturation, Tianhe District's land development intensity has reached 75%, and urban development has comprehensively transitioned to the urban stock renewal stage. In 2015, Guangzhou's Urban Renewal Bureau was established, with refined governance concepts such as "micro-renewal" and "double-repair city" promoted. By 2024, Guangzhou's urbanization rate reached 87.24%, with the core issue of urban development shifting from construction scale to spatial quality. The northern section of Finance City, integrating industrial heritage, urban villages, and aging residential areas, is one of the most typical areas facing concentrated urban stock renewal pressure in this transformational context.

3.1.3 Upper-Level Planning for the District

The research area is located at a critical node in Tianhe District's overall development pattern. The Guangzhou Tianhe District National Land and Space Master Plan (2021–2035) establishes Guangzhou's overall spatial pattern of "one belt, one axis, three cores, four poles,"

incorporating Guangzhou International Finance City into the core section of the "Zhujiang high-quality development belt," jointly constituting with Zhujiang New City the strategic backbone of high-quality development along the Pearl River, undertaking the strategic mission of aggregating global city core functions including headquarters finance, innovation creation, and international exchange. The research area is located at the intersection of the Zhujiang high-quality development belt and the eastern innovation axis—directly adjacent to the Finance City starting area on the south, directly receiving radiation from global city core functions; extending along Chebi Road to the east toward Tianhe Innovation Valley, integrated into the linkage range of the eastern innovation industry cluster.



天河区国土空间总体格局规划图

Figure 0-6 Tianhe District national land and space overall pattern planning
(Source: 《广州市天河区国土空间总体规划（2021-2035 年）》)

At the public service system level, the plan lists "Guangzhou International Finance City Service Center" as one of the city-level public service main centers, listed alongside Tianhe North-Zhujiang New City, undertaking city-level comprehensive service functions covering a larger range of southern Tianhe. The research area not only carries daily service needs of its own residents but must also provide city-level public facilities, distinguishing public service provision from general residential neighborhoods. The plan simultaneously proposes constructing a three-tier public service center system of "city-level—district-level—community-level," coordinating facility layout by community living circle units, with the explicit quantitative target of achieving 14.2m² of public service facilities per capita and 90% 5-minute pedestrian coverage of parks, green spaces, and plazas by 2035.

At the blue-green network level, the plan proposes constructing a blue-green pattern of "one core, two rings, five corridors, multiple parks." The first of the "five corridors" is the Tangxia Creek ecological leisure corridor running north-south, which runs directly across the eastern boundary of the research area. The plan requires this corridor to string together community parks, pocket parks, and streetscapes, combining with the urban slow-travel system to connect various public spaces, and interchanging with transit and subway stations, constructing a continuous blue-green ecological network.

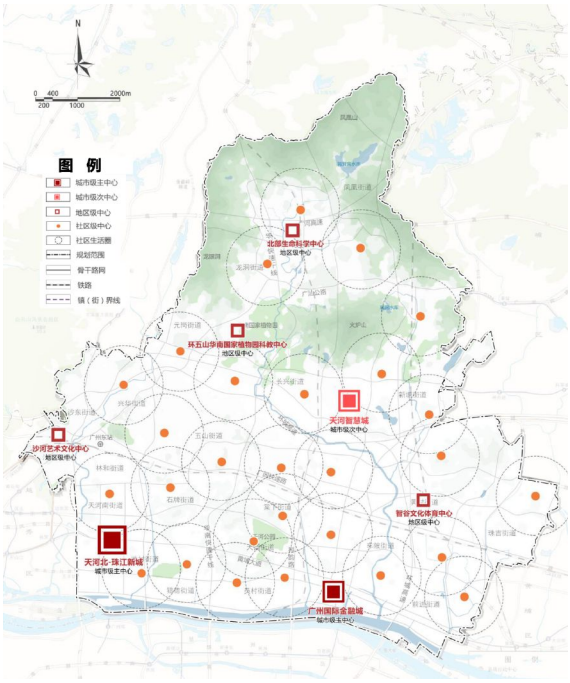


Figure 0-7 Illustration of Tianhe District public service facility system planning
(Source: 《广州市天河区国土空间总体规划（2021-2035 年）》)

3.2 Urban perspective: Tangxia-Chebei-Financial City area under the high-density pattern

Spatial contradictions in high-density mixed-use neighborhoods are often rooted in urban structure at a larger scale; problems such as functional deficiency, network fragmentation, and population segregation cannot be self-consistently explained within site boundaries. This section accordingly expands analytical vision from the design scope outward to directly related surrounding areas, conducting systematic investigation from dimensions including spatial structure, functional pattern, road transport, population characteristics, and public service provision, providing empirical basis for subsequent problem diagnosis and Urban Weaving strategy construction.[14]

3.2.1 Current High-Density Status of Research Area

The current status analysis of this research establishes two spatial levels. The design scope runs from Zhongshan Road West on the north to Huangpu Avenue middle on the south, from Tangxia Creek on the west to Chebi Road on the east, with total area approximately 1.21 square kilometers, serving as the spatial carrier for subsequent renewal design. The research scope extends outward from this base, from Tangde North Road on the north to Linjiang Avenue on the south, from Tangxia Creek on the west to Chebi Creek on the east, incorporating the complete settlement ranges of Tangxia and Chebi villages as well as Finance City's starting area into the analytical view. Current land-uses in the area are primarily village residence, small-community residence, commerce, and office, with multiple functional types highly juxtaposed within approximately 1.21 square kilometers. Spatial characteristics within the design scope and adjacent districts have direct correlation in structure, function, and population activity; current status analysis must unfold within the overall framework of the research scope.

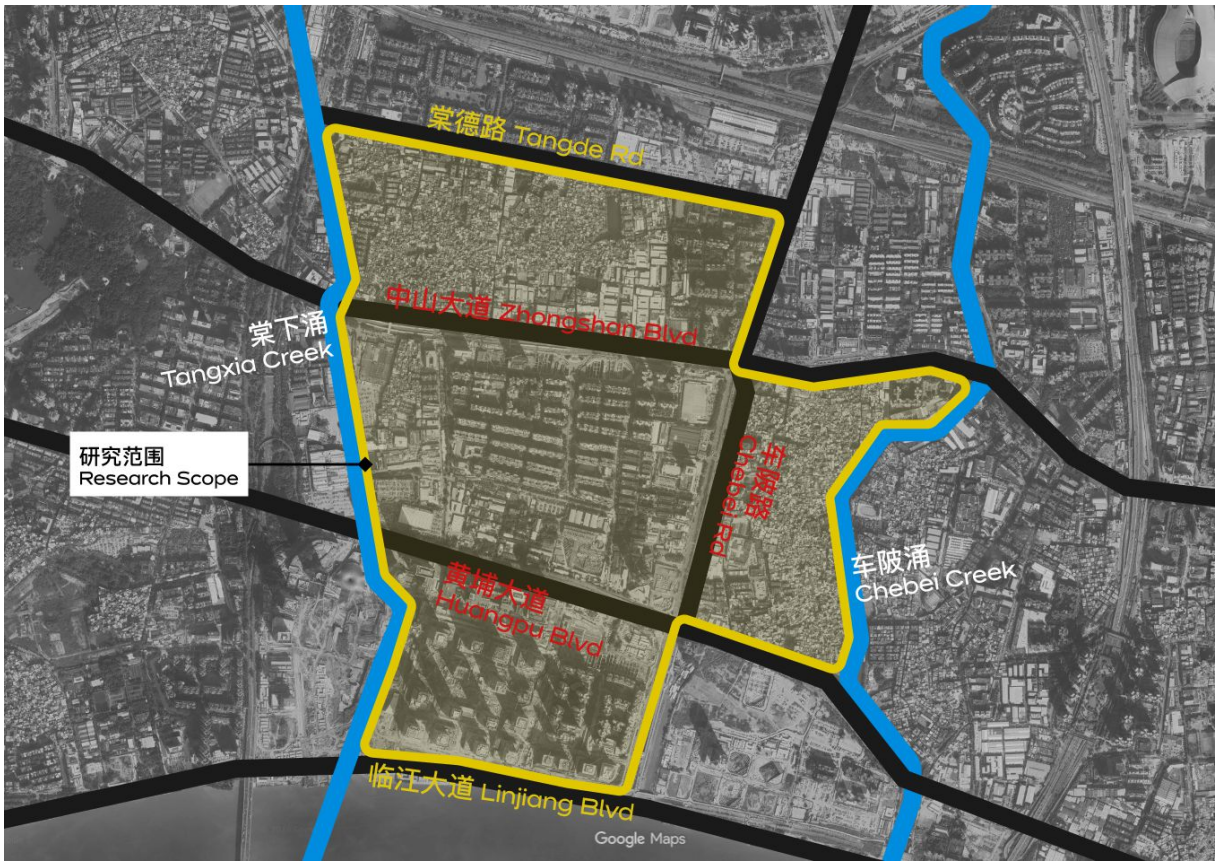


Figure 0-8 Research scope

(Source: Author)



Figure 0-9 Research scope functional pattern

(Source: Author)

The residential population within a 1.5-kilometer radius of the research area totals approximately 231,000, with office population about 121,000; the design scope's current resident population is approximately 33,000, with population density about 27,300 people/km², significantly exceeding the international high-density city identification threshold (15,000 people/km²) and domestic identification boundary line (10,000 people/km²) established in Chapter 1 of this thesis. Analysis scope 1.5-kilometer radius contains residential population totaling approximately 231,000 and office population about 121,000. Existing research on high-density cities indicates that high agglomeration of population and construction activity within limited territorial space inevitably creates demand for public space provision, public service capacity, and slow-travel networks far exceeding general cities.[12]

LandScan HD population density grid data reveals that population distribution within the analysis scope presents extreme differentiation in the north-south direction. The northern urban village area exhibits continuous deep red, with grid cell population reaching maximum levels, among the most concentrated density zones in the entire view range; while the southern Finance City starting area, despite massive building completion, has extremely sparse permanent population, with large areas appearing light yellow or nearly blank. High-density settlement and low-density vacancy are tightly juxtaposed within hundreds of meters—density distribution itself exhibits fragmented characteristics.

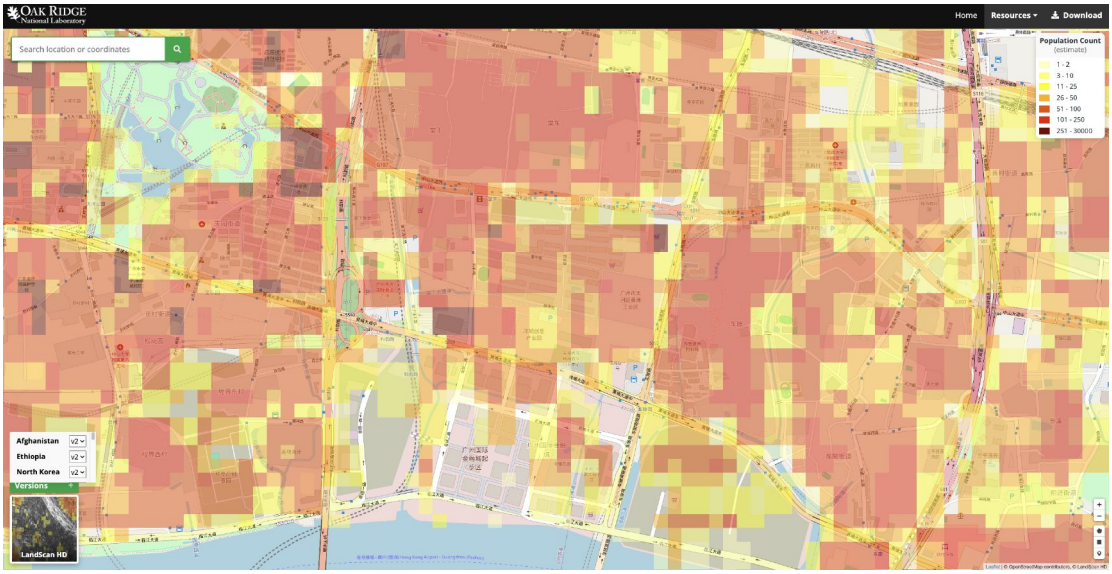


Figure 0-10 Research scope population heat map
(Source: LandScan HD)

By overlaying residential population and office population heat maps, the spatial distribution characteristics of district population activity can be further analyzed. The residential heat map shows high-heat areas mainly concentrated in the Tangxia Village, Junjing Garden, and Chebi Village areas north of Zhongshan Road, while the Finance City starting area south of Huangpu Avenue shows notably low residential density. The office heat map reveals that the area along Kexin Road and surrounding Tangxia Village forms a business tower zone with apparent office clustering; while the Finance City starting area has scattered office heat but has yet to form continuous agglomeration. Comparison of the two maps reveals the district's key characteristic: the northern area experiences dual high-density overlay of residential and office functions, with concentrated pressure on public space and service needs; the southern Finance City starting area, though already substantially built.



Figure 0-11 Research scope residential population heat map
(Source: Gaode poi)

3.2.2 Historical Evolution and Layering of High-Density Pattern

The spatial evolution of the research area presents a clear main thread: upon the spatial foundation of agricultural rural land on the north bank of Pearl River, construction activities led by different periods and different actors intervened in succession according to their own independent logic, with space elements continuously layered yet lacking overall coordination. Accompanying this process are two synchronous trends — unidirectional escalation of development intensity and continuous contraction of public space resources. The district did not form through one complete planning and construction cycle, but gradually evolved in multiple "partial development—partial residual" cycles into the current state of multiple urban fabric

juxtaposition, each orderly internally while chaotic overall. Below, the main stages of this evolutionary process are organized chronologically.

Historical topographic map from 1945 shows the area as agricultural rural land on the north bank of Pearl River, with villages like Chebi and Tangxia scattered as dispersed settlements between hills and water networks, with no traces of urbanization yet. From the mid-20th century onward, industrial facility entry, commodity housing large-scale development, old-factory creative transformation, and Finance City high-intensity construction successively layered upon this spatial foundation, forming the current pattern of multiple urban fabric juxtaposition.

Sequential comparison of satellite imagery clearly shows this layering process. Around 2005, the spatial foundation of the district had essentially formed: Chebi and Tangxia villages, as traditional Lingnan settlements, through decades of self-built additions, formed high-density, fine-grain organic growth urban fabric; multiple state-owned industrial facilities were distributed in the middle-south of the district, with large-span factories and fences delineating space territory independent from surroundings; large commercial housing communities were completed and delivered in the northern district, with enclosed high-rise residential groups occupying contiguous land. During this period, some parks, green spaces, and low-intensity land remained in the district, with the spatial pattern not yet exhibiting fully high-intensity development characteristics.

Between 2007 and 2015, two new spatial forces entered the district. Yangcheng Creative Industry Park was established in 2007 at the original Guangzhou Chemical Fiber Factory site, transforming historic industrial plants into creative office parks while largely preserving the original industrial urban fabric. Simultaneously, Guangzhou officially proposed the strategic vision of building an international finance city in 2011, launching international urban design competitions in 2012, with the starting area comprehensively beginning construction in 2015 on the Pearl River waterfront south of the district. Original villages and industrial mixed-use land entered high-intensity development cycles after large-scale land acquisition and preparation.

By 2025, Finance City's starting area high-rise tower group has essentially taken shape, creating striking scale contrast with the dense low-rise urban fabric of northern urban villages. In contrast, the spatial pattern within the design scope has not undergone fundamental change—urban village urban fabric continues self-densification, enclosed residential areas maintain

original operation models, industrial heritage remains idle or underutilized. Satellite imagery simultaneously reveals that the district's original parks and green spaces significantly decreased during this period, with some replaced by transportation infrastructure construction, and overall development intensity continuously rising while public space resources paradoxically contracted. The gap between high-intensity development in the south and spatial stagnation in the north constitutes one of the district's most visually striking structural characteristics.



Figure 0-12 Research scope spatial pattern evolution (1945-2025)
(Source: Author)

3.2.3 Urban Structure and Urban Fabric

The integrity of urban spatial form depends on the organic combination between physical and virtual elements. In the context of morphology, architectural entities constitute the "graphics" of space, while public open spaces such as streets, squares, and green spaces serve as "backgrounds". This balance is particularly fragile in high-density environments where the building entity expands under the pressure of land resources, and the public space as an imaginary body is often compressed first, resulting in an imbalance between the bottom of the map [12]. At the same time, as a basic spatial unit enclosed by urban roads, the scale of the block directly restricts the frequency of pedestrian continuity and public life. Existing studies have shown that block scales of 70 to 100 meters are most conducive to pedestrian activities and commercial agglomeration along the route, while mega-blocks above 300 meters significantly inhibit the permeability and vitality of space [19,66]. This section examines the urban structure within the study scope from three dimensions: map bottom relationship, texture type and block scale.

3.2.3.1 Figure-Ground Relationship: Imbalance of Tangible and Intangible Space

Nolli in 1748 used figure-ground relationship to depict a map of Rome, blackening building substance and leaving external space white, making the relative relationship between building coverage and public open space immediately apparent. This research adopts the same methodology, drawing the figure-ground relationship of the research scope based on building footprint data to examine the distribution characteristics and spatial implications of substance and void in the district's built environment.



Figure 0-13 Rome city map by Nolli—Nolli Map
(Source: References[72])

The building figure-ground of Tangxia and Chebi village areas contrasts dramatically between continuous black color masses and extremely fine-line white seams—these seams are the village lanes. Individual building footprints have extremely fine-grain characteristics, closely interlocking with virtually no gaps. Figure-ground relationship here presents extreme one-directional imbalance: substance dominates absolutely, while void degenerates to residual gaps between buildings, maintaining only minimum passage function, physically no longer capable of supporting public lingering, exchange, and outdoor activity.

The southern Finance City starting area exhibits completely opposite figure-ground characteristics. Building footprints appear in ultra-large scale, sparse in number, with extreme distances, with white space dominating absolutely in the diagram. However, this large-area whitespace does not indicate high-quality public space provision—these whites are mainly composed of building forecourts, municipal road setbacks, and block separations, at scales far exceeding pedestrian comfort perception ranges, lacking shade, lingering facilities, and interface enclosure, with space attributes closer to building appendage territory than public citizen spaces.

Figure-ground relationship here presents another form of imbalance—void is over-abundant in quantity but ineffective in quality.

Comprehensively, the research area has not formed the "figure-ground closure" state pursued by traditional urban design, but rather presents continuous figure-ground imbalance composed of excess substance compression and low-quality void ineffectiveness. Urban village void is absolutely compressed by substance, leaving only passage gaps; high-rise business district void area is in excess but quality ineffective; enclosed residential area interiors are acceptable but completely unopened externally; storage land void is occupied by freight functions. These imbalances link end-to-end in space, alternating in display, causing structural deficiency in the research scope's public space.

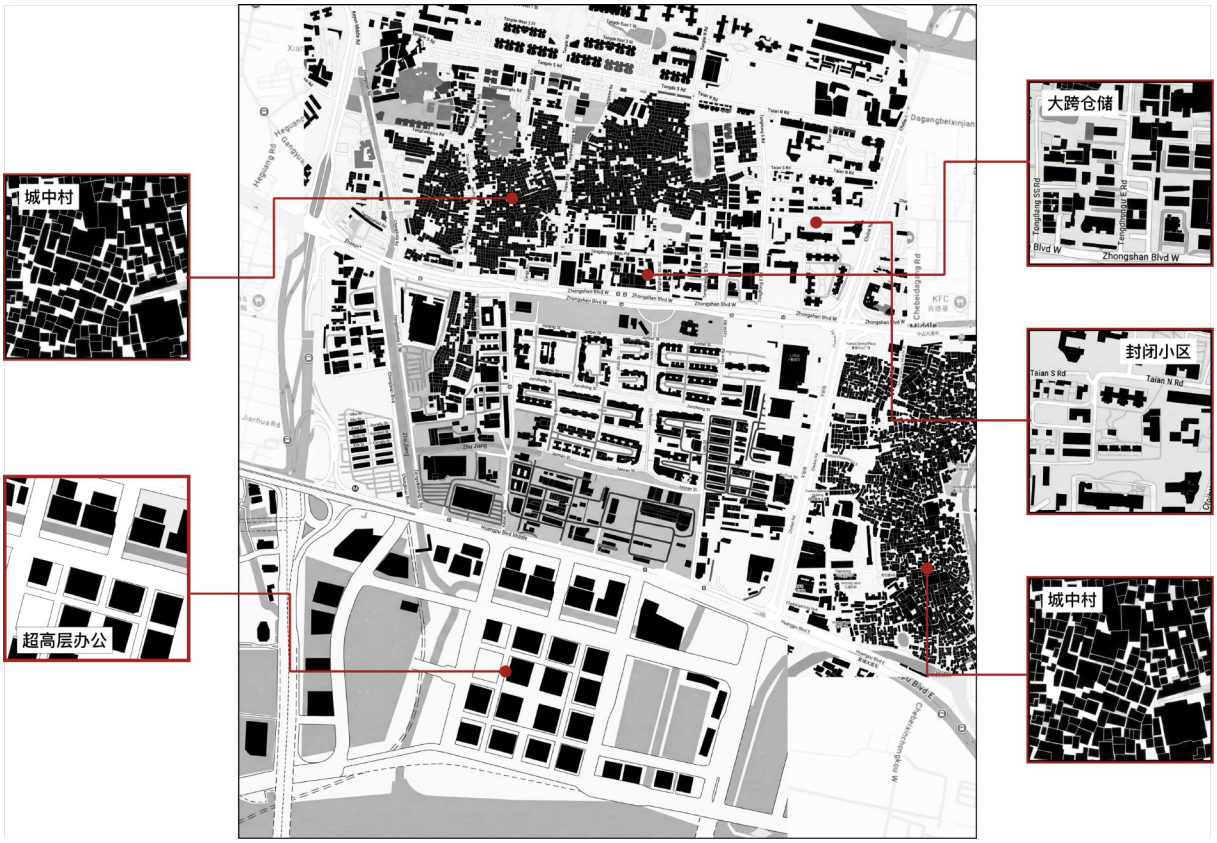


Figure 0-14 Research scope urban fabric types
(Source: Author)

3.2.3.2 Multi-Type Urban Fabric: Fragmented Pattern

Taking construction era, spatial organization logic, and functional attribute as classification criteria, combined with building satellite urban fabric imagery, the district's current urban fabric can be summarized into four typical types: urban village urban fabric, high-rise commercial

office urban fabric, enclosed residential community urban fabric, and warehouse wholesale land urban fabric.

Urban village urban fabric is the most extreme density type in the district. Buildings are primarily 3-8 story self-built residences, with individual footprints mostly 50-100 square meters, roof shapes irregular and orientations varied, presenting overall highly fine-grain characteristics. Building spacing is typically only 2-5 meters, forming extremely limited-width lane networks. While lanes are self-contained systems within villages with multidirectional routes, they barely connect with external urban roads, presenting "internally dense-continuous, externally highly enclosed" spatial organization characteristics. Estimated building coverage is 75-85%, with ground-level open space ratio only approximately 20%.

High-rise commercial office urban fabric forms the most striking morphological contrast with urban villages. Buildings are primarily super-high-rise towers, with individual footprints reaching thousands to tens of thousands of square meters, arranged orderly with extreme spacing, with clear complete block boundaries. Estimated building coverage is only 20-25%, with ground-level open space ratio high at approximately 80%. Super-high-rise buildings cast large shadow coverage areas under daylight, further diminishing ground space's use quality.

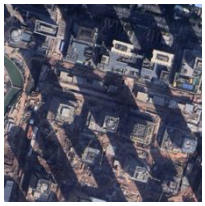
Warehouse wholesale land urban fabric is primarily composed of long-span, deep-depth rectangular buildings, with individual footprints approximately 500-3,000 square meters, forming broad passages between buildings for cargo vehicle access. Building coverage is approximately 45%, open space rate approximately 55%, but these open spaces' functional use is dominated by parking and freight loading-unloading, with crude space quality.

Enclosed residential community urban fabric is most orderly in spatial sequence. Buildings are primarily 20-30 story high-rise residences, individual footprints approximately 300-800 square meters, arranged in row formation, with uniform spacing and high greening rates, including independent internal road systems and public facilities. Building coverage approximately 25%, ground-level open space rate approximately 75%, with space quality relatively optimal among the four types.

Analysis from the table reveals: building coverage ranges from approximately 80% in urban villages to approximately 20% in Finance City, presenting a fourfold span within pedestrian-reachable ranges, while lacking transitional urban fabric types in the 40-60% intermediate range;

building individual grain size ranges from 50 square meters in urban villages to tens of thousands of square meters in Finance City, with span approaching 200-fold, a grain-size jump of this magnitude typically does not occur between adjacent blocks in well-organized urban space. The district's spatial difficulties originate not from the intrinsic defects of any single urban fabric type, but from four spatial logics each operating and mutually uncoordinated, creating fragmented collage pattern.

Table 0-3 Research scope urban fabric types

肌理类型	城中村片区	超高层写字楼	仓储批发	封闭式住区	混合过渡带
肌理图					
建筑覆盖率	80%	20%	45%	25%	55%
单体颗粒度	50-100 ㎡	3000-10000 ㎡	500-3000 ㎡	300-800 ㎡	200-800 ㎡
地面开放空间率	20%	80%	55%	75%	45%

(Source: Author)

3.2.3.3 Block Scale: Structural Discontinuities in the Pedestrian Network

Neighborhood scale represents basic metrics for measuring urban space organization efficiency and pedestrian friendliness. Mumford believed 70-100 meter neighborhood scales accommodate most neighborhood functions, belonging to reasonable ranges suitable for pedestrian activity; Wang Jianguo indicated approximately 100-meter neighborhood scales better meet pedestrian needs, also representing scales most traditional cities commonly adopt; Siksna further concluded 80-100 meter grids most ideal, retail areas possibly reduced to 50-70 meters, while 300 meters above represent large-scale neighborhoods generally inadvisable[66]. Jacobs in "The Death and Life of Great American Cities" similarly emphasized "most street segments must be short," as short segments enhance neighborhood permeability, increase path choices, and promote street vitality generation. These studies collectively provided clear reference for this district's neighborhood scale assessment.[66]

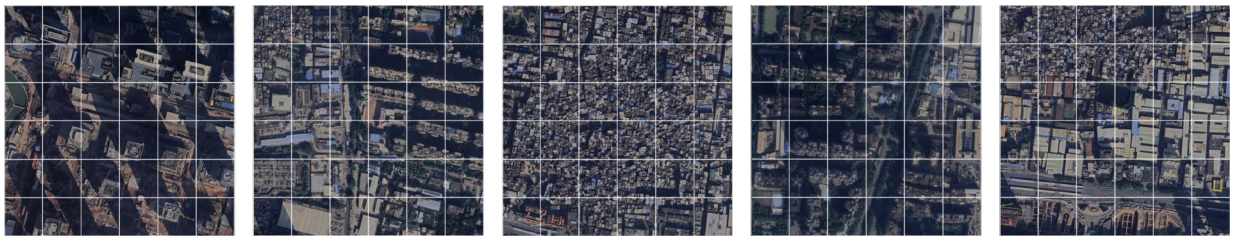


Figure 0-15 100m Block Pattern and Current Status Comparison
(Source: Author)

Based on satellite imagery measurement and analysis, the block scale of four types of typical urban fabric in the study area significantly deviate from the aforementioned pedestrian-friendly interval. The block scale of high-rise commercial office areas generally exceeds 262 meters, surpassing the ideal upper limit proposed by Siksna by approximately 1.6 times. The internal space within blocks consists mainly of plazas in front of buildings and municipal road setbacks, lacking continuous pathways for pedestrians to traverse. Warehouse and wholesale land blocks measure approximately 128 to 177 meters; while not reaching the super-large block standard of over 300 meters, their internal roads primarily serve cargo transportation and logistics organization, lacking openness oriented toward daily pedestrian circulation, and contributing very limitedly to the urban slow-mobility network. Although enclosed residential complexes have relatively moderate spacing between internal roads, at the urban street network level they typically exist as single enclosed blocks, with boundary walls isolating hundreds of meters of land use, making the effective block scale at the urban level far larger than the actual spacing of roads within the complex. Urban villages present yet another distinctive scale dysfunction: within 443 meters of continuous built environment, there is no identifiable urban-level street space; only 2-5 meter-wide narrow alleyways run through. Although these passages form a certain internal network within the village, their width, paving, and lighting conditions all fall short of urban street standards, and limited exit points with hidden locations make them difficult to constitute effective public circulation paths at the urban network level. Therefore, the problem of urban villages is not merely that 'blocks are too large,' but rather that 'the very concept of the block as an urban spatial unit has been dissolved'—its spatial form resembles a continuous, enclosed, and difficult-to-traverse entity rather than an identifiable block formed by road enclosure.

Overall, there exists no single urban fabric type within the study area that falls within the 70-100 meter pedestrian-friendly scale interval. Although the four types of urban fabric exhibit different manifestations of scale dysfunction—whether expressed as super-large setbacks, cargo-oriented closure, wall isolation, or continuous built form—their outcomes all point to the same spatial consequence: pedestrians in the area struggle to form continuous, complete, and uninterrupted circulation paths. From the 443-meter continuous construction of urban villages, to the extensive 128-177 meter layout of warehouse land, to the super-large scale spaces of 262+ meters in the Finance City, block scale undergoes multiple discontinuous jumps within limited pedestrian distances, and between different scales there is a lack of gradual.

3.2.4 Public Facility Configuration Analysis

Public service facility configuration is not merely a quantitative matter, but more fundamentally a structural problem aligned with the characteristics of the served population. The "Community Life Circle Planning Technical Guide" explicitly states that different dominant-function community life circles should "analyze population characteristics, living customs, and service demands, and configure service elements with targeted precision." The Guangzhou 2025 Guidance Opinion further divides community public service facilities into three categories based on functional attributes: basic security facilities serve all-age residents and respond to fundamental daily life needs, constituting mandatory rigid configuration requirements; quality-enhancement facilities are configured with precision according to the community population's age structure, employment characteristics, and service demands; distinctive guidance facilities are oriented toward future lifestyle scenarios and may be optionally configured in combination with regional characteristics. These three categories together constitute the operational framework of the "coordinated configuration by life circle" model, in which the provision level of basic security facilities serves as the foundational standard for measuring the supply of public services in the area.

