Research on the Effectiveness and Strategies of Protection and Utilization of Pantang Wuyue, Guangzhou from the Perspective of Typo-morphology

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摘要

形态类型学作为城市与建筑研究领域的重要理论工具，常被用于帮助理解建成环境的内在规律。然而，在那些地域文化多样、历史积淀深厚的传统村落研究中，形态类型学的应用仍有待进一步深化。泮塘村作为广州历史城区内少有的完整清代格局聚落，面临现代城市扩张与传统风貌保护的矛盾。在 2016 年启动的街区保护再利用实践中，泮塘村对历史文化空间响应有所欠缺。如何通过空间原型激活街区特色基因，并实现可持续更新是文本的主要研究问题。

本研究以形态类型学为基础，探讨泮塘村可持续发展机制，通过分析其空间格局演变与形态成因，结合微改造实践引入保护利用评价，构建评价体系并提出优化策略，推动历史文化创新传承与街区活力持续提升。

首先对泮塘村基本状况及其历史发展脉络进行概述，根据不同历史阶段，梳理泮塘村在关键要素上的形态类型演进特征，分别从街道系统与街道、街廓与地块、公共空间、建筑布局与三维形体几个要素出发。总结其形态演变规律，解释形态类型演进机制；

随后，将形态类型要素融入泮塘村保护利用评价指标，通过专家和民众的满意度分析对泮塘村街区保护再利用进行使用后评价。将两种评价对比分析后给出优化方向，并结合演进规律，得出泮塘村保护再利用的经验总结。接着将分析结果应用于泮塘五约，对其街道系统与街道、街廓与地块、公共空间、建筑布局与三维形体等方面提出优化策略，形成总体设计方案；

最后得出研究总结，本文以泮塘五约为例，构建中国特色城市形态分析框架，并识别街区空间原型和特色基因，提出优化策略应用于实践。在创新层面，本文结合"形态类型学+保护利用评价"形成闭环，精准定位更新需求。为解析中国传统历史文化街区空间原型、平衡历史保护与活化利用做出贡献。

关键词：形态类型学；历史文化街区；广州泮塘五约；更新活化；使用后评价（POE）

Abstract

Typo-morphology is an important theoretical tool in the field of urban and architectural research and is often used to help understand the inherent laws of the built environment. However, in the study of traditional villages with diverse regional cultures and profound historical accumulation, the application of typo-morphology still needs to be further deepened. Pantang Village, as one of the few complete Qing Dynasty settlements in the historical urban area of Guangzhou, faces the contradiction between modern urban expansion and the protection of traditional style. In the block protection and reuse practice launched in 2016, Pantang Village lacks response to historical and cultural space. How to activate the characteristic genes of the block through spatial prototypes and achieve sustainable renewal is the main research question of this article.

Based on typo-morphology, this study explores the sustainable development mechanism of Pantang Village. By analyzing the evolution of its spatial pattern and the causes of its morphology, this study introduces protection and utilization evaluation in combination with micro-transformation practices, builds an evaluation system and proposes optimization strategies to promote the innovation and inheritance of historical and cultural heritage and the continuous improvement of the vitality of the block.

First, the basic situation of Pantang Village and its historical development context are summarized. According to different historical stages, the evolution characteristics of the morphological types of Pantang Village in key elements are sorted out, starting from the elements of street system and street, street and plot, public space, building layout and three-dimensional form. Summarize its morphological evolution law and explain the evolution mechanism of morphological type;

Then, the morphological type elements are integrated into the evaluation indicators of Pantang Village, and the protection and reuse of Pantang Village blocks are evaluated after use through the satisfaction analysis of experts and the public. After comparing and analyzing

the two evaluations, the optimization direction is given, and combined with the evolution law, the experience summary of the protection and reuse of Pantang Village is obtained. Then the analysis results are applied to Pantang Wuyue, and optimization strategies are proposed for its street system and streets, street frames and plots, public spaces, building layout and three-dimensional shapes, forming an overall design plan;

Finally, the research concludes: Taking Pantang Wuyue as an example, this paper constructs a Chinese-style urban morphology analysis framework, identifies the block space prototype and characteristic genes, and proposes optimization strategies for practice. At the innovation level, this paper combines "typo-morphology + protection and utilization evaluation" to form a closed loop and accurately locate the renewal needs. Contribute to the analysis of the spatial prototype of traditional Chinese historical and cultural blocks and the balance of historical protection and revitalization.

Keywords: Typo-morphology; Historical and cultural blocks; Guangzhou Pantang Wuyue; Renewal and revitalization; Post occupancy evaluation

Contents

Chapter 1 Introduction

1.1 Research background

In the new stage of Guangzhou's old city renewal, the Pantang Wuyue project is another micro-renovation attempt after Yongqingfang. These renovation projects have common characteristics, namely, the site has a long history, special geographical conditions, rich building types, many stakeholders, and prominent property rights issues. How to comprehensively consider and solve these problems requires advanced and complete theories as guidance.

After decades of development, typo-morphology has formed a complete theoretical system and research method in the West. Its analysis of European towns based entirely on European culture and geographical background has broken away from the spatial interpretation of simple map reading and paid more attention to the cultural phenomena, economic and human development behind the morphological evolution. This is exactly what Chinese urban space needs to retain under rapid urbanization. In this regard, typo-morphology, which has already been tried in localization, is undoubtedly a good choice.

1.2 Research objects and contents

1.2.1 Pantang Village

Pantang Village is an ancient village located beside Liwan Lake in Liwan District. It is adjacent to Zhongshan 8th Road in the north, connected to Liwan Lake Park in the west and south, and to the square in front of Renwei Temple in the east. Surrounding it are the children's clothing wholesale market on Zhongshan 8th Road, Lizhi river Creek, Antique City, etc., which are close to Zhongshan 8th subway station and Pantang bus station. Pantang is one of the few settlements in Guangzhou's historical urban area that retains the complete pattern, texture and typical simple style of the Qing Dynasty. It basically maintains the original pattern and style of the ancient village. Different from the common clan villages in Guangzhou, the

form of Pantang Village has stronger natural characteristics and the influence of gods and township agreements. According to historical documents, Pantang Village was originally composed of the first two agreements, the third agreement, the fourth agreement, and Wuyue . Now only the third agreement and part of Wuyue remain . Among them, Wuyue , as the core component of the Fengyuan Street-Liwan Lake Park Historical and Cultural Block, has maintained relatively complete spatial continuity in the urban renewal in the past decade.

Between 2010 and 2016, the area experienced multiple cycles of demolition and stagnation, resulting in a large number of dangerous and old buildings that were expropriated but not demolished, leading to the continuous decline of the historical environment. After the implementation of the "Guangzhou Urban Renewal Measures" in 2016, the urban renewal model shifted to a parallel system of "micro-renovation" and comprehensive renovation. Pantang Wuyue was listed as one of the first micro-renovation pilot projects in the city, and the Liwan District Old City Renovation Project Center led the implementation of spatial intervention .

Currently, Pantang Village is still in the dynamic process of participatory community renewal . As a typical example of micro-renovation of historical urban areas, it is urgent to establish a scientific theoretical guidance framework and effectiveness evaluation system, which provides a key research field for exploring the sustainable renewal paradigm of historical and cultural spaces.

1.2.2 Research time and space definition

(1) Time range

The main body of this study is divided into two parts. The first is the study and analysis of the morphological types of Pantang Village in the natural evolution stage since the late Qing Dynasty , that is, from 1900 to 2016. This stage mainly focuses on the evolution characteristics and evolution laws of the morphological and architectural types of Pantang Village, hoping to find the evolution laws of the morphological types of Pantang Village and its surroundings, so as to provide clues and basis for subsequent design and optimization. The

second is to conduct a post occupancy evaluation of Pantang Village after demolition and operation, that is, from 2016 to 2024. This stage mainly conducts a post occupancy evaluation of Pantang Village and its surrounding environment, and obtains the use feedback of the site after protection and utilization. This paper hopes to conduct a more comprehensive and systematic optimization design of Pantang Wuyue through the analysis and evaluation of Pantang Village and its surrounding environment in two stages.

(2) Spatial scope

This paper takes Pantang Village as the research object. Historically, the village included the first two terms, the third term, the fourth term, and Wuyue. Now only the third term and Wuyue areas remain. Since Pantang Village has been in a water network environment for a long time, and the modern excavation of Liwan Lake has had a significant impact on its development, the study needs to include Liwan Lake Park. Therefore, the spatial scope of this study is determined as: north to Zhongshan Eighth Road, south to Lizhi Creek, west to Huangsha Avenue, and east to Pantang Road-Longjin West Road (including Liwan Lake Park).

However, Pantang Village is large and complex, with distinct historical evolution and current situations within its various neighborhoods. Pantang Wuyue is the most well-preserved area of historical significance and the most representative of its traditional texture. Its spatial structure, architectural types, and social activities epitomize the quintessential characteristics of Pantang Village as a Lingnan waterside settlement, and most clearly demonstrate the tension between historical heritage preservation and modern development. Therefore, this study selected Pantang Wuyue as the core design target. Through a "seeing the bigger picture from the smaller" approach, this study aims to deeply analyze its morphological evolutionary logic and post-occupancy evaluation feedback, thereby extracting universal design strategies. These Wuyue-based strategies—such as typologically appropriate building renewal, hierarchical governance of street spaces, strengthening cultural anchors, and implicitly integrating infrastructure—are rooted in Pantang Village's shared geographic

foundation, historical layers, and development challenges. These strategies are applicable not only to Wuyue itself but also to Sanyue in Pantang Village and other similar areas, thus providing a systematic solution for the sustainable renewal of the entire village and similar historical districts.

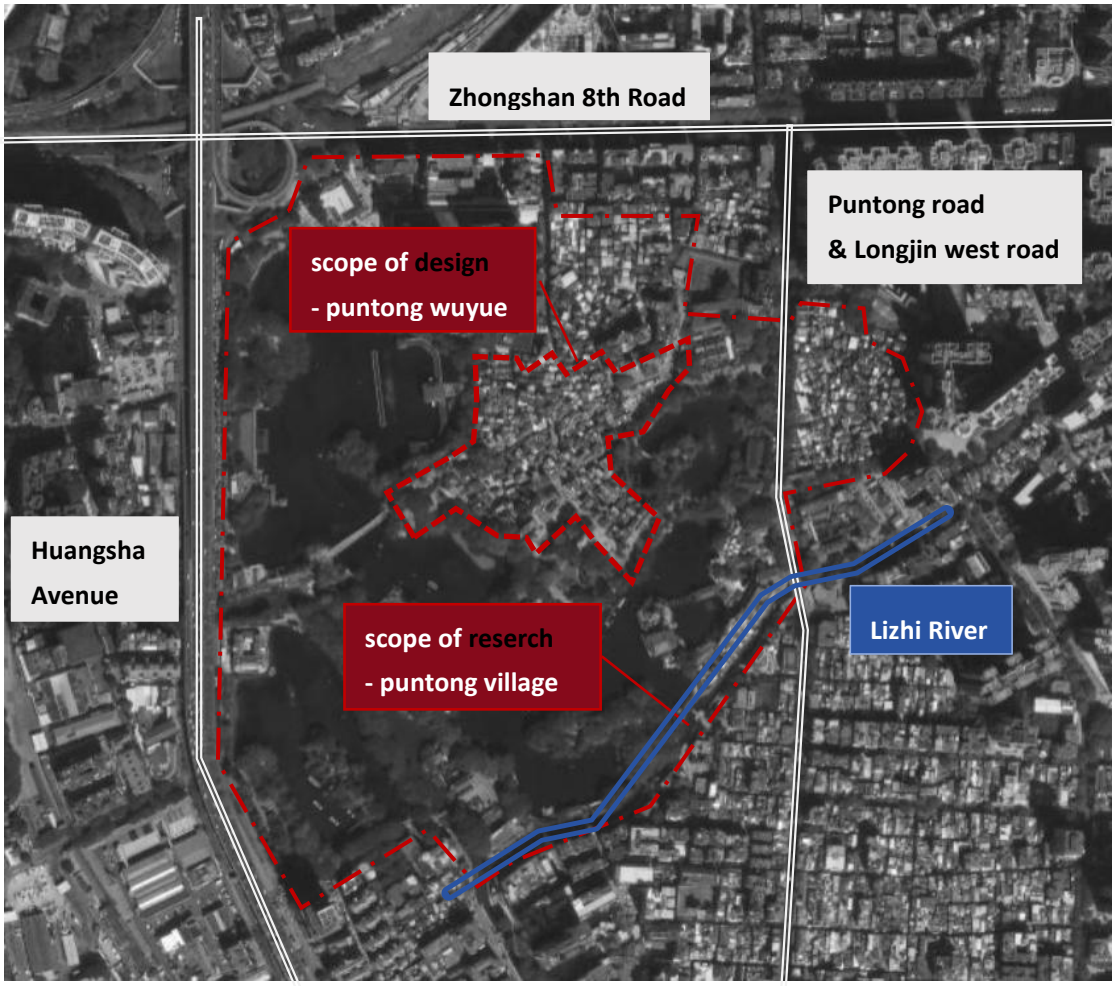


Figure 1.2-1 Study area of Pantang Village

Source: Adapted from Google maps

1.3 Research purpose and significance

1.3.1 Research purpose

This study aims to use the typo-morphology theory to systematically explore the spatial morphological evolution mechanism of Pantang Village in Liwan District, Guangzhou. As a Lingnan water village with profound historical and cultural heritage, the building types, street patterns and spatial forms of Pantang Village carry rich social and cultural values. However, current research on Pantang Village mainly focuses on the sorting out of historical culture and

traditional protection planning, lacking in-depth analysis based on typo-morphology . Therefore, this study hopes to fill this academic gap, reveal the morphological development laws of Pantang Village under the influence of multiple factors such as natural geography, social and economic changes, and cultural heritage evolution, and explain the formation dynamics and internal logic of its spatial form.

On this basis, this study further combines the micro-transformation results of Pantang Village in recent years, adopts the post occupancy evaluation (POE) method, evaluates the transformation effect from the perspective of experts and the public, and combines typo-morphology analysis with block protection and utilization to extract optimization strategies suitable for the current development of Pantang Village. Ultimately, this study hopes to promote the organic integration of traditional spatial forms and modern functions through morphological optimization design, promote the inheritance and innovation of historical culture, enhance the vitality of blocks, and provide a theoretical basis and practical path for the protection and renewal of traditional villages.

1.3.2 Research significance

(1) Theoretical significance

Although the theoretical system of urban morphology and architectural typology in Europe is relatively mature, its research paradigm is mainly based on the urban construction background and academic tradition of developed European countries. When facing regions with completely different cultural backgrounds, its applicability still has certain limitations. This study hopes to expand the cross-cultural application scope of urban morphology through the morphological type analysis of Pantang Wuyue Street in Guangzhou, and provide valuable reference for the comparative study of different urban morphologies around the world.

At the same time, the formation and evolution of cities in China have a unique development logic. Under the current background of rapid urbanization and stock renewal, the external contour and internal structure of urban morphology are undergoing drastic changes, and are deeply influenced by multiple factors such as social economy and cultural heritage.

Therefore, it has become an urgent need to build a morphological research system that conforms to the characteristics of Chinese urban development. This study uses typo-morphology as an analytical framework, but its core contribution lies in combining theoretical research with design practice to explore optimization strategies suitable for local block renewal.

Compared with traditional morphological research, this study not only stops at the description and classification of spatial structure, but also verifies the application value of typo-morphology in stock renewal through design practice, and further explores its combination with modern block optimization strategies. In addition, this study introduces the post occupancy evaluation (POE) method to evaluate the effectiveness of micro-transformation from the perspective of experts and residents, and optimizes the design plan based on feedback to make it more in line with actual needs. This research path based on the combination of morphological analysis, POE feedback and case comparison provides a new methodological exploration for the renewal design of traditional blocks, which helps to improve the scientificity and feasibility of urban renewal and protection practices.

(2) Practical significance

This study combs the spatial morphology of Pantang Village, enriches related morphological analysis research, and constructs a systematic morphological "database" to provide reference for urban renewal. Typo-morphology is not only highly descriptive, but can also refine the material spatial structure characteristics through comprehensive analysis, thereby forming a "prescription" that can guide practice and provide a scientific basis for planning and design.

On this basis, this study takes Guangzhou Pantang Wuyue Street as the core, focuses on exploring the optimization design strategy that adapts to contemporary needs, and proposes an operational solution. As a typical traditional block in Lingnan Water Village, Pantang Village carries a profound historical culture, but in the process of modernization, there is a contradiction between its spatial form and people's needs. Therefore, this study aims to

achieve the organic integration of traditional form and modern function through optimizing design strategies on the basis of respecting the original morphological characteristics, enhancing the vitality of the block, and promoting cultural inheritance and innovation.

This study not only focuses on the evolution of morphological types, but also emphasizes the proposed targeted optimization strategies from the design perspective. Through systematic analysis of the micro-transformation practices of Pantang Village and domestic and foreign cases, this study extracts the spatial optimization principles applicable to Wuyue Street, and carries out specific designs around key aspects such as street system and street , block and plot , public space, building layout and three-dimensional space. Ultimately, the research results can not only directly guide the protection and development of Pantang Village, but also provide reference for the renewal and transformation of similar traditional blocks.

1.4 Research theory overview

1.4.1 Overview of typo-morphology research

Since the 1980s, scholars at home and abroad have realized that although there are differences between the two research traditions of British and German morphogenesis and Italian and French design typology, they can be integrated into a new research framework. This new research framework is called " typo-morphology " [9]. Typo-morphology regards urban form as the product of various construction processes in the city and identifies the type characteristics of various morphological structures. The identification process requires understanding the process of morphological type generation, as well as the differences and connections between different morphological types. Because these characteristics are the material projections of various social, economic, folk cultural factors and periodic laws in the historical process.

The followers of the Conzen School of Urban Morphology and the Muller-Caniggia School of Architectural Typology realized very early that although their research methods were different, there were many aspects of coordination and unity. They realized that after the integration and development of these two research theories, they could form a very

operational analysis and practice tool. The term " typo-morphology " has gradually been used exclusively for the research methods and frameworks formed by these discussions and practices [12].

In recent decades, the West has explored typo-morphology in three main aspects: theoretical construction, case studies and planning practice. The 1980s and 1990s were the stage of theoretical formation. Mu Dong actively explored the research framework and basic concepts of typo-morphology , its advantages in understanding urban town morphology, and its positive role in urban planning and design and urban landscape management [1]. Since the 1990s, Kolov and Samuels have tried to apply typo-morphology to planning and management practices. Since the beginning of the 21st century, the theory has entered a comprehensive development stage. The research of scholars such as Samuels, Chen Fei, and Tian Yinsheng all involves theoretical construction, case studies and practical applications [13]. One phenomenon worth noting in this development stage is that the contribution of Chinese scholars is quite important, which also shows from the side that China's urban morphology issues are prominent and have attracted great global attention.

The most important scholars who have studied “typo-morphology” in the English-speaking world include Mudon, Samuel (Ivor Samuel and Karl Kropf [6] [5]. Mu Dong’s contribution is mainly to sort out the research methods of various schools of typo-morphology , and actively explore the use of morphological and typological research results on traditional urban built space to support urban design work and “New Urbanism”. Samuel's contribution is to bridge theoretical research and planning practice. He discussed in depth how the results of morphological analysis of the formation and evolution of urban landscapes can form effective urban landscape management tools. Gervais- les- Bains, Samuel explored how the typo-morphology analysis method can be applied to various planning and management levels to shape a town landscape that adapts to the local area. Kerof is an urban morphologist who focuses on construction practice. He analyzed and compared the research on architectural form by Conzen and Caniggia, and derived some basic knowledge of architectural form. He also further combined the research on architectural form

and the "Town Plan Analysis Method" Plan Analysis) to form a typologically oriented planning guideline. Zoning, and applied to the land use unit (Pland' Occupation des Sols, POS) division.

Looking back at the practice of typo-morphology in urban planning, the Mennecy region in France is the most comprehensive. Zoning) Completed land unit (POS:Pland' Occupation des Sols) division and its unit management details.

The final land unit is similar to the "morphological unit"; the management details are illustrated in the form of diagrams to illustrate the plot shape control, building coverage plot characteristics, and optional building forms for different land units. Obviously, this morphologically oriented planning method is the practical application of typo-morphology research. From this case, it can be seen that typo-morphology research has three application potentials for urban planning: first, to recognize the traces left by various historical processes in the built landscape; second, the demarcated spatial units can provide a spatial carrier for the implementation of urban morphological management; third, by analyzing the internal structural characteristics of the generation process of various morphological types and the analysis of the laws of historical evolution, a complete set of house construction guidance "index" can be provided for urban planning .

As early as the late 1980s, Chinese scholars actively introduced the theories of morphology and typology. Wu Jin was the first to introduce the British and German morphogenesis research tradition. Later, scholars such as Gu Kai, Duan Jin and Song Feng also actively introduced various research frameworks and theories of urban morphology. Shen Kening was the first to introduce Rossi's (A. Rossi) architectural typology theory into China. Driven by his research, Muletoni and Caniggia's typological research thinking gradually became familiar to domestic scholars. In the comprehensive development stage of typo-morphology theory, Chinese scholars also played a pivotal role.

Micro-historical human geography research on blocks started late in China, but has developed rapidly. It mainly draws on the urban morphology theory that originated from German and British human geography. In 2001 , Chinese scholar Gu Kai first introduced the

theory of urban morphology (also known as the Conzen theory) to China. After that, he cooperated with contemporary urban morphology scholars, Professor Whitehand.J.WR. of the University of Birmingham, UK, Professor Tian Yinsheng of South China University of Technology, and Professor Song Feng of Peking University, and established morphology research groups in Guangzhou and Beijing respectively. They have successively carried out joint research on Chinese urban morphology in Guangzhou, Beijing, Pingyao, Shanghai and other places.

In recent years, important domestic works on this type of research include: Gu Kai's "Theory and Method of Urban Morphology: Exploring a Comprehensive and Rational Research Framework" [24], and Whitehand.J.WR, Gu Kai's "Urban Morphology: Theory and Method of Urban Morphology: Exploring a Comprehensive Conservation in China: Historical Development, Current Practice and Morphological Approach》[11], WhitehandJ.WR, Gu Kai et al. "Urban Morphology and Conservation in China" [13], Tian Yinsheng, Gu Kai, Tao Wei "Urban Morphology Research and Urban Historic Preservation Planning" [47], Whitehand.J.WR, Song Feng et al. "Urban Morphology Regionalization and Town Historical Landscape" [33], Liang Jiang, Jiang Hui "Pattern and Motivation - Morphological Evolution of Chinese Urban Central Areas" [47], etc.

In terms of case studies, the relevant achievements in China are mainly concentrated in cities with well-preserved historical features (such as Pingyao) and relatively detailed data (Beijing, Shanghai, Guangzhou, Suzhou, etc.). Among them, the typo-morphology study of Suzhou's traditional blocks confirmed that in areas with low development pressure, the mutation process of ground plane types and morphological types will be delayed. The comparative study of Pingyao and Como, Italy, verified that the "regionalization" study of morphology can explain the characteristics of urban morphology under different regional cultural backgrounds. Moreover, Caniggia completed the analysis of Como's typology in the 1960s, so this study can become a comparative basis for the common object research of the two theories. The morphological comparison between Shanghai's traditional residential areas and British suburban residential areas uses "morphological cycle" and "typological process"

as the entry point to test how two different research thinking can comprehensively understand the cross-cultural transmission characteristics of morphology.

Based on the above description, we can see that in terms of theory, urban morphology has had a number of relatively rich attempts in the process of localization in China, and has specifically transformed the analysis methods of urban morphology theory in the analysis of old cities and old districts, so that it can make up for the defects of historical map data in the localization process and form a set of theoretical systems suitable for Chinese researchers. However, in terms of practical application, the accumulation of results is relatively lacking and is not enough to form a database for type research.

1.4.2 Overview of Pantang Village research

Pantang Village in China from the perspectives of academic monographs and dissertations . These studies mainly analyze and study Pantang Village from the aspects of historical and cultural block protection and renewal, community participation, space transformation, memory place creation, and architectural cultural heritage .

In terms of the protection and renewal of historical and cultural blocks, there are mainly papers such as "Research on the Preparation Method of Historical and Cultural Block Protection Planning from the Perspective of Urban Historic Landscape (HUL) - Taking Guangzhou Fengyuan Street-Liwan Lake Historical and Cultural Block as an Example" [37] Comparative Study on Micro-Renovation of [14]. "Research on the Preparation Method of Historical and Cultural Block Protection Planning from the Perspective of Urban Historic Landscape (HUL) - Taking Guangzhou Fengyuan Street-Liwan Lake Historical and Cultural Block as an Example" takes the preparation of Fengyuan Street-Liwan Lake Historical and Cultural Block Protection Planning as an example to explore the innovation of the preparation method of historical and cultural block protection planning based on "dynamic stratification", "holistic connection", "authenticity communication" and "capacity building"; " Comparative Study on Micro-Renovation of Yongqingfang Phase I and Pantang Wuyue Block" selects two Guangzhou micro-renovation projects, Yongqingfang Phase I and Pantang Wuyue , and

analyzes them from three aspects: physical space, post-renovation evaluation and implementation process through literature review, field research and other methods, to explore the problems that are prone to occur in micro-renovation practice and the focus points that need to be balanced, providing reference for subsequent micro-renovation projects in Guangzhou.

In terms of community participation, there are papers such as “A Study on the “Translation” Model of Community Participatory Planning Based on Actors: A Case Study of Pantang Wuyue Micro-Renovation in Guangzhou” [43]. Starting from the perspective of actors, this paper draws on the concept of “translation” in actor-network theory, takes the Pantang Wuyue Micro-Renovation in Guangzhou as an example, analyzes the translation process among various actors in the participatory planning process, and proposes an explanatory model for community participatory planning.

In terms of spatial transformation, "Research on Spatial Micro-Transformation Strategies of Lingnan Old City Blocks Based on Climate Adaptability" [32] focuses on the Lingnan Old City blocks, takes climate adaptability as the starting point, and formulates the principles of climate-adaptive spatial micro-transformation through the definition of Lingnan Old City blocks, current situation investigation and analysis, etc., and finally forms a corresponding micro-transformation strategy system to provide reference for the micro-transformation of Lingnan Old City blocks; "Research on Renovation Models and Strategies of Old Communities within Historical and Cultural Blocks" [60] takes the old communities within the historical and cultural blocks as the objects, analyzes their micro-transformation principles and models, and puts forward targeted strategic suggestions based on the current situation. It also explores contents such as flexible menu-based transformation methods.

Regarding the creation of memory places, "Research on the Protection and Renewal of Guangzhou Xiguan Traditional Residential Community Based on Collective Memory" [65] takes Guangzhou Xiguan traditional residential community as the object, constructs the selection principles and content of collective memory, extracts specific memory elements and analyzes and explains them, and then proposes corresponding protection and renewal

strategies. It also interprets the Pantang project to assist related research; "Research on Urban Memory in the Protection and Renewal of the Historical Environment of Guangzhou Xiguan" [52] first explains the basic concepts of urban memory, and then summarizes the basic principles and strategies for constructing urban memory through existing relevant case studies, and provides guidance and suggestions based on the situation of Guangzhou Xiguan.

In terms of architectural cultural heritage, the “Study on the Cultural Heritage of Newly Built Buildings in Urban Historical Environments” [35] takes newly built buildings in urban historical environments as research objects, traces back the development process of urban historical environment protection and renewal, analyzes the form and difficulties of built cases, sorts out relevant construction basis, and constructs a new architectural cultural heritage strategy from the macro, meso and micro scales and verifies its rationality.

The research results listed above all have different perspectives: such as history, historical geography, human geography, architectural design, urban planning, etc. By combing through these research results, it can be seen that the current status of research on Guangzhou residential areas (taking Pantang Village as an example) has the following characteristics: First, it focuses on multiple dimensions, not only paying attention to the exploration of transformation strategies at the material space level, but also paying attention to the role of soft factors such as culture and community participation in the renewal and development of residential areas; second, it focuses on case studies, mostly through in-depth analysis of specific cases such as Pantang Village, summarizing the experience and problems in practice, to provide support for theory and subsequent practice; third, there is an obvious trend of interdisciplinary research, integrating multidisciplinary knowledge and methods such as urban planning, architecture, sociology, and cultural studies to comprehensively study issues related to residential areas.

At the same time, the author also found that there are some problems in Pantang Village. For example, there is a gap in the field of combining new technology application with residential renewal. There is a relative lack of research on how to better integrate some emerging digital technologies and intelligent technologies into the protection and renewal of

Pantang Village and its subsequent operation and management. There is not enough attention paid to ecological sustainable development. Although there are studies on spatial transformation from the perspective of climate adaptability, more comprehensive ecological sustainable development research such as the construction of the entire Pantang Village ecosystem and resource recycling needs to be improved. In addition, there is a gap in the long-term monitoring and evaluation of social effects after residential renewal. Most of the focus is on the transformation process and the short-term evaluation after the transformation. There is a lack of follow-up research on long-term changes in social relations and the continuous impact on residents' quality of life [14].

1.5 Research methods and framework

1.5.1 typomorphological approach

The typomorphological approach used in this paper The Morphological Approach is a research method that combines the British Conzen urban morphology and the Italian Caniggia architectural typology. These two research methods have many different characteristics and are also highly complementary . [18] Morphology is a historical and geographical analysis method that takes property plots as basic units. It analyzes the evolution process of the morphology from the beginning of its formation, focusing on the conceptual analysis of the internal structure of the elements that constitute the urban morphology, thus forming a "Morphological Unit". Unit/ Landscape Unit) and Morphological Cycle The generation and evolution of forms are explained by concepts such as "Period" and "Typology". Typology takes the plane form of buildings as the starting point, and recognizes the composition characteristics of the "site" and "building" of towns from the structural relationship between the "virtual" and "real" of buildings. Among them, the "site" refers to the space not occupied by buildings, such as squares, green spaces, and roads. Through the analysis of these elements, "types" are extracted to shape new forms, thus forming the "typological process" and "urban texture". The two methods are dialectically unified. Therefore, when interpreting the structural relationship of the urban material space composition process, the morphological

concept system can be used to identify the structural form between the constituent elements, and the relationship between the constituent elements can be examined with the typological evolution concept, so as to determine the direct relationship between different morphological types [19].

The so-called typo-morphology analysis method is to understand the structure and characteristics of the form (physical properties) with the analytical and conceptual cognitive framework of urban morphology, and to examine the logical relationship between the formation and change of these forms (humanistic properties) with the evolutionary perspective of typology. Therefore, the analysis process must be maintained within the four-dimensional scope composed of three-dimensional space and time dimensions.

The selection of elements for this study will refer to the research elements in the typo-morphology research framework proposed by scholar Chen Fei. The reasons are as follows: First, through the research results published in domestic core journals, it can be seen that the research objects are all located in China, in the same historical background and policy environment as the research objects of this study, and have a long history of urban development. Second, Chen Fei successfully used this research framework to conduct a detailed analysis of the evolution of urban morphology in Nanjing and Suzhou, and provided guidance for the urban design of the two cities, which has the same purpose as this study. Based on this, Chen Fei's research elements have a greater reference significance for this study. Since the research object of this study is a historical block, the research scale is directly defined below the block. Its elements include:

(1) Street system : the street pattern within the built-up area.

(2) Street : The spatial component of the built-up area, defined by the road red line, and used for ground transportation.

(3) Block : The smallest set of urban land enclosed by urban roads. It can be composed of one plot or multiple plots.

(4) plot : property plot, defined by boundaries.

(5) Public space : an open, shared space outside buildings in a built-up area that serves the

city’s public life, other than streets.

(6) Building layout : the layout of multiple buildings within a single property plot.

(7) Three-dimensional building form : the plan and elevation forms of a single building, taking into account the number of floors, appearance, and material characteristics.

Elements	Type			Typological Process			Design Guide
	Phase 1	Phase 2	Phase 3	Phase 1	Phase 2	Phase 3	
elements1	typeA	typeA'	typeA''	→			Continue Type A''
elements2	typeA	typeD	typeF	II	II	II	Continue type E in Area B Continue type C'' in Area C
	typeB	typeE	typeE'	II	→		
	typeC	typeC'	typeC''	→			

II means type process interrupt
→ means type process continue

Figure 1.5-1 The typo-morphology analysis framework used by Chen Fei in Chinese Cities
Source: Reference [16]

The specific research methods are as follows:

(1) Literature research method : By collecting, reading and organizing domestic academic papers related to the topic, clarify the concepts, categories and connotations of relevant academic terms such as " typo-morphology ", "micro-transformation" and " Pantang Wuyue ", and summarize and classify these documents, so as to establish the necessary theoretical basis for literature review for the research of the paper.

(2) Observation method : The observation method can be used to study the transformation results of Pantang Wuyue and the lives of residents. When recording the transformation results, record specific scenes through photos and videos; when recording the lives of residents, do not intervene in their lives, observe their living conditions in the transformed environment, and also record specific scenes through photos and videos.

(3) Survey research method : Questionnaires are distributed in the form of questionnaire surveys combined with field research interviews. By making appropriate questionnaire questions, users including residents, businesses, and tourists are asked to make satisfaction evaluations on the problems encountered during the micro-renovation process and the effects after the renovation. Therefore, this article will conduct a survey and research on stakeholders mainly through interviews and supplemented by questionnaire surveys to understand the views of the government, enterprises, Pantang residents, and the media on this micro-renovation, and record the impact on residents and the problems they most hope to improve.