The "Guangzhou Tianhe District Spatial Planning Framework (2021-2035)" proposes quantified targets by 2035: achieve 100% coverage of 15-minute walking accessibility to community public service facilities, 14.2 square meters of public park and green space per capita, and 90% 5-minute walking coverage of parks, green spaces, and plazas.

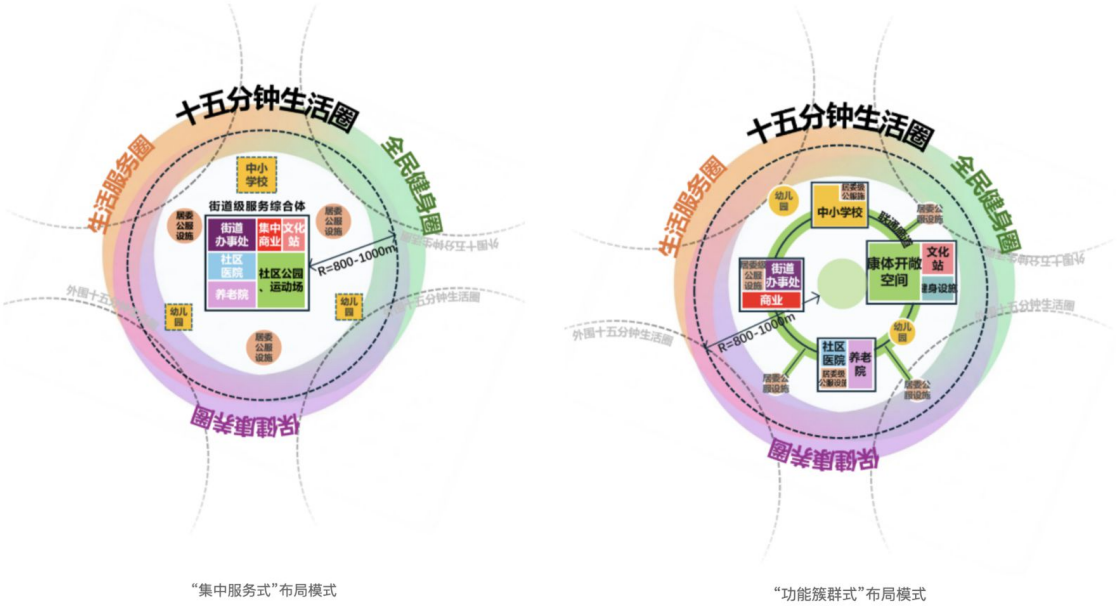


Figure 0-16 15-Minute Life Circle Facility Configuration Mode
(Source: Guangzhou Bureau of Planning and Natural Resources Guidance Opinion on Promoting Planning and Construction of Public Service Facilities and Improving Livelihood Protection Services)

3.2.4.1 Overall Analysis

Taking the center point of the study area as the center and 1.5 kilometers as the radius, the region currently contains 49 schools, 78 hospitals, 488 residential areas, and 50 commercial areas. From the facility distribution map, both complementary facilities and commercial formats show characteristics of highly concentrated clustering toward the urban village areas in the north. The Finance City pilot zone in the southern study area forms an almost blank area on both maps—around numerous completed commercial office buildings, whether basic complementary facilities or commercial formats, density is extremely low.

From a quantitative perspective, the region contains a certain scale of public service facilities and commercial formats, but the type composition of complementary facilities reveals obvious structural problems: of 78 medical institutions, zero are top-tier hospitals, indicating significantly insufficient high-level comprehensive medical resources; of 49 schools, only 6 are primary schools; according to Tianhe District's configuration standard of 80 school seats per thousand persons, the 231,000 residential population corresponds to approximately 18,500 school seats needed, and basic education capacity may face insufficient risk. The structural imbalance of commercial formats is equally prominent—dining and retail combined account for 65.89% of total format types, highly concentrated spatially within urban village settlements;

sports and fitness occupy only 1.71%, with formats of 50 yuan or less per capita consumption accounting for as high as 94.36%. While total format quantity is not insufficient, the service tier and spatial distribution are highly biased toward basic living demands of the urban village floating population, showing obvious discrepancy with possible consumption demands of Finance City white-collar workers and middle-class families.

The aforementioned facilities exhibit obvious unbalanced distribution across different functional zones. Within the study area, urban village migrant workers, Finance City daytime office workers, and enclosed residential complex family residents show significant differences in income levels, age structure, daily rhythms, and service demands. However, existing complementary facilities have not formed a supply system adapted to these differences in type composition, service tier, and spatial layout.

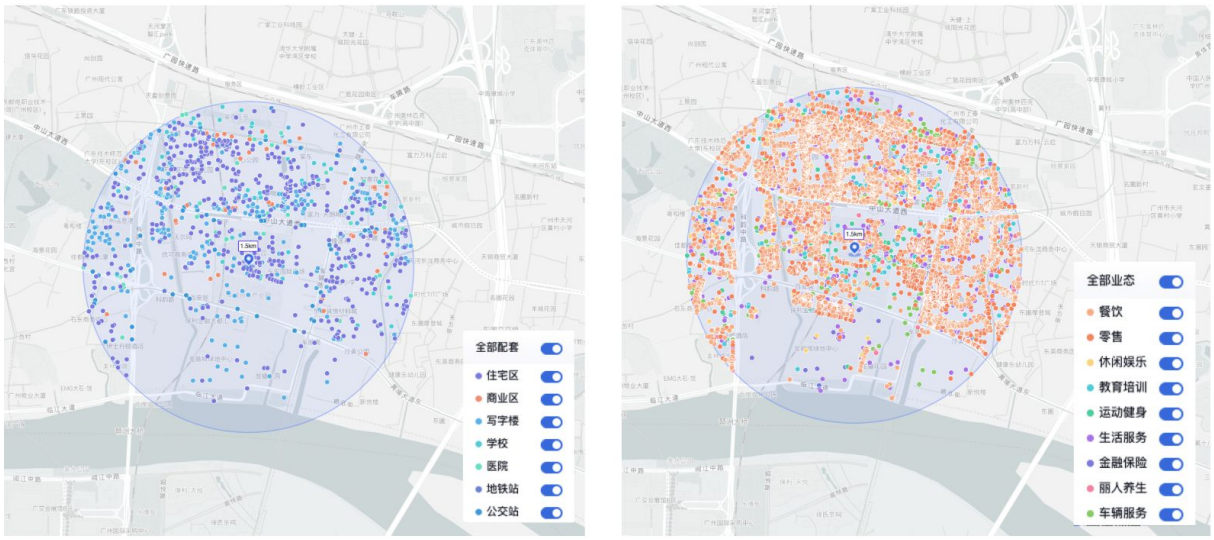


Figure 0-17 Study Area Complementary Facilities and Commercial Distribution
(Source: GaodeMap POI)

3.2.4.2 Targeted Analysis

The design area is located at the intersection of three zones—Tangxia, Chebei, and the Finance City pilot area—within the study area, with walking distance to the core areas of each zone within 1,000 meters, falling within the 15-minute life circle service range shared by all three (service radius 800-1,000 meters, "Guangzhou Bureau of Planning and Natural Resources Guidance Opinion on Promoting Planning and Construction of Public Service Facilities and Improving Livelihood Protection Services," 2025). Therefore, it possesses spatial feasibility for coordinating cross-zone public service facility configuration.

The Tangxia area covers approximately 2.25 square kilometers with 213 residential areas, of which over 70% are self-built urban village residences, with approximately 18% self-built by work units. The residing population consists primarily of migrant workers, with a relatively young age structure, family forms dominated by single occupation or rental sharing, with some households including school-age children. This population's core service needs concentrate at the basic security level: accessible community health stations, affordable fresh produce markets, compulsory education seats for migrant children, and basic public activity spaces. Existing complementary data show the area contains 24 schools, 34 hospitals, and 26 commercial areas—the highest numbers among the three zones. However, a considerable portion consists of small clinics and street-level shops spontaneously formed within urban villages, whose service tiers and hygiene standards cannot be equated with standardized facilities. Measured against the basic security facility checklist, shortfalls concentrate in three dimensions: medically, community health service centers are absent; culturally and athletically, cultural stations, community cultural activity centers, cultural rooms, cultural and athletic activity centers, and cultural and athletic plazas all lack—with urban village building coverage reaching approximately 80%, there is no physical space to accommodate community parks or sports facilities; in elderly care, street-level comprehensive elderly care service centers are completely absent. The guidance opinion specifically proposes providing "builder manager homes" with complementary shared dining halls and social affairs services for migrant workers, but the Tangxia area currently lacks the facility foundation and spatial conditions to implement this requirement.

The Finance City pilot area covers approximately 1.35 square kilometers, with basic security facility shortfalls most severe among the three zones: in education facilities, the numbers of primary schools, middle schools, and kindergartens are all zero; in medical facilities, only 1 medical institution exists, with community health service centers absent; in cultural and athletic facilities, cultural stations, cultural activity centers, cultural and athletic activity centers, and cultural and athletic plazas all lack; in convenience services, standardized fresh produce supermarkets number zero; commercial areas number zero. The served population in this area consists primarily of daytime office white-collar workers, with core demands comprising business dining, sports and fitness, convenience retail, midday rest, and public social spaces. The guidance opinion proposes a "industrial neighborhoods center" model for industrial cluster

areas—emphasizing configuration of lecture halls, shared meeting rooms, maker spaces, and dining and fitness facilities—yet shows no implementation traces in this zone. The service demands of the daytime office population consequently overflow toward the low-end supply systems of surrounding urban villages or more distant commercial centers, forming a landscape of supply-demand tier mismatch: abundant high-consumption-capacity white-collar population yet lacking service facilities matched to their demand tier.

The Chebei area covers approximately 0.8 square kilometers with 88 residential areas, 9 commercial areas, 34 office buildings, 8 schools, and 8 hospitals. The smallest area among the three zones yet with relatively highest facility density, it is one of the few areas in the study region possessing park and green space resources. The type composition balance of complementary facilities is slightly superior to the other two zones, with school, hospital, and commercial area numbers basically matched. However, measured against the basic security facility checklist, cultural stations, cultural and athletic activity centers, and cultural and athletic plazas still entirely lack, and street-level comprehensive elderly care service centers are similarly not configured. More prominent is the issue of carrying capacity: within 0.8 square kilometers accommodating 88 residential areas, there exists obvious tension between the actual service capacity of existing facilities and daily demands of the high-density population. Chebei Park, as the area's scarce public green space resource, measured against Tianhe District's "14.2 square meters public park and green space per capita" and "90% 5-minute walking coverage" planning targets, its coverage range and service capacity fall far short of meeting the high-density residential area's demands.

The supply-demand gaps of the three zones jointly point toward two levels of structural difficulty: within zones, basic security demands of various populations and existing facility supply exhibit systematic misalignment; between zones, almost no shared public facility nodes exist at the intersection, with the "block-by-block configuration" development model directly contradicting the "coordinated by life circle" configuration principle. Measured item by item against the basic security facility checklist in the guidance opinion, shortfalls distribute across facility categories as follows: cultural and athletic facilities are completely absent across all three zones, with cultural stations, community cultural activity centers, comprehensive cultural stations, cultural and athletic plazas, and cultural and athletic activity centers entirely

unconfigured; among elderly care facilities, street-level comprehensive elderly care service centers are completely absent across the study area; among convenience service facilities, standardized meat and vegetable markets matching the overall population scale are insufficient. The design area, located at the overlapping intersection of the 15-minute life circles of all three zones, can coordinate the layout of the aforementioned various missing facility types, covering service demands of all three zones in the form of shared nodes.

Table 0-4 Study Area Public Complementary Facilities Comparison

研究范围公共服务设施配置对标表（基于广州市指导意见 2025）

设施大类	保障级别	具体设施项	金融城	车陂村	棠下村	设计范围
教育设施	基础保障型	初中	✗	✓	✓	✓
		小学	✗	✓	✓	✓
		九年制学校	✗	✗	✓	✗
		幼儿园	✗	✓	✓	✓
	品质提升型	早教中心	-	-	-	-
		家庭教育指导服务站	-	-	-	-
		全龄学堂	-	-	-	-
		"四点半课堂"	-	-	-	-
	特色引导型	粤港澳青少年交流中心	-	-	-	-
医疗卫生设施	基础保障型	社区卫生服务中心	✗	✓	✗	✓
		社区卫生服务站	✓	✓	✓	✓
	品质提升型	护理站	-	✓	-	-
		健康体检中心	-	✓	-	-
		应急医疗服务点	-	✓	-	-
	特色引导型	远程诊疗服务点	-	-	-	-
		AI 智能辅助诊断点	-	-	-	-
		智慧健康小屋（无人药房）	-	-	-	-
公共文化设施	基础保障型	文化站	✗	✗	✗	✓
		社区文化活动中心	✗	✓	✗	✓
		文化室	✗	✗	✗	✓
	品质提升型	社区少年宫	-	-	-	-
		陈列展览馆	-	-	✓	✓
		图书馆分馆	-	-	-	✓
		社区学校	-	-	-	-

		社区自助图书室	-	✓	-	-
	特色引导型	旅游信息咨询中心	-	-	-	-
		非遗体验馆	-	-	-	-
		自修室	-	-	-	-
体育健身设施与公共空间	基础保障型	群众性文体运动场地	✓	✓	✓	✓
		综合文化站	✗	✗	✗	✗
		文体广场	✗	✗	✗	✗
		文体活动中心	✗	✗	✗	✗
		社区公园	✓	✗	✗	✗
		居民健身场所	✓	✗	✗	✓
		小区游园（口袋公园）	✗	✓	✗	✗
	品质提升型	社区体育中心	-	-	-	-
		社区体育公园	-	-	-	-
		社区足球场	-	-	-	-
	特色引导型	屋顶公共开放绿化活动空间	✓	-	-	-
养老与社会福利设施	基础保障型	街镇综合养老服务中心（颐康中心）	✗	✗	✗	✗
		社区养老服务机构（村居颐康服务站）	✗	✓	✗	✓
	品质提升型	残疾人康复服务中心	-	-	-	-
		心理咨询室	-	-	-	-
		社区老年课堂	-	✓	-	-
		老幼食堂	-	✓	-	✓
		托育机构	-	✓	-	-
		母婴室	✓	-	-	-
	特色引导型	银发人才中心	-	-	-	-
		残障人士日间照料中心	-	-	-	-
	基础保障型	公交站场	✓	✓	✓	✓

市政交通设施		社会停车场/库	✓	✓	✓	✓
		公共厕所	✓	✓	✓	✓
		垃圾收集站	✓	✓	✓	✓
	品质提升型	可回收物中转站	-	✓	✓	✓
		环境卫生车辆停车场	-	-	-	-
		可回收物便民回收点	-	✓	-	✓
		公交首末站	-	-	-	✓
		公共非机动车（电动自行车）停车场	-	-	-	✓
	特色引导型	低空起降点	-	-	-	✓
		无人驾驶公交站	-	-	-	-
便民服务设施	基础保障型	生鲜超市（肉菜市场）	✗	✗	✓	✓
	品质提升型	物流配送站	-	✓	✓	✓
		邮政所	-	✓	✓	✓
		快递送达设施（智能快件箱/快递快餐收发点）	✓	✓	✓	✓
	特色引导型	共享会客厅	-	-	-	-
		创客空间	-	-	-	-
		共享食堂	-	-	-	-
		共享厨房	-	-	-	-
		共享洗衣房	-	-	-	-
		"社区合伙人"站	-	-	-	-

注：基础保障型设施为必须设置，品质提升型设施为针对性设置，特色引导型设施为自选设置。

(Source: Author)

3.2.5 Imbalance in Road Space Right-of-Way Allocation

There are inherent contradictions in high-density cities at the transportation level: high-intensity agglomeration of population and function should improve the efficiency of slow travel and public transportation, but the road systems of a large number of high-density cities still continue the planning logic of giving priority to motor vehicles. Yan Xiaopei and Mao

Jiangxing's research on Guangzhou pointed out that the absolute position of private transportation obviously does not meet the requirements of high-density centralized development cities, which directly leads to serious traffic congestion and public space squeezing problems [5]. Zhuang Yu and Wu Jingwei also pointed out that in the process of rapid modernization, pedestrian life and pedestrian environment have invariably given way to the vehicular system, and the motorway occupies the center of the street and is much wider than the pedestrian lane on both sides, which is the most prominent anthropogenic dislocation phenomenon in high-density cities [26]. Gale proved through the San Francisco empirical study that when the average daily traffic volume on the street increased from 2,000 to 16,000, outdoor activities practically ceased to exist, and neighborhood interactions were difficult to maintain [19]. In the spatial environment of high-density population agglomeration, the suppression effect of motor vehicle-led right-of-way allocation on pedestrian life is particularly prominent due to the amplification of density.

The density of public transportation stations within 1.5 kilometers of the area is high, and the macro accessibility is still sufficient at the theoretical level. However, the current distribution of the right of way between the three urban arterial roads surrounding the area, Huangpu Avenue, Zhongshan Avenue and Chepi Road, continues the design logic of giving priority to motor vehicles, so that pedestrians encounter systematic resistance in the process of reaching the boundary of the area. The measured and analyzed cross-sections of the three main roads show that the driving space of the three main roads accounts for 77% to 90% of their respective road widths, the non-motorized lanes and sidewalks are compressed to the edges of both sides of the road width, the width of the sidewalk is only 3-4.5 meters, and the building setback space on both sides is generally occupied by parking and municipal facilities, and the actual usable walking width is further compressed. Zhuang Yu and Wu Jingwei pointed out that the division of the main road tens of meters wide makes it difficult to connect between the functional areas of the high-density area and seriously impairs the continuity of walking activities [26], which is directly confirmed by the pattern of three enclosed arterial roads in this area.

The structural imbalance of right-of-way allocation creates continuous pedestrian barriers on three sides of the area: the three trunk roads, while ensuring external motor vehicle accessibility, systematically sever daily slow-mobility connections between the internal

population and surrounding urban areas. The macro-level public transit coverage advantage therefore fails to translate into actual pedestrian permeability and public vitality within the area. This structural transportation problem will be jointly incorporated with other dimension investigation findings in section 3.4 as core contradictions facing area renewal.

Table 0-5 Study Area City Trunk Road Cross-Section Comparison

道路名称	道路等级	总路幅 (m)	机动车道 (m)	行人及非机动车道 (m)	机动车 占比(%)
黄埔大道	城市主干道	36–64	30-55	3-4.5 *2	77%–90%
中山大道	城市次干道	45–64	36-55	4.5 *2	80%–86%
车陂路	城市次干道	45–47	36	4.5 *2	77%–80%

(Source: Author)



Figure 0-18 Chebei Road Right-of-Way Allocation Diagram
(Source: Author)

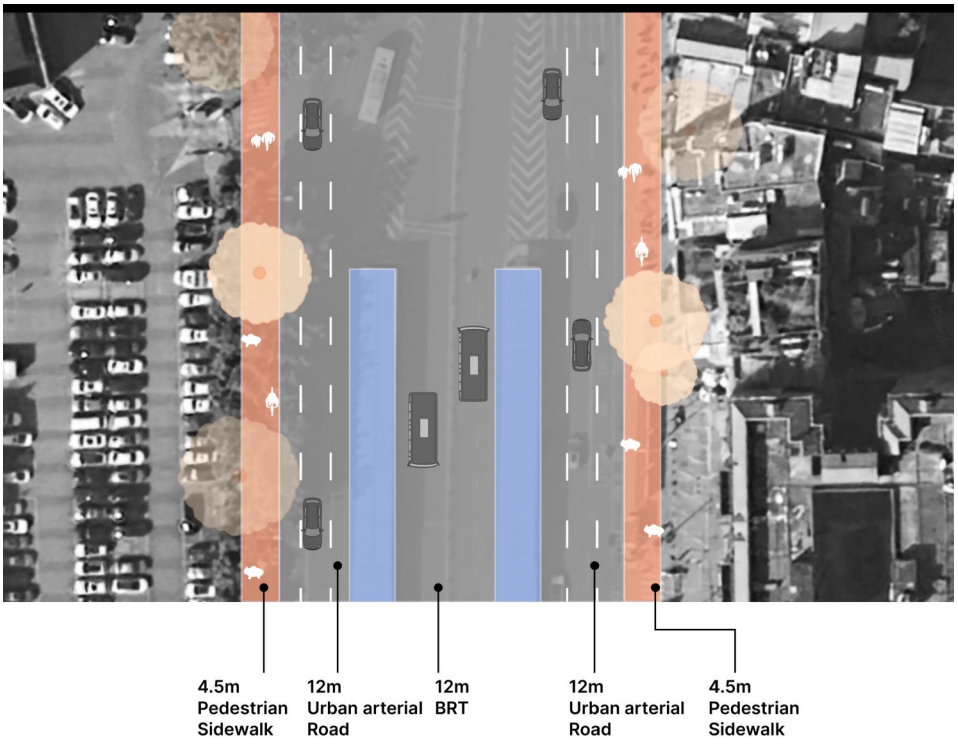


Figure 0-19 Zhongshan Avenue Right-of-Way Allocation Diagram
(Source: Author)

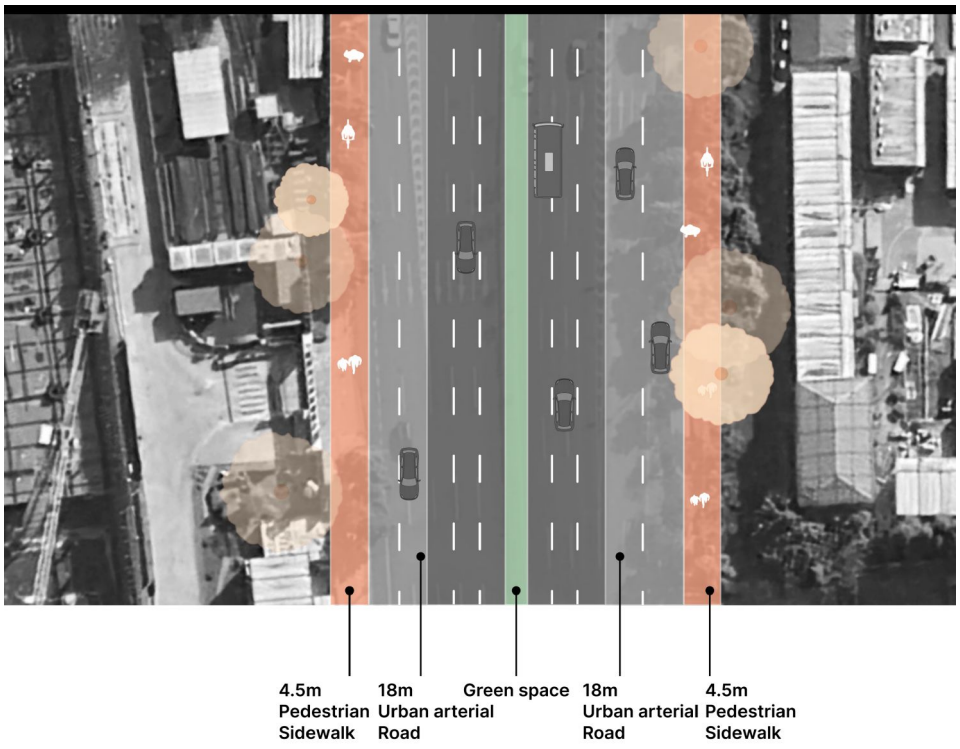


Figure 0-20 Huangpu Avenue Right-of-Way Allocation Diagram
(Source: Author)

3.3 Block perspective: The collage pattern of inward stagnation in the northern area of Guangzhou International Financial City

In the process of high-density rapid urbanization, the spatial pattern of the research scope gradually forms a trend of encirclement at the macro level, so that the design scope is structurally isolated from the external urban system, and the area as a whole falls into the urban structure dilemma of inward closure and stagnation and self-circulation. In this context, the construction activities of different periods and subjects in the area are promoted but lack integration, and finally superimposed into a collage pattern of "closed and disorderly as a whole".

The northern area of the financial city is embedded in the high-intensity development hinterland of Tianhe District with a residential population density of about 27,300 people/km² , which means that the land use, building mix and spatial relationship within the block are in a highly compressed state. However, high density itself does not necessarily lead to spatial disorder—what really makes the area complex is the collage pattern superimposed on top of density: closed settlements, urban villages, industrial relics and financial offices coexist in the same plot boundary, and various spaces operate according to their own logic, but lack an integrated public structure to connect them. What macro data can always present is the outline of this structure, rather than the real material texture and usage logic inside the block. Colin Rowe argues in Collage Cities that urban restoration must respond to specific places that have been forgotten and fragmented; The research and evolution of weaving and patching theory also shows that the understanding of high-density collage environment must be developed according to the three progressive levels of material form, functional vitality, and social use to form a systematic diagnosis [8]. Under this framework, this section takes the design scope of 1.21km² in the north of the financial city as the object and carries out a systematic investigation based on the above three dimensions.

In terms of research methods, this section mainly uses field observation and field records, on-site surveying and mapping, and image data collection to obtain basic information. Based on the observation results obtained from the survey, the above three dimensions are analyzed separately and further synthesized to form a systematic judgment on the current situation of the area.

3.3.1 Overview of Basic Conditions

The Finance City northern area specified in this section—the design area of this research—stretches north from Zhongshan Avenue West, south to Huangpu Avenue, east to Chebei Road, west to Tangxia Creek, with total land area approximately 1.21 km². The area is located in eastern Tianhe District, Guangzhou, immediately the District North of Guangzhou International Finance City pilot zone, east adjacent to Chebei Road city trunk, west relying on the Keyun Road interchange node, situated within the overlap of Tianhe District's high-intensity development hinterland and the urban-rural transition belt. The area's current construction density is extremely high yet simultaneously contains large quantities of inefficiently utilized and idle land. Enclosed residential complexes, urban villages, industrial remnants, and commercial blocks are interlocked and juxtaposed at minute scales, each operating in isolation, lacking integrative public structure, with spatially fragmented conditions prominently evident.



Figure 0-21 Design Area
(Source: Author)

The area's current conditions present a typical functional collage pattern, with several land use categories of markedly different functional attributes juxtaposed coexisting within the approximately 1.21 km² range. From spatial location perspective, the northern area consists primarily of Tangxia Village urban village and street-level commercial zones, with the former being dense concentrated village self-built residential areas with extremely high building density and continuous ground-floor commercial use, representing the area's highest-density local

residential region. The central area is occupied by Junjing Garden enclosed residential complex as the largest continuous block, a large commercial residential community completed around 2000 with relatively complete internal facilities yet with highly enclosed perimeter boundaries. The southern area concentrates Yangcheng Creative Industry Park and Dongya Magnetic Factory, two industrial remnants, with the former a creative office park converted in 2007 from the former Guangzhou Chemical Fiber Factory site, and the latter largely in inefficient use or idle state at present, representing the area's largest industrial remnant awaiting renewal. A small-scale residential community and public bus depot occupy the southeast corner. From business format composition perspective, retail business types have the highest proportion (41.22%), followed by dining (19.18%), with cultural, sporting, and public service format types combining for extremely low proportions, forming obvious discrepancy with the residential population scale the area sustains.

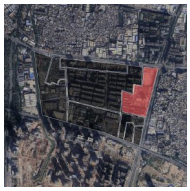


Figure 0-22 Design Area Functional Pattern
(Source: Author)

The area's permanent resident population approximately 19,359 persons, office population approximately 18,963 persons, these two population groups comparable in scale. When adding Tangxia Village floating rental population, total permanent population approximately 33,000 persons, corresponding to population density approximately 27,300 persons/km² , significantly exceeding Guangzhou built-up area average levels. From population composition perspective, the area simultaneously congregates several main actors: middle-class residents primarily accommodated by Junjing Garden, urban village residents gathered in Tangxia Village (including significant external rental population), and people related to building materials wholesale industry. These three populations are spatially proximate yet lack shared public activity spaces, each operating in attachment to relatively enclosed spatial units.

In land ownership aspect, state-owned construction land and village collective land coexist in the area, with ownership boundaries and spatial boundaries highly coincident, constituting structural constraints on subsequent renewal intervention. The aforementioned six functional zones, three population groups, and composite ownership structure together constitute the spatial foundation for subsequent material entity, spatial environment, and social-cultural three-dimension analysis in this section.

Table 0-6 Design Area Overview

	骏景居住片区	羊城创意园	棠下村	大型商超办公	建材批发
片区范围					
用地性质	居住用地	办公用地	居住/商业混合	商业/办公用地	商业用地
主要功能	封闭住区/ 内部配套	创意办公/ 工业遗存	城中村住宅/ 底层商业	大跨商超/ 零散办公	大型厂房商业
容积率	约 3.1 （占地 6.4 万㎡，建筑面积 20 万㎡）	约 0.76 （占地 17.1 万㎡，建筑面积约 13 万㎡）	-	-	-

人口密度	约 8900 户，按均 3 人/户估算约 2.7 万人，折合约 42 万人/km²	-	棠下街道整体约 2.5 万人/km²，城中村核心区局部约 15 万人/km²	-	-
建成年代	分期建设，北苑 2000 年、南苑 2003—2005 年、西苑 2007 年、东御苑 2010 年	2007 年改建	形成于南宋，现状自建住宅主要为近 30 年自发加建	-	-
现状特征	高层住宅为主，边界高度封闭，内部配套相对完整	原化纤厂旧址改建，部分工业建筑保留；聚集 190 余家企业，年产值超 300 亿元	自建住宅密集，底层商业连续，人口密度最高	有大面积未使用停车场，超出实际需求，用地效率低，道路混乱	内部有货车车道，规划较为混乱，空间品质差

(Source: Author)

3.3.2 Material Entity: Block Boundaries and Street Network Structure

Space fragmentation concentrates at two interrelated material dimensions: boundary nature determines whether functional units can form spatial contact, while road network completeness determines whether people and vehicles can freely circulate within neighborhoods. Colin Rowe in "Collage City" noted modern city spatial units operate under respective logics lacking integrative structure, with material consequences solidifying through boundary closure and road network fracturing within city fabric. This section examines how material physical elements within design scope structurally cause neighborhood spatial fragmentation from boundary types and road network connectivity dimensions.[8]

3.3.2.1 Boundary Type Identification

High-rise block boundaries constitute the most direct material manifestation of the collage pattern. Colin Rowe pointed out in "Collage City" that each spatial unit in modern cities operates according to its own logic while lacking integrative structure, causing the built environment to present high fragmentation. This fragmentation's concrete spatial manifestation is precisely the

boundary areas between units. Kevin Lynch further distinguished urban boundaries in "The Image of the City" into two types: barrier boundaries that sever spatial and functional connections across sides, and suture boundaries that connect adjacent fragments into wholes[73]. In high-density mixed-use neighborhoods, boundary character critically affects public life—the block's proximity means numerous boundaries with large aggregate length. If boundaries predominantly trend toward the barrier end, the area's overall pedestrian connectivity and functional permeability will face systematic suppression.

Based on field investigation analysis, current block boundaries in the design area can be categorized into three types. Boundary walls/fencing form densely continuous closed line networks on plan view, concentrated appearing at each ownership and function interface—between urban villages and enclosed complexes, between industrial remnants and surrounding blocks, between creative parks and city roads—encompassing nearly all outward-facing interfaces of functional zones in the design area. From material condition perspective, this boundary type uniformly achieves closure through low-quality masonry walls or metal fencing, with rough interfaces lacking any detailed treatment, contributing near-zero to street landscape. From urban effect perspective, continuous fencing at block intersections forms dual back-to-back negative facades, not only severing pedestrian connections but systematically dissolving the public potential boundary areas should possess. Green boundaries present distinctly different dual forms: one comprises urban-level planned green belts deployed along Zhongshan Avenue, Chebei Road, and Tangxia Creek, municipally standardized installation, larger in scale but serving primarily traffic-isolation functions, lacking lingering and social interaction conditions. The other comprises landscape green buffers set at block boundaries by high-end residential complexes like Junjing Garden and Dongyuyuan, with relatively higher quality but extremely limited quantity within the design area, moreover serving internal blocks rather than the urban public space system. Access control nodes densely distribute on plan view, approximately 20 nodes dispersed throughout the design area in all directions. Notably, certain access control nodes are not merely positioned at block entrances/exits but appear at intersections that should maintain city-level public circulation function.

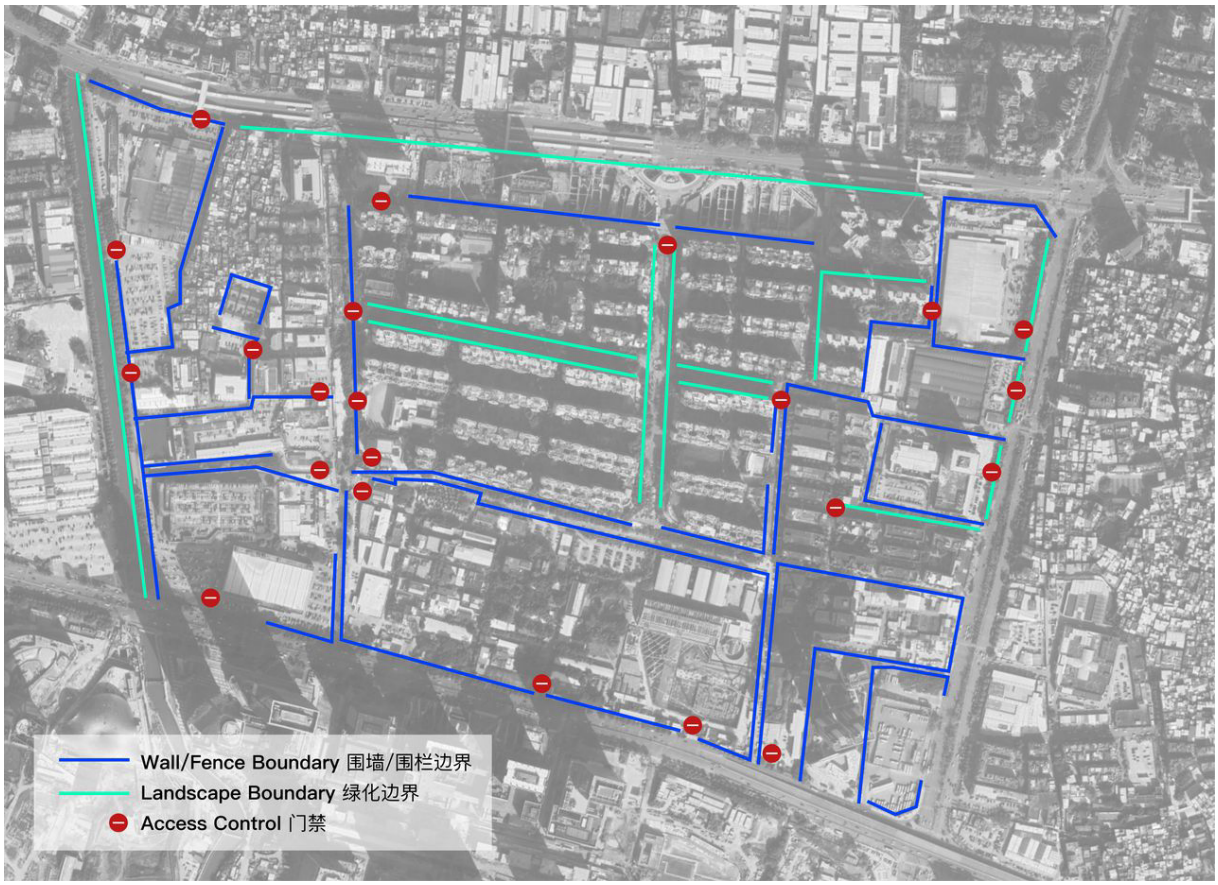


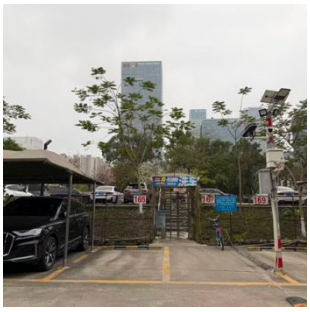
Figure 0-23 Design Area Boundary Distribution
(Source: Author)

The three boundary types exhibit different material characteristics and spatial consequences. Walls/fencing boundaries form continuous impenetrable hard interfaces where pedestrians must circumnavigate, with significant disparity between straight-line distance and actual walking distance. Continuous walls around Junjing Garden make it the area's largest pedestrian obstacle with longest detour distance. Green boundaries preserve certain visual transparency but green width and planting density likewise constitute physical traversal obstacles, while lacking lingering facilities along the line, producing no edge effects and contributing similarly to public life as wall boundaries. Access control nodes physically preserve traversal possibility, but managerial segregation creates psychological thresholds where non-local users show extremely low actual entry willingness—approximately 20 access nodes mean that pedestrian pathways within the area face managerial filtering in virtually all directions, with public path continuity systematically interrupted.

The boundaries within the design range vary in nature, but all tend to be at the barrier end defined by Lynch: the functional plates do not form a transitional semi-public space at the

boundary of the plot, and the boundaries generally operate as partitions rather than connections. The high-density coverage of the closed line network and the systematic distribution of control nodes solidify the functional plates of the area into isolated spatial units at the material level, which constitutes the structural premise for subsequent pedestrian accessibility analysis and public space quality assessment.

Table 0-7 Design Area Boundary Types

边界类型	围墙/围栏边界	绿化边界	门禁管控点
现状照片			
设置特点	产权交界处边界	城市道路及住宅小区	各板块出入口
物质特征	连续硬质界面或铁丝围栏，品质较差	绿化带+灌木，视线通透	闸机/保安亭，品质与设立位置相关
可穿越性	不可穿越	不可穿越	管理过滤
对交通影响	强制阻断，形成断头路	软性隔断，对行人无停留价值	心理门槛高，非本地块使用者实际不进入

(Source: Author)

3.3.2.2 Street Network Connectivity Analysis

Based on current road classification, the street network in the design area exhibits obvious single-channel dependency and block fragmentation characteristics. Only one 12m+ wide north-south block-level trunk road runs along the western side, constituting the only internal road with urban connectivity in the design area, undertaking primary traffic connection between enclosed blocks and surrounding city trunk roads. Conversely, the area's eastern side from Tangxia Village to the industrial zone lacks north-south through pathways, and east-west direction similarly lacks cross-connecting roads realizing two-side connection. Whether pedestrians or

vehicles, to travel from the western Tangxia Creek direction to the eastern Chebei Road direction, all must detour external city trunk roads. Beyond this pathway, remaining 10m and 4m-level internal roads all present branch forms extending into individual blocks, lacking inter-connection, with abundant dead-end roads and terminating routes.

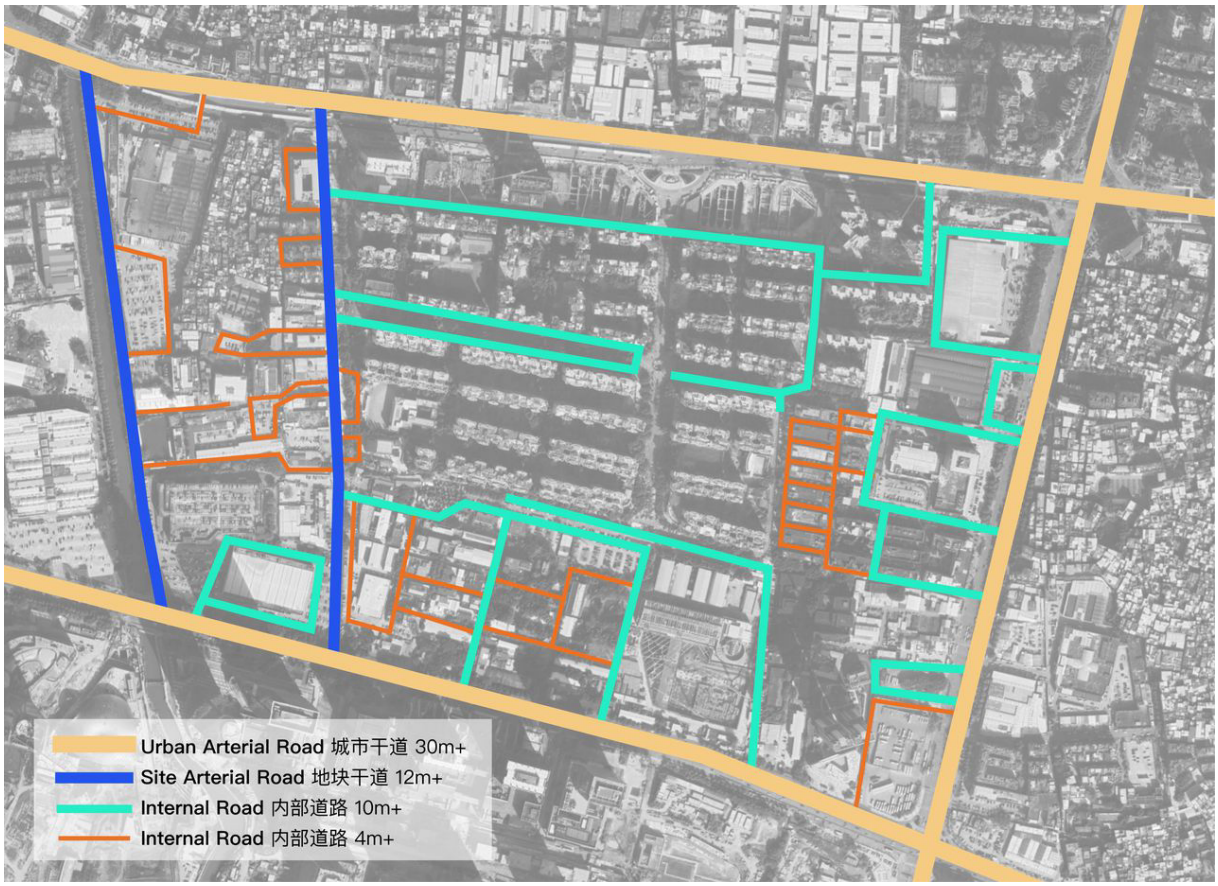


Figure 0-24 Design Area Road Classification Map
(Source: Author)

Road condition temporal data further confirms this network structure's fragility. During holidays, the design area's roads collectively maintain smooth operation with no obvious congestion. Upon entering workdays, as Finance City and Yangcheng Creative Industry Park commute flow increases, the sole north-south block trunk road and its junction node with Huangpu Avenue exhibits congestion during morning peak, reaching severe congestion during evening peak. Simultaneously, Junjing Garden resident return routes concentrate toward Zhongshan Avenue, further aggravating northern exit pressure. Notably, external city trunk roads during the same period maintain relative smoothness. The area's internal traffic pressure primarily derives not from external through-traffic but concentrates from local commuting and internal travel demands. Enclosed street network compresses the area's internal traffic into a

single channel, simultaneously objectively intensifying the area's isolation state from external urban systems.

Synthesizing street network structure and road condition data across dimensions, the design area's internal street network connectivity exhibits systematic structural defects: north-south features only single channel, east-west completely fragmented, internal networks each closed without interconnection. The sole block trunk road approaches saturation during weekday peaks, with no network redundancy available for distribution, nor transverse paths supporting cross-zone traffic connection. The area's functional zones achieve high spatial compression and juxtaposition geographically, but actual connectivity level at the network level falls far short of the accessibility implied by their spatial distances.

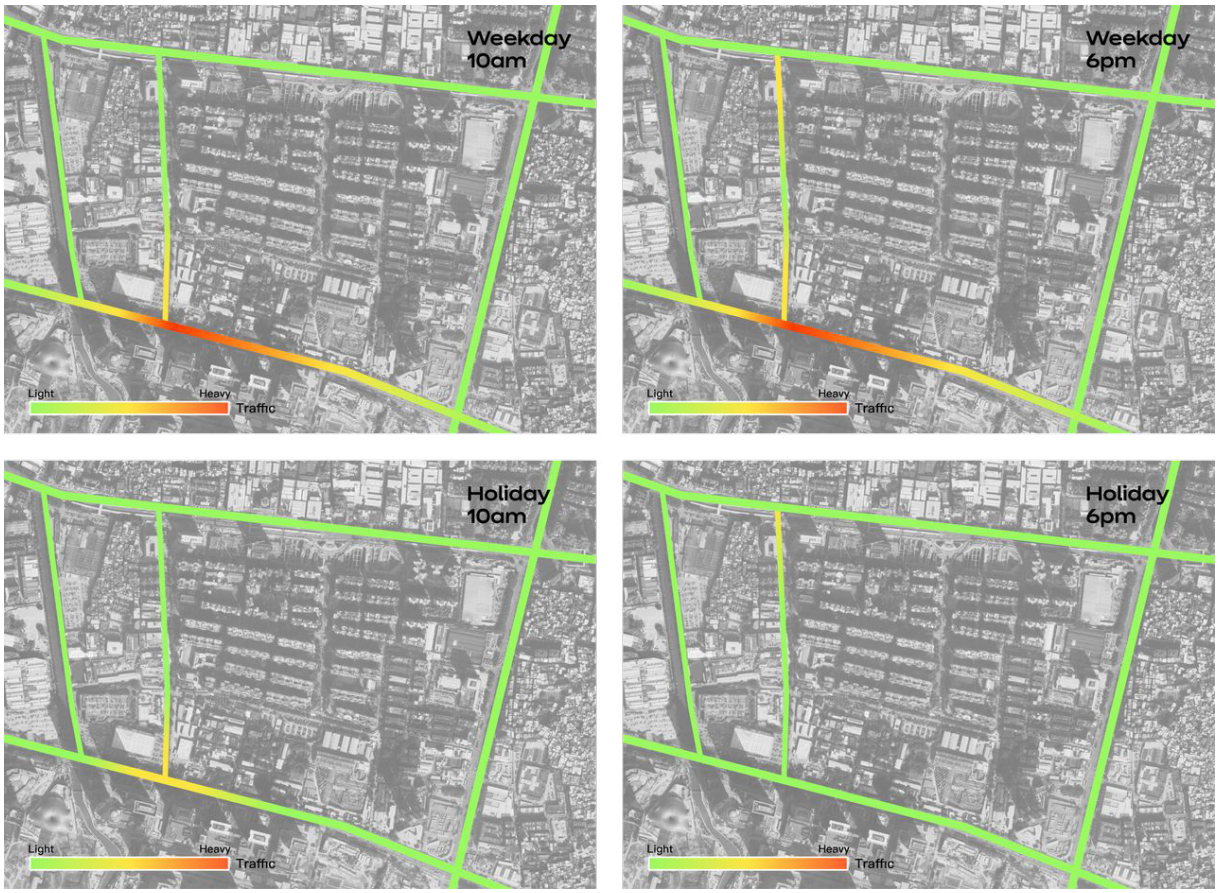


Figure 0-25 Design Area Road Traffic at Different Times
(Source: Author)

3.3.3 Spatial Quality: Lost Spaces and Street Spaces

The closed nature of material entities delineates the spatial skeleton of the area, and the space between the skeletons is also a key dimension to understand the current situation of the

area. These non-building sites and street spaces are not automatically transformed into usable public spaces – their quality status directly determines whether public life can take place in the gaps outside the closed boundaries. Colin Rowe pointed out that public space is the core medium that connects isolated urban fragments and supports collective life [8]. Trancik defines surplus spaces that cannot be used due to lack of organization as "lost spaces", pointing out that they are essentially negative by-products of urban planning and development logic [69]. Under this framework, this section examines the current conditions of space quality within the design scope from three dimensions: lost space identification, street interface quality and green space accessibility, and judges whether it can support people's stay and public life.

3.3.3.1 Lost Space Identification

There is a considerable amount of non-building land in the area, which exists in the form of lost spaces that can neither be used nor perceived as public spaces. Roger Transic defined lost space as "a space that becomes difficult to use and define due to lack of organization, and is a leftover material left after urban planning is delineated" [74]. Lost spaces within the design scope can be classified into three types according to their characteristics:

First, underutilized land without planning. Two such spaces exist in the design area: extensive idle land within Dongya Magnetic Factory site long remains unused, having neither use function nor clear spatial form, completely isolated from urban public life through wall enclosure and functional absence, representing the single block where lost space concentrates most intensely. Similarly, underutilized land exists around the Shen Clan Ancestral Temple within Tangxia Village, currently in inefficient use state, yet as surroundings of the historic settlement's core space, possesses scarce place value and activation potential within the area. The two spaces show marked differences in scale and location but jointly possess material conditions for conversion into public space nodes without disturbing surrounding building patterns.

Second, unattributed boundary-adjacent surplus land. Considerable quantities of surplus land with unclear ownership accumulate between functional block boundaries, possessing neither form nor function. This space has partially been self-occupied through disorderly parking in current conditions—this phenomenon is no accident but a direct manifestation of bottom-tier

users filling space vacuums through informal means under severe public space supply shortages, pointing toward the area's systematic lack of public lingering spaces.

Third, parking land of single function with low efficiency. Multiple large parking lots distributed around Junjing Garden and Tangxia Village show actual usage rates far below supply capacity, occupying the area's few relatively large-scale, positionally advantageous space resources yet contributing nothing to the urban public space system. This space type's problem lies not in functional absence but in single inefficient function locking what could accommodate diverse public activities as potential carriers.

The three lost space types differ in character, pointing toward unified judgment: usable land in the design area is systematically segregated through walls, occupied disorderly, and locked by low-efficiency function from public life. The area's public space scarcity results not from absolute land resource shortage but from accumulated governance failure.

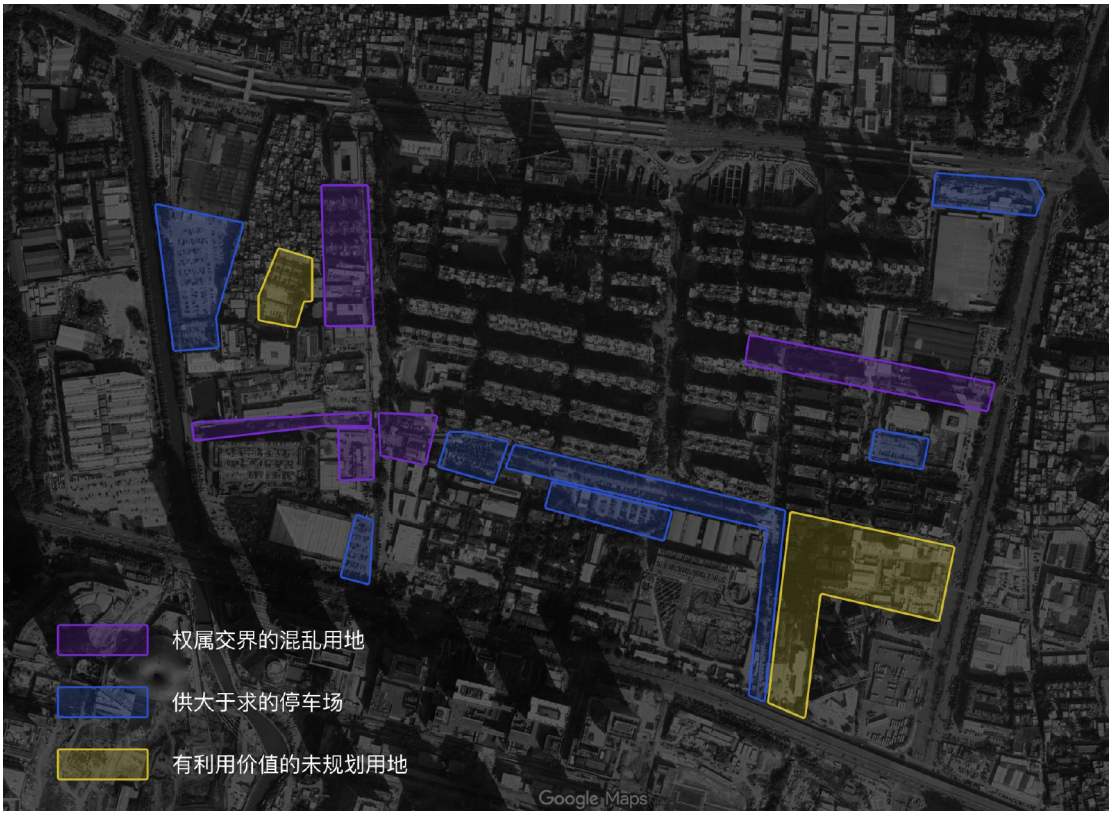


Figure 0-26 Design Area Lost Space Distribution
(Source: Author)

3.3.3.2 Street Interface Quality and Scale

Streets in the design scope show significant variation in street width and building height combinations on both sides due to differences in development, with different cross-section

width-to-height ratios corresponding to different degrees of spatial enclosure and pedestrian perceptual experience. Yoshinobu Ashihara, in Exterior Design in Architecture, proposed the D/H ratio—the ratio of street width D to building height H on both sides—as an important metric for measuring the sense of spatial enclosure in exterior spaces: when D/H approaches 1, the sense of enclosure and openness are relatively balanced; when D/H exceeds 2, the sense of enclosure begins to weaken; when D/H reaches 4, the space tends toward loss of control and the sense of enclosure essentially disappears; when D/H is less than 1, the space tends to create a sense of oppression, increasing in proportion to how much below 1 the ratio falls. He further noted that the scale of exterior spaces should take pedestrian walking experience as the fundamental reference, as spaces that are either too open or too oppressive will undermine pedestrians' willingness to linger and the quality of environmental perception[75]. Based on these criteria, this section selects four representative street cross-sections in the design scope for measured analysis, assessing their spatial scale characteristics and impact on walking experience.

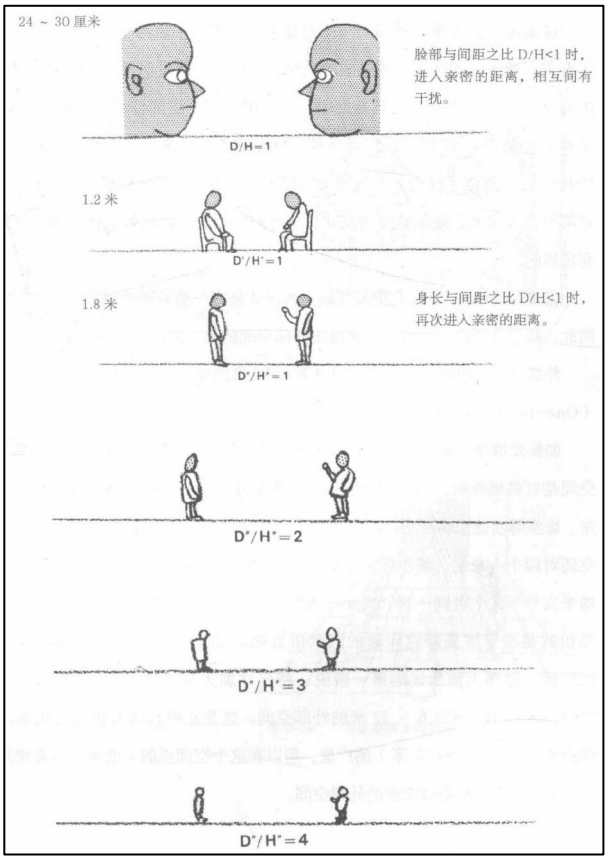


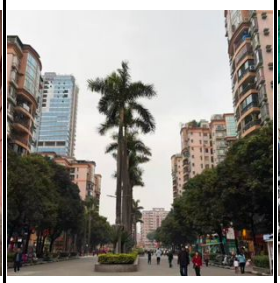
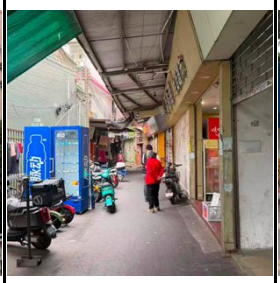
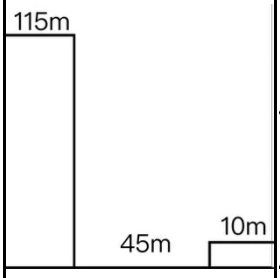
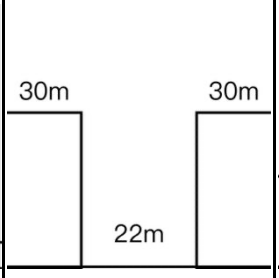
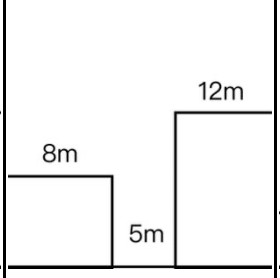
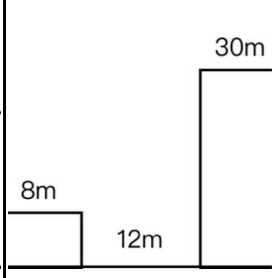
Figure 0-27 D/H and feelings
(Source: reference[75])

Huangpu Avenue along Dongya Magnetic Factory section has total width approximately 45 meters with street-facing interface primarily 10-meter-high walls, D/H approximately 4.5, far exceeding the enclosure-loss threshold. Finance City towers behind walls, approximately 115 meters high, visually reinforce the loss-of-control perception. Pedestrians in this section exist in completely exposed spacious environment lacking any lingering support. Urban village internal passages measure approximately 5 meters wide with both-sides building approximately 12 meters high, D/H approximately 0.4 with height-width ratio approximately 2.4:1, space highly compressed with insufficient lighting, walking experience locally oppressive. Kexin Road as the area's sole north-south through block-level road, measures approximately 12 meters wide with eastern building approximately 30 meters high and western approximately 8 meters, D/H fluctuating between 0.4 and 1.5, extreme asymmetry between sides creates highly chaotic pedestrian space perception. Within the 12-meter width, vehicular roadway occupies the main portion, with pedestrian pavement nominal width only approximately 3 meters, with merchant goods occupying approximately 60% of actual space, effective circulation width severely constrained, forcing some pedestrians into vehicular roadway. Huangpu Avenue conditions nearby similarly, with shared bicycles and electric scooters occupying approximately 60% of pedestrian pavement space, walking continuity equally unsecured. Junjing Garden interior walking street measures approximately 22 meters with both-sides building approximately 30 meters high, D/H approximately 0.7, the sole section among four streets within appropriate range—yet this scale relationship remains completely enclosed within residential walls, contributing nothing to external urban public life.

Among four streets, none simultaneously satisfies both "appropriate D/H ratio" and "open to public" conditions—Junjing Garden interior scale is reasonable but enclosed, the remaining three are publicly open but ratios all misaligned, with misalignment directions varying. This pattern reveals the structural root of the area's street space quality difficulty: the problem is not individual route accidental design failure but a systematic result of closed development model and right-of-way allocation logic acting together. Kexin Road as the area's sole intervenenable public north-south corridor, with current pavement width constrained by vehicular roadway, can adjust D value through right-of-way reallocation widening pedestrians, correcting D/H ratio

toward appropriate range without disturbing surrounding buildings—this judgment will directly point toward Chapter 4's transport weaving strategy.

Table 0-8 Design Area Typical D/H Identification

位置	黄埔大道沿线	骏景花园内部	棠下村巷道	科新路
现状照片				
断面示意				
街道宽度（D）	45 m	22 m	5 m	12 m
建筑高度（H）	115m/10 m	30 m	8m/12 m	8m/30 m
D/H 比值	4.5	0.7	0.4	0.4
空间感知	D/H > 4 围合感消失	D/H < 1 尺度宜人	D/H << 1 压迫感	D/H << 1 压迫感
使用情况	共享单车及电单车占用空间	封闭小区内部使用	人与非机动车混行	商家杂物占用空间
人行道宽度	3m	22m	-	3m
公众可达性	对外开放	门禁，不对外	对外开放	对外开放
问题判断	D/H 严重偏大 围合感消失	比值合理 但封闭内向	D/H 严重偏小 压迫感强烈	比值失衡 步行空间受压

(Source: Author)

3.3.4 Public life: Population Activities and Demand Analysis

Jan Gehl categorized outdoor activities into three types: necessary activities including school, work, shopping and other "somewhat involuntary" "externally environment-unrelated" daily behaviors; optional activities including strolling, pausing to observe, sitting in sunshine and other behaviors that "only occur when external conditions prove suitable and venue and weather possess attraction"; social activities including children's play, conversation, mutual greeting and other "dependent on others' participation" interactive behaviors, representing "chain activities" naturally arising from the preceding two within the same space. Direct structural relationships exist between these three activity types and material environment quality: "when outdoor space quality proves unideal, only necessary activities can occur." Only when space conditions sufficiently support optional activity occurrence can social activities subsequently arise—"whenever public space necessary and optional activity conditions improve, social activity indirectly results." [19] This logic signifies optional activity occurrence density serves as core index judging public space quality, constituting material premise whether public life can establish at block level.