1.5.2 Adjustment of the analytical method for this study

(1) Problems faced in the study of typo-morphology of Pantang Village

1) Lack of drawings and documentation

Typo-morphology research is usually based on maps and documents from different periods. After the Renaissance, with the enhancement of scientific concepts, the invention of perspective painting and the emergence of new measuring tools, the level of urban map drawing in European countries has been greatly improved. In some countries, such as the United Kingdom, "systematic and comprehensive map surveying and mapping work has been started since the 19th century, and the surveying and mapping results have been continuously updated. At the same time, the surveying and mapping accuracy of buildings, streets, and plots has been achieved, providing complete historical and geographical information for related urban research." For various reasons, the drawings and documents of Chinese cities are not as complete and detailed as those preserved in European cities. This is the first problem faced in drawing typological maps. As a city with a relatively fast urbanization process in modern times, Guangzhou has lost the original planning drawings and construction archives of many historical blocks due to wars, poor management or low degree of digitization.

2) Changes in property rights

The land reform after 1949, the housing commercialization policy in the 1990s, and the "three old renovations" in recent years have led to multiple reorganizations of the property rights structure of historical blocks. For example, buildings such as Sanguan Temple and Dunben Hall have undergone changes in private, public, and mixed property rights, making it difficult to conduct a coherent analysis of the correlation between building function and form .

3) Differences in construction systems

Guangzhou's historic blocks are a fusion of Chinese and Western Qilous, traditional bamboo houses, modern industrial plants and other types, with significant differences in their structural systems (wooden, brick-concrete, reinforced concrete) and spatial patterns (front

shop and back house, vertical partitions). The study shows that the "cold alley" ventilation system of traditional Lingnan architecture in the Enning Road block and the Qilou layout of colonial architecture are difficult to analyze using the same typological framework.

(2) Adjustment of the research framework of this paper

The typomorphological approach in 1.5.1 above is based on some specific backgrounds in China and abroad. It has certain universality and theoretical guidance. It provides a systematic framework and ideas for the study of urban morphology, covering the common characteristics and laws of urban development in different regions and cultural backgrounds. However, Pantang Village in Guangzhou has a unique cultural heritage, a specific historical process, and its own unique historical data for research and analysis. These factors are significantly different from the general context on which the typomorphological approach is based. Therefore, in order to ensure the accuracy, pertinence and effectiveness of the research, it is necessary to make corresponding adjustments.

The adjustment work mainly starts from the following three key aspects: First, the historical data available for morphological type analysis in Guangzhou. Compared with other regions, the historical data sources of Pantang Village in Guangzhou are unique. On the one hand, the historical data are recorded in various forms, including but not limited to local chronicles (Liwan District Chronicles), family genealogies, travel notes and poems of literati, and oral histories of villagers. These materials reflect the development context and morphological characteristics of Pantang Village in different historical periods from different angles, but there are also problems such as information fragmentation and accuracy to be verified. For example, the Liwan District Chronicles may record the overall layout and important buildings of Pantang Village and its surrounding environment, but the details may not be detailed enough; and although the oral history vividly conveys some cultural and life scenes, it is interspersed with vague fragments of memory. On the other hand, the historical data of Pantang Village have certain discontinuities in the time series. The data of some key historical stages may be missing due to war, natural disasters or other reasons. This requires

us to treat these data more cautiously when using the typomorphological approach, fill the gaps in the data through cross-validation of multi-source information and reasonable inference, and thus construct a relatively complete and accurate historical morphological evolution path.

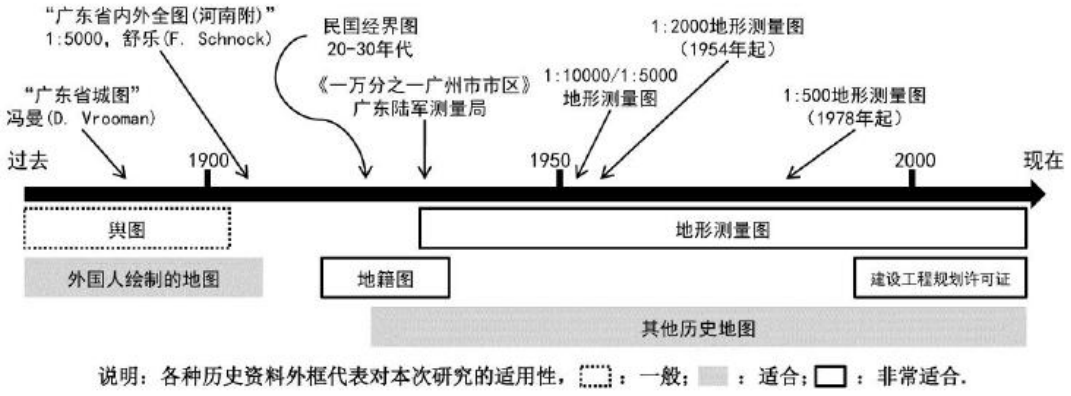


Figure 1.5-2 Historical data of Guangzhou

Source: Reference [18]

（Note：This map mainly shows that the cadastral maps and topographic survey maps that appeared in Guangzhou after 1930 are very suitable for this study.）

Secondly, the spatial scale of Pantang Village is available for research. In the research elements of the typomorphological approach, the hierarchical nature of the research scale is clearly reflected, and the scale presents a progressive relationship from micro to macro, that is, building → plot (construction scope) → block (road system) → block (unit, spatial module) → city → region [21]. The object of this study is Pantang Village in Guangzhou. Based on its unique geographical scope and research focus, the research scale is directly defined as below the "block". From the architectural level, the traditional architecture of Pantang Village has distinct Lingnan characteristics, such as wok-ear houses and sliding doors. These buildings are not only unique in appearance, but also contain rich historical and cultural information in their internal spatial layout, structural construction, and the selection of building materials. They are key elements for studying morphological types at the micro scale. At the plot level, the land division and use of Pantang Village have been influenced by various factors such as clan, agricultural production, and commercial activities in history, showing irregular and organic morphological characteristics. Studying the evolution of the plot helps to understand the development model of the village and the formation of functional zoning. At the block

level, the street pattern of Pantang Village is intricate but orderly. The streets of varying widths echo the surrounding buildings, forming a unique ventilation, lighting and transportation system. It is also an important place for villagers' social and cultural activities. The study of blocks can deeply explore the spatial logic and humanistic connotation of the village. Through in-depth analysis of these micro- and meso-scale elements, we can more accurately grasp the morphological characteristics of Pantang Village and its inherent evolution mechanism without over-expanding the research scope to the urban or regional scale, avoiding the generalization and lack of pertinence of the research due to the large scope.

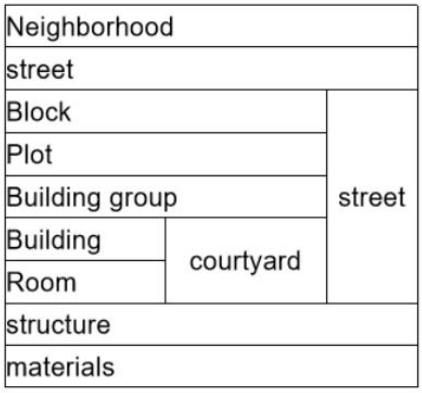


Figure 1.5-3 Hierarchical structure system of historical blocks
Source: Adapted from reference [30]

Finally, the focus is on the key aspects. Due to its special historical and cultural background and development status, the focus of Pantang Village in the research process is different from that of general urban morphology research. Cultural inheritance and change is one of the important focuses. As one of the important carriers of Lingnan culture, how the architectural style, folk customs, traditional skills and other cultural elements of Pantang Village are inherited and evolved in the historical evolution process, as well as the interaction between these cultural elements and the village form, all need to be explored in depth. For example, how are the traditional festivals of Pantang Village held in specific spatial places, and how these activities in turn affect the spatial form of the village and the layout of public facilities. In addition, community vitality and the quality of life of residents are also one of the focuses. In the process of urban renewal and modernization, whether the community vitality

of Pantang Village has been effectively maintained and improved, and whether the quality of life of residents has been improved in terms of social interaction, cultural experience, etc., while the material space has been improved, has it also received corresponding attention and satisfaction? These issues need to be thought about and answered from the perspective of morphological type analysis, so as to better balance the relationship between historical and cultural protection and modern life needs in the research process, and provide scientific and reasonable suggestions and strategies for the sustainable development of Pantang Village.

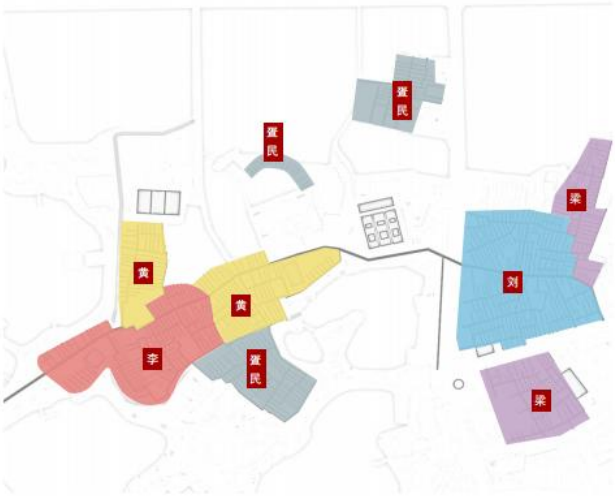


Figure 1.5-4 Clan distribution map of Pantang Village

Source: Xiangcheng Architecture

（Note: This picture shows the Li, Huang, Liu, Liang and Dan clans in Pantang Village.）

In summary, through careful and in-depth adjustments to the historical data available for morphological type analysis in Guangzhou, the research spatial scale of Pantang Village, and the focus of attention, we can more accurately use the typomorphological approach to study the unique morphological types and evolution laws of Pantang Village, laying a solid foundation for subsequent research work, thereby achieving a comprehensive, in-depth, systematic and targeted understanding of Pantang Village, and providing strong theoretical support and practical guidance for its protection, development and planning.

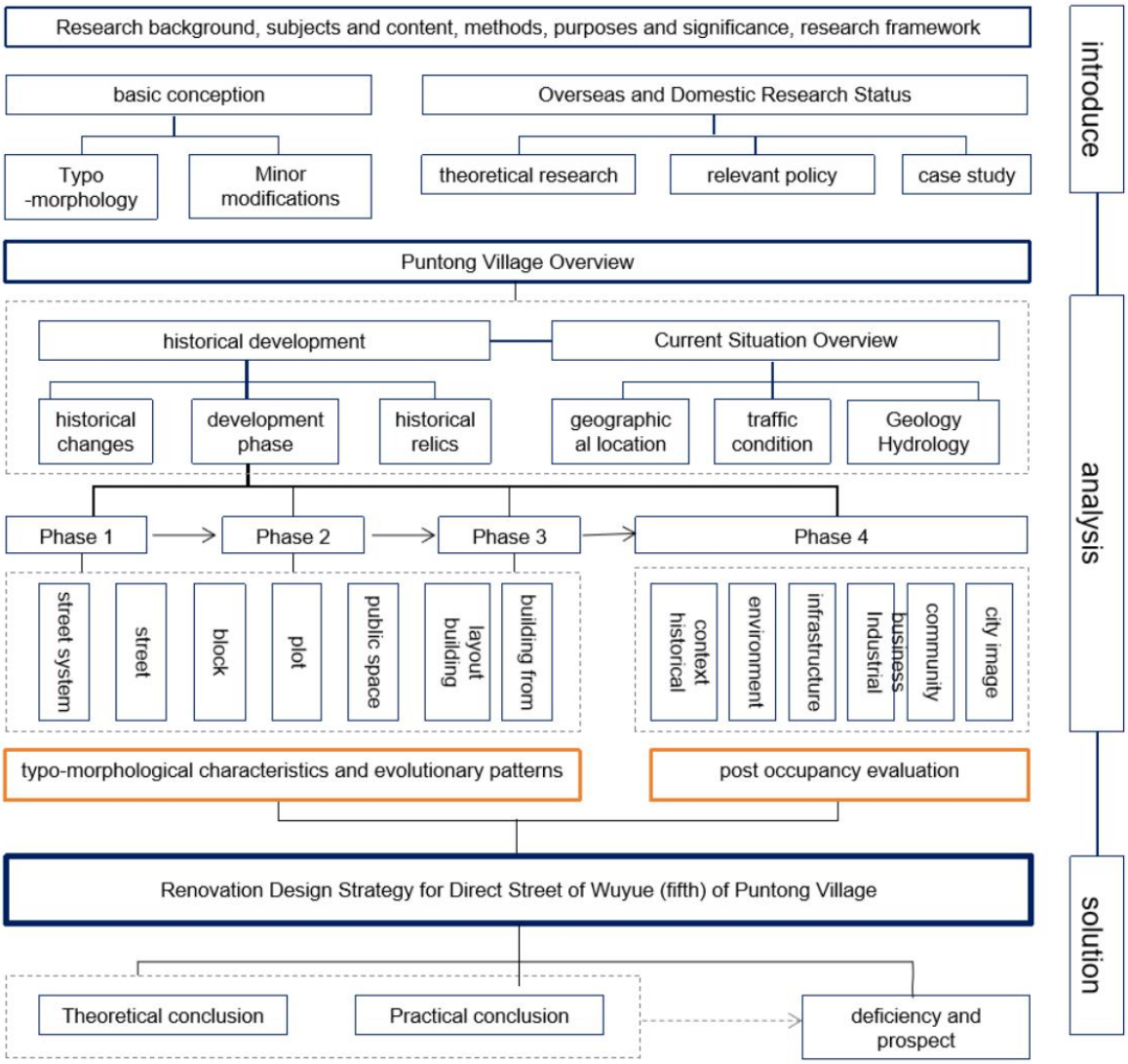


Figure 1.5-5 Research framework

Source: Author's own drawing

1.6 Case analysis

1.6.1 Bologna historic centre planning

（1）Background overview: The dual crisis of the postwar historical center

In the 1960s, the historic center of Bologna faced a dual crisis of material and social structure. The census data from 1951 to 1971 showed that the number of residents in the central area decreased by 29.5%, the population density dropped from 184 people/km² to 129 people/km², the social structure showed an aging and low-income trend, and industrial workers accounted for 26.1%.

The crisis has its roots in the rapid urbanization model of postwar Italy. In the 1960s, Bologna's suburbs expanded through private automobile traffic, while the historic center became a target for real estate speculation due to the lack of operational protection measures in the Gubbio Charter (1960). In 1970, the city government published the document "Preserving an Ancient City for a New Society". Centro Storico clearly pointed out that this contradiction urgently needs to be resolved through "Integrated Protection". Conservation, the core of which is to coordinate physical restoration, social equity and regional development.

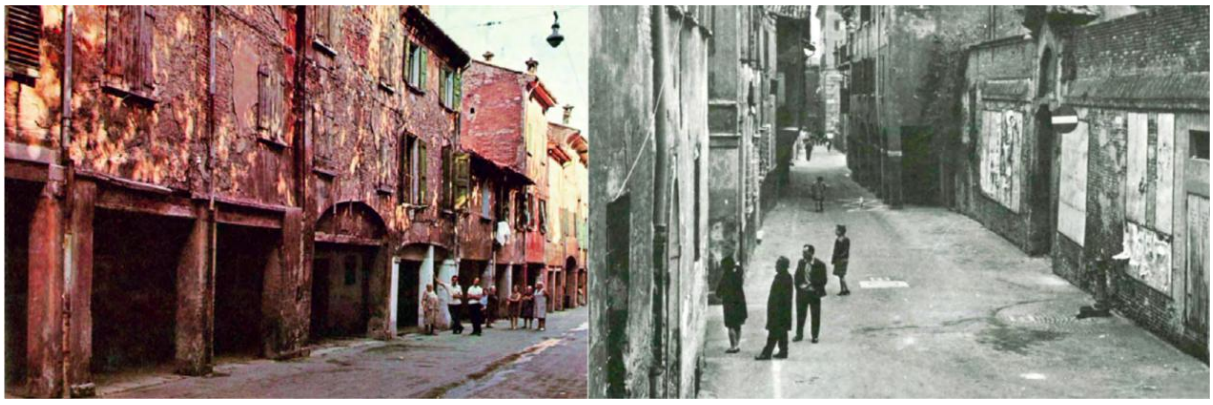


Figure 1.6-1 Physical decay of Bologna's historic centre in the 1960s

Source: Reference [4]

（2）Planning evolution and policy framework: innovation from theory to system

1) 1969 general plan revision (PRG Variante 1969)

Planning team (Leonardo Benevolo) adopted an urban morphological approach to divide the historic center into several "homogeneous areas" and developed differentiated intervention

strategies based on architectural typology. For example, the townhouses from the 14th to 16th centuries were treated with "main body maintenance + functional replacement", while religious buildings such as St. George's Church were transformed into cultural facilities. According to the Urban Construction Law (Ln765/1967), the historic center was designated as Zone A, high-rise development was prohibited, and industrial functions were evacuated to the "Regional Town System Plan" (PIC) nodes of the surrounding 15 municipalities [3].