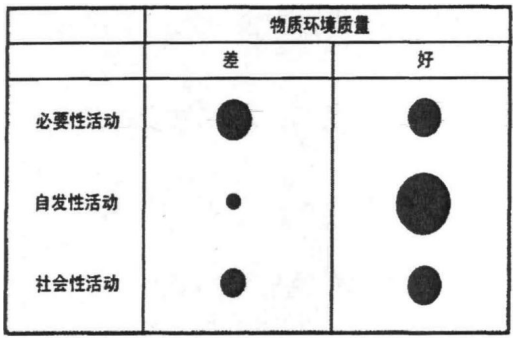


Figure 0-28 Activity and Material Environment Quality Relationships
(Source: References[19])

Using this framework as observation tool, this section conducted systematic investigation of population behavior within the design area. Concentrating on two time periods—11:30–12:30 and 17:30–18:30—systematic activity observation was conducted across the entire design area, with one record each for workdays and weekends. The investigation employed activity marking method, using ■ to mark one person-activity location during 11:30–12:30, using ▲ to mark one person-activity location during 17:30–18:30, with color-coding by Gehl's three activity types:

a. Necessary activities (purple): daily behaviors with unclear environmental quality relationship and definite purposeful direction, including commute walking, returning home, traffic traversal, cargo handling, pickup/dropoff, etc.;

b. Optional activities (blue): lingering behaviors dependent on space condition attractiveness that occur, including strolling, sitting rest, outdoor dining, etc.;

c. Social activities (orange): interactive behaviors dependent on others' participation, naturally arising from preceding two types within same space, including neighbor conversation, chatting, card playing, square dancing, etc.

Observation results present across workday and weekend maps, developing problem observation analysis based on spatial distribution patterns of activity types regarding area public life current conditions:

(1) The area's public life vitality is low

Both workday and weekend activity maps show overall marked notation dominated by purple necessary activities. Following Gehl's logic, necessary activities relate to space quality—occur regardless of environment. When only this activity type can be observed in a space, it signifies the space materially cannot support any lingering beyond commute purposes.

(2) Junjing Garden is the area's only region with complete activity hierarchy, with vitality halted at the wall

Junjing Garden central evening period simultaneously shows dense blue and orange marks—optional activity concentration triggering social activity chain production, forming the complete activity hierarchy Gehl described. However, the street outside the wall is nearly empty during the same period, with vitality spatial boundary highly coinciding with wall boundary, the enclosed complex's physical boundary directly cutting off vitality's outward-spreading possibility.

(3) Industry logic creates temporal locking of vitality, unable supporting sustained public life

Workday midday shows blue optional activity marking near Yangcheng Creative Industry Park, yet the same region returns to zero weekends. Whether vitality exists completely depends on park opening, not space's own publicness—this indicates the region's vitality is industry logic's byproduct, lacking space condition support independent of management use.

(4) Temporal complementarity potential completely fails due to lacking space reception mechanisms

Workday map shows Yangcheng area midday active, Junjing area evening active, naturally complementary temporally. Yet both maps show the transition area between them shows no obvious marking at any time—no public space node exists that can simultaneously receive both populations, with temporal complementarity potential completely negated by spatial segregation.

The continuous vitality vacuum at the plate interface validates the lack of an integration mechanism in functional collage pattern.

Commercial, wholesale, and industrial plates present consistent characteristics across four observation dimensions (workdays vs. weekends, noon vs. evening): internally self-sufficient through necessary activities, with activities at boundaries approaching zero. This phenomenon is not a temporal issue but a structural one—each spatial logic operates as a closed system internally, producing no intersection of public life at boundaries, constituting direct social evidence that the collage pattern of area functions lacks an integration mechanism.

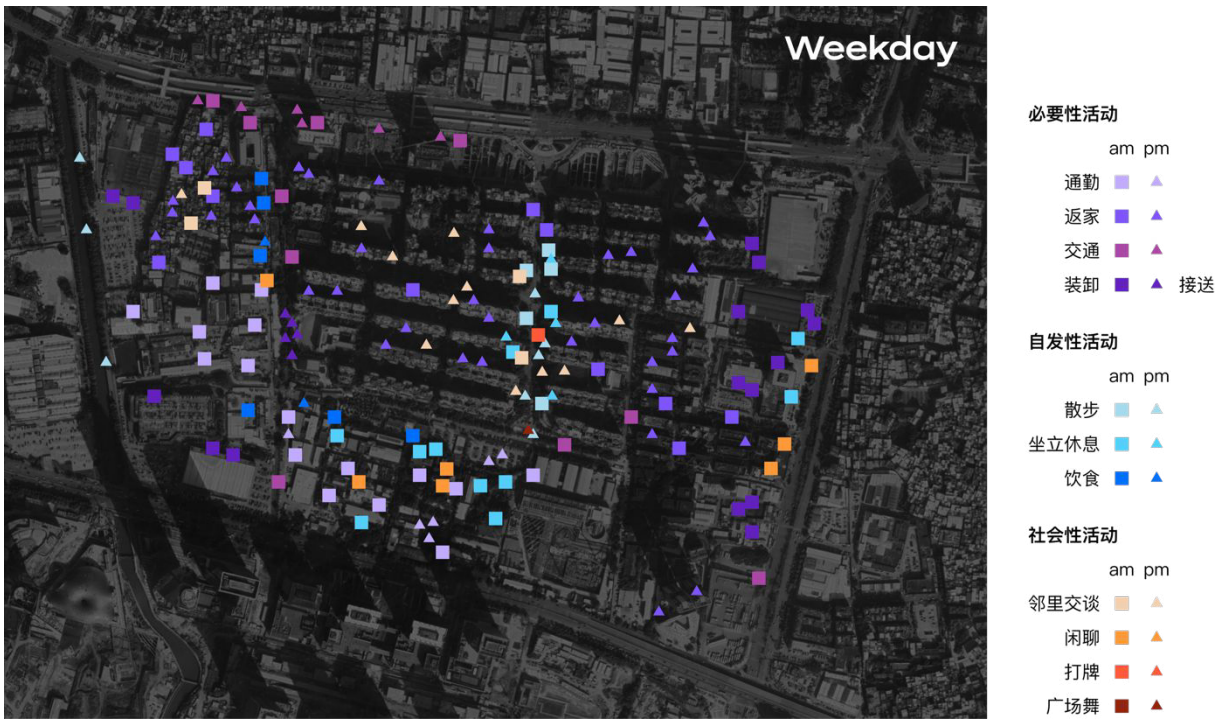


Figure 0-29 Activity Distribution in Design Area During Workdays
(Source: Author)

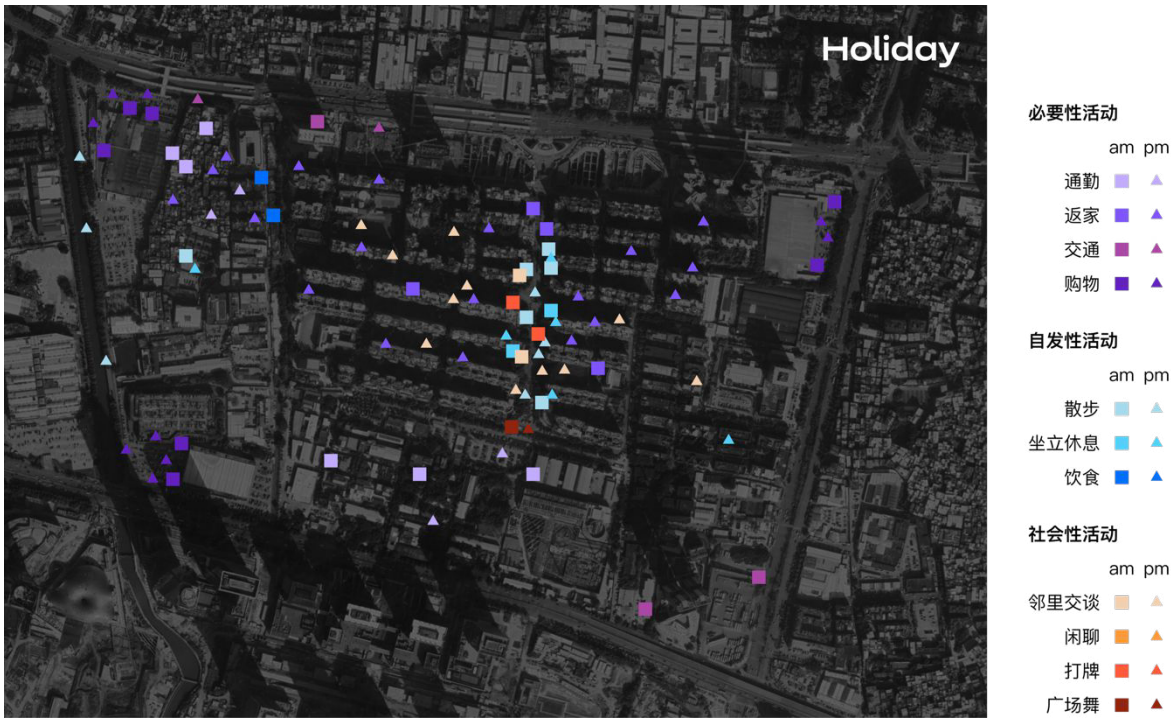


Figure 0-30 Activity Distribution in Design Area During Weekends
(Source: Author)

3.4 Summary of Existing Problems

The previous analysis reveals the current characteristics of the area from the two scales of city and block: from the perspective of the city, the research scope presents the systematic characteristics of the high-density collage pattern at the level of urban structure, functional layout and transportation system; From the perspective of the block, the specific performance of this pattern at the level of material entity, spatial environment and social use is recorded through field research.

The analysis of the two scales corroborates each other and points to four current problems. The four are rooted in the manifestations of high-density collage patterns in the four dimensions of urban structure, public function, spatial vitality and transportation: the fragmentation of urban structure stems from the systematic accumulation of hard boundaries between various texture units, so that the spatial correlation across plates tends to be severed at the physical level; The imbalance of public functions stems from the systematic lack of public space in the high-density built environment, and the lack of space carriers that can carry cross-plate shared service facilities. The lack of public space is a structural feature of the high-density urban environment,

which is a concrete presentation in this area: the high-density built environment itself has caused an innate lack of public space, and the continuous accumulation of lost space and the overall imbalance of street quality have further aggravated this lack at both the quantitative and qualitative levels. The low traffic accessibility is due to the tilt of motor vehicles in the right of way and the branch fracture of the internal road network, making it difficult to effectively reach the public space nodes even if they exist. The four problems are established independently, superimposed on each other, and reinforce each other, constituting a systemic dilemma that is difficult to solve by single-dimensional intervention, and together constitute the entry point of systematic intervention of weaving strategies.

3.4.1 Fragmentation of Urban Structure

The area contains multiple fabric types with orders of magnitude differences in building coverage rate, spatial granularity, and block scale, with each spatial logic operating coherently internally but lacking any transitional connection at boundaries, forming a 'individually ordered, collectively disordered' fragmented pattern that constitutes the fundamental material obstacle to subsequent functional integration and vitality generation. Specific manifestations include:

a. Urban figure-ground imbalance: building coverage rate ranges from approximately 80% in urban villages to approximately 20% in the finance city, with void space either absolutely compressed by solid entities leaving only passage gaps, or excessive in area with ineffective quality, resulting in structural insufficiency of public space in the area;

b. Urban fabric rupture: building unit granularity ranges from 50 square meters to tens of thousands of square meters, with granularity discontinuity occurring directly between adjacent plots, coverage rate, building scale, and spatial direction all showing abrupt rupture at boundaries, lacking any transitional spatial language;

c. Urban-neighborhood scale imbalance: all fabric types in the area fail to fall within the 70 to 100-meter pedestrian-friendly scale range, with 443 meters of continuous urban village construction and 262 meters or more of super-large setbacks in the finance city, resulting in systematic rupture of the pedestrian network at the structural level;

d. Neighborhood-boundary hardening: all functional plates have external interfaces trending toward walls, green isolation, and gate access control, with approximately 20 gated

nodes distributed across all directions of the design scope, with no permeable spatial relationships existing between adjacent units.

3.4.2 Public Function Imbalance

The area contains a certain scale of public service facilities and commercial forms in total quantity, but have not formed a supply system adapted to the needs of various populations in terms of type composition, service hierarchy, and spatial distribution. The fragmentation pattern at the material level has made 'plot-based configuration' the dominant logic of facility supply, with the absence of cross-plate shared facility nodes depriving different populations of functional foundations for aggregation in the same public place. Specific manifestations include:

a. Urban facility type gap: cultural and sports facilities are entirely absent across all three plates, elderly care service facilities are completely missing; in the finance city initial development area, education, medical, and convenience service facilities are nearly blank, with fundamental gaps compared to their planned positioning as city-level public service centers;

b. Urban business structure imbalance: restaurants and retail combined account for 65.89% of total business types, highly clustered within urban villages, with service hierarchy heavily skewed toward basic living needs of floating populations, presenting clear supply-demand hierarchy mismatch with consumption needs of finance city white-collar and middle-class households;

c. Urban spatial distribution imbalance: facilities and businesses are highly clustered in the northern urban village, while the southern finance city initial development area forms a service vacuum, with almost no shared public facility nodes existing in the overlapping area of the three plates' 15-minute life circles, creating direct contradiction between 'life circle planning' principles and 'plot-based configuration' reality.

3.4.3 Absence of Spatial Vitality

The area's existing public space is unable to support spontaneous and social activities at three levels—quantity, quality, and distribution. Functional imbalance has deprived different populations of functional motivations for aggregation, while systematic accumulation of lost spaces and comprehensive spatial quality imbalance further erode from material conditions the

space carriers upon which public life can occur, together locking the area's vitality to the minimum level of necessary activities. Specific manifestations include:

a. Neighborhood-systematic accumulation of lost spaces: large idle vacant land within the East Asia Magnetic Factory, land at property boundary intersections, and low-efficiency parking land together constitute three types of lost spaces in the area, available land is systematically excluded from public life through wall enclosure, disorderly occupation, and single low-efficiency functions, the insufficiency of public space in the area is not absolute shortage of land resources but accumulated results of failed space governance logic;

b. Neighborhood-street space quality imbalance: all four typical street sections in the area have D/H ratios entirely out of balance, with urban village lanes at D/H approximately 0.4 creating oppressive feeling, Huangpu Avenue at D/H approximately 4.5 trending toward loss of control, and no street simultaneously satisfying both conditions of 'appropriate ratio' and 'open to the public';

c. Neighborhood-low vitality in isolated enclosure: all area activities are dominated by necessary activities, Junjing Garden's vitality stops at the wall, Yangcheng Creative Industry Park's vitality entirely depends on industrial logic, with the plate interface showing continuous vitality vacuum across all four observation dimensions (workdays vs. weekends, noon vs. evening), making the potential for temporal complementarity completely ineffective due to lack of spatial accommodation mechanisms.

3.4.4 Low Traffic Accessibility

The area has adequate macro public transportation coverage, but the road right-of-way allocation of surrounding arteries and internal road network structure together constitute systematic pedestrian resistance. This problem does not exist in isolation—it completely locks the negative cycle formed by the three preceding problems: even if functional nodes were implanted and lost spaces activated, the rupture of pedestrian paths would still make these nodes difficult to reach effectively, making urban renewal of public life lose its final condition of realization at the accessibility level. Specific manifestations include:

a. Urban arterial road right-of-way imbalance: the three arterial roads surrounding the area—Huangpu Avenue, Zhongshan Avenue, and Chebei Road—each allocate 77-90% of road

width to motor vehicle travel, with pedestrian walkway width only 3-4.5 meters and commonly occupied by parking and municipal facilities, forming continuous pedestrian barriers on three sides of the area, making the coverage advantage of macro public transportation difficult to translate into actual pedestrian penetration within the area;

b. Neighborhood-internal road network single-corridor dependence: within the design scope only one north-south plot-level artery has urban connectivity, east-west is completely ruptured, with remaining internal roads all showing branch-end forms; during rush hours the only passage is already saturated, with neither road network redundancy for distribution nor cross-direction paths supporting cross-plate traffic connections.

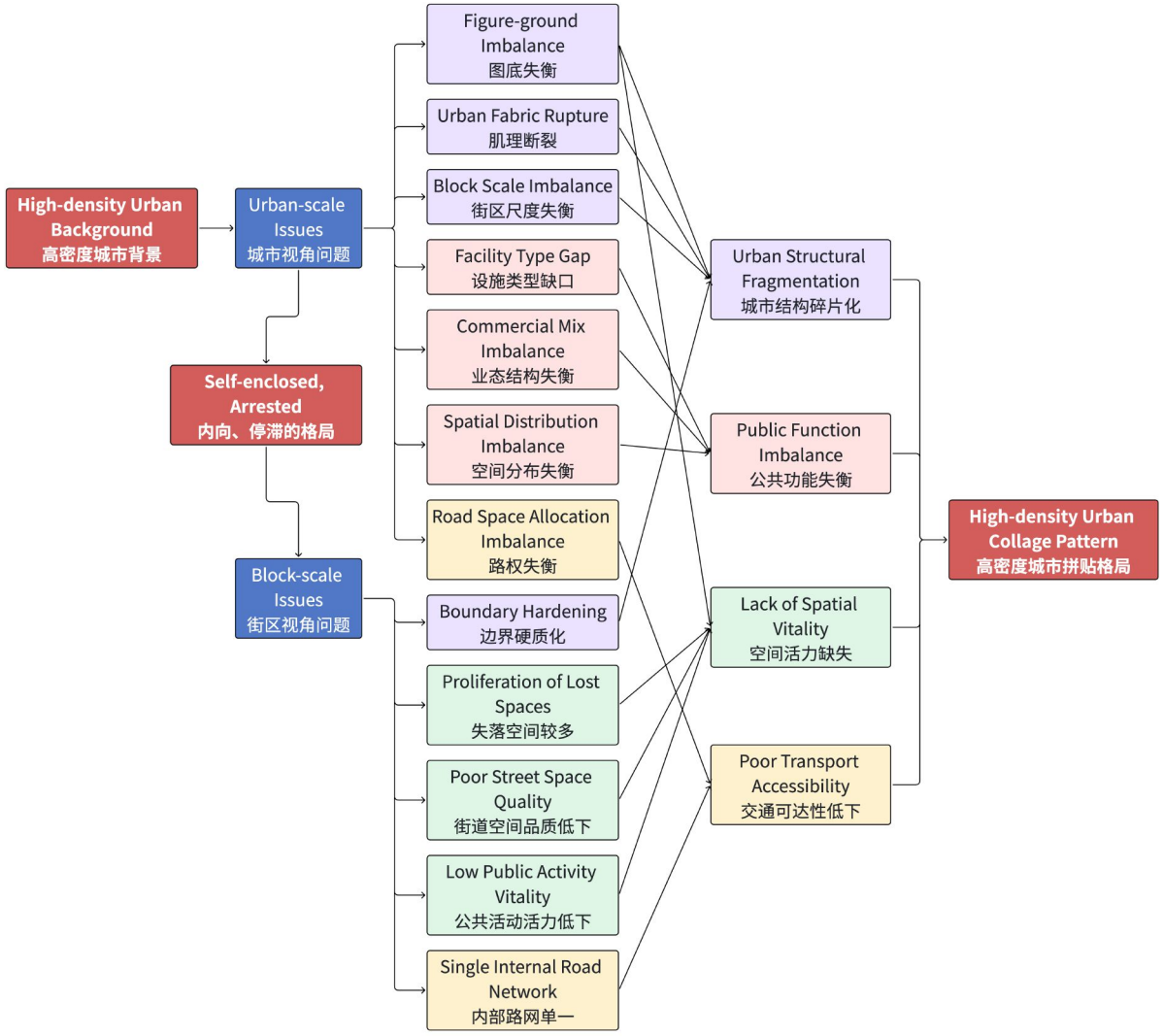


Figure 0-31 High-Density Problem System Identification in Design Scope
(Source: Author)

3.5 Chapter Summary

This chapter takes high density as the core analysis clues, constructs a two-level perspective of city and block, and conducts a systematic investigation on the northern area of the financial city. From the perspective of cities, the research scope is taken as a typical carrier of high-density urban problems, and from the background of high-density development in Guangzhou, the structural problems caused by high-density conditions at the level of urban structure, functional supporting facilities and traffic right-of-way are systematically examined. The perspective of the block focuses on the upper part of the design scope, and reveals the specific implementation of the above problems at the block scale and the particularity of the site's own collage pattern from the three progressive levels of material form, spatial quality and social activities.

The core finding of the two perspectives is that the spatial dilemma of the area does not stem from the lack of any single element, but is the systematic result of the superposition and reinforcement of the four problems of urban structure fragmentation, low transportation accessibility, lack of spatial vitality and imbalance of public functions under high-density conditions. The fragmentation of urban structure creates closed boundaries and texture fractures at the material level. The imbalance of public functions has caused facility misalignment and service vacuum at the supply level. The lack of spatial vitality makes spontaneous and social activities lose their material carriers, and the spatial vitality of the area is insufficient. Low accessibility blocks pedestrian connections within the area at the connectivity level. The four problems are superimposed on each other and point to the same result at the level of use: although the various groups of people in the area are geographically adjacent, they operate according to closed spatial units, and public life is inwardly fragmented rather than organically shared. The existence of this causal chain means that any local intervention for a single problem is difficult to break through the systemic dilemma.

Therefore, the above systemic dilemma determines that the renewal intervention must be based on the methodological framework of weaving theory, intervening simultaneously in the four dimensions of structure, transportation, vitality and function, and using the continuous public space axis as the spatial carrier to integrate the interventions of each dimension. This logic will be concretely developed in Chapter 4.

Chapter 4 Urban Weaving: Design Strategies for District North of Guangzhou International Finance City

Chapter 3, through both urban- and block-scale perspectives, identified four interrelated and mutually reinforcing problems that have emerged in the northern Finance City district under conditions of high-density urban development: fragmented urban structure, imbalance in public functions, deficiency of public space, and low transport accessibility. Taking urban weaving as the methodological framework, this chapter first defines the renewal objectives and overall spatial framework of the area, and then translates the diagnostic findings into implementable design actions through four corresponding strategies.

The four strategies—spatial weaving, transport weaving, urban structure weaving, and functional weaving—respond respectively to the four existing problems identified in the previous chapter. While the problem sequence in Chapter 3 follows a causal progression, the order of strategies in this chapter is organized according to a gradual implementation logic, beginning with the widely distributed lost spaces within the design area. The process unfolds from the activation of public places, to the reorganization of the street network for improved accessibility, then to the stitching of fragmented urban fabric, and finally to the supplementation of missing functions. All interventions are carried out within the overall spatial structure defined as “two axes and one belt.”

4.1 Design Objectives and Positioning

4.1.1 Design Objectives

The northern area of the finance city is a typical product of urban collage patterns in the context of rapid high-density urbanization. An excessively fast urbanization process, applying infill growth logic, has overlaid construction activities from different periods and different subjects onto the same spatial substrate, resulting in systematic fragmentation of the area's urban fabric, systematic erosion of public space by building entities, and lack of integrative public structure among spatial units. [26,76]

Enclosed residential areas, urban village settlements, industrial heritage, and commercial plots coexist side by side within approximately 1.21 km^2 , with the road network systematically ruptured at enclosed plot boundaries, large swathes of low-efficiency land and idle industrial land constituting vacuums in the area's public life, with various populations in the area geographically close but lacking substantial public life connections. Colin Rowe, in 'Collage City', points out that the urban fragmentation caused by modernist planning requires streets and public spaces to serve as spatial media linking isolated fragments, with contextualism as the methodological stance for urban repair. Yan Xunqi further points out that the vitality of high-density cities depends on whether the urban connective tissues possess sustainability—these spaces spanning public and private realms with flow and extensibility characteristics not only serve basic pedestrian movement but at higher levels integrate various public functions and connect temporal and historical associations of the public realm. Public space, as urban connective tissue, is the fundamental means of repairing the area's fragmented structure and reconstructing the public life system.[40]

This research takes Urban Weaving Theory as its methodological framework, using public space as the core medium for repairing fragmented urban structure, reconstructing the completeness of the area's spatial fabric and organic functional connections through progressive intervention—systematically implanting public space nodes on the area's low-efficiency land to establish structural connections among spatial units through functional axes, integrating long-term separated populations into a shared urban life system.

At the spatial level, this design systematically identifies three types of lost spaces in the area, transforms the idle vacant land and the negative boundary gap into a public place that can be used by multiple types of people through the placement of public space nodes, and carries out lightweight transformation for the quality defects of the street interface to make up for the structural lack of public space in the two dimensions of quantity and quality. At the traffic level, this design transforms the coverage advantages of macro public transportation into actual accessibility within the area through the redistribution of right-of-way to widen the slow travel space, open up the east-west fault road network, and dredge the branch end path. At the structural level, this design uses a differentiated scale of common space sequences to stitch the granularity fractures between adjacent textures, promote the transformation of the boundary of the closed

plot from solid separation to permeable interface, and repair the "separate closure" , overall disorder". At the functional level, this design takes the 15-minute overlapping living circle of the three plates as the basis for the landing of facilities, makes up for the systemic gaps in culture and sports, pension, and industrial support, and replaces the isolated supply logic of "building according to the plot" with shared functional nodes. The four levels of weaving and repairing operations take the systemic spatial dilemma caused by the high-density collage pattern as the starting point of the common problem, and take the continuous public space axis as the spatial carrier to integrate the intervention of various dimensions, and point to the same goal: to transform the area from a collage state of multiple spatial logics but lacking an integration mechanism to a mixed block with organic integration of functions and shared public life.

4.1.2 Design Positioning

In the renewal approach, this research adheres to the principles of progressive and systematic intervention emphasized by Urban Weaving Theory, adopting minimum intervention as the basic stance, retaining most of the existing building fabric, using selective activation of low-efficiency land and lost spaces as the primary means. In high-density built environments, land resources are extremely scarce, large-scale demolition and reconstruction neither aligns with the policy orientation of urban stock renewal nor adapts to the reality of complex land ownership in the area; the large quantity of low-efficiency vacant land and lost spaces existing in the area constitute the material foundation for implementing urban weaving intervention without disturbing existing building configuration, with public space node implantation being the direct response to this condition.[2]

In spatial operations, the design organizes operations according to the logic of 'implanting connective tissue, establishing framework, restructuring fabric', using public space nodes as catalysts to construct the overall spatial structure of 'two-axis, one belt', with functions growing along spatial framework, promoting the area's transformation from fragmented collage pattern to organic urban form with integrated public structure[15]. The community axis extends north-south along the western side of the area, centered on community facilities and residents' daily activities; the industrial transformation axis extends north-south along the eastern side, oriented toward wholesale commerce transition and industrial heritage revitalization; the vitality belt runs

east-west through the central area, linking urban spaces on both sides through continuous green space and public nodes, forming the area's primary public life corridor. The two axes and one belt together constitute the structural framework of area renewal, providing the overall structure for the subsequent spatial implementation of four urban weaving strategies.

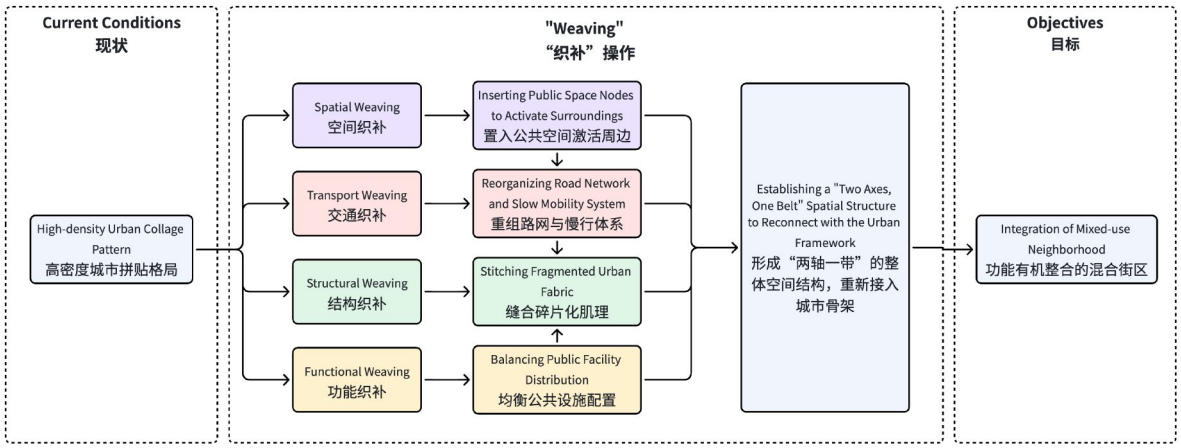


Figure 0-1 Overall Framework of Urban Weaving Strategies
(Source: Author)

4.2 Overall Planning

The urban weaving intervention in the northern area of the finance city is not limited to localized repairs within the area, but first re-establishes the area's spatial role at the urban scale—clarifying its functional relationships with surrounding Tangxia Village, Chebei Village, wholesale market, and Guangzhou International Finance City initial development area, transforming the area's fragmented state isolated by urban fabric in all directions into a public space node capable of accommodating, stitching, and radiating to surrounding areas. On this basis, the design enters the neighborhood scale, providing an overall framework for the subsequent implementation of four urban weaving strategies through land use adjustment and road network restructuring. The following elaborates across four dimensions: design principles, overall spatial structure, land use layout, and road network adjustment.

4.2.1 Design Principles

The high-density collage pattern facing the northern area of the finance city is a historical accumulation of rapid urbanization overlaying multiple rounds of construction activities on

limited space, with repair requiring not demolition-based solutions but rather intervention pathways discovered under the dual constraints of theoretical methodology and site conditions. Urban Weaving Theory's core methodology provides precisely this path's foundation—'urban weaving is a systematic, multi-level, progressive spatial design process', repairing fragmented and decaying urban spaces through micro and selective intervention, restoring spatial and fabric continuity[14]. This design proceeds from the following three principles organizing all urban weaving operations.