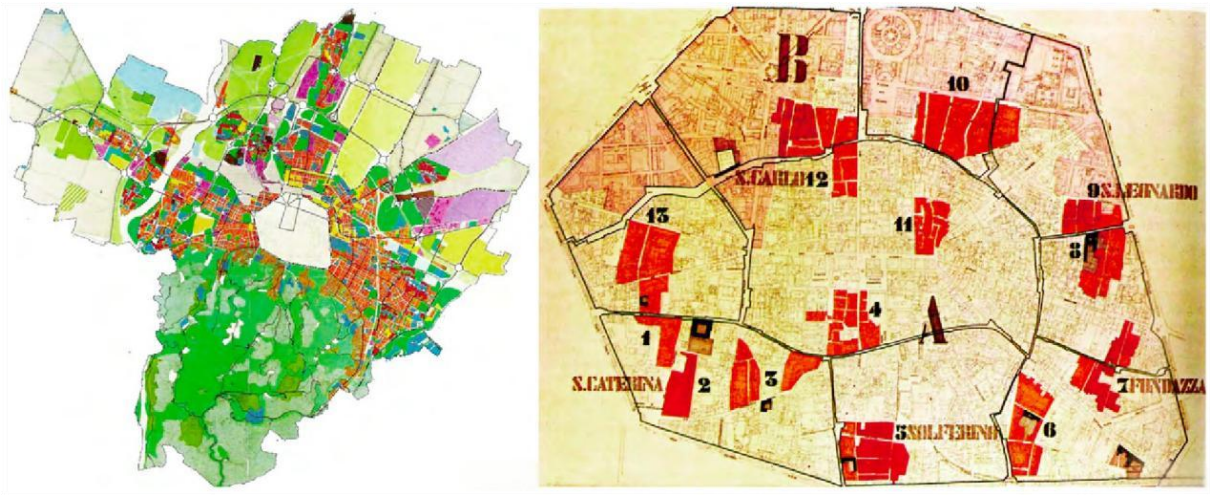


Figure 1.6-2 1969 Bologna general plan revision
Left: Urban land use layout, right: Homogeneous areas within the historical center and 13 people's economic residential blocks
Source: Reference [3]

2) People's economic residential area plan 1973 (PEEP-CS1973)

According to Article 9 of the Public Housing Planning and Coordination Law (Ln865/1971), 13 decayed neighborhoods were selected (Figure 1.6-2 right), of which Solferino and other five neighborhoods were selected as the first batch of pilots (Figure 1.6-3) . The plan proposes four standardized residential units (Figure 1.6-4), such as the 21 ㎡ single elderly apartment (Type A) and the 96 ㎡ 5-person family apartment (Type C) to meet the needs of different social classes. At the same time, the " Tripartite Agreement" was passed - the 1975 municipal government document LaConvenzione peril Risanamento specifies the proportion of burden to be shared by public finance, regional funding and workers' housing management agencies [2].

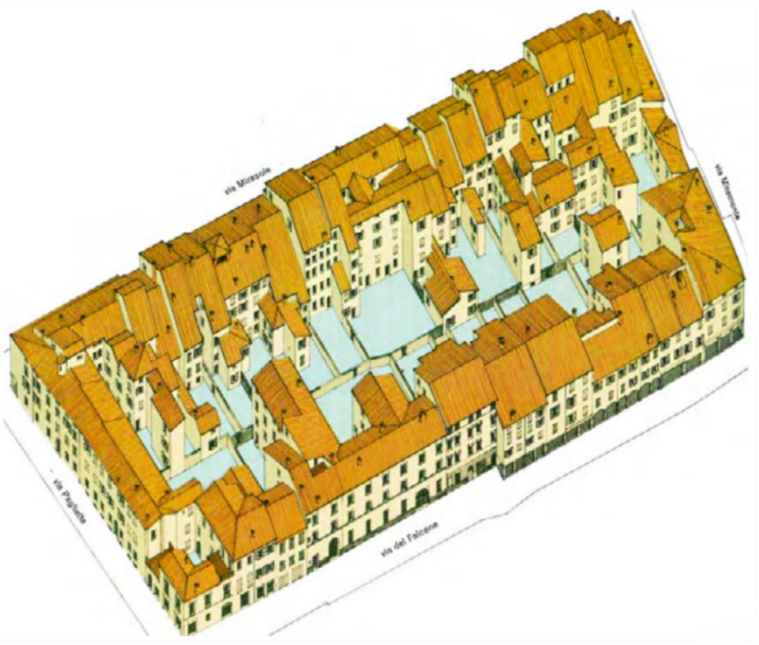


Figure 1.6-3 Model of the Solferino people's economic housing area

Source: Reference [2]

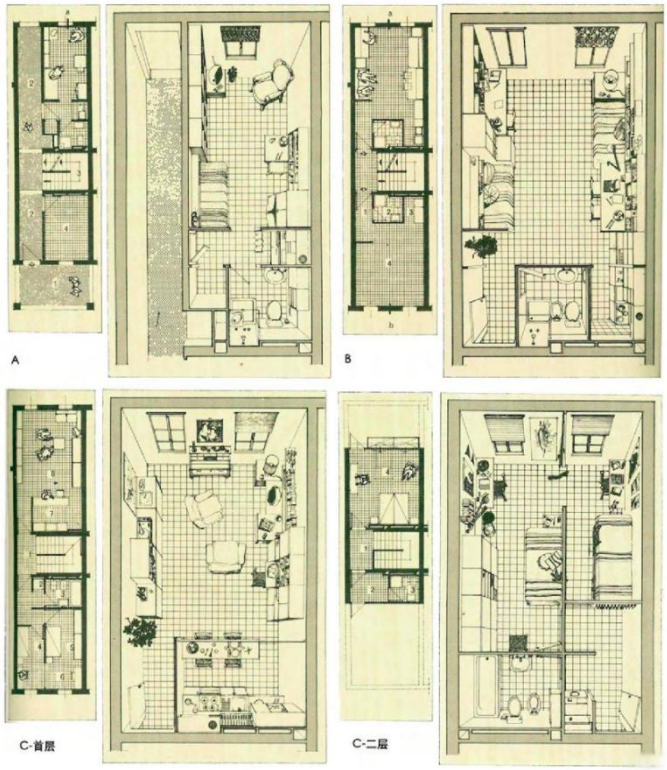


Figure 1.6-4 Residential units in the Solferino people's economic housing complex

A is a 21m^2 apartment for single elderly people, B is a 30-33m^2 apartment for students and elderly people, and C is a 96m^2 apartment for 4-5 people.

Source: Reference [2]

（3）Implementation method: balance between public intervention and social participation

1) Property rights integration and agreement governance

In 1975, the special hearing committee passed two agreements that were legally binding: Agreement 1 (government-public institution): stipulates that the renovated houses must be rented out at 30% of the market rent, with a minimum lease term of 15 years ; Agreement 2 (government-property owner): private homeowners can retain their property rights, but must accept the government's right of first refusal and allow their houses to be included in the public housing system. By 1978, only 40% of private property owners signed the agreement, reflecting a lack of trust in the market.

2) Technical implementation details

In terms of building restoration , the use of "conservative restoration" (Risanamento Conservativo), such as Santa Caterina The facade renovation of the block (Figure 1.6-5) strictly followed the original masonry technology. In terms of environmental improvement , 32,000 square meters of illegal buildings were demolished, 11 new green spaces were added, and motor vehicles were restricted from entering the core area in accordance with the Traffic Control Regulations (1973).

Figure 1.6-5 Santa claus in the 1970s Caterina street facades before and after renovation
Source: Reference [3]

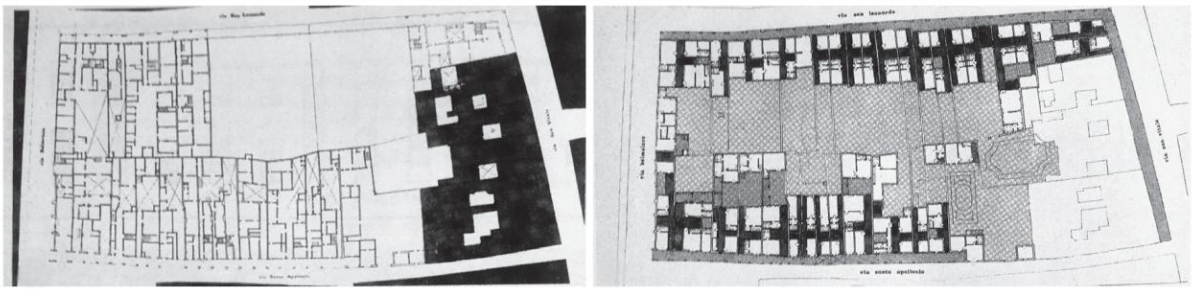


Figure 1.6-6 Comparison of the floor plan of a block in Bologna before and after intervention
Source: Reference [53]

(4) Social participation mechanism

14 “Neighborhood Councils” Quartiere directly participated in the review of the plan. For example, in 1974, the public hearing of the Soferino community rejected the original high-density renovation plan (Cervellatietal, 1977).

(5) Planning achievements and historical impact

Completed the renovation of five blocks, provided 760 public housing units (23,064 m^2), renovated 243 private houses (30,051 m^2), and added 72,406 m2 of public service facilities. The population of the historical center stabilized at around 37,000 (accounting for 14.5% of the total urban population), only 1.5% lower than in 1971, much lower than the decline in Venice during the same period (DeAngelis, 2013). Established the principle of "social protection first": In 1977, Cervellati (Cervellati) in "The New Culture of the City" (La Nuova Cultura Della Città emphasized that "the protection of stone must be based on the protection of people". He promoted the reform of the Italian Housing Law in 1978, extending the scope of application of "Planning for Regulation and Regulation" (PdR) to the entire built-up area of the city. In 1985, the master plan turned to marketization, exposing the sustainability issues of public intervention (Agostini, 2013). Social structure is rigid: According to the 2001 census, the employment rate of the tertiary industry in the historical center was only 41%, lower than the 68% in the new urban area (Giardiello, 2005).

1.6.2 Protection planning of Pingjiang historic district in Suzhou sncient city

As one of the first national historical and cultural cities in China, the protection and renewal of the ancient city of Suzhou has important demonstration significance. As the most

complete and largest historical area in the ancient city of Suzhou, the protection planning and practice of Pingjiang Historic District embodies the innovative application of morphological and typological theories in the protection of Chinese historical urban areas. This case will systematically analyze the application of theories and methods in the protection and renewal of Pingjiang Historic District from the aspects of background overview, planning evolution and policy, specific implementation methods, planning results and impacts.

(1) Background

Pingjiang Historic District is located in the northeast corner of Suzhou Ancient City, with a total area of 116.5 hectares. It is one of the most typical and complete historical and cultural protection areas in Suzhou Ancient City. Its history can be traced back to the Song Dynasty. It still retains the double chessboard pattern of "water and land parallel, river and street adjacent", which is highly consistent with the record of "Pingjiang Map" in the Song Dynasty. There is a world cultural heritage garden, more than 100 provincial and municipal cultural relics and monuments, and 167,000 square meters of historical buildings in the district, which can be called a microcosm of Suzhou Ancient City. In the 1990s, with the acceleration of urbanization, Suzhou Ancient City faced tremendous pressure for modernization. On the one hand, historical buildings fell into disrepair, infrastructure was backward, and living environment deteriorated; on the other hand, blind development led to an increased risk of destruction of historical features. After the successful application of Suzhou Classical Gardens for World Heritage in 1997, the protection of the ancient city became more urgent. As "the dazzling diamond on the cultural treasure of Suzhou", the protection and renewal of Pingjiang Historic District has become a key issue in balancing historical inheritance and modern development.

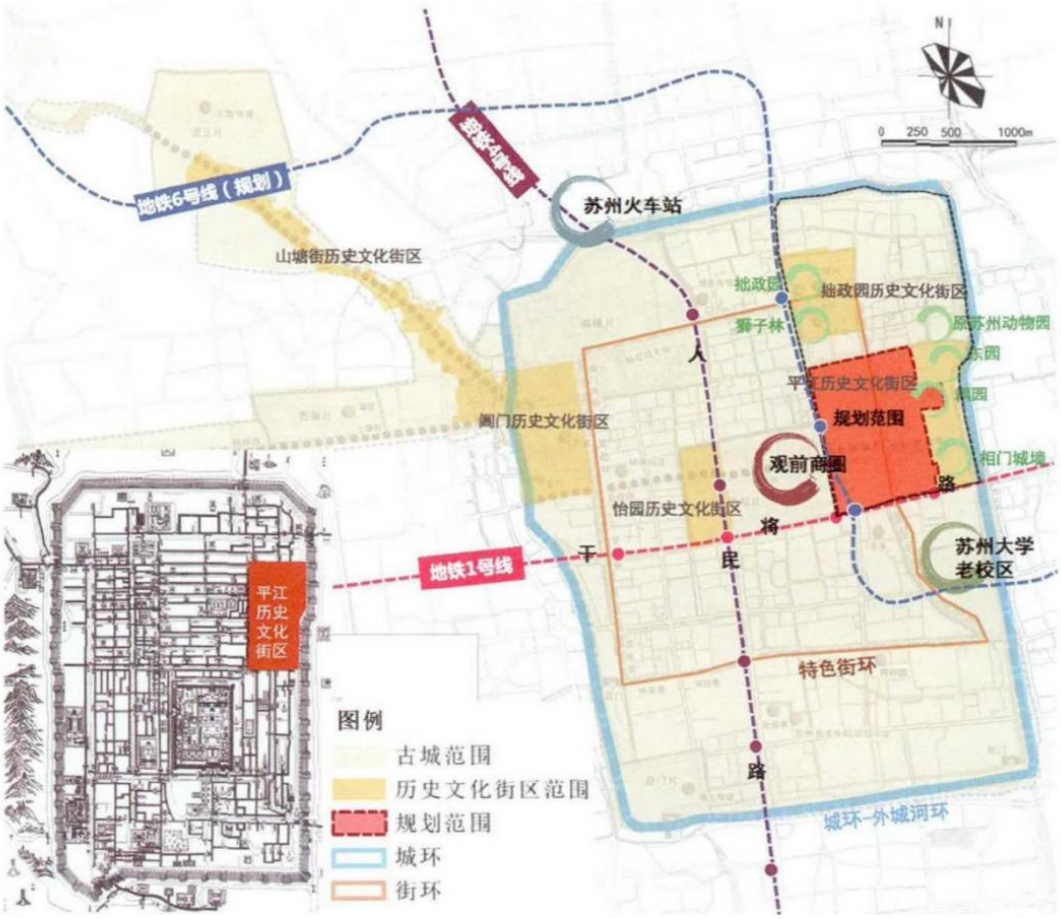


Figure 1.6-7 Location map of Suzhou Pingjiang ancient city

Source: Reference [48]

(Note: This map reflects the positioning of the planning scope in the ancient city)

Jiang Wenbei (1998) and Lin Lin and Ruan Yisan (2006) showed that the protection of Pingjiang Street innovatively introduced urban morphology and architectural typology theories. Morphology regards the city as an organic life form and analyzes the generation and evolution of its spatial structure; typology extracts prototypes from historical buildings and realizes the continuation of tradition through modern translation. These two theories provide methodological support for solving the contradiction between "protection and renewal".

(2) Planning evolution and policy framework

Evolution of policies and guidelines: The protection of Suzhou's ancient city has undergone a systematic process from point to surface. In the 1980s, the sixteen-character policy of "focusing on protection, reasonable preservation, general improvement, and partial transformation" was established, and the ancient city was divided into 54 neighborhoods for

phased implementation. Before 1998, the transformation of three neighborhoods (No. 10, No. 16, and No. 37) had achieved initial results. As a national historical district, the protection of Pingjiang Street (No. 21 and No. 22 Streets) has been elevated to a strategic level.

Influence of international consensus: The Suzhou Declaration adopted by the 1998 "International Conference of Mayors of European Historic Cities in China" clearly stated that historical blocks are the embodiment of the city's cultural identity. This concept has profoundly influenced the protection positioning of Pingjiang blocks. After the promulgation of the "Urban Purple Line Management Measures" in 2003, Pingjiang Planning further clarified the "Urban Purple Line" control system and implemented graded protection for cultural relics, historical buildings, etc.

Innovation in planning system: The 2006 protection plan established a four-in-one framework of "research-preparation-implementation-management": (1) historical and cultural research and current situation survey as the basis; (2) two-way planning route of protection and development; (3) implementation of feedback mechanism to ensure dynamic adjustment of planning; (4) multi-subject collaborative management system. This whole-process planning method breaks through the limitations of traditional blueprint planning. On this basis, the concept of micro-renewal of Pingjiang Historical and Cultural District is proposed.