4.2.1.1 Progressive Intervention

The high complexity of the area's current state determines that any large-scale comprehensive renovation scheme would be difficult to implement. The design scope simultaneously contains clearly-owned commercial housing communities, collectively-owned urban village settlements, historically-inherited industrial land, and commercially-leased business plots, with interest relationships among different ownership subjects intricately interwoven and difficult to complete unified land consolidation in the short term. At the same time, existing social networks in the area—the informal commercial ecosystem of urban villages, daily activity patterns long-formed by Junjing Garden residents—would suffer certain social costs from large-scale demolition. Urban Weaving Theory advocates replacing whole-scale demolition with small-scale progressive renovation, gradually improving area quality through local implantation while adhering to urban structure fabric, aiming precisely at minimizing negative impacts of renewal construction on old urban areas[15]. This design adopts this as its basic stance, concentrating urban weaving intervention on the large quantities of low-efficiency land and lost spaces existing in the area, adopting phased implementation approaches not dependent on wholesale acquisition, progressively repairing spatial connections without disturbing the overall intensity of existing building configuration, reducing renovation resistance and improving implementation flexibility.

4.2.1.2 Public Space Prioritization

The area's most fundamental predicament lies in lacking space carriers capable of accommodating multiple populations' common use and facilitating public life intersection. The wall systems of enclosed plots completely isolate internal space from urban public networks,

while plate boundary areas have accumulated large quantities of formless, ownerless negative gaps—yet these locations are precisely the structural nodes where different populations' daily paths potentially intersect. In high-density built environments, continuous compression of public open space not only creates material spatial tension but also causes atrophy of daily interaction and insufficient capacity of public life bearing. From Urban Weaving Theory's perspective, the key to repairing this predicament lies not in simple facility supplementation but in implanting public space as an urban connective tissue into the area's structural gaps—these spaces spanning public and private realms with flow and extensibility characteristics can at higher levels integrate various public functions and connect temporal and historical associations of the public realm. Accordingly, this design establishes the implantation of public space nodes as the starting point of urban weaving operations, prioritizing activation of the area's negative spaces and low-efficiency land, establishing a public space system capable of serving multiple populations based on shared, accessible, stayable space nodes.[40,76]

4.2.1.3 Systematic Urban Weaving

The compound characteristics of the area's spatial problems determine that any single-dimensional patch would be difficult to produce sustained effects—road network connectivity, public space accessibility, functional configuration, and place identity are all interrelated, with isolated intervention often resolving only surface symptoms without addressing structural roots. Urban Weaving Theory emphasizes proceeding from overall structure, forming hierarchically progressive renewal logic through point-based node activation, linear structure stitching, and areal network integration, integrating whole, partial, and individual into a balanced organic urban form. This logic requires that various urban weaving operations cannot operate independently but must proceed in coordination within a shared spatial framework, making localized repair actions accumulate effects at the system level[14]. On this methodological foundation, this design places four urban weaving strategies within the overall spatial structure of 'two-axis, one belt', with node activation, corridor connection, and network integration mutually supporting, ensuring that repair actions of each spatial unit jointly point toward establishing the area's integrated public structure.

4.2.2 Master Plan Design



Figure 0-2 Master Plan
(Source: Author)

4.2.3 Spatial Structure

The area's fragmented state in urban structure is collectively shaped by functional patterns in four surrounding directions. The northern Tangxia Village is dominated by ultra-high-density residential, with building coverage rate exceeding 80%, aggregating approximately 231,000 residential population within 1.5 km analysis scope, with public service facilities long relying on informal commerce to fill gaps; the northeastern wholesale market area operates on freight and commerce logic, with the area linked by vehicle passages only and no public pedestrian connections; the eastern Chebei Village, as another high-density urban village settlement, is adjacent to the area yet effectively severed by Chebei Road; the southern Guangzhou International Finance City initial development area concentrates approximately 121,000 daytime office population with strong external overflow needs for public services and recreation, yet public space connection between the two areas is nearly zero. Simultaneously, the area's western Tangxia Creek serves as an urban ecological corridor, currently excluded from any public activity paths, with its ecological landscape value effectively isolated from area residents.

Facing such four-directional urban fracture relationships, this design positions the overall spatial structure of 'two-axis, one belt' at two levels simultaneously: internally establishing the area's public space framework, externally serving as a structural medium connecting surrounding urban regions and integrating multiple user demands. The community axis extends northward to Zhongshan Avenue West, southward connecting to Huangpu Avenue, integrating Tangxia Village residents and finance city office populations into a single north-south public thoroughfare; the industrial transformation axis northward unblocks connections between wholesale market and urban pedestrian networks, southward connecting through East Asia Magnetic Factory to Huangpu Avenue, eastward establishing pedestrian relationships with Chebei Village; the vitality belt westward integrates Tangxia Creek waterfront resources into the area's public activity system, eastward extending to the industrial transformation axis, forming an east-west public activity belt traversing the area.

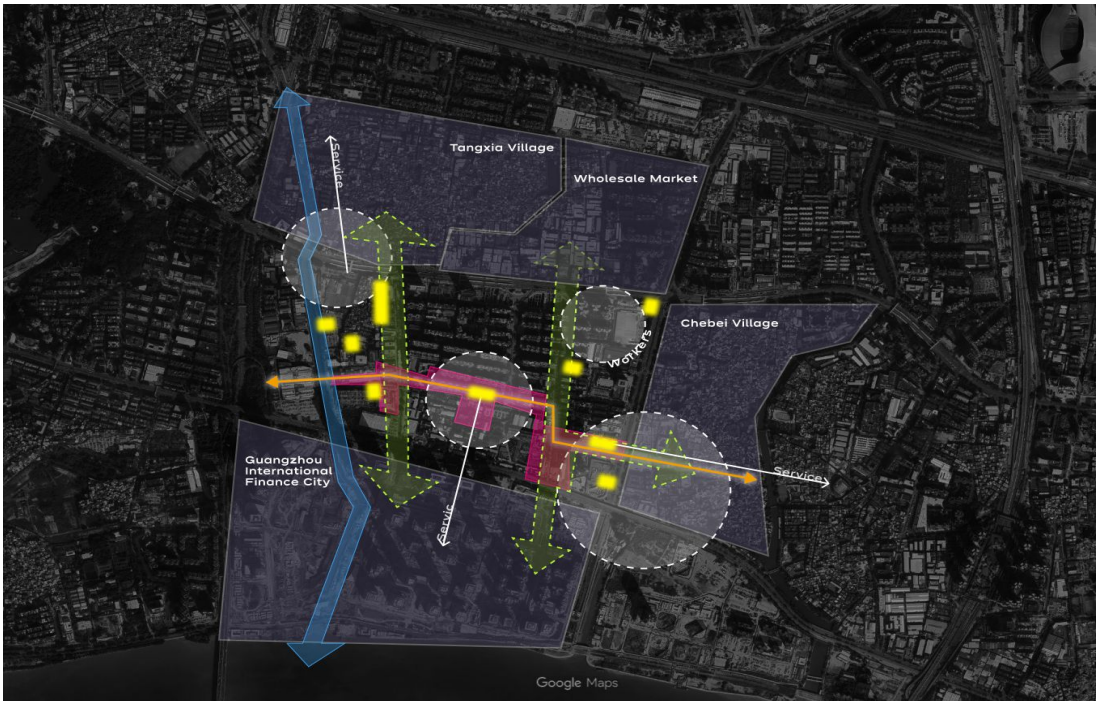


Figure 0-3 Pattern of Design and Research Scope
(Source: Author)

At the neighborhood scale, the routing choice of two axes and one belt adheres to the internal logic of existing fabric distribution. The community axis runs through the transition area between urban villages and enclosed residential areas with the greatest density differential and most urgent public space needs; the industrial transformation axis links the area's two primary low-efficiency and idle land sites, using public space intervention to promote them toward urban public interfaces; the vitality belt, centering on a central park with areal form, horizontally connects the two axes, undertaking the area's public activity role with the highest functional mixing. All four core nodes are anchored at boundary areas of different fabric units, using existing low-efficiency land as material carriers. 'Two-axis, one belt' is therefore not merely the area's internal spatial framework but more importantly transforms the area from a passively enclosed urban fracture zone into an organic mixed-use neighborhood capable of opening to surrounding urban areas and accommodating diverse population demands, constituting the structural premise for such transformation.

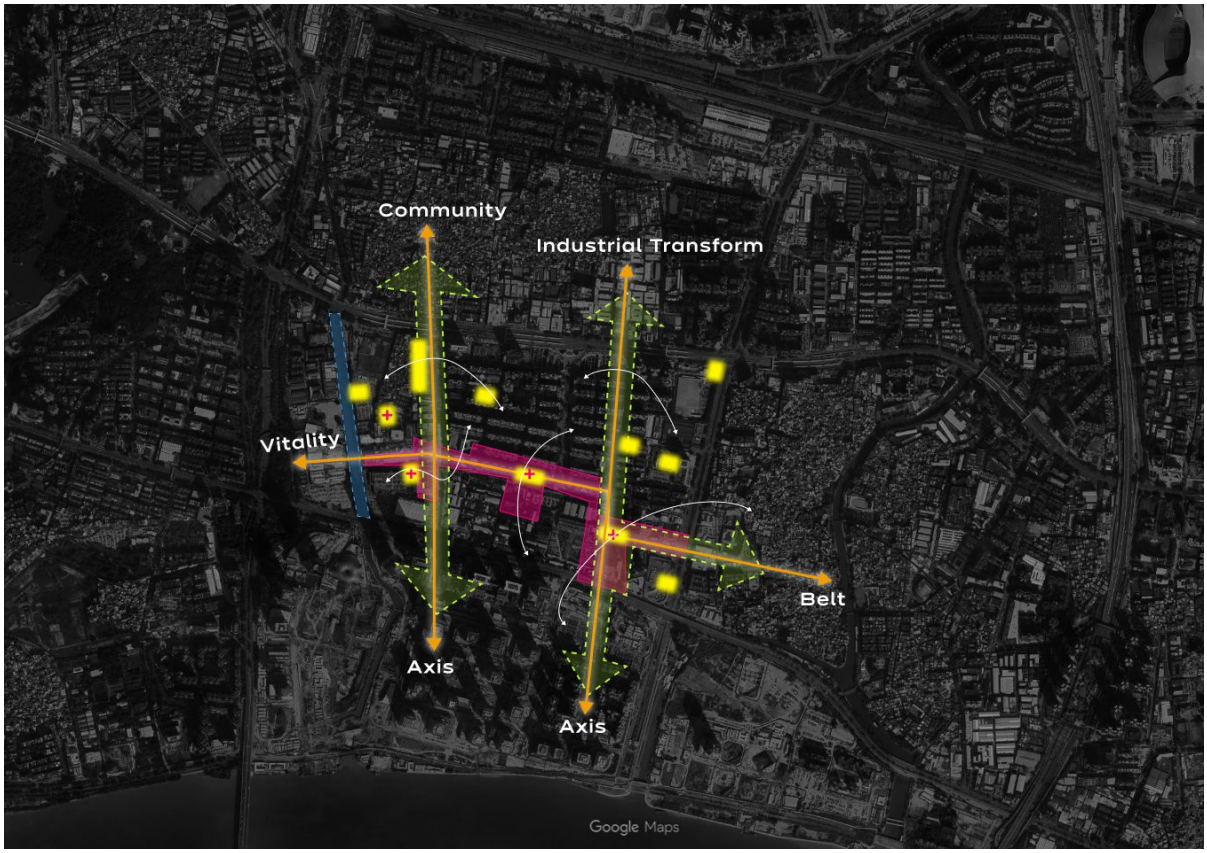


Figure 0-4 Two-Axis, One Belt
(Source: Author)

4.2.4 Land Use Layout and Functional Zoning

The area's current land use pattern exhibits structural characteristics of highly differentiated functions yet lacking integration—each functional plate operates within plot boundaries, with residential, commercial, industrial, and urban village land spatially proximate and juxtaposed yet functionally sealed, with neither spatial transition nor functional connections between plates. Investigation shows that residential, commercial, industrial, and urban village land are highly collaged within approximately 1.21 km^2 , with each plate delimited by walls or roads

The design scope's functional adjustment adopts progressive intervention as its basic stance without functionally re-dividing the area. Residential, commercial, industrial, and other current land uses are essentially retained, with adjustment focus concentrated on two location types: first, the area contains multiple categories of low-efficiency land—long-term idle industrial areas, internally enclosed parking lots, surplus hardscape of unclear ownership lacking users—these uses in the current state produce neither economic benefit nor serve any public function yet

occupy several of the area's larger-scale spaces with relatively superior location conditions. Second, functional module boundary areas, systematically converting current negative gaps and surplus spaces into public green land and public service land, with public space implantation filling functional vacuums at plate boundaries and resolving hardened plot edges and isolated conditions.

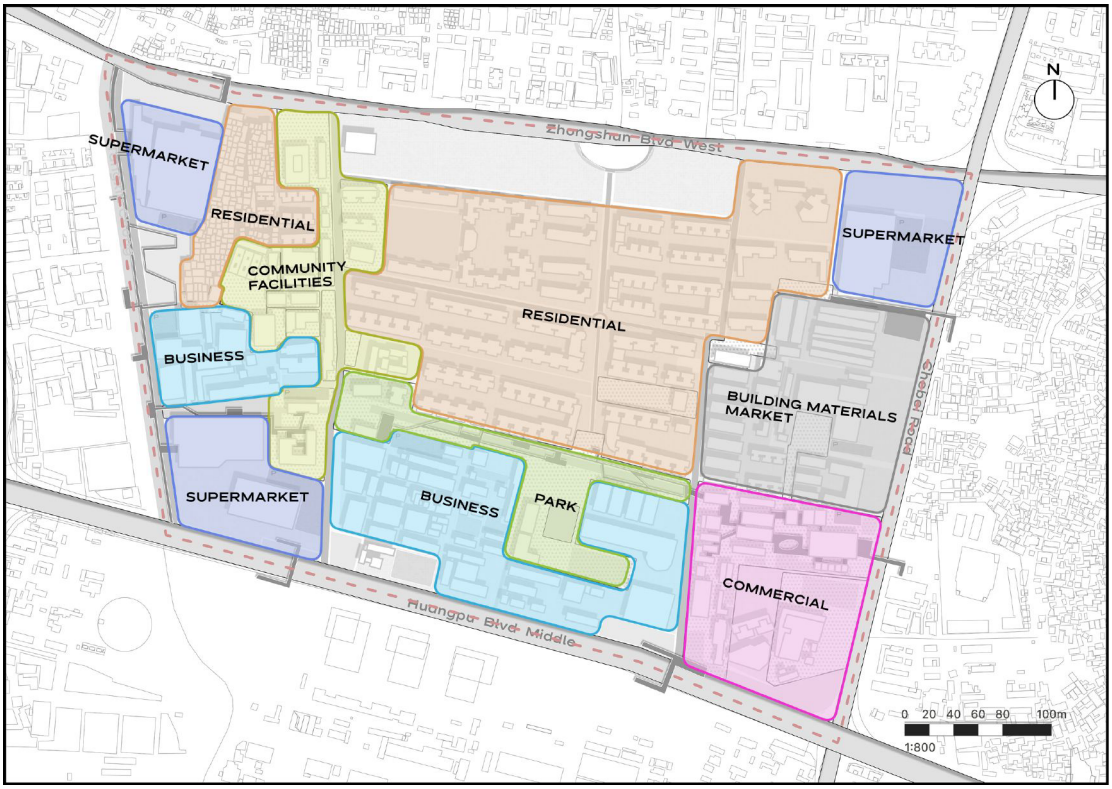


Figure 0-5 Functional Planning

(Source: Author)

In functional zoning, the design divides the area into four functional modules: the northwest, dominated by mixed community life (Community Life), integrating residential functions and community facility needs of urban village settlements and enclosed residential areas; the northeast, characterized by community and industrial mixing (Mixed Block), responding to common public service needs of wholesale commerce workers and surrounding residents; the southwest, dominated by office and commercial mixing (Mixed Commercial), leveraging Yangcheng Creative Industry Park's existing industrial foundation to elevate public interface vitality; the southeast, centered on urban public services (Public Service), using East Asia Magnetic Factory activation and central park system as carriers to form public activity centers serving city-level users. The four modules are closed and lack connection in the current situation, and this design systematically implants the public space nodes at the junction of the modules, so

that the functional plates that were originally collage and juxtaposed form functional complementarity and spatial penetration, and provide a land use basis for the subsequent development of the weaving and supplementation strategy.

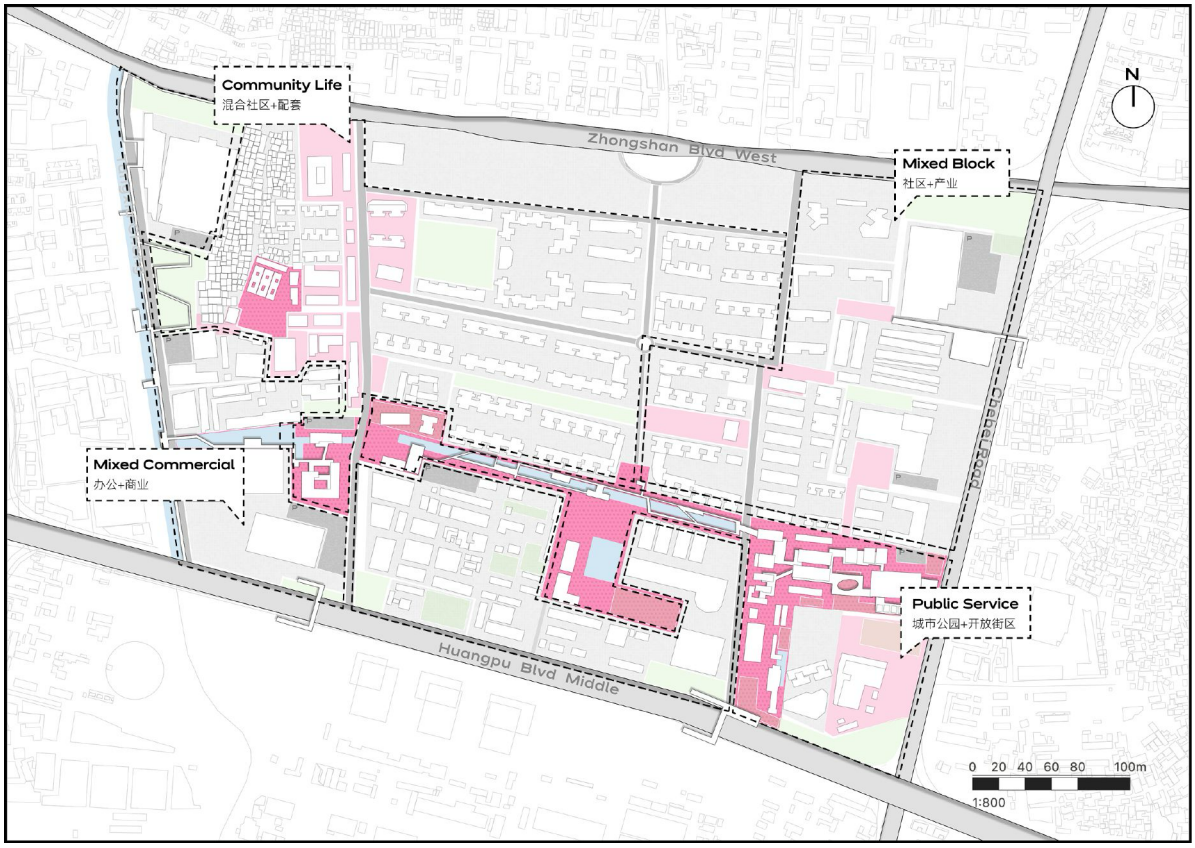


Figure 0-6 Functional Module Pattern
(Source: Author)

4.3 Urban Weaving Strategies

The spatial predicament of the finance city's northern area stems from the collage pattern lacking integrative public structure under high-density rapid urbanization. In this pattern, different spatial units operate separately following their own development logic, with multiple populations in the area geographically highly proximate yet lacking common space foundations capable of bearing daily interaction and public life. The third chapter's diagnosis indicates this predicament possesses clear hierarchical progression: fragmentation of urban structure constitutes the material-level foundational premise, inefficient traffic accessibility further solidifies this division, while vitality deficiency and public function imbalance are its direct results at the use level. The four problems progress from structure to use, from spatial form to

daily experience in successive layers, together constituting mutually reinforcing systemic predicament.

Weaving and repairing theory emphasizes the repair of urban fracture structures in a gradual and minimally interventional manner. For high-density built environments, the new construction space is limited, so the widespread inefficient open space and lost space in the design scope have become the most feasible entry point for weaving and repairing under the premise of retaining the existing built pattern. Therefore, the four weaving strategies proposed by the design follow the path of "gradually responding to structural problems from implementable spatial interventions". Firstly, the lost space is activated through the placement of public space nodes, forming the initial anchor point of crowd gathering. Secondly, the spatial skeleton of "two axes and one belt" is used to connect the nodes in series, and the road network structure and slow traffic are reorganized. thirdly, relying on the skeleton to systematically sort out the fragmented texture to improve the continuity of the overall spatial organization of the design scope; Finally, the functional weaving is expanded along the skeleton to supplement the facility needs of different groups of people in daily life. The four strategies correspond to the four types of problems identified in the design scope, and jointly serve the same goal, that is, to gradually alleviate the systemic spatial dilemma caused by the high-density collage pattern through weaving and complementary intervention.

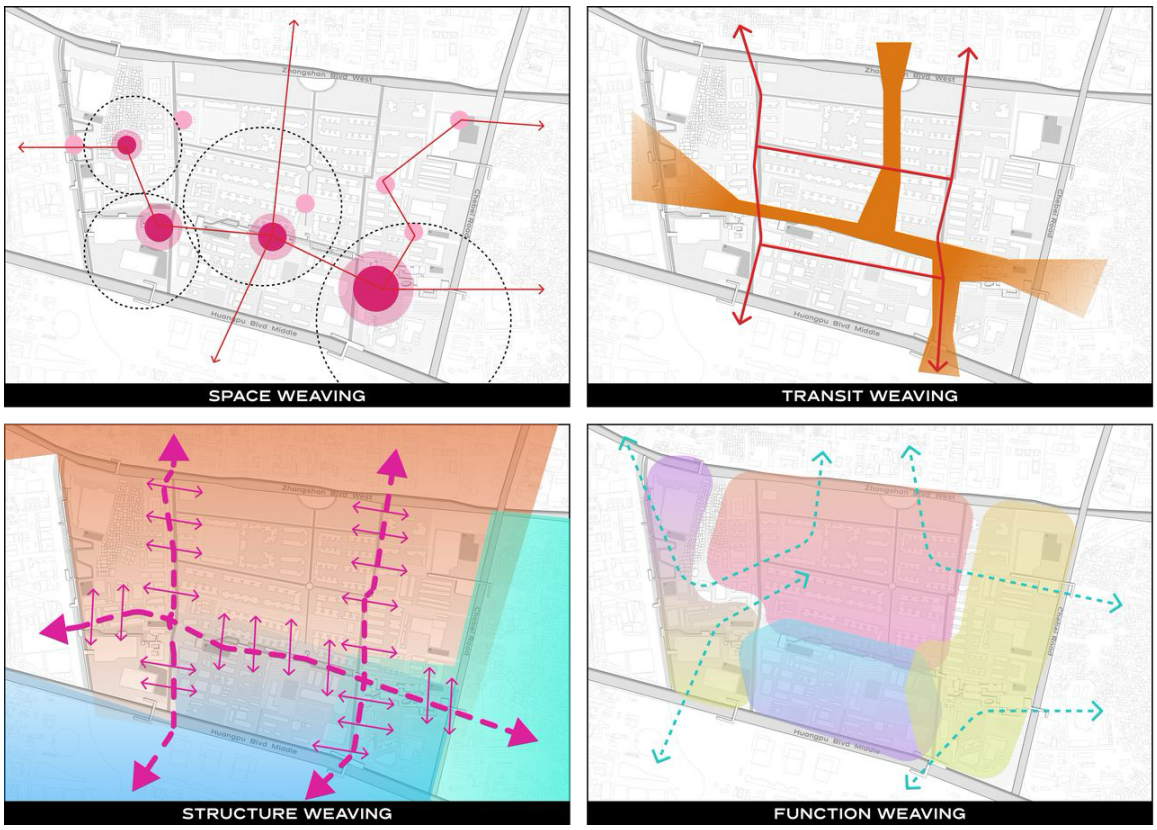


Figure 0-7 Four Steps of Urban Weaving Strategies
(Source: Author)

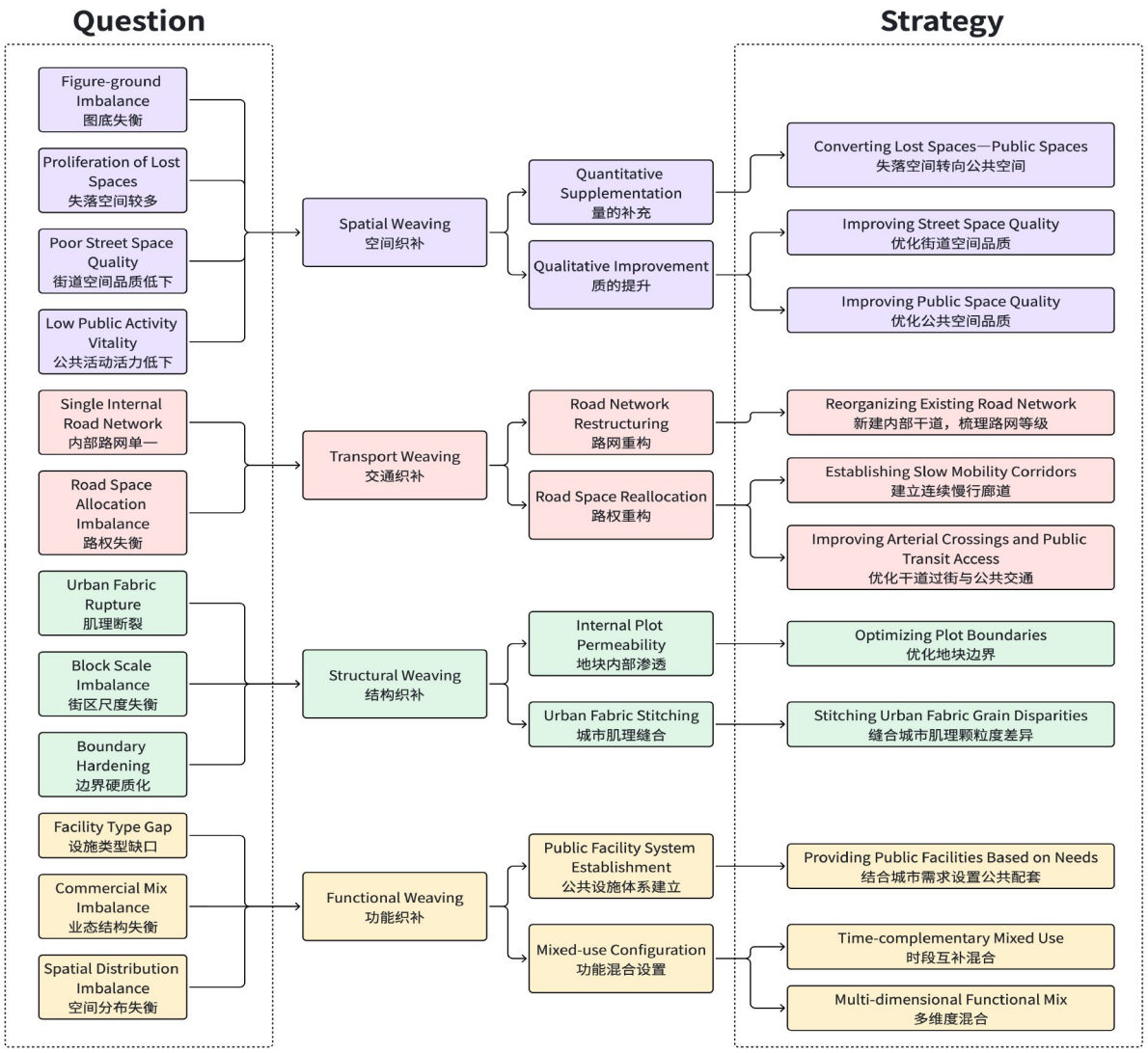


Figure 0-8 Specific Operations of Urban Weaving Strategies
(Source: Author)

4.3.1 Spatial Weaving: Establishing an Excellent Public Space System

The area's public space predicament manifests at both quantity and quality levels. At the quantity level, land resources are extremely scarce in high-density built environments, with the needs of various populations for public space continuously unmet due to population density compression; at the quality level, existing street spaces and open areas in the area largely exist in negative forms, lacking shade, seating, and visual pause points, allowing users only necessary activities without extending to spontaneous and social activities. Gehl points out that when outdoor space quality is unsatisfactory, only necessary activities occur; only when space conditions improve will spontaneous activities emerge, indirectly promoting social activities[19].

This logic demonstrates that public space weaving must simultaneously address quantity insufficiency and quality deficiency, neither being dispensable.

4.3.1.1 Quantity Supplementation

The area's public space quantity shortage stems from systematic erosion of open space by building entities during high-density urbanization—enclosed plots systematically expand within wall boundaries, areas potentially becoming public space are continuously compressed into ownerless residual gaps, ultimately forming large-scale lost spaces. In the urban stock renewal context, this predicament cannot be resolved through new construction land acquisition but requires identifying existing resources within the area for intervention. Lost spaces within the design scope are categorized into three types, with the design adopting differentiated intervention approaches according to each type's spatial characteristics and location conditions.