(3) Specific applications of morphology and typology

1) Spatial analysis of urban morphology

Multiscale morphological analysis:The planning team used morphological theory to systematically analyze the Pingjiang block: Neighborhood scale: Analyzing the double chessboard structure of "river and street parallel, alleys vertical", it was found that the depth of residential houses has a regular scale of 70-110 meters, and the transition space (4.5-7 meters) is larger than the road space (2-4.5 meters). This virtual and real interweaving forms a rich spatial sequence ; Cluster scale: The residential cluster is 55-65 meters wide from east to west (accommodating 4-5 residential buildings) and 70-95 meters deep from north to south (5-7 residential buildings). The layout of "front street and back river" and "front street and

back street" can adapt to different terrains ; Courtyard scale: The residential buildings are linked by patios and alleys. The regular combination of 4-5 residential buildings and 5-7 residential buildings not only maintains privacy, but also promotes neighborhood interactions through "grey space".

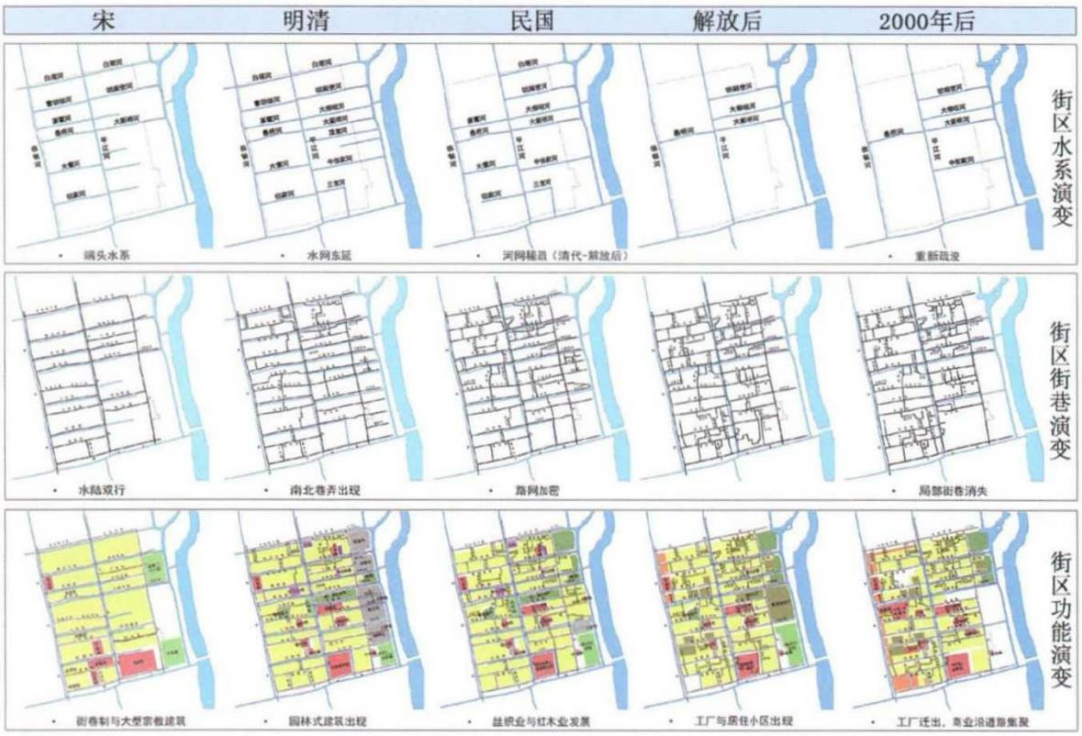


Figure 1.6-8 Evolution of water system, streets and lanes and functions in Pingjiang
Source: Reference [48]

Structural continuation and renewal:The planning respects the original "semi-network structure", retains characteristic traffic elements such as rivers and alleys, and avoids the destruction of the historical spatial texture by modern functional zoning. Through morphological analysis, the principle of "overall protection of the skeleton and local renewal of cells" was established, and adaptive transformation of building units was carried out on the premise of keeping the street pattern unchanged. According to the different combinations of rivers, streets and buildings, the streets and alleys of the ancient city have formed spatial forms such as two streets sandwiched by a river, streets along the river, rivers without streets (two houses sandwiched by a river), and rivers and streets in parallel.

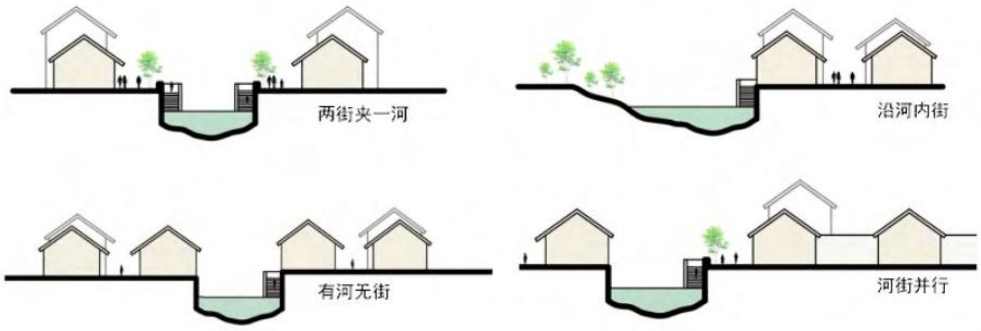


Figure 1.6-9 Schematic diagram of the river and street section in Suzhou ancient city

Source: Reference [49]

2) Updated design of architectural typology

Type extraction and restoration: Based on the typological method, the planning team abstracted the prototypes of Sanheyuan, Bianlong, Qilou, and Shuibu from the historical buildings, and established a type library: basic combination: such as "Sanheyuan + Bianlong + Courtyard = House", "House + Qilou = Street" and other generation rules ; hierarchical relationship: from detailed components (doors, windows, roofs) to building monomers and then to group combinations, a complete type system is formed .

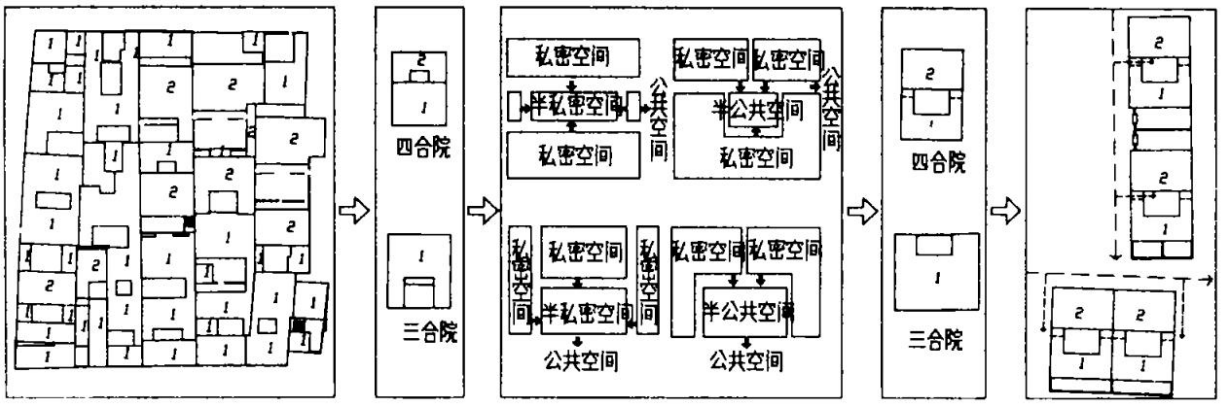


Figure 1.6-10 The formation of the form of Suzhou ancient city

Source: Reference [36]

(Note: This image reflects the changes in private and public spaces.)

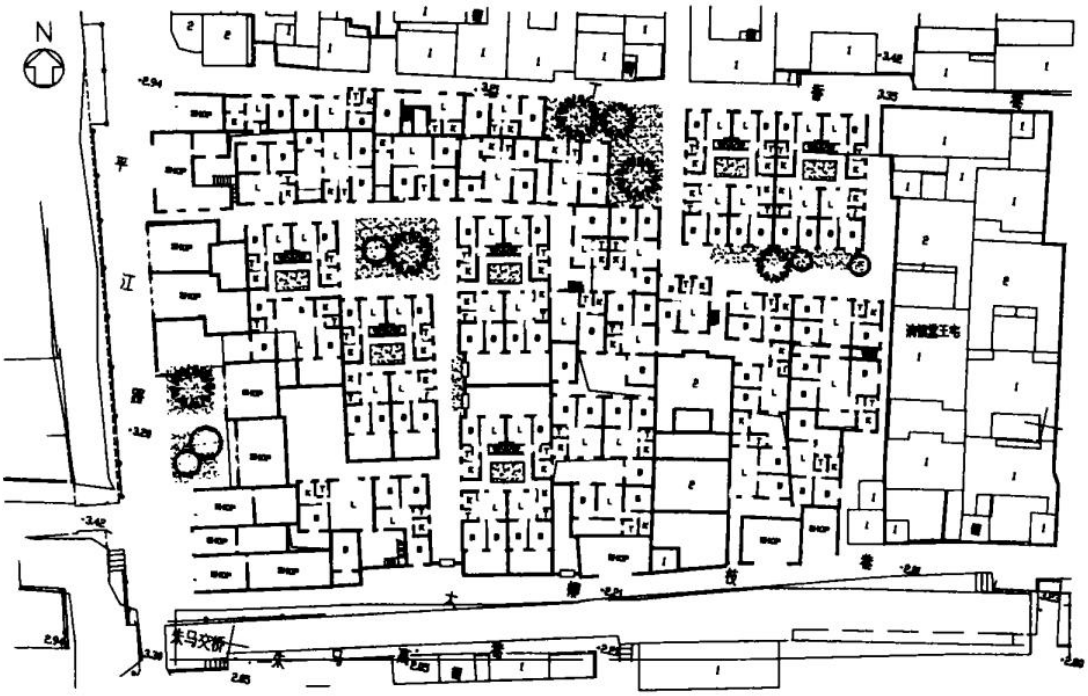


Figure 1.6-11 Plan view of the protection and renovation of Daluizhi lane (partial)
Source: Reference [36]

The remediation strategy: Differentiated measures are taken based on building value assessment (Table 1.6-1) :

Table 1.6-1 Building categories and protection measures Source: drawn by the author

Building Type	Protective measures	Technical points	Case
Heritage buildings	Repair	"Unchanged original state", original protection	Couple Garden Garden Architecture
Historic buildings	Renovate	"Inlay" or "Demolition" Repair	Daliushixiang Residence
General Building	Preservation/Renovation/Demolition	Landscape coordination assessment	Factory building demolition
New construction	Similar in appearance/similar in spirit	Combining modern materials with traditional forms	Cultural Exhibition Hall

Innovative design techniques: New buildings explore two paths: "similar in form" - using modern materials to imitate traditional forms; "similar in spirit" - interpreting the essence of space in modern language. For example, a cultural facility uses steel structure instead of wooden structure, which not only maintains the outline of the sloping roof, but also meets the

needs of large internal space.

3) Implementation mechanism and innovation

Diversified collaboration mechanism: Pingjiang District has formed an implementation system of "government-led, expert-guided, and social participation": at the government level: a special project company was established to coordinate fund operations (such as an investment of 150 million yuan in the renovation of Pingjiang Road) and the promulgation of the "Pingjiang Historic District Protection and Management Measures" ; at the expert level: an expert advisory committee was established to provide technical guidance, such as "surveying, designing, and constructing" historical buildings ; at the community level: residents' opinions were solicited through a public notice system and the "house not on the ground" demolition method was adopted to balance protection and people's livelihood .

Flexible planning and management: Innovatively set up "renewal development land" (accounting for 16.9%), without presetting specific functions, only specifying compatibility requirements, leaving space for future development. For cultural relics and historical sites (accounting for 12.5%), encourage diversified use that conforms to cultural connotations.

Technology integration and innovation: In the renovation of historical buildings, traditional craftsmanship and modern technology are integrated: "inlay-style" renovation - partial replacement of damaged components; "deconstruction-style" renovation - retaining the facade and using steel structure to reinforce the interior. For example, a residential building retains the brick-carved gatehouse from the Qing Dynasty, and the interior is transformed into a cultural and creative space.

Figure 1.6-12 Pingjiang district implementation guarantee mechanism

Source: Reference [48]

(Note: This image reflects three perspectives on micro-renewal of historical blocks: contextual perspective, dynamic activation, and catalyst-driven)

(4) Planning results and impact

1) Material space effects

After systematic renovation, Pingjiang Street has achieved remarkable results in terms of material space: first, the historical street network and scale relationship since the Song Dynasty have been completely preserved, achieving effective protection of the historical pattern; by repairing more than 100 cultural relics and historic sites and renovating more than 100,000 square meters of historical buildings, the integrity and authenticity of the architectural style have been comprehensively improved; by placing municipal facilities underground, increasing open space and demolishing more than 30,000 square meters of uncoordinated buildings, the environmental quality of the street has been significantly improved.

The design results are eventually transformed into an implementation project library, which mainly includes six types of projects: function improvement, community improvement, environmental improvement, protected building utilization, traffic optimization, and sign landscape improvement. The project library is flexible and open, and can be adjusted as the external environment changes, so as to promote the organic renewal of the block in a scientific and orderly manner .

项目类型		项目名称	第一阶段	第二阶段	第三阶段
功能提升类	保留建筑转换功能	1. 六六视觉厂房改造项目			•
	新建、拆除重建	2. 园林主题酒店 3. 孟子里特色餐饮街 4. 平江旅游服务中心 5. 桐园游客服务中心 6. 中张家巷社区创业传习坊 7. 卫道观西地块商务会馆项目 8. 妙相庵北侧地块			•
社区改善类	社区配套	9. 社区中心改建、新建项目 10. 平江幼儿园迁、扩建项目		•	
	社区停车	11. 金刀桥巷、管家园地面停车场 12. 社区创业工坊地下停车		•	
环境整治类	河道整治	13. 总桥河、胡厢使河、柳桥河、新桥河景观整治	•		
	街巷整治	14. 钮家巷、大儒巷、总桥巷、胡厢使巷、柳枝巷、新桥巷、邹长巷、仓街街巷立面整治与景观提升	•		
	公共空间增补优化	15. 桥头空间、井台空间、滨河空间、街巷转角空间整治		•	
保护建筑利用类	文保单位	16. 文保单位内居民逐步腾迁，置换为文化展示、文化商业等公共功能		•	
	控保建筑	17. 控保单位逐步收储，进行功能置换		•	
	传统民居	18. 民居建筑维修、改善基础设施、整治院落环境			•
交通优化类	道路拓宽改造	19. 仓街道路更新改造项目	•		
	码头设施	20. 沿总桥河、新桥河、中张家河增设码头		•	
	公共停车设施	21. 苏州市第一初中操场改造地下公共停车场		•	
标识景观提升类	入口节点改造	22. 平江路北入口改造 23. 平江路南入口改造 24. 东园南入口改造 25. 桐园仓街入口改造		•	
	指引系统完善	26. 入口标识、地图导引、路标、景点标识等指引设施		•	

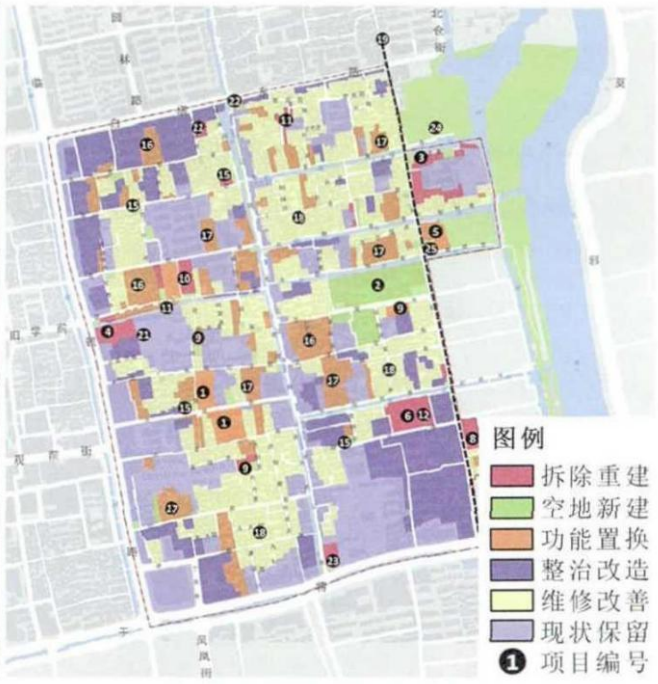


Figure 1.6-13 Project library and distribution diagram

Source: Reference [48]

（Note: The project library includes functional improvement, community improvement, environmental improvement, protected building utilization, traffic optimization, and sign landscape improvement.）

2) Social and cultural influence:

While protecting the physical space, the renovation of Pingjiang Street has also had a profound social and cultural impact: first, by retaining about 40% of the original inhabitants, the traditional social network and community vitality have been maintained; second, its protection results won the UNESCO Asia-Pacific Cultural Heritage Conservation Honor Award in 2005, demonstrating its outstanding cultural value; third, the project's innovative morphological-typological approach has been promoted and applied to other historical neighborhoods in Suzhou (such as No. 37 Street), providing an important reference for similar practices.