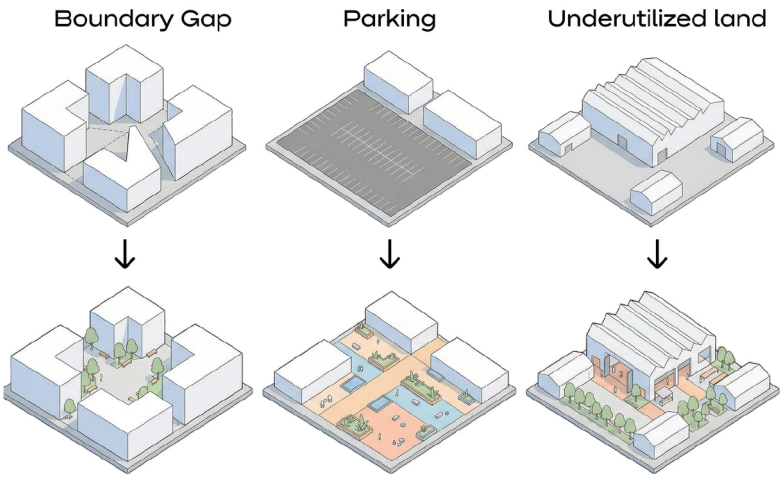


Figure 0-9 Renovation of Three Types of Lost Spaces
(Source: Author)

First type: undeveloped land with utilization value. Large vacant areas within the East Asia Magnetic Factory have long been idle, producing neither use function nor clear spatial form, completely isolated from urban public life through wall enclosure and functional absence; similarly, undeveloped land around Zhong's Ancestral Hall in Tangxia Village exists in low-efficiency use state. Both spaces possess material conditions for conversion into public space nodes without disturbing surrounding building configuration, with this design selecting them as priority sites for area-level public activity centers, converting idle areas into shared spaces open to multiple populations through large-scale public space node implantation.

Second, unclaimed boundary-adjacent margins among various functional blocks accumulate significant unmapped, formless, functionless residual spaces, now partly self-appropriated for disorderly parking. Colin Rowe indicated linking isolated city fragments through streets and public spaces represents fundamental methodology for repairing fragmented urban patterns. This design systematically implants public nodes within these boundary gaps, with nodes opening to both adjacent blocks, transforming previously hard boundaries separating closed units into mediating boundaries achieving connection functions, accomplishing isolated fragment spatial stitching.[2,25]

Third, single-function inefficiently-occupied parking land. Multiple large parking areas scattered across the site operate far below capacity, with single low-efficiency functionality locking potential carriers capable of accommodating diverse public activities. Barcelona's weaving-style renovation practice demonstrated that through gradual transformation of wasteland and lost spaces like parking lots, constructing dispersed yet integrated small parks, effectively activates surrounding block vitality[15]. This design conducts selective renovation of underutilized parking lots within the district, with ground parking transferring to underground or three-dimensional parking as prerequisite, transforming released ground space into community-scale public green areas, filling public space vacancies within individual blocks.

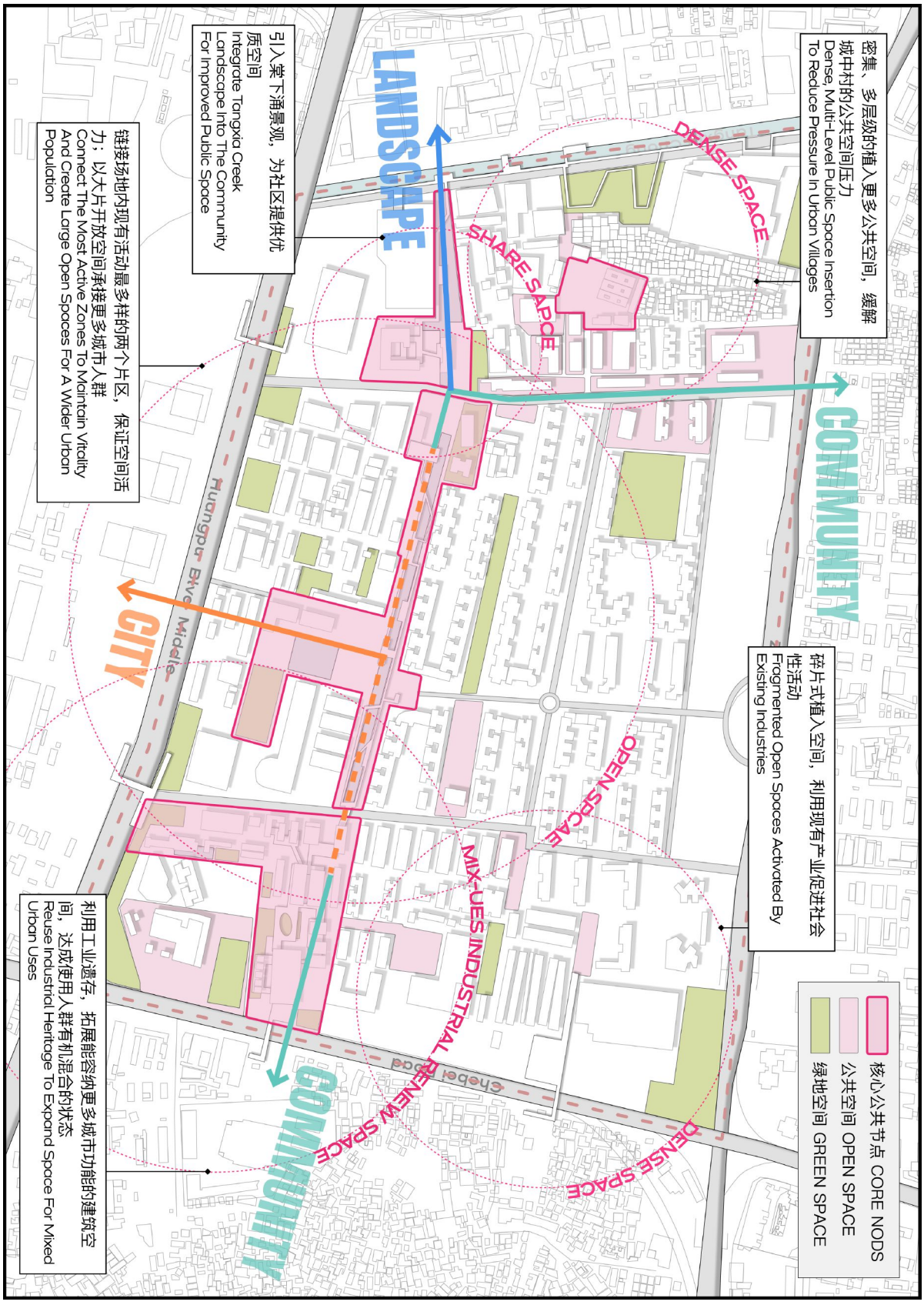


Figure 0-10 Public Space Insertion
(Source: Author)

4.3.1.2 Quality Enhancement

Neighborhood public space quality dilemmas fundamentally stem from physical material conditions systematically suppressing spontaneous activity. Gehl noted people tend lingering beside building facades and space margins, with positions possessing rear support and broad views most attractive. When facades lack perceptible details and stoppable interface conditions, physical foundations for pedestrian lingering become difficult establishing[19]. From current investigation, neighborhood-wide activities demonstrate necessary activities as absolute majority, with spontaneous and social activities nearly absent, directly corresponding with street and public space overall material environmental imbalance. Therefore, space quality enhancement cannot depend solely on local node creation but requires simultaneous intervention across street space and public space dimensions.

As far as street space is concerned, the D/H ratio of various street sections in the design range is generally unbalanced, and the space problems are obviously different. For the unbalanced section, the design adopts differentiated correction strategies: for the road section with excessive D/H, the somatosensory scale is compressed at the visual level by planting street trees and green buffer belts, and corridors and outer corridors are arranged along the building setback, so that the originally completely exposed pedestrian space is transformed into an edge stay zone with roof cover and façade support. For the continuous closed façade section, the combination of roof and seat intervention is used as the main means to establish a minimum stay condition between the existing building façade and the street, and the negative interface is transformed into an active boundary with the possibility of stopping. For the commercial interface on the ground floor along the street in Tangxia Village, on the premise of retaining the existing commercial continuity and spontaneous order, the store signs, paving and interface

details are systematically renovated to improve the overall environmental quality without destroying the spontaneously formed commercial ecology.



Figure 0-11 Street Space Design Elements
(Source: Author)

Former activity observation within design scope revealed crucial contrast: Junjing Garden interior evening spontaneous and social activities simultaneously densely occur, forming Gehl's complete activity hierarchy; while surrounding street simultaneously remains nearly empty, with vitality boundary highly coinciding with walls. This phenomenon indicates the neighborhood possesses sufficient population base generating spontaneous and social activities, rather lacking material carriers replicating Junjing interior space quality conditions within public domains. Gehl defined passive contacts as public life's broadest foundational form—merely visual-auditory perception of others, naturally triggered chain activities from necessary and spontaneous activities coexisting in same space[19]. Accordingly, this design adopts creating passive contact conditions as core operational logic for public space quality enhancement, intervening across three dimensions: edge conditions, interface density, and screening continuity.

At edge conditions, Gehl points out that people tend to linger at space edges rather than centers, with positions having backing support and open views most favored. One spatial foundation for vitality within Junjing Garden is precisely the semi-enclosed pause areas at cluster edges with shade and backing. This design systematically establishes transition layers at building facades of various public nodes, forming continuous soft boundaries through semi-outdoor eaves corridors, seating alcoves, and shade canopies, allowing pedestrians pause points with backing support before entering open space, rather than forced exposure in unshaded central paving.

At interface density, one condition enabling sustained vitality within Junjing Garden is sufficient richness of cluster interfaces within pedestrian vision—facility layers, greenery, and human activity constitute continuously changing perception stimuli, providing visual

foundations for passive contact. In contrast, continuous sealed facades and large monotonous paving in the area's central-southern section produce virtually no perception stimulus visually, leaving pedestrians no reason to linger. This design implants small-scale commercial units and display openings around newly-implanted nodes' peripheral interfaces, replacing interface information density for monotonous paving, introducing the effective perception conditions verified within Junjing into the area's public space system.

In terms of shade continuity, the design scope is located in the high temperature and high humidity climate zone of Guangzhou, and the unshaded open space is not attractive to pedestrians for most of the time, which is one of the direct material reasons for the activity observation of the Middle East Asia magnetic plant and parking lot area around the clock. This design establishes a shading system along the main walking path, combining the canopy layer of the street with the building protrusion to ensure that the pedestrians are in a sheltered thermal comfort environment when moving between nodes, and provide the basic climatic guarantee for the occurrence of spontaneous activities.



Figure 0-12 Road space
(Source: Author)

4.3.2 Traffic Weaving: Reorganizing Road Networks and Slow Mobility Systems

The traffic dilemma of high-density cities often does not stem from the absolute lack of total road network, but from the systematic compression of urban space by the logic of motor vehicles, such as wide arterial roads cutting off pedestrian continuity, closed plots causing serious disconnection between the nominal road network and the effective road network, and the slow travel system continuing to shrink under the squeeze of vehicular infrastructure [26]. The design scope is a concentrated embodiment of this dilemma: the motor vehicles on the three main roads on the periphery account for 77% to 90% of the road width, and the width of the sidewalk is only about 3 to 4.5 meters, and it is generally encroached upon by parking and municipal facilities; design scopeThere is only one north-south passage on Kexin Road internally, which has urban connectivity, and the east-west connection has been absent for a long time, and the nominal road network density is high and the actual effective path is extremely limited. Therefore, the task of traffic weaving is not road network encryption, but reorganization - road network reconstruction solves the problem of whether the path exists, and road rights reconstruction solves the problem of whether the path is really usable to pedestrians. Gale pointed out that the occurrence of walking activities is highly dependent on spatial continuity, and when walking becomes difficult or uncomfortable, the frequency of spontaneous and social activities decreases[19]. The slow travel system is the key medium connecting the nodes of public space and users, and the traffic weaving and space weaving form a direct operational relationship here.

4.3.2.1 Road Network Reconstruction

The road network within the design scope suffers from both hierarchy discontinuity and single-corridor dependency, with effective connectivity far below the levels suggested by nominal network density. This design advances road network reconstruction across three levels, achieving overall repair through local breach-filling.

First, supplementing secondary arterial grades. Currently, the outer 40-meter arterial roads and internal 6-to-8-meter access roads lack intermediate-grade roads for transition, creating a

hierarchical break in the road network. Vehicle and pedestrian flows are directly channeled into access roads, forming structural congestion. This design inserts 20-to-25-meter secondary roads between arterials and access roads, restoring hierarchical continuity and providing structural buffering for internal circulation while offering sufficient cross-section space for independent slow-mobility corridors. Second, supplementing east-west connection pathways. East-west connections have long been absent from the design scope, with no transverse linkage between the two north-south axes, making cross-block connections structurally impossible. This design introduces east-west secondary roads and pedestrian passages, establishing transverse frameworks between community and industrial transformation axes, converting the fragile single north-south corridor structure into a grid system with network redundancy, ensuring walkable alternative routes between any two functional blocks. Third, promoting enclosed blocks to release interior passages. The boundary walls of Junjing Garden, Yangcheng Creative Industrial Park, and the East Asia Magnetic Company cut large land areas from the urban road network, creating spatial obstacles forcing pedestrians into extensive detours. Combined with ownership conditions and renewal timelines for each block, this design progressively opens these blocks' interior passages to the urban road network, reweaving road fragments severed by walls into continuous networks with pedestrian permeability, transforming enclosed blocks from road obstacles into traversable urban nodes.

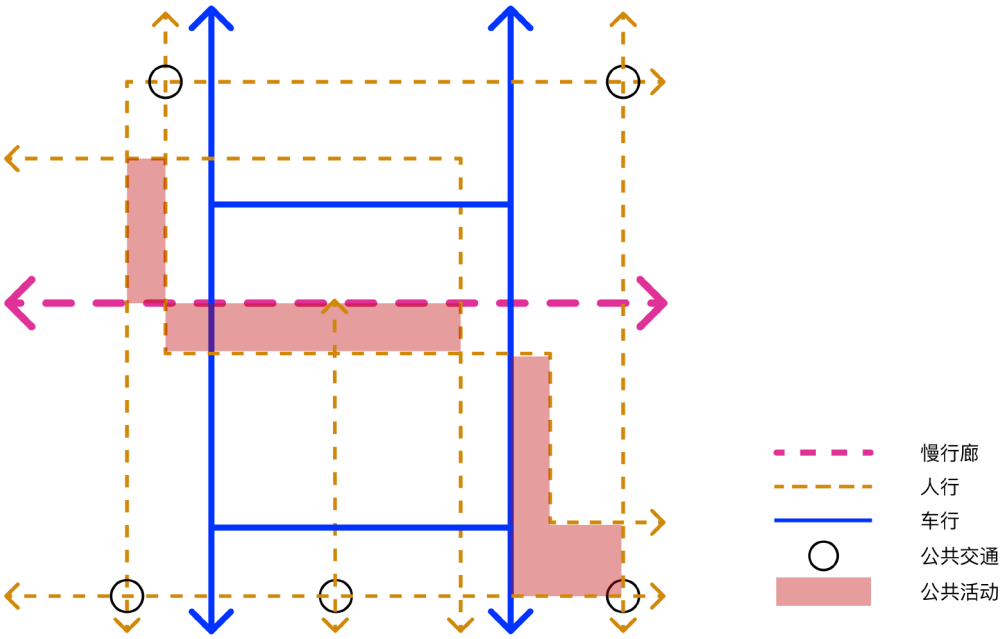


Figure 0-13 Road Network Weaving
(Source: Author)



Figure 0-14 Road Network System Reconstruction
(Source: Author)

4.3.2.2 Road Right-of-Way Restructuring

Design scope's three surrounding trunk roads feature motor vehicle pathway proportions between 77%-90%, with pedestrian lanes systematically occupied by parking and municipal facilities, making macro-public transit coverage advantages difficult converting into actual internal pedestrian penetration. This design employs "automobiles are guests in pedestrians' territory" as fundamental road-right allocation principle[19], promoting road-right restructuring from slow-mobility corridor establishment and trunk road crossing optimization dimensions.

At the slow-mobility corridor level, this design establishes continuous pedestrian and non-motorized vehicle corridors independent of vehicular lanes along the two-axis, one belt framework. Where conditions permit, planar separation of pedestrian and vehicular traffic is achieved through greenery or topographic change, forming explicit right-of-way boundaries; at crossings with arterials—where planar separation is infeasible—three-dimensional separation mitigates human-vehicle conflicts. The corridor is lined with continuous vegetation forming a shading system, improving thermal comfort for pedestrian experiences in high-density built environments. Slow-mobility corridor endpoints directly connect to major public transit stations within the district, linking metro exits with key public space nodes through continuous pedestrian paths, converting macro-level transit accessibility into practical pedestrian accessibility within the district. Slow-mobility corridors terminate at major public transit nodes, linking metro station entrances with key public space nodes in the district through continuous pedestrian routes, converting macro-level transit accessibility to micro-level pedestrian accessibility.

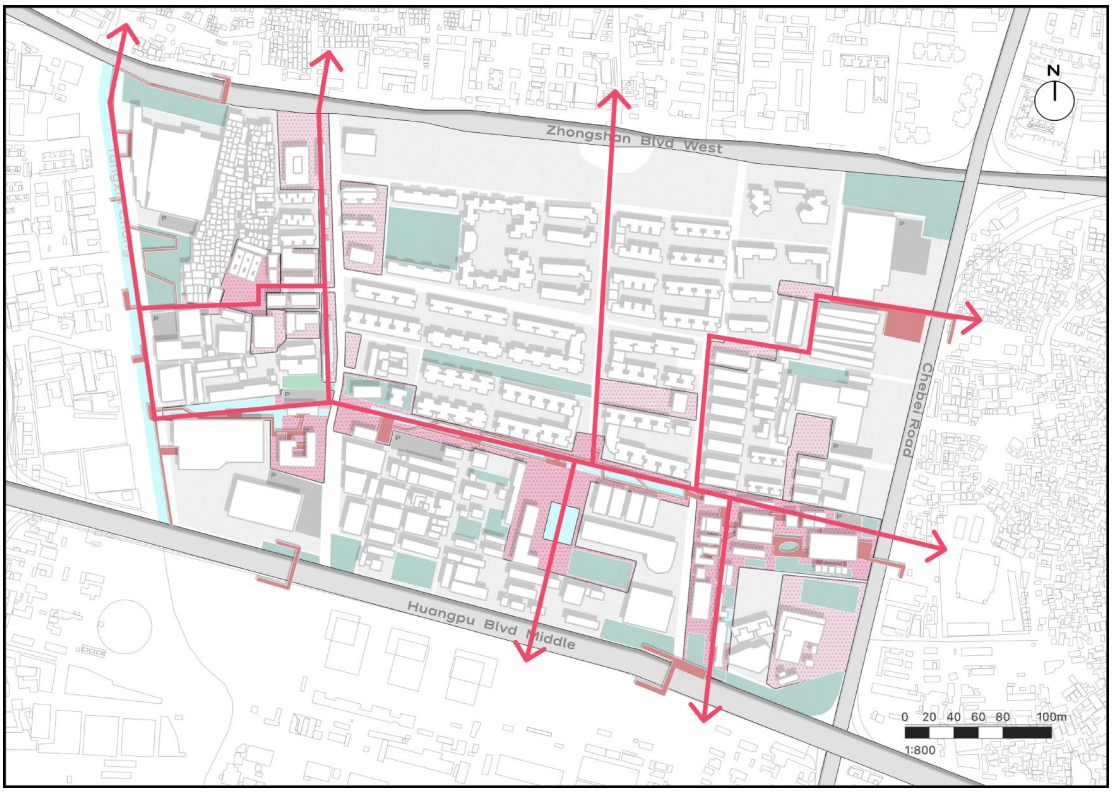


Figure 0-15 Slow-Mobility Corridor Configuration
(Source: Author)

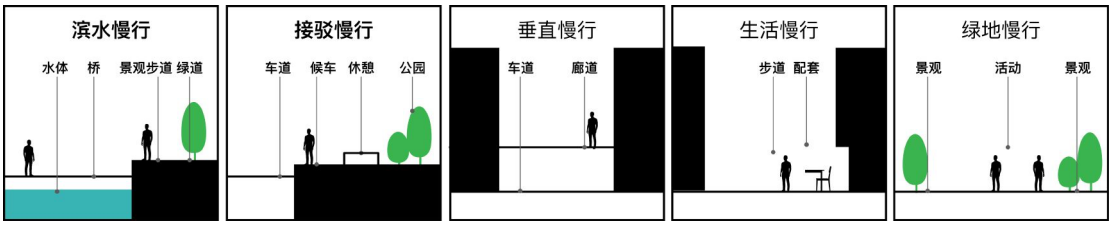


Figure 0-16 Slow-Mobility Space
(Source: Author)

At the arterial crossing level, the barrier effect created by the district's outer wide arterials exhibits a characteristic of "macro-level accessibility, micro-level isolation"—pedestrians face systematic obstruction in the final mile from public transit stations to the district interior. This design increases crossing facility density along Huangpu Avenue, establishing three-dimensional crossing systems at major intersections with heavy traffic, separating pedestrian and vehicle flows, and aligning crossing locations with slow-mobility corridor alignments, enabling transit users to reach district interior public space nodes through continuous comfortable pedestrian paths. Through this approach, outer arterials are no longer mere boundary infrastructure for rapid throughput, but are converted into traffic interfaces supporting internal public life connectivity.

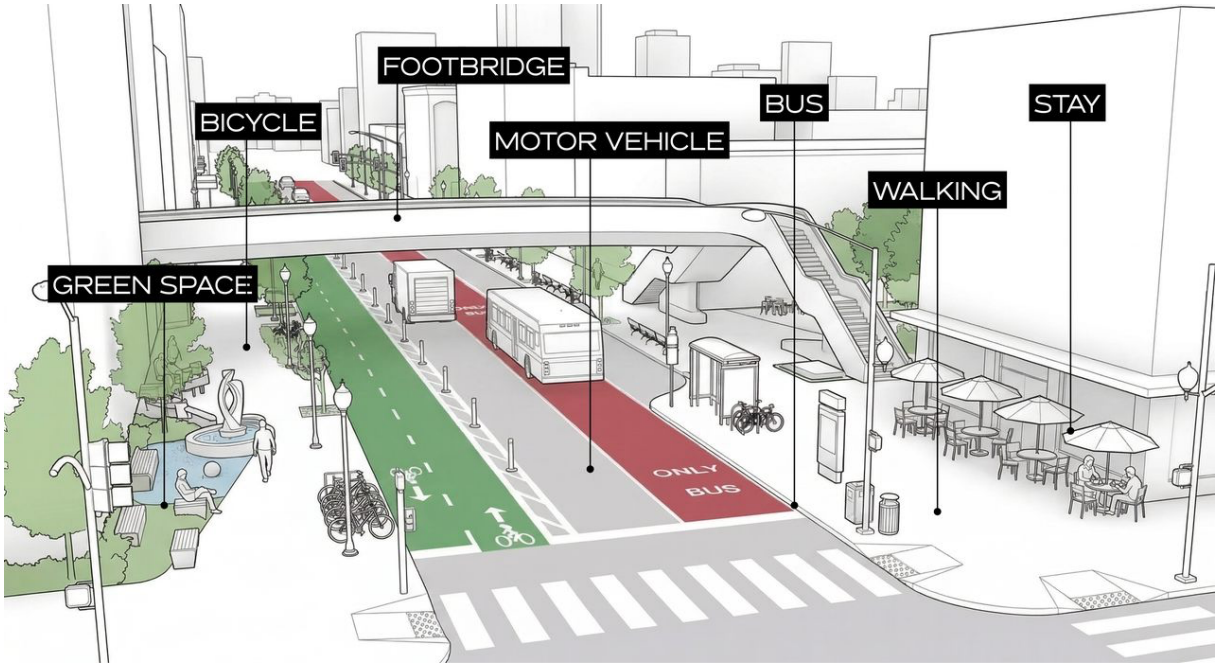


Figure 0-17 Road Right-of-Way Restructuring of Urban Arterials

4.3.3 Urban Structure Weaving: Suturing Fragmented Fabric

Within the design scope, multiple spatial logics coexist within the same geographic area yet lack integration—the organic growth logic of urban villages, the gate-controlled management logic of enclosed residential compounds, the freight efficiency logic of building material wholesale—each forms internally coherent spatial order, but terminates abruptly at boundaries, leaving spatial fissures composed of walls, derelict land, and scale discontinuities. Urban structure weaving does not aim to eliminate these differences—the morphological characteristics of each fabric type result from historical accumulation and cannot be flattened through design intervention—but rather to establish permeable transition relationships at boundaries while preserving each fabric's characteristics, enabling the fragmented "locally ordered yet globally chaotic" pattern to achieve overall spatial coherence. Concrete operations occur at two levels: optimizing block edges, promoting each fabric unit from closed islands to permeable units; suturing fabric grain-size differences, establishing scale transitions between extreme fabric types through differentiated public space sequences.

4.3.3.1 Optimizing Block Boundaries

Block boundaries throughout the design scope uniformly trend toward barrier characteristics—walls and fences, green isolation, and gate-controlled access represent three

boundary types distributed across approximately 20 nodes in all directions, with no permeable spatial relationships formed between functional blocks at any interface. In "The Image of the City," Kevin Lynch distinguishes urban boundaries into two types: barrier boundaries that sever spatial and functional connections between sides, and suture boundaries that connect adjacent segments into wholes. This design employs differentiated softening strategies targeted at the material characteristics of these three boundary types.

For wall and fence boundaries, differential handling adopts according to block management needs—for completely openable boundary zones, removing walls and replacing with greenery, achieving bidirectional sight and space permeability while preserving boundary marking; for boundaries requiring certain management definition retention, replacing solid walls with visually transparent green screening, transforming boundaries from physical closure to visually transparent soft interfaces. Both treatment approaches promote block retreat on public node sides forming open interfaces, originally negative boundary margins filled with public green areas or shared courtyards, transforming "impenetrable solid separation" to "permeable void interfaces." For green isolation boundaries, maintaining green ecological functions while increasing openings and entries, implanting lingering facilities within isolation belts, converting them from pure traffic isolation function to semi-public spaces with edge effects. For access-controlled boundaries, promoting enclosed block opening during non-management hours, transforming management cutoffs to time-period permeability, progressively reducing non-block users' entry thresholds. All three boundary softening operations collectively promote design scope's overall void-solid pattern from respective closed isolated states toward permeation-linked integrated state gradual transformation. [15]

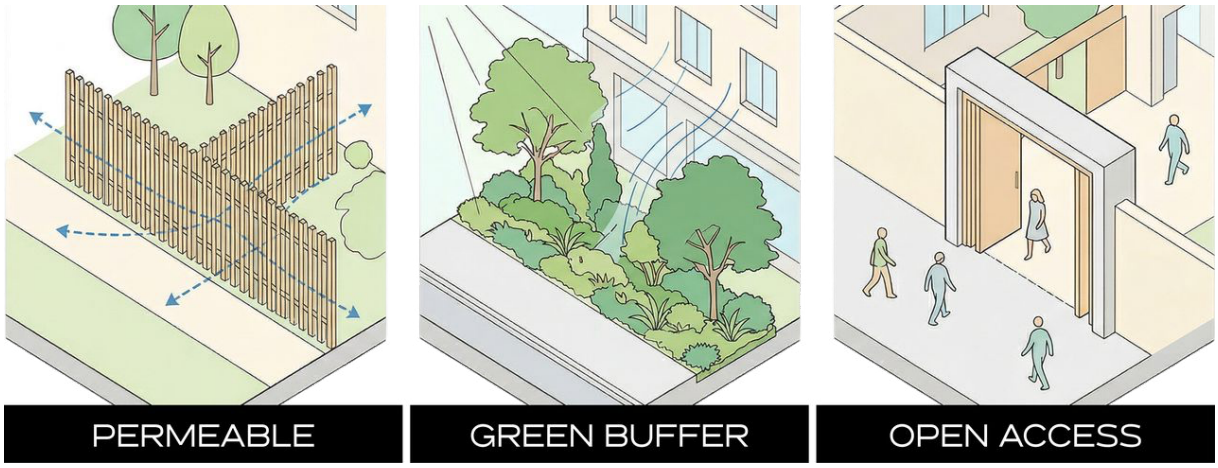


Figure 0-18 Three types of boundries
(Source: Author)

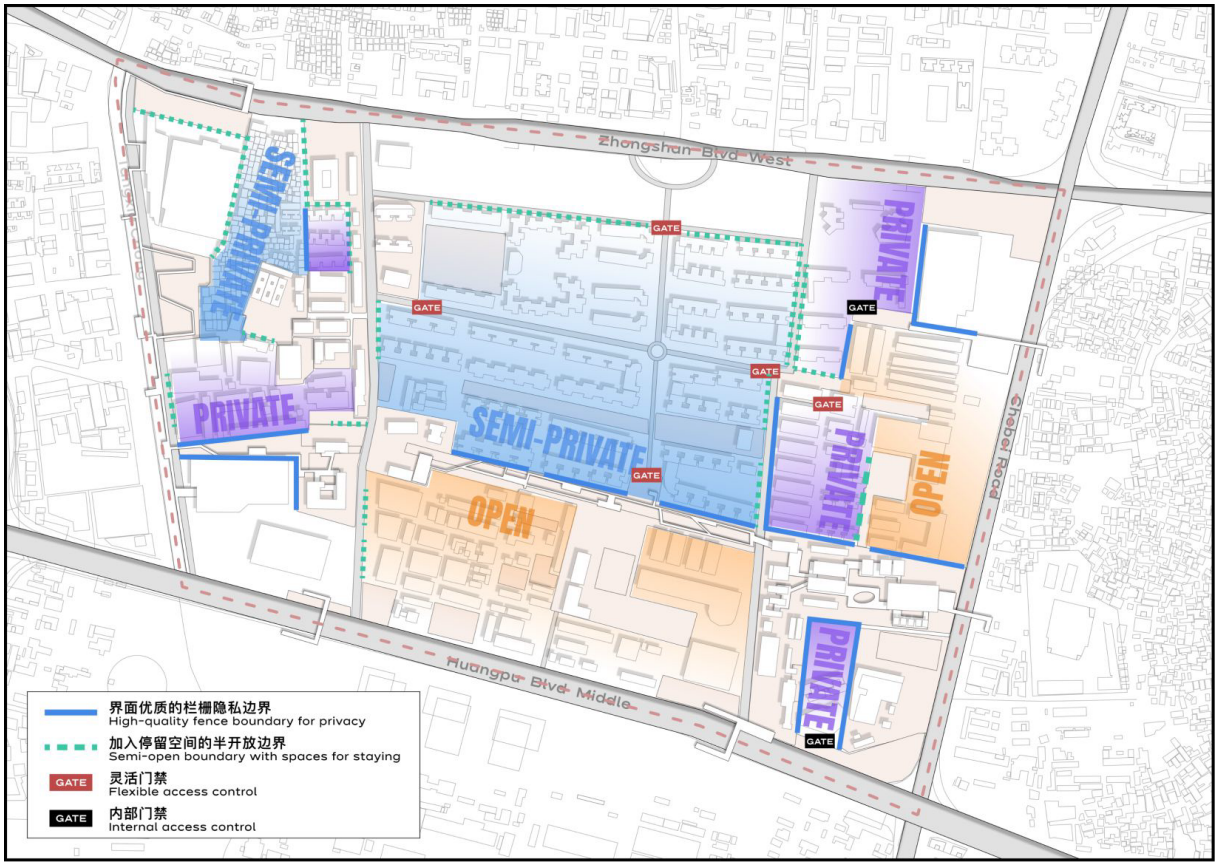


Figure 0-19 Optimization of Block Boundaries
(Source: Author)

4.3.3.2 Suturing Urban Fabric Grain-Size Differences

Design scope's urban fabric grain size differences extremely vary—urban villages self-grow in fine 50-square-meter units, enclosed residential areas and storage land operate at hundreds to thousands of square meters mid-large block scale, ultra-high-rise offices present at ten-thousand-square-meter super-large block magnitude—adjacent fabric lacks any mid-scale

space units bridging, directly colliding forming fabric fractures. Weaving theory indicates repairing such morphological breaks requires establishing "layered, transitional" space morphology between extreme fabrics. [77]

Targeting grain-size characteristics of different fabric sections, this design employs differentiated public space configuration strategies. On the urban village side, semi-open space is introduced at scales matching the village's fine grain, forming permeable public interfaces capable of interlocking with surrounding building fabric; in the junction zones between large-span warehousing and enclosed residential compounds, small-scale openings are interspersed to provide grain transitions.

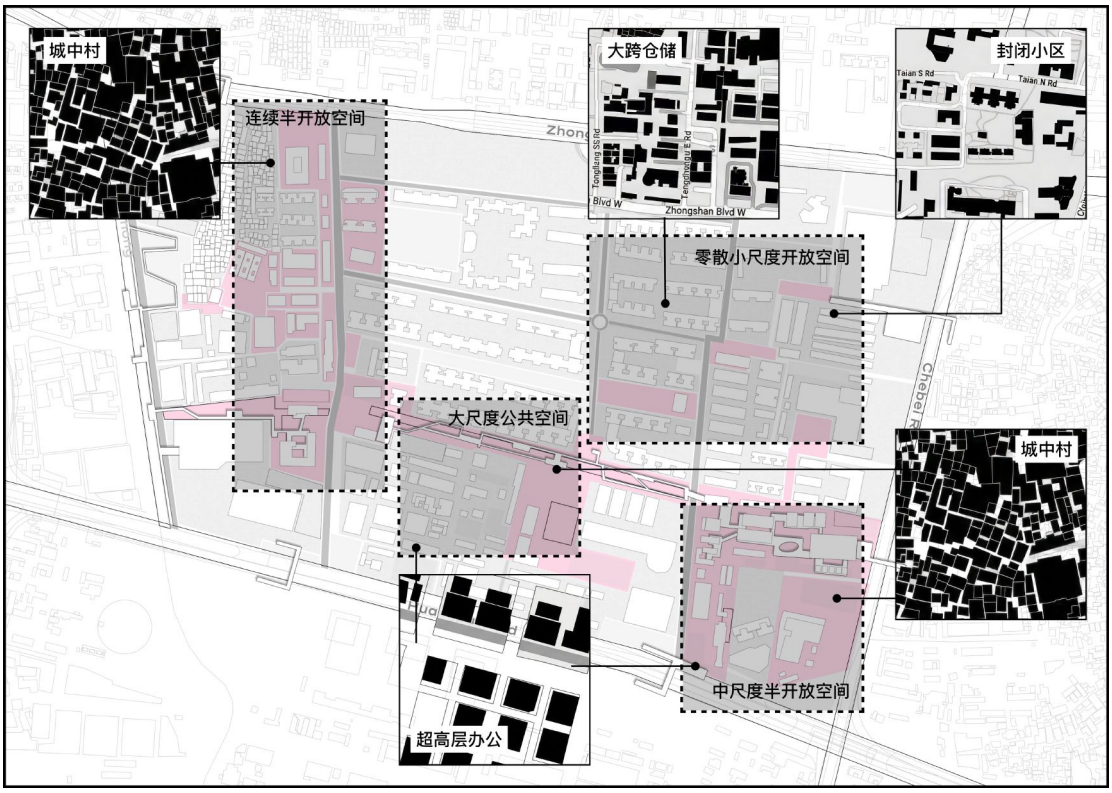


Figure 0-20 Public Space Weaving of Different Scales Mediating Different Fabrics
(Source: Author)

4.3.4 Functional Weaving: Balancing Public Facility Distribution

Former three weaving strategies respectively reorganized design scope's public skeleton from space, transportation, and structural dimensions, yet physical space restoration does not necessarily transform into public life generation. Public skeleton's true effectiveness depends on whether functional configuration can provide practical support for different populations' sustained activities within neighborhoods. Jacobs noted mixed major functions should prompt

people's appearance at neighborhood for different times and purposes, forming high-frequency equipment sharing and cross-usage. Design scope's current situation precisely opposes—each block individually configures per single block serving objects, with public function vacuums at block interfaces, different populations' daily needs struggling forming effective spatial connection. Functional weaving's objective thus transcends simply supplementing facility quantities but breaking enclosed block internal self-provision facility logic, establishing cross-block-boundary public service connections at macro levels, replacing mutually isolated facility configuration patterns with complex, shared functional systems. [16]

4.3.4.1 Public Facility System Establishment

The design scope is located at the intersection of 15-minute life circles spanning Tangxia, Chebei, and the Finance City startup district, providing locational conditions to accommodate cross-block public service functions. Guangzhou's 2025 guidance document explicitly requires transition from "block-based provision" to "life-circle coordination," dividing public service facilities into three categories: basic guarantee type, quality enhancement type, and special guidance type, using basic guarantee facility provision as the fundamental standard for measuring district public service supply levels. Based on these allocation criteria, against facility gaps in three districts: Tangxia district lacks community health service centers, cultural centers, and comprehensive elderly care service centers (Yikang Centers), nor does it provide conditions for "Workers' and Managers' Homes" needed by migrant laborers; Chebei district completely lacks cultural centers, cultural and sports activity centers, and cultural and sports plazas, while Chebei Park's green coverage falls far short of meeting high-density residential population demands; the Finance City startup district lacks basic supporting infrastructure, with no sign of "industrial neighbor centers" required by guidance documents for industrial cluster areas.

This design uses public space nodes established by the preceding three strategies as functional deployment carriers, differentially embedding the above-listed missing facilities based on node location and service population characteristics—functional types are determined by each district's basic guarantee facility gaps, functional locations determined jointly by population distribution and node locations. Each node establishes continuous service connections with surrounding districts through slow-mobility corridors and open interfaces,

integrating previously dispersed fragmented facility supply into a public service network serving multiple population groups, achieving transition from "block-based provision" to "life-circle coordination".

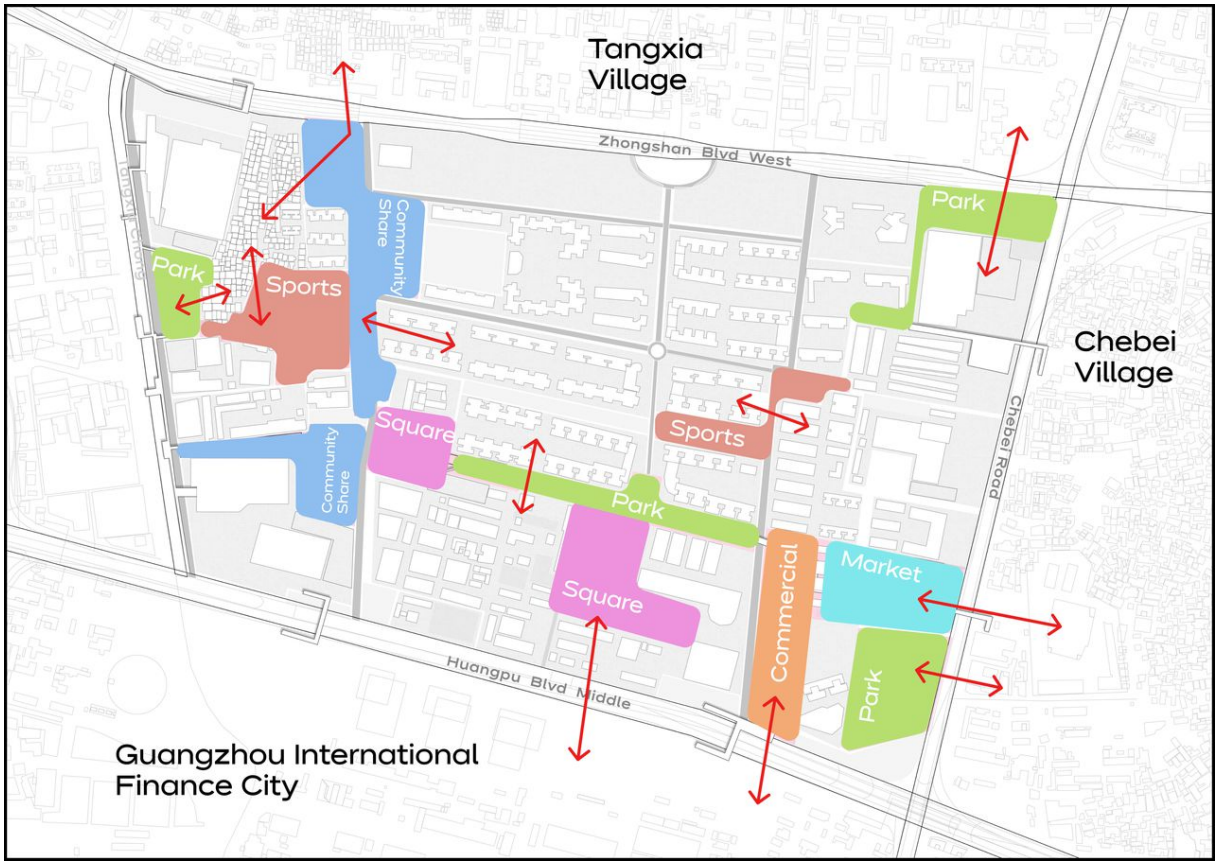
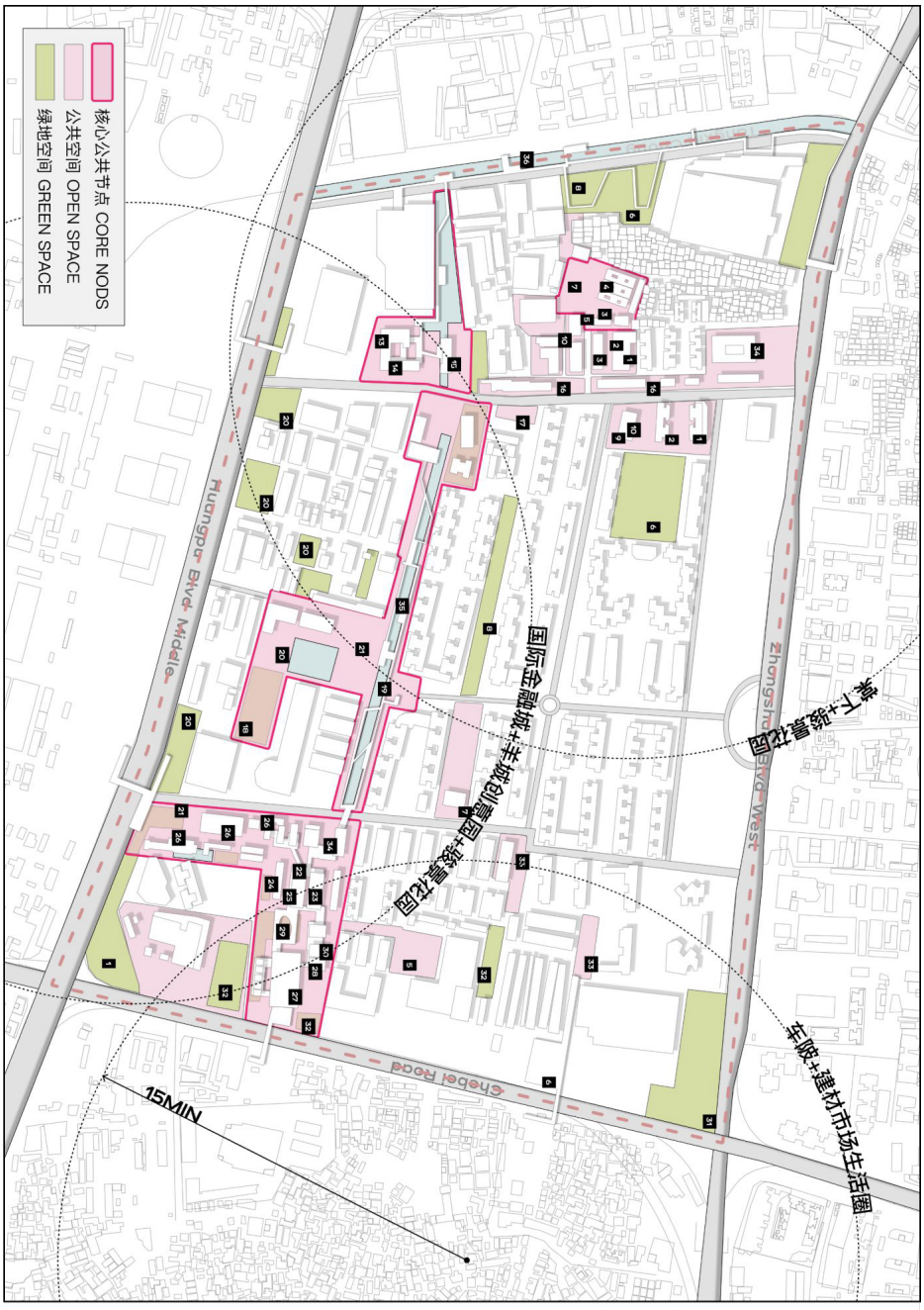


Figure 0-21 Integration of Public Facility System
(Source: Author)



配套设施表（按15分钟生活圈配置）

棠下-骏景花园生活圈
1 社区卫生服务中心
2 应急医疗服务
3 文化站
4 陈列展览馆
5 文体广场
6 社区公园
7 居民健身场所
8 小区游园（口袋公园）
9 颐康服务站
10 社区老年课堂
12 共享食堂
13 共享会客厅
14 创客空间
15 社区自助读书室
16 餐饮商业
17 学校接送

国际金融城-羊城创意园-骏景花园生活圈
18 文体广场
19 社区公园
20 小区游园（口袋公园）
21 文体广场
22 屋顶公共开放绿化活动空间
23 创客空间
24 酒店公寓
25 共享办公
26 餐饮商业

车陂-建材市场生活圈
27 生鲜市场
28 社区文化活动中心
29 文体广场
30 文化站
31 社区公园
32 小区游园（口袋公园）
33 居民健身场所

城市公共设施
34 商业设施
35 城市公园
36 滨水绿道

Figure 0-22 Supporting Facility Schedule (15-Minute Living Circle)
(Source: Author)

4.3.4.2 Functional Mixed-Use Configuration

Public facility system establishment primarily addresses insufficient service coverage, but generation of mixed-use neighborhood public life depends not only on facility quantity supplementation but critically on whether different functions and populations can continuously intersect within the same spatial system. This design advances functional integration across two levels: temporal complementarity and multi-dimensional mixing.

At the temporal complementarity level, activity observation reveals that the design scope already possesses latent complementary structures: the Yangcheng Creative Industrial Park vicinity experiences concentrated spontaneous activity at midday on workdays, Junjing Garden exhibits relative vitality in evenings, yet transition areas between these two show sustained vitality deficiency across all four observational dimensions—weekdays versus weekends, noon versus evening. This phenomenon does not stem from insufficient foot traffic but rather from lacking functional nodes simultaneously addressing both population groups' needs and continuously attracting lingering activity across different time periods. This design plants hybrid nodes between these two activity hubs accommodating noon leisure, daily consumption, and community dwelling needs, materializing the potential for different populations "appearing in the street for different reasons at different times" into physical space.

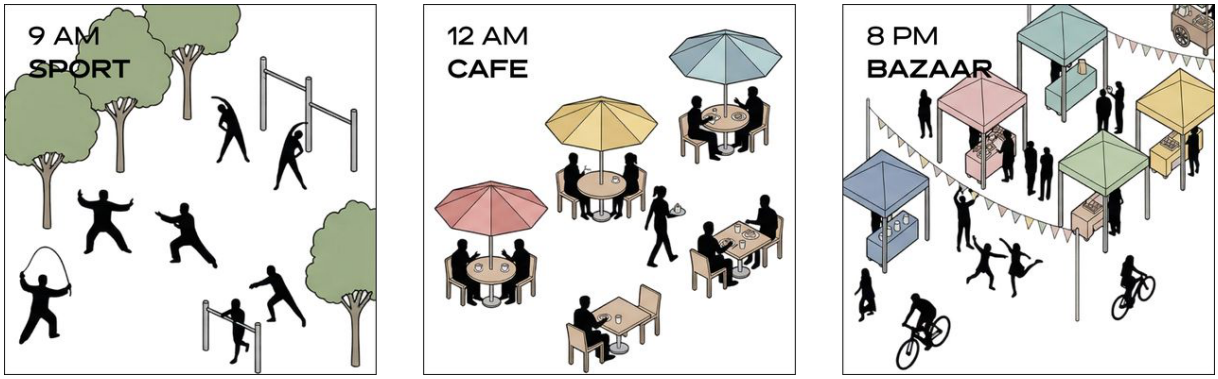


Figure 0-23 All-Day Functional Mixed-Use
(Source: Author)

At the multi-dimensional mixing level, the design scope contains significantly differentiated populations in age structure, consumption tier, and activity timing, with single-function types difficult to support multi-population shared use. This design's public nodes possess three functional configuration dimensions: vertical mixing—embedding public-facing commercial and service facilities at ground-floor interfaces while retaining existing upper-floor

functions, activating street interfaces' openness and usage frequency; horizontal permeation—forming functional permeation zones on node sides, generating intersections between adjacent districts' populations at the same horizontal level; flexible use—reserving certain spaces for temporary activity integration conditions, embedding variable content such as markets, exhibitions, and community activities into daily usage processes, enabling nodes to dynamically adjust functions according to changing needs. The three dimensions operate jointly, converting each public node into a hybrid venue accommodating multiple population groups across different times and methods, advancing the design scope from functionally isolated collage pattern toward human-mixing, activity-compound mixed-use neighborhoods.

4.4 Node Design

4.4.1 East Asia Magnetic Factory: Shared Activation of Public Life

The East Asia Magnetic Company block is located at the southeastern terminus of the design scope, serving as the singular structural node simultaneously bearing dual missions of urban interface repair and internal district integration—its south face directly confronts approximately 121,000 daytime office workers' overflow demand from the Finance City startup district, its north connects to Chebei Village's high-density residential system, its west links via the vitality belt to the Central Park, constituting the eastern anchor of the two-axis, one-belt framework. Yet this block with the strongest connection potential is precisely where derelict space problems concentrate most severely in current conditions: entirely enclosed by walls, large areas of land long abandoned, ambiguous boundary treatment with urban roads, pedestrians chronically exposed to excessively open environments lacking enclosure and shelter.



Figure 0-24 Node1 Location
(Source: Author)



Figure 0-25 Node One Current Conditions
(Source: Author)

This design positions intervention at this node as "removing walls, weaving into city"—not merely releasing land, but converting the closed, defunct industrial block into an open interface being absorbed by the city's pedestrian system, public space network, and hybrid functional system.

At the functional configuration level, the north side facing Chebei Village extracts local pitched-roof morphology and fine-grain street fabric, constructing open-plan fresh produce markets and daily commercial streets, maintaining continuous public flow at ground level,

reintegrating long-absent standardized fresh markets and daily interaction interfaces into residents' living systems. The south side facing Finance City office workers preserves well-maintained industrial buildings as converted transparent gray spaces, inserting dining, retail, and informal social venues; well-preserved high-rise industrial buildings are converted to hotel apartments, drawing post-work Finance City office workers into the design scope, sustaining public nodes' all-day vitality.

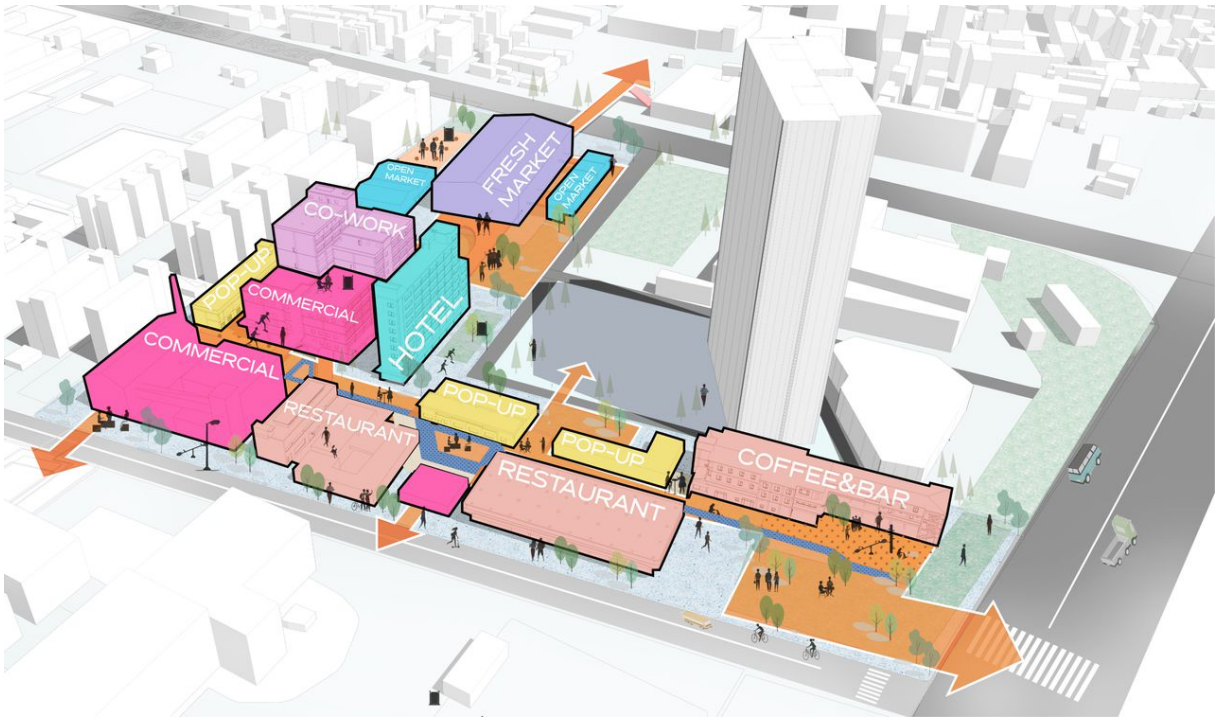


Figure 0-26 Node One Functional Distribution
(Source: Author)

At the spatial operations level, current walls are demolished along Huangpu Avenue, rebuilding urban public interfaces with both planar and three-dimensional permeability through ground-floor setbacks, open framework layers, and bridge connections, inserting continuous vegetation and shade structures into street-level walking segments, converting originally transit-only marginal zones into lingering urban plaza forecourts. The site preserves most well-constructed industrial buildings, demolishing temporary metal-sheet factories and low-efficiency structures, carrying new public functions through adaptive reuse of industrial heritage. Daytime: the north fresh market absorbs residents' daily provisioning while south gray spaces draw office workers' noon dining and brief rest; evening: Finance City white-collar workers walk along the vitality belt, lingering and consuming in industrial-converted commercial spaces, with

hotel apartments further extending district usage duration; weekends: the urban plaza and open streets become shared public venues for Chebei Village residents, Finance City workers, and outside visitors.



Figure 0-27 Tangxia Village Supporting Livelihood Street District (left) and Finance City Supporting Commercial Street District (right)
(Source: Author)



Figure 0-28 Relationship with Central Park
(Source: Author)

4.4.2 Tangxia Zhong's ancestral hall: Supplement the community public space

The construction density of Tangxia Village is extremely high, and public places for residents' spontaneous activities are scarce. The Zhong Clan Ancestral Hall and the open space in front of it are one of the few places in the village that retains the intact historical public core - the ancient trees of Gantang and the square in front of the ancestral hall have long carried the spontaneous gathering activities of villagers. The existing inefficient parking lots around the ancestral hall occupy scarce large-scale vacant land resources in the village, and the current situation is mixed with people and vehicles, and the space quality is low.

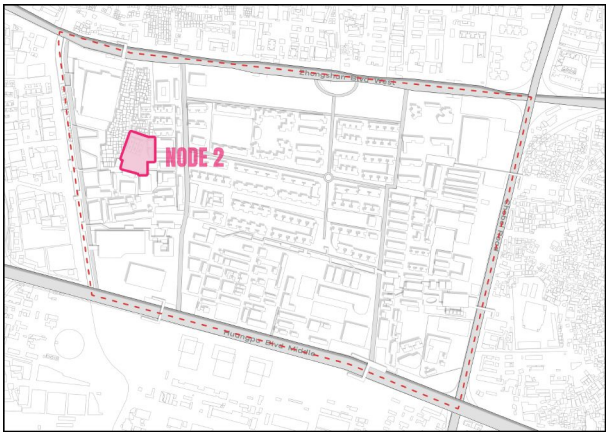


Figure 0-29 Node2 Location
(Source: Author)

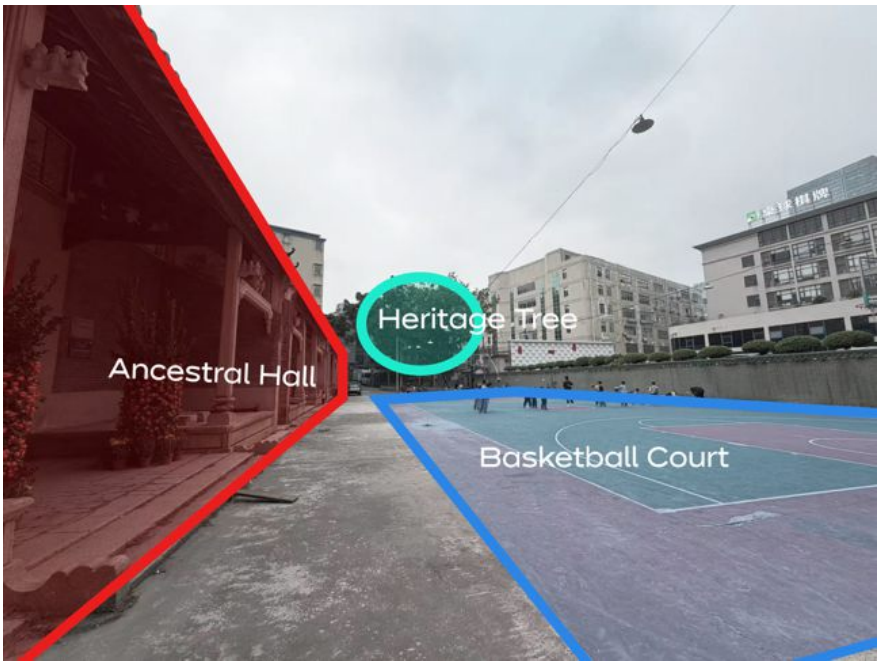


Figure 0-30 Node Two Current Conditions
(Source: Author)

Taking the Zhong Clan Ancestral Temple as spatial core, this design removes surrounding walls and incorporates low-efficiency parking facilities into the design scope, creating the largest public activity ground within Tangxia Village. At the functional configuration level, the node prioritizes addressing Tangxia district's long-absent cultural and sports facilities, plus children's activity amenities—the basketball court extends residents' spontaneous usage patterns with in-situ placement, children's recreation areas deploy under the ancient Gantang tree's natural shade conditions, the temple building itself achieves light cultural exhibition activation, the temple forecourt preserves its original spaciousness, maintaining its spatial character as a ceremonial public core through minimal intervention.



Figure 0-31 Zhong Clan Ancestral Temple Renovation Effect Diagram
(Source: Author)

At the traffic organization level, the node establishes three-dimensional connection with Kexin Road through overhead corridors—current connection paths exhibit mixed pedestrian-vehicular use with extremely narrow widths. Three-dimensional separation elevates pedestrian flows above vehicular layers, simultaneously eliminating human-vehicle conflicts while enabling Tangxia Village residents to access the community axis slow-mobility system through continuous comfortable pedestrian paths, integrating the node into the district's overall public space network.

At the activity scenario level, the node employs all-day public activity as basic usage logic: early mornings elder residents gather and rest under ancient trees, daytime children engage in

play areas, evenings basketball courts absorb residents' spontaneous recreational needs, temple exhibitions provide cultural activity venues for holidays. The node addresses precisely the structural gap identified in Chapter Three's activity observations—spontaneous social activity does occur within Tangxia Village, yet due to poor space quality and confined grounds, remains unable to accommodate broader populations.



Figure 0-32 Zhong Clan Ancestral Temple Forecourt
(Source: Author)



Figure 0-33 Children's Activity Area (left) and Basketball Court (right)
(Source: Author)

4.4.3 Kexin Road: The opening of the junction of multiple plots

Kexin Road is one of the plot-level trunk roads planned to run north and south within the design scope The node is located at the intersection of the three closed plots of Junjing Garden, Tangxia Village and Yangcheng Creative Industry Park - the current number of plots have their own entrances and exits, and the access control nodes are dense, the road is mixed and the road width is extremely narrow, which is one of the most chaotic nodes in the traffic organization within the design scope. The surrounding area is dominated by inefficient catering and negative gaps, which have neither form nor public function. At the same time, Tangxiayong is close to the west side of the node, and the current situation is isolated from residents as an urban ecological corridor, and the potential connection between its landscape value and the planned central park has not been activated for a long time.