3) Inspiration for sustainable development:

The protection practice of Pingjiang Block provides important inspiration for the sustainable development of historical blocks: first, we need to uphold long-term thinking, abandon the "short, flat and fast" development model, and accept gradual renewal; second, we should seek a dynamic balance between historical authenticity, life continuity and functional

modernity; finally, we need to focus on methodological innovation, organically combine traditional construction wisdom (such as the use of "grey space") with modern technical means, and achieve the coordinated promotion of protection and development.

The protection practice of Suzhou Pingjiang Historic District has successfully verified the applicability of morphology and typology theory in China's historical urban areas. By grasping the essence of space through morphological analysis and realizing traditional innovation through typological translation, this method not only avoids the falsity of antique buildings, but also prevents the abruptness of modern buildings. The protection of historical districts in the future needs further exploration: 1) digital technology-assisted morphological recording and analysis; 2) deep integration of typology and modern functions; 3) long-term maintenance mechanism with community participation. The Pingjiang case provides valuable experience for the inheritance of historical and cultural heritage in the context of rapid urbanization.

1.6.3 Study on the evolution of Jianshe New Village in Guangzhou

(1) Background

Guangzhou Jianshe New Village was built in 1953 as the first worker residential area in Guangzhou funded by the government after the founding of the People's Republic of China. It is the starting point of urban planning and construction in Guangzhou after the founding of the People's Republic of China and has important historical and research value. This residential area, located on the eastern edge of the built-up area of Guangzhou in 1949, has experienced various historical stages of China's urban construction in its more than 60 years of development. It has gradually evolved from an initial worker residential area to a comprehensive community suitable for living and working in modern cities. Its morphological changes reflect the evolution of China's urban development policies.

This study adopts the analytical framework of typo-morphology, combines the ground plane analysis of the Conzen School with the typological method of the Caniggia School, and reveals the internal laws of the evolution of the new village form by analyzing the changes in

elements such as plot, street system, building layout and building form. This method can effectively "read" the changing process of urban form in the time dimension and provide a theoretical tool for understanding the transformation of urban settlements in China.

(2) Planning evolution and policy background

The planning evolution of new villages in Guangzhou is closely related to the phased changes in China's urban development policies and can be clearly divided into four major periods, each of which reflects specific planning concepts and policy orientations.

Table 1.6-2 Characteristics of the evolution of new village planning in Guangzhou Source: Author compiled from references [17]

period	Era	Policy Background	Morphological characteristics	Changes in building density
Start-up period	1953-1957	Planned economy, welfare housing	Column layout, mainly bungalows	Initial 18.48%
Development	1958-1972	Pragmatism, meeting basic needs	Building new buildings wherever possible and improving the road system	Increased to 31.41%
Transition period	1973-1999	Reform and opening up, the beginnings of marketization	High-rise buildings appear, mixed functions begin to emerge	Increased to 38.22%
Update period	2000-2010	Intensive land use and urban renewal	Super high-rise residential area, comprehensive development	Slightly decreased to 37.23%

This evolution process shows that the construction of new villages has gradually evolved from the initial homogeneous workers' residential areas to high-density mixed-function urban communities, reflecting the transformation trajectory of China's urban residential areas from a planned economic model to a market economic model. The morphological changes in each stage are the material spatial manifestation of the social and economic conditions and policy orientations of a specific historical period.

(3) Specific implementation methods and evolution of morphological elements

The morphological evolution of Guangzhou’s new villages is reflected in the systematic

changes in four key elements, which are achieved through different implementation methods and together shape the existing spatial characteristics of the residential areas.

1) Progressive subdivision of the plot system

The evolution of the plots used to build the new village shows a clear characteristic of gradual subdivision from north to south. When it was first built in 1957, the number of plots was small but the area of each plot was large, reflecting the characteristics of large-scale unified development during the planned economy period. As time went by, the original large plots were continuously subdivided, and by 2010 the number of plots increased significantly while the average area decreased significantly.

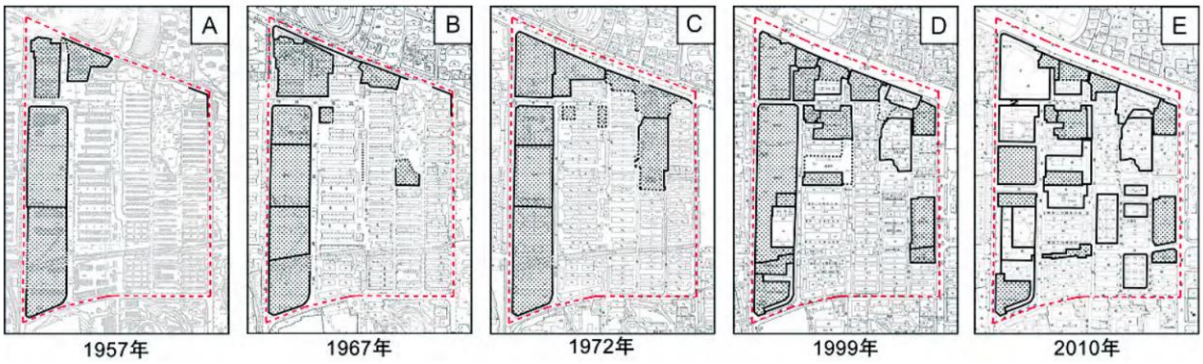


Figure 1.6-14 Evolution of the plot for building a new village
Source: Reference [17]

2) Increased density and differentiated levels of road systems

The road system of the new village has evolved from simple to complex, from homogeneous to differentiated. This process of road network densification and plot subdivision promote each other, improving traffic accessibility on the one hand, and creating more street frontages on the other hand, providing conditions for functional mixing. However, the fact that the horizontal roads are not fully connected has also caused traffic bottlenecks in some areas, showing the inadequacy of systematic planning in organic renewal.

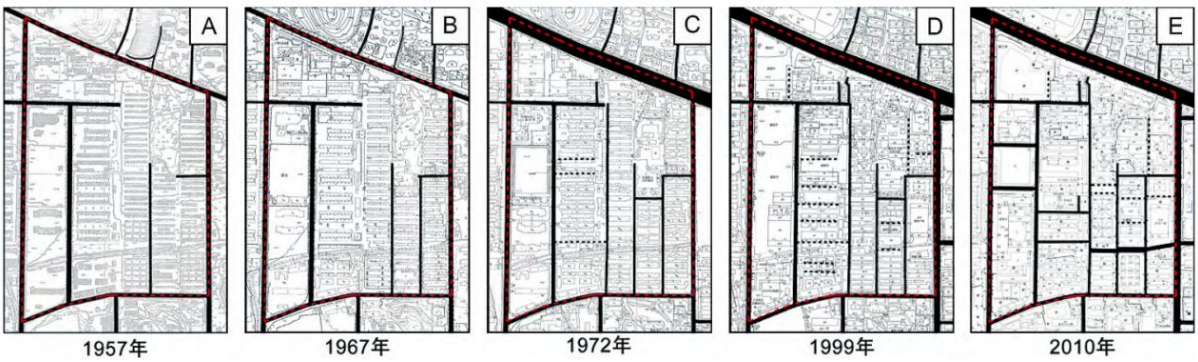


Figure 1.6-15 Evolution of the road system in the construction of new villages

Source: Reference [17]

3) Diversified transformation of architectural layout and form

The architectural evolution of the new village has undergone a transformation process from homogeneity to diversity. This evolution of architectural form has not only changed the spatial form of the residential area, but also affected the social spatial structure, from a homogeneous worker community to a diversified and mixed urban community. The building density increased from 18.48% in 1957 to 37.23% in 2010. Although it has declined slightly after 2000, the significant increase in the volume ratio has fundamentally changed the spatial experience.

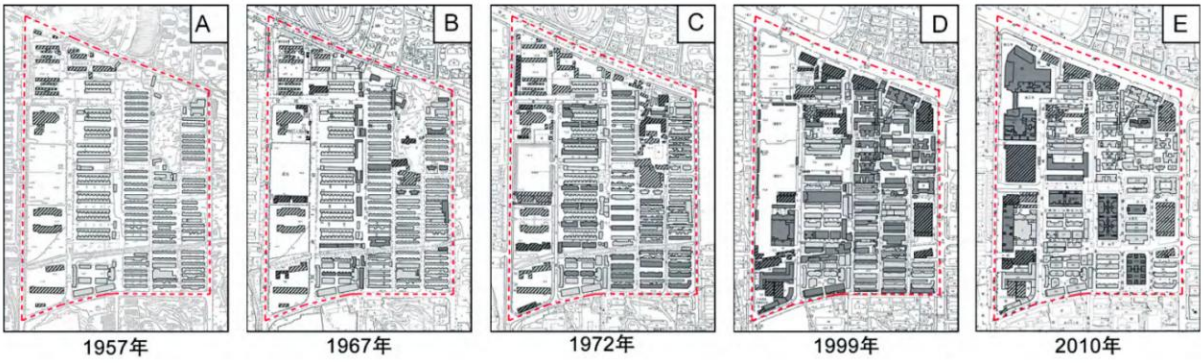


Figure 1.6-16 Evolution of the architectural layout of new villages

Source: Reference [17]

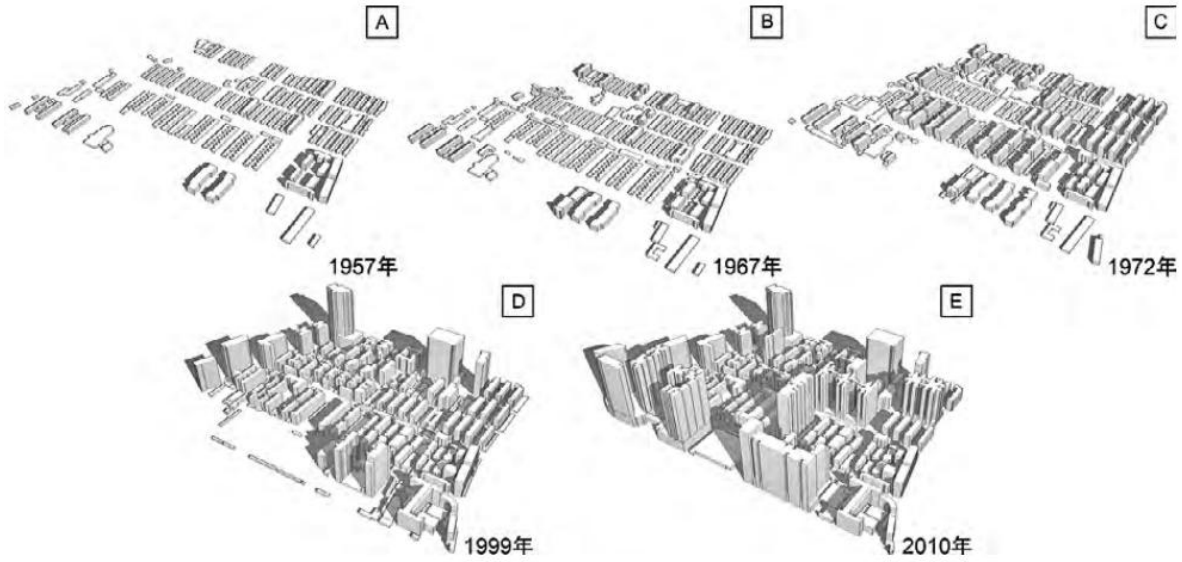


Figure 1.6-17 Evolution of the three-dimensional form of the new village
Source: Reference [17]

4) Functional mixing and spatial replacement

The functional evolution of Jianshe New Village reflects the transformation from single residence to mixed function. When it was first built, it was mainly used for residential functions, with a small number of public service facilities. Over time, the land along Huanshi East Road on the north side was gradually replaced with office functions, and the land along Jianshe Liuma Road on the east side was developed into a commercial office area, retaining the residential function inside but adding ground floor shops. This functional replacement is mainly achieved through four ways: first, the renewal of the unit's own land, such as the original Jianshe Primary School land was converted into an office building for the Municipal Corporation; second, the redevelopment of state-owned enterprise land, such as the Good World Plaza replacing the original workers' housing; third, the transformation of municipal facilities, such as the construction of a community park after the river channel was culvertized; fourth, market-oriented real estate development, such as comprehensive projects such as Poly Central Plaza. The increase in functional mixing has injected new vitality into the residential area, but it has also brought challenges such as traffic pressure and changes in the living environment.

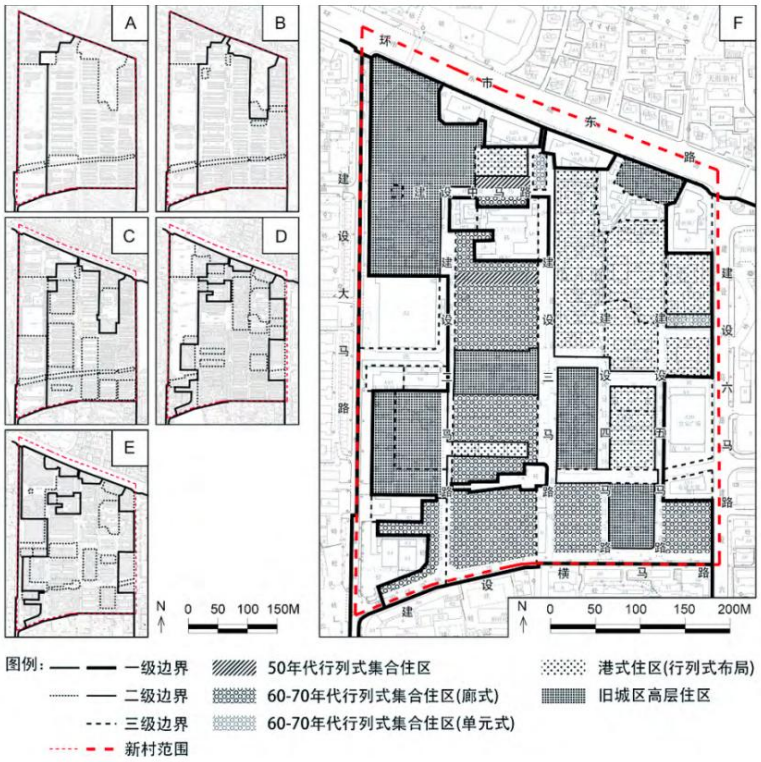


Figure 1. The pattern of ground plane units and morphological types in the five periods
Source: Reference [17]

Table 1.6-3 Evolution characteristics of morphological elements of new villages in Guangzhou Source: compiled by the author from references [17]

Morphological elements	Early characteristics (1950s)	Evolution	Current situation characteristics (2010s)
Plot system	Small number, large area	Gradual subdivision from north to south	Large number, small area, north-south differences
Road system	Simple and homogeneous	Increased line density and grade differentiation	Grid-shaped, not completely connected horizontally
Building form	Determinant bungalow, homogeneous	Diversification and high-level	Podium + tower, high density
Functional layout	Single residence	Functional replacement and mixing	Mainly residential, mixed with commercial and office

The evolution of these morphological elements is not isolated, but a systematic project that is interconnected and mutually influential. Plot subdivision provides conditions for road density, road improvement improves the value of plots, functional mixing promotes the diversification of architectural forms, and the emergence of high-rise buildings changes the

way plots are used. This complex interactive relationship is the essential feature of urban morphological evolution and the important value of typo-morphology research.

(4) Planning results and impact

1) Spatial distribution characteristics of morphological type units

Based on the typo-morphology method, the study divided the new village into 7 primary morphological units and 43 subdivided units, and constructed a complete morphological unit pattern map. The spatial distribution of this type of unit reflects the superposition effect of construction activities in different periods, and also records the "stratigraphic" information of the evolution of residential morphology.

2) Quantitative analysis of spatial vitality characteristics

The study used Baidu heat map data to analyze the vitality values at 30 time points on weekdays and weekends, revealing the spatial vitality characteristics of the new village. It confirmed that functional mix, development intensity and building age are the key factors affecting spatial vitality.

Figure 1.6-19 Comparison of the relationship between vitality units and various morphological units

Source: Reference [17]

（Note: A: Vitality unit, B: Functional unit, C: Strength unit, D: Age unit）

3) Social-spatial effects of morphological evolution

The morphological evolution of the new village construction has produced significant social-spatial effects. On the one hand, some areas have experienced "gentrification". On the other hand, the functional replacement in the renewal process has changed the socio-economic structure of the community. The study also found that residential units with ground floor shops generally have higher vitality values, showing the positive impact of functional mixing on community vitality. However, some old residential areas have become vitality "holes", which also suggests the social-spatial differentiation problem that may be caused by unbalanced renewal.

4) The relationship between morphology and vitality

Comprehensive analysis reveals the association mechanism between the morphological characteristics of the new village and spatial vitality. In the plane dimension, small-scale plots and rich street systems provide more street frontage and accessibility, which is conducive to commercial activities and interpersonal communication; in the vertical dimension, moderate development intensity ensures population density and threshold population to support commercial services; in the functional dimension, mixed use creates diverse activity needs and time distribution; in the time dimension, recently updated units are more adaptable to contemporary lifestyles. These factors work together to form the characteristic pattern of high-vitality space. The study also found that the vitality values of units close to major roads are generally higher, showing the fundamental role of transportation accessibility in vitality. These findings provide empirical evidence for understanding how physical space affects social life.