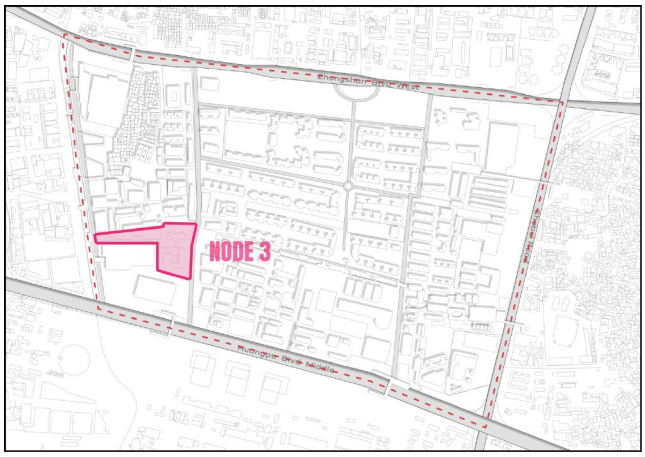


Figure 0-34 Node Three Location
(Source: Author)

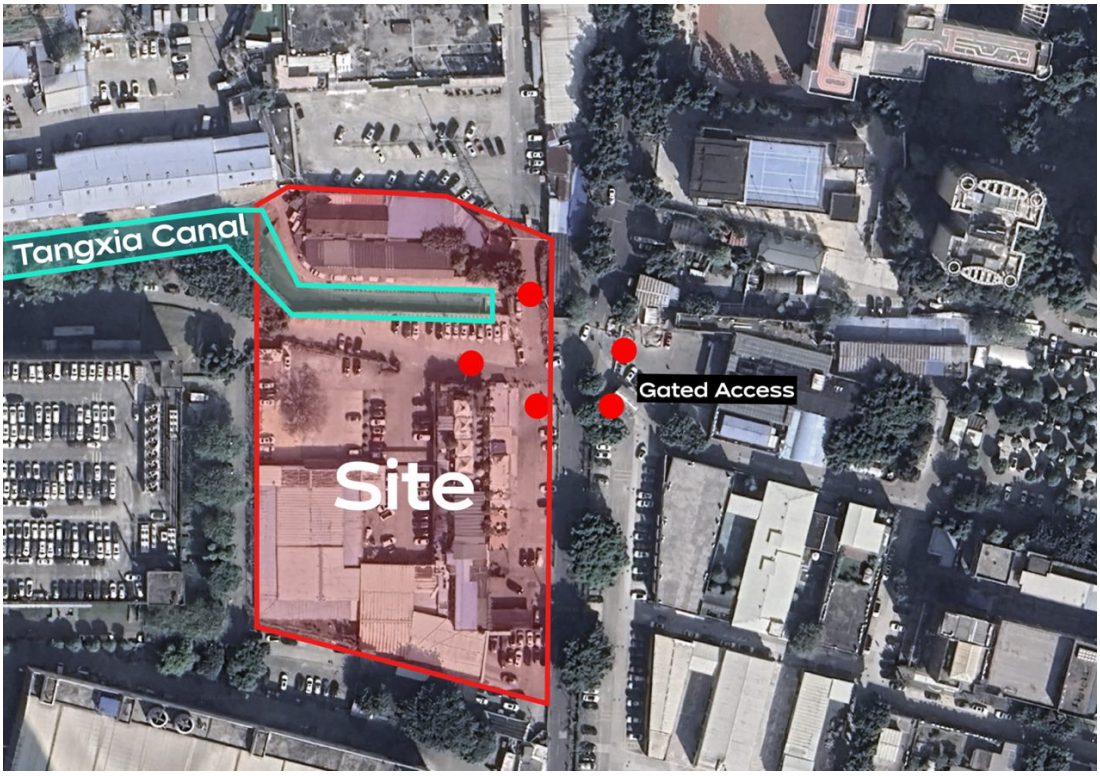


Figure 0-35 Node Three Current Conditions
(Source: Author)

The design takes consolidated multi-block entrances and clarified pedestrian-vehicle traffic as its primary operational logic. Through unified consolidation of currently dispersed gate-control access points, it integrates five originally enclosed block entrances into shared public interfaces facing Kexin Road, eliminating mixed pedestrian-vehicular conditions. New community living room building clusters are constructed on passive gaps at block boundaries, organizing public activity spaces through transparent glass interfaces and inward-facing courtyards, maintaining continuous ground-level openness toward Kexin Road. Tangxia Creek is incorporated into the node design scope, converting waterfront space into lingering public green through stepped accessible embankments and continuous pathways, establishing east-west landscape and pedestrian connections with the Central Park via the node, transforming Tangxia Creek from visual boundary into accessible public activity zones.

At the functional configuration level, the node primarily serves Junjing Garden and Tangxia Village residents, embedding community living rooms, libraries, and shared activity spaces, addressing long-absent cultural basic-guarantee facilities in surrounding high-density residential areas. Building roofs feature green platforms and semi-outdoor activity zones, expanding public

activity capacity per land unit through vertical mixing, addressing high-density environments' structural constraint of severely scarce ground-level public space.

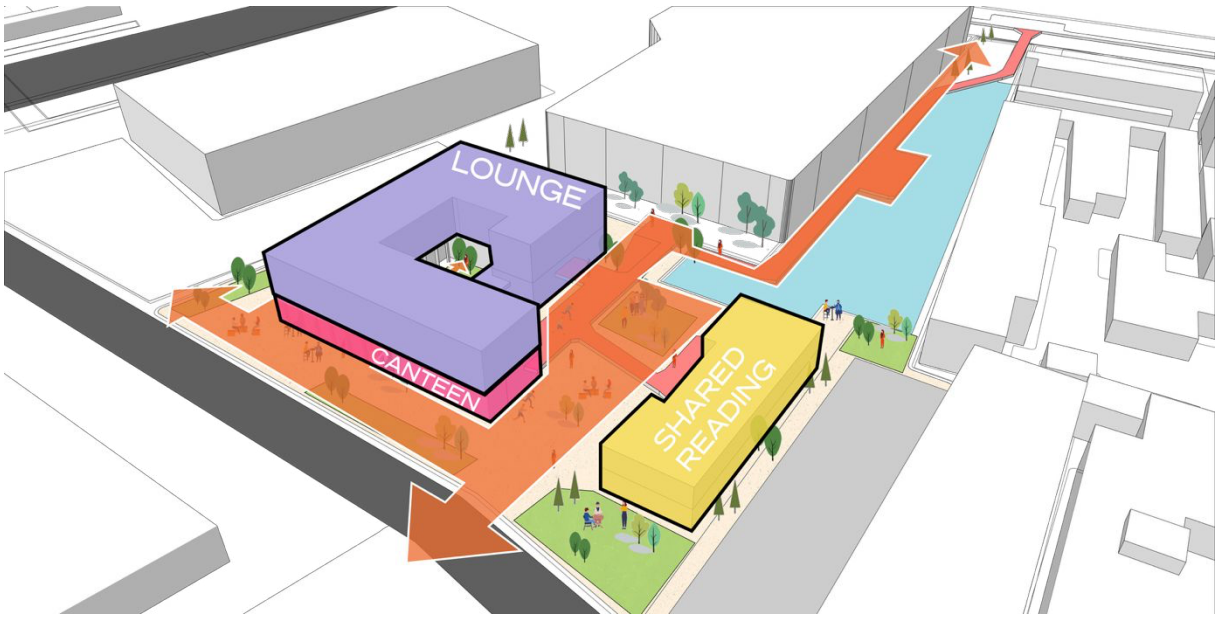


Figure 0-36 Node Three Functional Distribution
(Source: Author)

At the activity scenario level, the node employs all-day community life as basic usage logic: early mornings residents walk along Tangxia Creek pathways, daytime libraries and community living rooms accommodate parent-child reading and daily interaction needs, evenings waterside steps become residents' spontaneous gathering points for rest and socializing, weekend roof green platforms provide outdoor activity conditions. Functioning as the intersection of community axis and Tangxia Creek riparian corridor, the node simultaneously carries structural function of integrating the district's western ecological resources into daily public life systems.



Figure 0-37 Community Living Room
(Source: Author)



Figure 0-38 Waterside Space (left) and Central Court Space (right)
(Source: Author)

4.4.4 Central Park: All-Day Mixed-Use Vitality

The Central Park is sited at the junction between Junjing Garden and Yangcheng Creative Industrial Park, representing one of the most typical locations of block boundary hardening

within the design scope—the two enclosed blocks operate back-to-back here, the current site is occupied solely by parking functions, and site height differentials further reinforce the boundary's barrier effect, forming typical low-efficiency parking derelict space. Simultaneously, this location sits at the intersection of community axis and vitality belt, serving as the structural intermediary connecting Junjing Garden residents' daily activity patterns with Yangcheng Creative Industrial Park office workers' overflow demand—Chapter Three's activity observations show these two population groups' activity periods naturally complement each other, yet without spatial accommodation mechanisms have long generated vitality vacuums here.

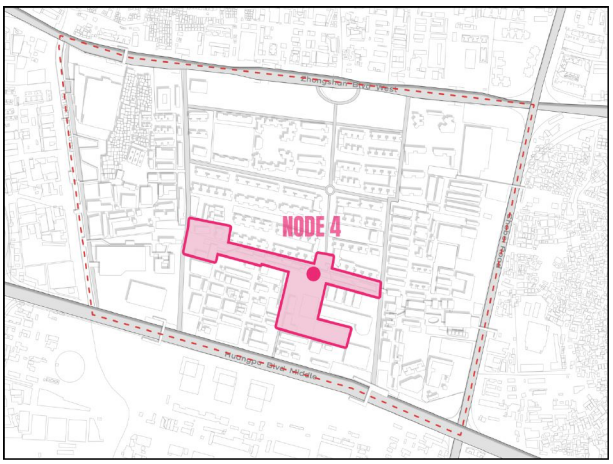


Figure 0-39 Node Four Location
(Source: Author)



Figure 0-40 Node Four Current Conditions
(Source: Author)

This design leverages site height differentials, converting originally obstacle-forming vertical drops into spatial layers through terraced green and stepped landscape treatment, creating permeability relationships between adjacent blocks in both visual and pedestrian terms. The node establishes clear functional zoning in horizontal direction: the east side features a park district emphasizing greenery, water features, and rest facilities, using natural vegetation and undulating terrain to create restorative lingering environments, primarily serving Junjing Garden residents in post-work and weekend periods; the west side features an activity plaza emphasizing hard paving and outdoor service facilities, employing open flat spatial form to absorb office workers' noon rest and informal socializing needs, responding to long-absent outdoor lingering space for Finance City startup district and Yangcheng Creative Industrial Park.

At the activity scenario level, the node employs temporal complementarity as core usage logic: weekday noons plaza areas concentrate office workers while evenings park areas absorb residents' walking and resting; weekends both spaces jointly open to multi-population groups, with plaza flexible paving reserving market and outdoor activity integration conditions. Serving as the Central Park's core public space node on the vitality belt, simultaneously carrying structural function of merging community life and industrial vitality within a single venue, the Central Park represents the site where the district's temporal complementarity potential is most directly realized in spatial terms.



Figure 0-41 Central Park (left) and All-Day Plaza (right)
(Source: Author)

4.5 Chapter Summary

The spatial predicament of the GIFC North Area is rooted in a collage pattern where multiple development logics are juxtaposed without any integrating mechanism: the street network fractures systematically at block boundaries, lost spaces accumulate continuously, public facilities are misaligned with actual demand, and spatially proximate populations lack any shared spatial foundation for public life. Taking Urban Weaving Theory as its methodological framework and public space as the primary medium for repairing fragmented urban structure, this chapter constructs a "two-axis, one-belt" spatial backbone, advances four mutually reinforcing strategies—spatial weaving, transport weaving, structural weaving, and functional weaving—and realizes them through the design of four key nodes.

The four weaving strategies form a progressive rather than parallel logic of "place activation → path connectivity → fabric suturing → functional support." Spatial weaving begins with the activation of lost spaces, converting idle land, unattributed boundary remnants, and underutilized parking into habitable public places, while improving street spatial quality across three dimensions—edge conditions, interface density, and shelter continuity—to establish the material preconditions for spontaneous and social activities. Building on this foundation, transport weaving restructures the road network and redistributes right-of-way, translating macro-level public transit advantages into perceptible pedestrian connectivity within the area and ensuring the effective accessibility of public space nodes. Structural weaving then softens hard boundaries and organizes a differentiated sequence of public spaces to establish spatial transitions between the fine-grain urban village fabric and the oversized-scale Finance City, suturing the area's fragmented "individually enclosed, collectively disordered" pattern. Functional weaving, drawing on the overlapping 15-minute life circles of the three sub-districts, addresses systemic gaps in cultural, sports, elderly care, and employment-support facilities, and through temporal complementarity and mixed-use programming endows the backbone spaces with the sustained capacity to draw together diverse populations.

The node designs translate these strategies into specific sites: the Dongya Magnetic Factory activates industrial heritage to simultaneously absorb overflow demand from the Finance City and support the everyday life of Chebi Village residents; the Zhong Clan Ancestral Hall fills the

acute shortage of public activity space within Tangxia Village; the Kexin Road Community Living Room consolidates multiple block entrances and activates the waterfront resources of Tangxia Creek; and the Central Park employs a temporal-complementarity logic to draw both Junjing Garden residents and Yangcheng Creative Industry Park office workers into a shared public place.

This chapter represents a systematic design translation of Urban Weaving Theory into the specific context of high-density, multi-logic juxtaposition. Through the "two-axis, one-belt" backbone, it reconstructs the area's public spatial structure; through four progressive weaving strategies, it responds to the area's systemic spatial predicament; and in doing so, it advances the design scope from a fragmented collage of mutually isolated enclaves toward a mixed-use neighborhood defined by functional complexity, structural connectivity, and shared public life

Conclusion

Research Conclusions

This study addresses the structural problem of multiple spatial logics operating in juxtaposition without any integrating mechanism in Guangzhou high-density urban centers, taking the district north of Guangzhou International Finance City in Tianhe District as its research object. It unfolds around two core questions: what systemic predicament does the high-density collage pattern produce in this area, and how can Urban Weaving Theory serve as a methodological framework for constructing strategies that respond systematically to these problems and translating them into design practice.

At the theoretical level, the study conducts a literature review of three core concepts. An examination of high-density urban research identifies the defining characteristics of high-density cities and establishes fabric fragmentation, public space deficiency, functional misallocation, and right-of-way imbalance as the typical problems of high-density built environments—forming the problem-identification framework for the field investigation in Chapter Three. In the domain of Urban Weaving Theory, the study traces the theoretical trajectory from *Collage City* to contemporary practice, distilling through literature and case analysis the key operational principles of urban weaving, which provide the methodological grounding for the design strategies and specific interventions constructed in Chapter Four. Mixed-use block theory both describes the existing condition of juxtaposed functions within the design scope and defines the integrated target toward which weaving intervention is directed. Building on this foundation, the study shifts the operational focus of weaving from "repairing ruptures under singular disorder" toward "constructing an integrative public structure within a multi-logic context," thereby extending the applicable boundaries of Urban Weaving Theory.

At the practical level, systematic field investigation first identifies four categories of core problems across urban and neighborhood scales—fragmentation of urban structure, low traffic accessibility, absence of spatial vitality, and public functional imbalance. These problems overlap and mutually reinforce one another, ultimately converging on a single condition: the various populations within the area, though geographically proximate, each operate anchored to

enclosed spatial units, with public life appearing as inward fragmentation rather than organic sharing.

In response, the study proposes four weaving strategies—spatial weaving, transport weaving, structural weaving, and functional weaving—organized according to a progressive logic of "activate nodes → clear pathways → suture fabric → supplement function," with the "two-axis, one-belt" spatial backbone serving as the shared carrier through which all four strategies advance in coordination. Each strategy corresponds to one category of problem, while together, under the unifying spatial backbone, they form a coherent intervention framework rather than a set of isolated, single-dimension operations—this constitutes the primary methodological distinction of the present study from existing urban weaving practices. Through design work at four key nodes—the Dongya Magnetic Factory, the Zhong Clan Ancestral Hall in Tangxia Village, the Kexin Road Community Living Room, and the Central Park—the study tests the operability of this strategic framework at the spatial level, offering a methodological reference for the renewal of analogous multi-logic juxtaposition conditions in high-density urban contexts.

Research Limitations and Outlook

This study leaves several directions open for further investigation. The primary focus of the research has been on deploying theoretical tools to generate context-specific strategies and renewal design for the selected research and design scope. In terms of practical applicability, the design work concentrates primarily on urban spatial design and key node interventions, with relatively limited discussion of the governance mechanisms, stakeholder coordination, and community participation pathways required at the implementation level.

In sum, this study offers a systematic diagnosis of the spatial predicament facing the district north of Guangzhou International Finance City under high-density urban conditions, advances a coherent renewal strategy framework grounded in Urban Weaving Theory, and tests that framework through design practice. Given the inherent constraints of a single study, certain dimensions have inevitably received less attention than they deserve, and some conclusions may reflect the limitations of a partial view. The author hopes that future research will build upon, refine, and extend what has been undertaken here.

References

［1］王凯．“双碳”背景下的城市发展机遇[J]．城市问题，2023(1)：15-18．

［2］张杰．存量时代的城市更新与织补[J]．建筑学报，2019(7)：1-5．

［3］杨东峰，毛其智，龙瀛．迈向可持续的城市:国际经验解读——从概念到范式[J]．城市规划学刊，2010(1)：49-57．

［4］李和平，刘志．中国城市密度时空演变与高密度发展分析——从 1981 年到 2014 年[J]．城市发展研究，2019，26(4)．

［5］闫小培，毛蒋兴．高密度开发城市的交通与土地利用互动关系——以广州为例[J]．地理学报，2004(5)：643-652．

［6］常娜．咫尺空间·芥纳须弥——论珠三角高密度城市中心区微绿地的空间价值[J]．华南师范大学学报（社会科学版），2018(1)：185-188, 192．

［7］许晶．城市纹理断裂区的形态织补与功能嵌入——以福州中洲岛为例[J]．规划师，2021，37(1)：44-49, 63．

［8］Rowe C., Koetter F. Collage city[M]. MIT Press, 1984.

［9］张杰，邓翔宇，袁路平．探索新的城市建筑类型,织补城市肌理——以济南古城为例[J]．城市规划，2004(12)：47-52．

［10］黄纯灿，公伟．从静态图底到动态系统：织补理论的空间逻辑嬗变[J]．艺术与设计（理论），2025，2(11)：39-42．

［11］董春方．密度与城市形态[J]．建筑学报，2012(7)：22-27．

［12］董春方．城市高密度环境下的建筑学思考[J]．建筑学报，2010(4)：20-23．

［13］李敏，叶昌东．高密度城市的门槛标准及全球分布特征[J]．世界地理研究，2015，24(1)：38-45．

［14］汪馨杨．基于城市织补理论的街道空间更新策略研究——以苏州市干将路古城区段为例[J]．城市建筑，2026，23(3)：124-127．

［15］姚心淇．“城市碎片”的整合与织补策略研究[J]．建筑与文化，2016(3)：162-163．

［16］Jacobs J. The death and life of great American cities[M]. Vintage Books, 1961.

［17］Turner A. Stitching together the fabric of space and society: An investigation into the linkage of the local to regional continuum[J]. 2009: 116.

［18］Martinez Perez A. Spaces of absence in the european city: Stitching urban infrastructure to

contemporary collective life[J]. Architecture and Culture, 2021, 9(4): 625-634.

［19］Gehl J. Life between buildings: Using public space[M]. Island Press, 2011.

［20］Rowley A.. Mixed-use Development: Ambiguous concept, simplistic analysis and wishful thinking?[J]. Planning Practice & Research，1996.

［21］Hoppenbrouwer E.，Louw E.. Mixed-use development: Theory and practice in Amsterdam's Eastern Docklands[J]. European Planning Studies，2005.

［22］张杰，刘岩，霍晓卫. "织补城市"思想引导下的株洲旧城更新[J]. 城市规划，2009(1)：51-56.

［23］张杰，张弓，胡建新，等. 开放街区模式的传统与创新[J]. 时代建筑，2022(1)：14-19.

［24］臧佳明，郑波，孙晖. 基于"嵌入"与"织补"策略的城市更新规划设计——以石家庄老火车站地区更新改造为例[J]. 华中建筑，2010，28(6)：72-76.

［25］王露媛，邓奕，刘佳燕，等. 织补视角下的泉州古城完整社区重构研究[J]. 城市发展研究，2023，30(7)：106-115.

［26］庄宇，吴景炜. 高密度城市公共活动中心多层步行系统更新研究[J]. 西部人居环境学刊，2017，32(4).

［27］何文斌. 城市高密度环境下的公共空间建筑设计研究[J]. 城市建设理论研究（电子版），2024(28)：73-75.

［28］史北祥，杨俊宴. 城市中心区混合用地概念辨析及空间演替——以南京新街口中心区为例[J]. 城市规划，2019，43(1)：89-99.

［29］王暄晴，史北祥. 混合与活力：南京中心区街区用地混合发展的评价与优化[J]. 规划师，2025，41(3)：92-101.

［30］严湘琦，张建新，李煦. 从"织补"到"再生"：居住型历史地段的渐进式更新与公共化转向——以湘潭十八总为例[J]. 华中建筑，2025，43(12)：120-125.

［31］ Pont M.B., Haupt P.A. Spacematrix: Space, density and urban form[M]. 2023.

［32］ 杨永春，刘沁萍，田洪阵. 中外紧凑城市发展模式比较研究[J]. 城市问题，2011(12).

［33］王辉，杨眉. 高密度城市研究综述与量化指标分析[J]. 山东林业科技，2023，53(4)：116-122.

［34］陈立娴. 紧凑高密度环境下的文化建筑综合体外部公共空间设计策略研究[D]. 华南理工大学，2018.

［35］庄宇，周玲娟. 上海中心城街区形态及其密度指标的量化研究[J]. 同济大学学报（自然科学版），2019，47(8)：1090-1099.

［36］陈威. 高密度城市设计中的健康策略及重要研究问题[J]. 西部人居环境学刊，2018(4)：60-66.

［37］张灵珠，晴安蓝．三维空间网络分析在高密度城市中心区步行系统中的应用——以香港中环地区为例[J]．国际城市规划，2019，34(1)：46-53．

［38］杨睿琪．高密度城市环境下社区图书馆设计研究[D]．华南理工大学，2022．

［39］王建国．城市设计[M]．4 版．东南大学出版社，2023．

［40］严迅奇,庄元莉．联系的美学[J]．世界建筑，1997(3)．

［41］张为平．隐形逻辑:香港,亚洲式拥挤文化的典型:Hong Kong, as Asian culture of congestion[M]．东南大学出版社，2009．

［42］Koolhaas R. Delirious new york: A retroactive manifesto for manhattan[M]. The Monacelli Press, LLC, 2014.

［43］吴屹豪，刘阳．紧凑高密度环境下的城市形态研究进展——源流演进、主流范畴与应对策略[J]．新建筑，2023(5)：139-145．

［44］蔡云楠，温钊鹏，雷明洋．高密度城市绿色开敞空间的建设误区和优化策略[J]．中国园林，2016，32(12)：76-80．

［45］陈心盈．高密度城市街区绿地节能减碳评估及设计优化策略研究——以广州市为例[D]．华南理工大学，［2024］.

［46］张圆，康健，金虹．高密度城市公共开放空间的恢复性效益研究——以沈阳市为例[J]．建筑学报，2015(S1)．

［47］徐磊青．恢复性环境、健康和绿色城市主义[J]．南方建筑，2016(3)：101-107．

［48］王云才，刘悦，王育辉．全球高密度城市三大关键生态问题及其应对策略的研究进展[J]．园林，2025，42(6)：4-13, 73．

［49］王子豪，张春阳．高密度建成环境与公共健康的关联研究综述[J]．南方建筑，2023(6)：21-31．

［50］廖开怀，蔡云楠．重塑街区道路公共性——巴塞罗那“大街区”规划的理念、实践和启示[J]．国际城市规划，2018，33(3)：98-104．

［51］张杰，袁路平．巴塞罗那扩展区多层高密度街坊的发展与启示[J]．国外城市规划，2004(4)：51-55．

［52］赵之枫，张玺，惠晓曦．公共空间的复兴——巴塞罗那城市扩展街区改造解读[J]．建筑技艺，2013(1)：226-231．

［53］朱跃华，姚亦锋，周章．巴塞罗那公共空间改造及对我国的启示[J]．现代城市研究，2006(4)：4-8．

［54］凌晓红．紧凑城市:香港高密度城市空间发展策略解析[J]．规划师，2014，30(12)：100-105．

［55］郭巍，侯晓蕾．高密度城市中心区的步行体系策略——以香港中环地区为例[J]．中国园林，2011，27(8)．

［56］Zhang L.，Chiaradia A.．Three-dimensional Spatial Network Analysis and Its Application in a High Density City Area, Central Hong Kong[J]．Urban Planning International，2019，34(1)：46-53．

［57］刘剑刚．城市活力之源——香港街道初探[J]．规划师，2010，26(7)．

［58］孙志敏，叶遥，宋天奇．意大利都灵多拉公园保护更新实践[A]．土木工程新材料、新技术及其工程应用交流会论文集（下册）[C]．2019．

［59］傅倩 1，牧骑 2．工业遗产助推城市转型发展——都灵的经验及启示[A]．2018 中国城市规划年会[C]．2018．

［60]张倩,冯志敏.基于城市再生的工业遗址空间再生策略研究——以都灵工业遗址公园为例[J].大众文艺，2021(5)：96-98．

［61］王寒妮．多拉公园,都灵,意大利[J]．世界建筑，2013(5)：48-57．

［62］张靖伟，乔楠，时陈．基于织补理论的城市旧区更新策略研究——以徐州市奎东村为例[J]．城市建筑空间，2023，30(10)：66-68．

［63］付磊．城市更新中的空间织补与保留——上海田子坊的空间形态与场所特质研究[J]．福建建筑，2011(5)：16-19．

［64］毛华松，王静，程语，等．织补理论下的近代城市历史地段保护策略研究——以重庆北碚老城区为例[J]．中国名城，2023，37(4)：78-87．

［65］翟强．城市街区混合功能开发规划研究[D]．华中科技大学，2010．

［66］赵柏洪．密度构成策略下的城市空间形态[D]．同济大学，2007．

［67］邓颖敏，段川．深圳盐田区混合性居住街区更新探索[J]．规划师，2006(6)：22-24．

［68］Lu J.．Transforming urban industrial space and cultural memory in China’s medium-small industrial cities, a case study of pingdingshan city[D]．Politecnico di Torino，2025．

［69］周霞．广州城市形态演进[M]．中国建筑工业出版社，2005．

［70］谢守红，宁越敏．城市化与郊区化：转型期都市空间变化的引擎——对广州的实证分析[J]．城市规划，2003(11)：24-29．

［71］戴方舟．广州琶洲-员村滨江工业旧址更新优化策略研究[D]．华南理工大学，2023．

［72］Morris A.E.J. History of urban form: Before the industrial revolutions[M]. Longman Scientific & Technical, 1994.

［73］Lynch K.．The image of the city[M]．33. print．Cambridge, Mass.：M.I.T. Press，2008．

［74］Trancik R. Finding lost space: Theories of urban design[M]. John Wiley & Sons, 1991.

［75］Ashihara Y. Exterior design in architecture[M]. Revised ed. New York: Van Nostrand Reinhold, 1981.

［76］赵勇伟. 缩微化策略——一种高密度发展背景下的城市设计策略初探[J]. 华中建筑，2008(10)：142-145.

［77］张东辉，陈敏. 城市肌理织补策略于一元片街区保护的应用[J]. 山西建筑，2008(14)：35-36.

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）

致谢

研究生的学习生涯转眼就要结束，三年时间并不很长，但收获的却是值得一辈子回忆的美好体验、和让我终生受用的成长经验。十分不舍，但总要学会告别。

首先衷心感谢我在求学过程中遇到的所有华南理工大学、都灵理工大学的老师们，你们对建筑学、城市设计的热衷和对教学的认真负责在这个时代如此的稀有、珍贵，让我坚信终其一生专注于自己热爱的事或许就是人生的价值和意义；感谢导师组王静、钟冠球、庄少庞、林正豪老师，对我给予的莫大帮助，在我总是迷失方向时给予拨云见日的指点和专业意见，辅导我顺利的完成毕业论文和设计；同时也感谢李春老师，认真负责的指导我们完成出国、毕业的每一步流程，在生活和学习方面热心的提供帮助。

其次，我想感谢我的父母，无条件的给予我支持和信任，尊重我的想法，让我有足够的底气去挑战自我或探索未来；感谢我的男朋友郭永阳、我的小猫 Joa 和椰子，包容我时常情绪低落时的自我封闭、深更半夜工作学习的作息，在我总是无端的陷入负面情绪时把我拉回美好的现实世界。

感谢我的好朋友们，张钰欣、倪嘉恒、袁秀伟、喻琬淇，我遇到过最优秀的挚友。我们一起在国内外渡过了很多美好、痛苦，但都闪闪发光的日子，这些回忆一直在低谷期支撑着我；几年的相处中我不断从你们身上学习新的价值观、思考和行为方式，这让我在认知、成长、遇到困难时，总能站在更多的角度，获得更多彩的世界。也许我们无法回到都灵的 Via Gerolamo Savonarola 3，但未来我永远会在你们需要时提供自己最大的帮助。

最后，谢谢我自己的坚韧，让我获得了人生无限的可能性。

由衷的感谢这段旅程陪伴、支持我成长的各位老师、家人、朋友们，祝愿我们未来万事顺意。

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）

论文选题具有一定价值，研究方法较严谨，论证逻辑清晰研究工作量充分，结论合理。论文撰写认真，基本掌握研究设计方法研究包括以下几点内容：紧扣我国城市发展从增量扩张转向存量更新的时代背景，以广州国际金融城北部片区这一典型的混合街区为研究对象。以高密度城市普遍问题作为调研框架，按照城市-街区的递进视角，系统性的梳理了研究范围的问题；以织补理论为依据，针对性的进行相关设计。

答辩过程中，汇报流畅清楚，对于答辩委员提出的全部问题能详细回应达到建筑学硕士学位论文要求。根据投票结果，答辩委员会一致同意郑泽楠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）		Federico Dell'Anna（邵建明代签）
答辩秘书签名			