Table 1.6-4 Analysis of characteristics of high-vibrancy morphological units in Guangzhou New Village

Source: Author compiled from references [17]

Influencing factors	Mechanism of action	Typical Cases	Policy Implications
Functional Mix	Diversify activity needs and extend active time	6-3-0 (residential building with ground floor commercial building)	Encourage moderate functional mixing

Development Intensity	Ensuring a threshold population that supports business	Poly Central Plaza	Reasonably increase development intensity
Building Year	Adapting to contemporary lifestyles	Updated units after 2000	Update the material environment in a timely manner
Accessible by transportation	Improve foot traffic and visibility	Unit along Huanshi East Road	Improve public transport connections

5) Implications for urban renewal

The study of the morphological evolution of the construction of new villages provides important inspiration for the renewal of old urban areas. First, the vitality unit pattern map can be used as a planning tool to help identify potential vitality areas and priority renewal areas. Second, the "small and flexible" organic renewal strategy can better maintain the social network and spatial continuity of the community than large-scale demolition and construction. Third, functional mixing and moderate high-intensity development are effective ways to enhance spatial vitality, but coordination with the existing environment must be considered. Finally, morphological units with historical value, such as row-style residential areas in the 1950s, should be protected during the renewal process to maintain the collective memory and identity of the community. These inspirations are of great reference value for the current transformation of Chinese cities from incremental expansion to stock renewal.

The case of Guangzhou's new village construction shows that the evolution of urban form is a complex socio-spatial process, which is jointly shaped by policy orientation, market forces and social needs. Typo-morphology provides a systematic method to analyze this process, while vitality research helps to evaluate the social effects of morphological changes. The combination of the two provides a scientific basis for sustainable urban renewal and expands the application prospects of urban morphology in the Chinese context.

The three cases together show that typo-morphology, as a core analytical framework, can not only systematically interpret the laws of the generation and evolution of urban spatial structure, but also provide an effective methodology for balancing historical inheritance and

modern development. Specifically, its value is reflected in three aspects: first, it has the ability to analyze across scales, from macro-regional structure to micro-building types, to build a systematic cognitive tool; second, it demonstrates dynamic adaptability, which is not only applicable to the protection practices of historical urban areas such as Bologna and Suzhou, but also can deeply analyze the transformation logic of rapidly evolving residential areas such as Guangzhou's new villages; third, it is rich in policy enlightenment, providing decision-making support based on spatial background characteristics for key issues such as property rights integration, functional regulation, and vitality enhancement. These practical experiences provide ideas for reference for the optimization design of Pantang Village from the perspective of typo-morphology .

Chapter 2 Overview of Pantang Village

2.1 Location and transportation of Pantang Village

This summary provides a detailed explanation and analysis of Pantang Village's macro-regional location, its specific position in Liwan District, its connection with the surrounding transportation network, its topographical features, hydrological conditions, and the impact of its geographical location on the development of the village . It aims to explain the comprehensive situation of Pantang Village's geographical location and its relationship with the surrounding environment, and to provide geographical basic information for further research on the history, current situation, and morphological type evolution analysis of Pantang Village.

2.1.1Geographical location

Pantang Village is located on the northern edge of the Pearl River Delta Plain, southwest of the central urban area of Guangzhou. From a larger regional perspective, it is located in the core area of the Guangdong-Hong Kong-Macao Greater Bay Area and is a node in the Greater Bay Area's transportation, economic, and cultural exchange network. As one of the core cities in the Greater Bay Area, Guangzhou has a developed transportation hub and a diversified industrial system. Pantang Village can benefit from this regional advantage and maintain close economic ties and personnel exchanges with surrounding cities such as Foshan. It has potential development opportunities in the process of regional integration. For example, in terms of tourism resource integration and coordinated development of cultural industries, it can use the platform of the Greater Bay Area to attract a wider range of customers and resources.

Pantang Village is located in the central and western part of Liwan District, bordering Zhongshan Eighth Road to the north and adjacent to Liwan Lake Park; connected to Longjin West Road to the east, facing cultural attractions such as Xiguan Antique City and Liwan Museum; to the south, Huangsha Avenue, across the road from Shamian Island; to the west,

extending to the bank of the Pearl River, across the river from parts of Nanhai District, Foshan City. This location in the core area of Liwan District makes it one of the important windows to showcase the historical and cultural features of Liwan. The rich historical and cultural resources and modern commercial facilities in the surrounding area blend with each other, forming a unique regional atmosphere.

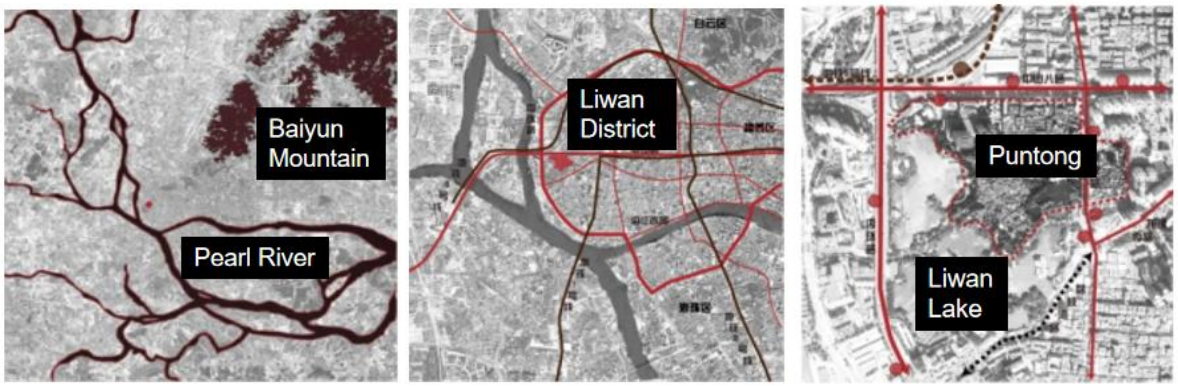


Figure 2.1-1 Location analysis map of Pantang Village
Source: Author's own drawing

2.1.2Traffic conditions

(1) Road traffic:

Pantang Village is characterized by three-dimensional accessibility, and its locational advantages are fully demonstrated through a multi-level traffic system. Zhongshan Eighth Road on the north side is the east-west main artery of Guangzhou City. It not only bears the hub function of connecting the city center with the western part of Guangzhou and Foshan, but also relies on the Zhongshan Eighth Road subway station and a dense bus line network to form a composite traffic corridor. Pantang Road-Longjin West Road on the east side constitutes a characteristic traffic axis. After the reconstruction , this section of the road was widened to a two-way four-lane road, which greatly improved the traffic efficiency and became a cultural and tourism line connecting scenic spots such as Yongqingfang and Lizhi river. Huangsha Avenue on the southwest side is a north-south main road. Relying on the inner ring road elevated and the Pearl River Tunnel, it bears the heavy responsibility of cross-river transportation . The newly built Ruyi Bridge East Bridge further strengthens the Guangzhou-Foshan intra-city transportation network.

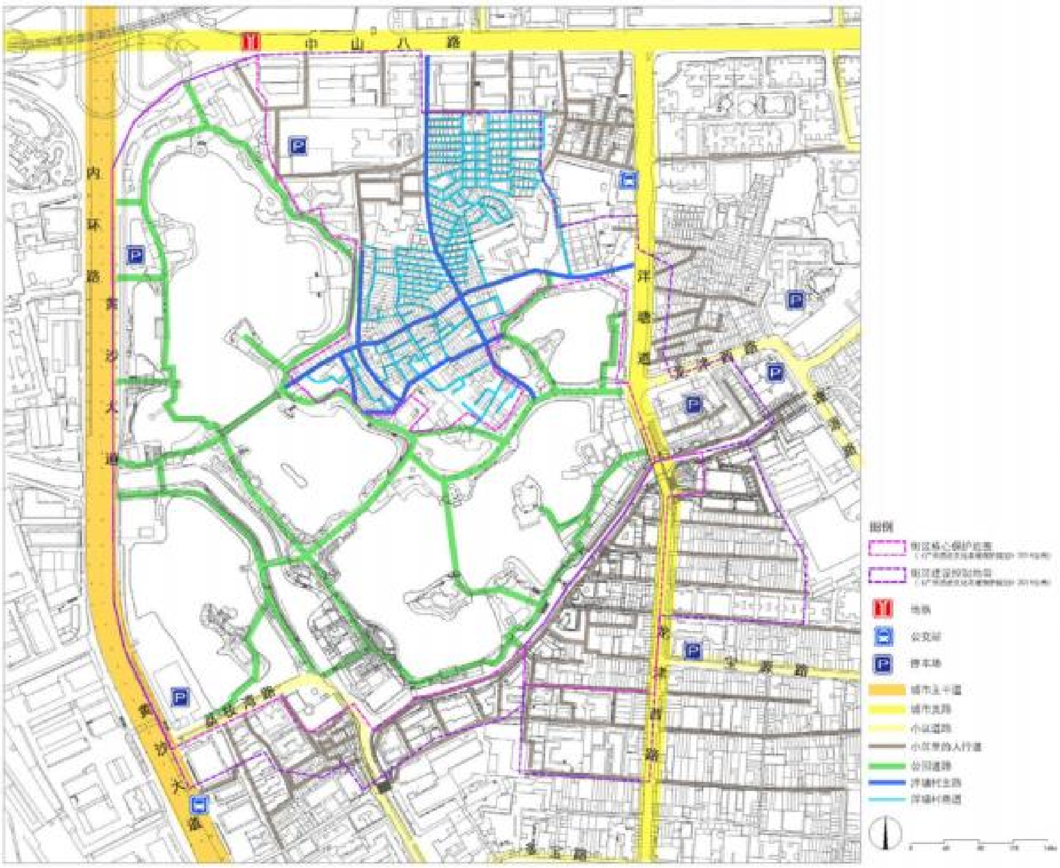


Figure 2.1-2 Pantang Village road fraffic analysis map

Source: Fengyuan Street-Liwan Lake Historical and Cultural District Protection and Utilization Planning Text and Atlas

(2) Public transportation

In terms of public transportation, there are many bus lines passing by Pantang Village, such as Bus No. 8, No. 104, No. 107 and dozens of other bus lines, covering the main functional areas of the city. Among them, the average daily passenger flow of Zhongshan Eighth Road Terminal exceeds 10,000 people, becoming an important public transportation node in the west of the city. However, the connection between the stations of some lines and the interior of the block is not close enough, and passengers may need to walk a long distance to reach their destination . At the same time, there are Zhongshan Eighth Station of Metro Line 5 and Line 11, Ruyifang Station of Line 6 and Changshou Road Station of Line 1 nearby, but the distance between each station and the block is different. It takes about 1.5 kilometers to walk from Exit B of Ruyifang Station to the east gate of Liwan Lake Park. Exit A of Zhongshan Eighth Station is relatively close to Pantang Village and Liwan Lake Park, about

500 meters away on foot.

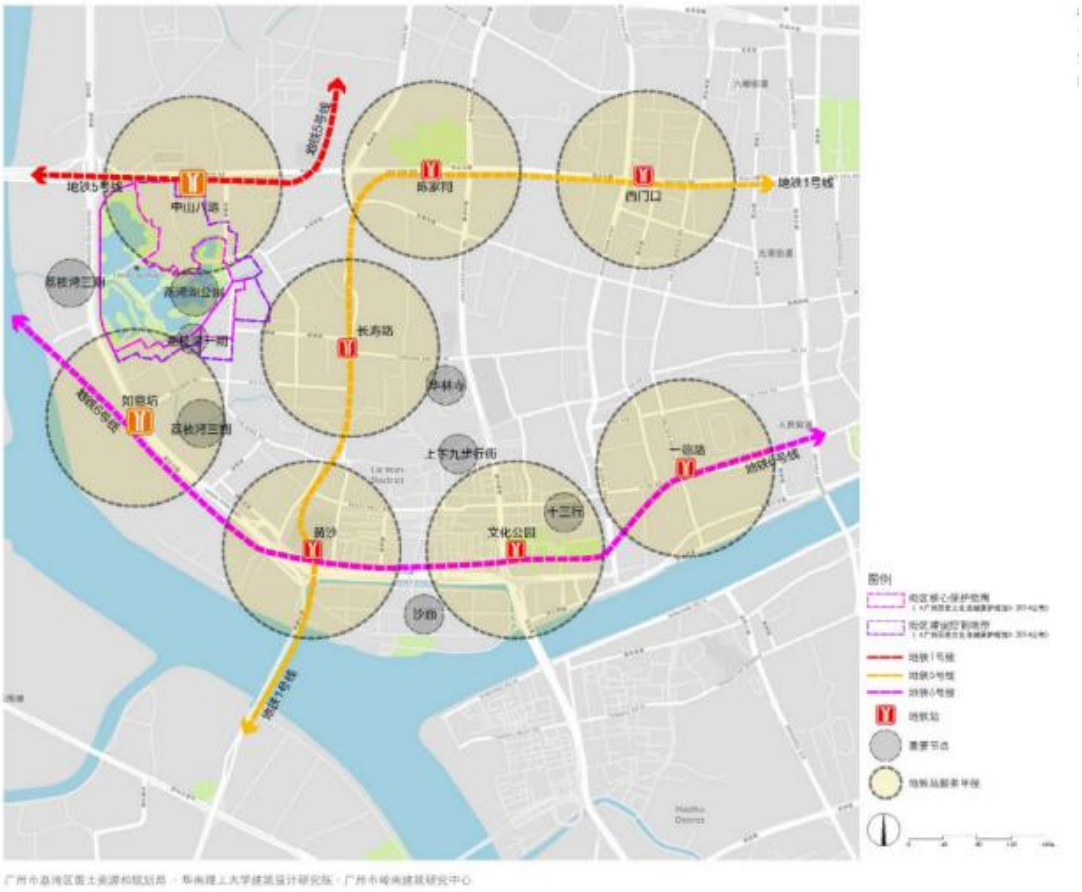


Figure 2.1-3 Pantang Village rail transit analysis diagram

Source: Fengyuan Street-Liwan Lake Historical and Cultural District Protection and Utilization Planning Text and Atlas

(3) Water transportation

As a living carrier of Lingnan water village culture, Pantang Village's water transportation system presents the dual characteristics of historical inheritance and modern transformation. As a hub for water and land transport in the west of ancient Guangzhou, the rivers and streams in Pantang Village once undertook important functions of cargo transportation and agricultural irrigation, and still retain the historical texture of the water system of the Southern Han Imperial Garden. With the development of the city, although the dependence of residents on water transportation for daily travel has decreased, through systematic river and stream management projects, waters such as Liwan Lake and Lizhi river Creek have achieved water quality Class IV standards, forming an ecological pattern of "clear

water corridors", laying the foundation for tourism development.

At present, Pantang Village has built a water tourism system of "cruise sightseeing + cultural experience". The cruise route from Wenta Wharf to Yongqingfang connects cultural landmarks such as the Cantonese Opera Art Museum, Xiguan Mansion, and Renwei Ancestral Temple. Along the way, you can enjoy the Lingnan water village style of "a bay of green water and red lychees on both sides". It is worth noting that Pantang dragon boat culture has been deeply integrated into water tourism - the "dragon starting" ceremony on the eighth day of the fourth lunar month every year attracts tens of thousands of tourists, and the "dragon boat covenant" parade with the nearly 500 -year-old Foshan Yanbu Laolong has become a folk culture brand in the Guangdong-Hong Kong-Macao Greater Bay Area.

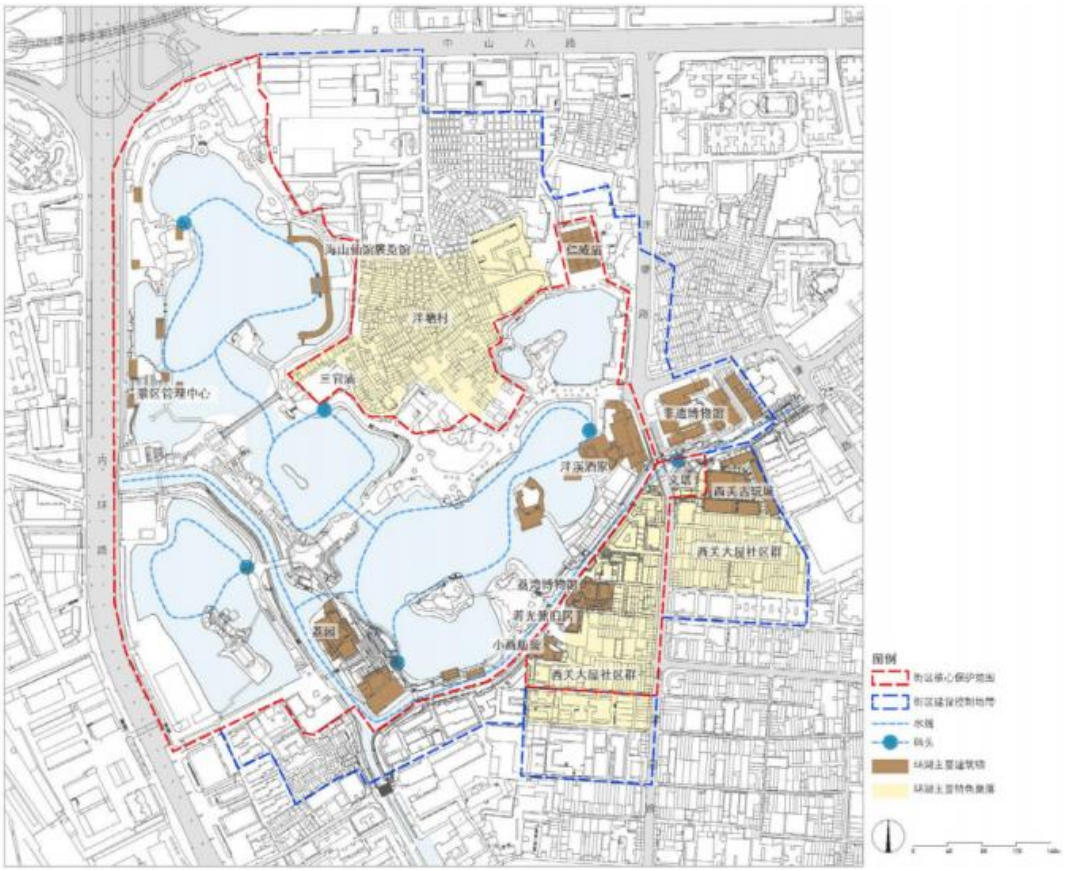


Figure 2.1-4 Pantang Village water transportation analysis

Source: Fengyuan Street-Liwan Lake Historical and Cultural District Protection and Utilization Planning Text and Atlas

2.1.3 Topographic and hydrological characteristics

Pantang Village is located, with its unique topographic base and hydrological network,

has formed the natural framework for the development of Lingnan Water Village. As the core node of water and land transport in the west of Guangzhou, its topographic and hydrological characteristics have profoundly influenced the historical evolution and modern transformation of the region.

Pantang Village is located is low-lying and densely covered with rivers, with an average altitude of only 5-8 meters. This flat and open terrain laid the foundation for the formation of Lingnan water village settlements. Since the siltation of the Pearl River formed land in the Tang Dynasty, a pastoral pattern of "ten miles of smoke and water, lotus ponds everywhere" has gradually formed here. The Western Imperial Garden (Liuwang Huawu) was built here during the Five Dynasties, and large-scale agricultural production appeared in the Song Dynasty. The flat terrain allows traditional houses to be built along the water, forming the "comb-style layout" of Lingnan water village texture. For example, Pantang Wuyue still retains the ancestral hall, book club and residential complex of the Qing Dynasty.

Pantang Village presents the characteristics of "three waters working together": the Pearl River system provides a stable water source, rainwater replenishment flows into rivers through surface runoff, and groundwater achieves natural infiltration through sandy soil. This multi-supply model has made Pantang a "land of fish and rice" in history. According to the "History of Regional Changes in Xiguan", in the Qing Dynasty, Pantang "was more than 20 miles in circumference, mostly ponds", forming a water town scenery of "ten miles of red clouds and eight bridges and painted boats".

The total length of the existing rivers and streams in this area is about 8.7 kilometers. They are connected to the main channel of the Pearl River through the Lizhi river, forming a "two horizontal and three vertical" water network. Historically, these rivers and streams not only undertake the economic functions of cargo transportation and agricultural irrigation, but also give birth to a unique water town culture . The large-scale cultivation of the " Pantang Five Beauties" (lotus root, water chestnut, water caltrop, bamboo shoots, and water chestnut) in the Qing Dynasty relied on the ecological environment of the river wetlands. According to the "Guangdong Xinyu", Pantang water chestnut powder was once exported overseas and

became a symbol of Xiguan's food culture.

Historically, the water of Pantang River was clear and could be used directly for drinking and irrigation. However, in the mid-to-late 20th century, with the discharge of industrial pollution and domestic sewage, the river became black and smelly. Through sewage interception and drainage, ecological restoration and other projects, the water quality of Liwan Lake has been improved from Class V to Class IV, and Liwan River has been selected as one of the first beautiful rivers and lakes in Guangzhou. The water system after treatment has not only restored its ecological function, but also become the core carrier of cultural and tourism integration .

2.2 Historical development and current situation research

2.2.1 Historical development

Pantang is located was still a shallow bay at the mouth of the Pearl River before the Tang Dynasty. As the Pearl River silt continued to accumulate, land gradually formed in the Tang Dynasty. Due to the low terrain and crisscrossing rivers, early residents lived by the water and built ponds. Aquatic crops such as lotus roots and water chestnuts were planted in the ponds, and lychees and longans were planted on the foundations, forming a unique "pond agriculture" model. This "half land and half river" geographical pattern laid the foundation for the birth of the "Five Beauties of Pantang " in later generations.

During the Southern Han Dynasty of the Five Dynasties (917-971), Pantang was the core area of the royal garden "Liuwang Huawu", where peaches, plums, lotus and other plants were planted, which were both ornamental and productive. After the Song Dynasty destroyed the Southern Han Dynasty, the garden was burned down, but its status as a scenic spot in the west of the city continued, and it was still a place where literati and scholars lingered. During the Ming and Qing Dynasties, the fertile silt brought by the Pearl River alluvial deposits made Pantang agriculture mature. In the Ming Dynasty, the " Pantang Wuxiu" planting system, which mainly included water chestnuts and water caltrops, was formed, becoming a famous product of Lingnan. In the late Ming and early Qing Dynasties, Qu Dajun recorded its name

"Bantang", reflecting the geographical characteristics of "half pond and half land" and the use of nature by agricultural civilization. In the middle and late Qing Dynasty, "Bantang" was renamed " Pantang ", which contained the villagers' expectations for literary fortune. At this time , Pantang's cultural heritage gradually became thicker. Qiu Xi, a doctor in the Qing Dynasty, built Tangli Garden to promote cowpox surgery. Cultural celebrities such as Li Shaofang and Li Fanfu all came from here. In the mid-19th century, the Shamian Concession was established. Although Pantang was not included , its surrounding environment and economy were affected. The closed nature of the traditional water village was broken, the degree of commercialization of agricultural products increased, and processed products were exported overseas. From the late 19th century to the early 20th century, the alluvial deposits of the Pearl River expanded the land area of Pantang . Later, due to the expansion of Guangzhou city, it changed from a suburban water village to the edge of the city. In 1958, the excavation of Liwan Lake changed the natural water system. Pantang transformed from an agricultural village to an urban community. The villagers turned to the service industry, and the tourism industry and cultural industry sprouted. In the 21st century, Pantang's urbanization deepened. In 2016, Pantang Wuyue became the first batch of micro-renovation projects in Guangzhou, forming the "ancient village + cultural and creative" model, preserving ancient monuments and revitalizing cultural space. It is now an important part of Guangzhou's historical and cultural blocks and a window to showcase the Lingnan style.

(1) Development stage

Since the research on the typo-morphology of Pantang Village in this paper mainly relies on the city map, according to the city map data collected by the author, and also taking into account the historical period and urban construction reasons, the historical development of Pantang Village is divided into the following stages:

1) From the late Qing Dynasty to the Republic of China (late 19th century - 1949)

At this stage, early city maps can show us the basic outline and surrounding environment of Pantang Village. From the map, we can see that Pantang Village is closely connected with

the surrounding water systems (such as Liwan Lake, Pearl River, etc.). At this time, Pantang Village is mainly based on traditional agriculture and fisheries. The architectural layout of the village is relatively compact, distributed around farmland and rivers, forming a natural settlement form. During the Republic of China period, with the development of urban mapping technology and the initial introduction of urban planning concepts, maps of this period can present the changes in Pantang Village and its surroundings in more detail. It can be observed from the map that some small handicraft workshops or simple commercial facilities may have appeared around Pantang Village, which reflects that Pantang Village began to be affected by the urban commercial atmosphere during the Republic of China period.

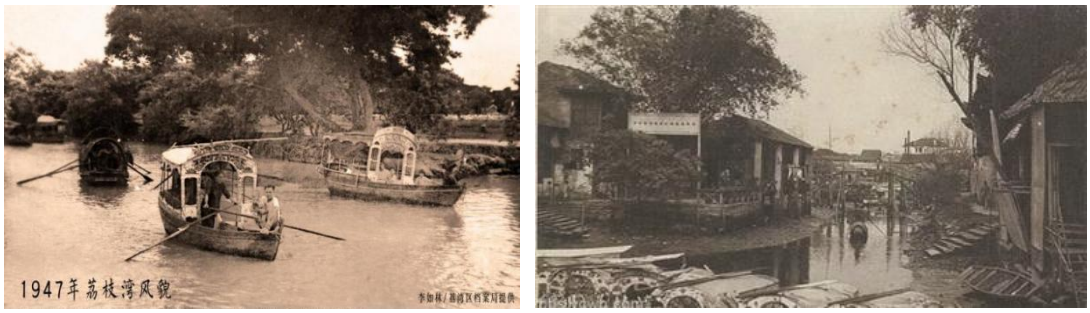


Figure 2.2-1 Left: The scenery of Lizhi river in 1947 Right: Old photo of Lizhi river
Source: Liwan District Archives

from the late Qing Dynasty may show that the main transportation routes of the village are mainly narrow village roads and river channels. During this period, the economic form of Pantang Village was relatively simple, with crop planting such as " Pantang Five Shows" and water fishing as the main economic sources. Some farmland signs and small docks may be seen on the map. These maps can help us understand the early spatial structure of Pantang Village, its dependence on the water system, and the basic distribution of economic activities, and study its original style and functional layout as a traditional Lingnan water village. Entering the Republic of China period , the transportation routes may be updated on the map, and the prototype of roads that are more closely connected to the city center has appeared. The architecture of Pantang Village may also have some new changes, such as the renovation of some traditional buildings or the construction of some buildings in the style of the Republic of China. Maps at this stage can help us study the transformation of Pantang Village under the

initial influence of urbanization, such as the integration of traditional agricultural economy and emerging commercial activities, and the adaptive changes in the village's architectural style and spatial layout.

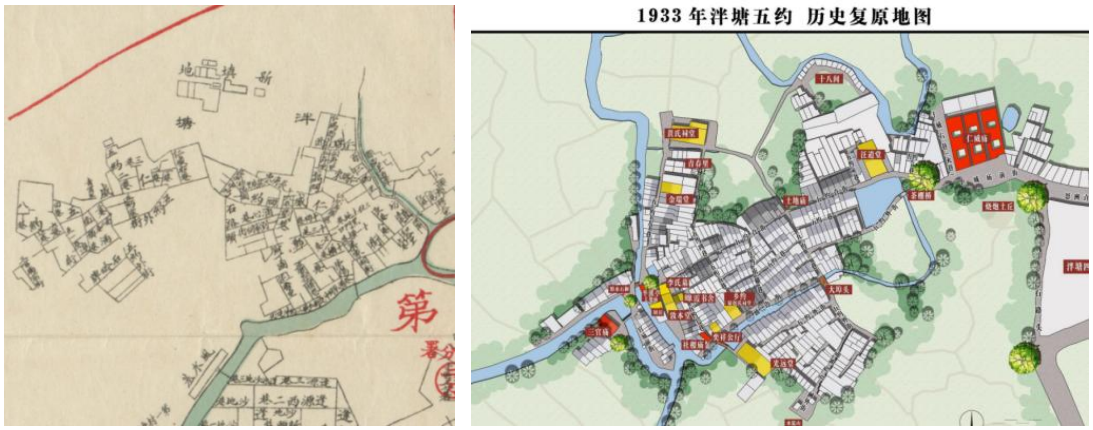


Figure 2.2-2 Left: The latest Guangzhou road map in 1924 Right: Pantang Wuyue historical restoration map in 1933

Source: Left: Guangzhou Archives; Right: Xiangcheng Architecture

The author restored the map of Pantang Village from the late Qing Dynasty to the Republic of China (Figure 2.2-3) by using the latest Guangzhou road map of 1924 and the 1933 Pantang Wuyue historical restoration map provided by Xiangcheng Architecture (Figure 2.2-2), combined with oral history and other written materials.

Figure 2.2-3 Map of Pantang Village from the late Qing Dynasty to the Republic of China
Source: Author adapted

2) Early years of the People's Republic of China – before reform and opening up (1949-1978)

After the founding of New China in 1949, Pantang Village experienced a series of social changes, including land reform. In February 1950, the People's Government of Fengyuan District established a working group in Pantang Street. In June of the same year, Pantang Street was transferred to Xicun District. The rural land reform movement was fully launched, farmers obtained land, and production enthusiasm was significantly improved. During this period, the land use type of Pantang Village became more regular due to the collectivization movement, and the signs of collective farms and agricultural cooperatives began to appear on the map. As an important cultural heritage built in the Song Dynasty, Renwei Temple was once converted into a school and police station after the founding of the People's Republic of China, reflecting the era transformation of the function of public buildings.

In 1958, in order to improve the living environment and prevent floods and waterlogging, the Guangzhou Municipal Government mobilized the masses to do voluntary labor and excavated the fish ponds and depressions in Lizhi river and Pantang into artificial lakes. The project took more than a year and was completed in 1959. In 1960, it was officially named "Liwan Lake Park" and the name of the park was written by Shen Junru. As one of the three major municipal projects in Guangzhou to celebrate the tenth anniversary of the founding of the People's Republic of China, the construction of Liwan Lake Park embodies the urban construction concept of "man conquers nature" at that time. According to the Yangcheng Evening News in 1960, after the completion of the park, it not only beautified the environment, but also promoted the development of the surrounding tourism industry. Catering places such as Panxi Restaurant gradually emerged and became the representative of Xiguan cuisine.

Figure 2.2-4 Left: Liwan Lake excavation site in 1958 Right: Photos of activities at Liwan Lake Park in 1959

Source: Liwan District Archives

The excavation of Liwan Lake completely changed the natural water system of Pantang. The original river was integrated into an artificial lake. Although the river can still connect Fengyuan Bridge to Duobao Bridge in the south, the tributaries of the water system were filled and turned into streets. Some historical relics, such as the stone lions that guard the water, disappeared in the river cover project in the 1970s, becoming an irreversible loss in the process of urbanization.

In the middle of the 20th century, the infrastructure construction of Pantang Village was gradually advanced. The improvement of water conservancy facilities effectively alleviated the flood problem. Simple schools and medical facilities began to be marked on the map, reflecting the progress of social public services. At the same time, the connection between Pantang Village and the city center was further strengthened, and the transportation network became clearer on the map . The construction of main roads such as Zhongshan 8th Road and Pantang Road laid the foundation for Pantang to integrate into urban development.

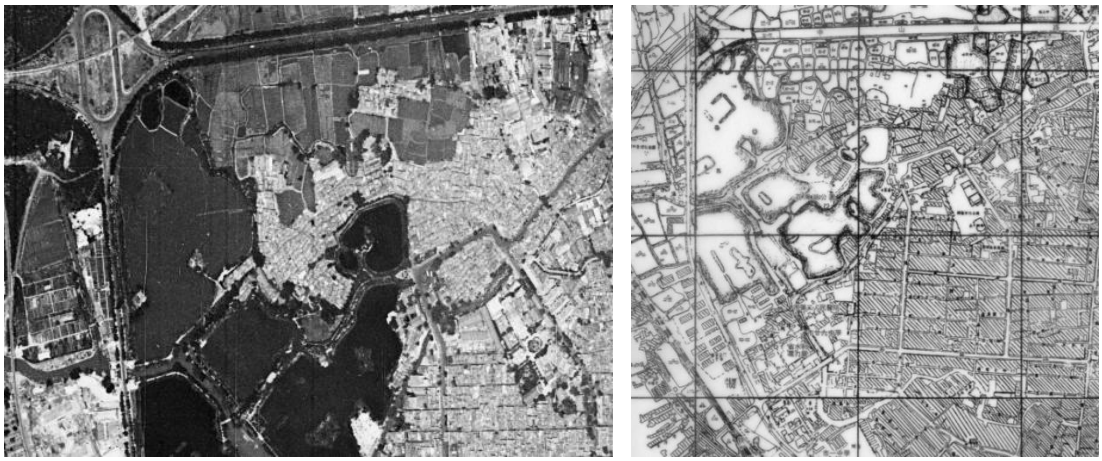


Figure 2.2-5 Left: Image of Xiguan residential area in Guangzhou in 1966 Right: Land survey map of Guangzhou in 1955

Source: Xiangcheng Architecture

The author restored the map of Pantang Village in the early days of the founding of New China and before the reform and opening up (Figure 2.2-6) through image data such as the Xiguan residential area image of Guangzhou in 1966 and the land survey map of Guangzhou in 1955 (Figure 2.2-5).

Figure 2.2-6 Map of Pantang Village in the early days of the People's Republic of China - before the reform and opening up

Source: Author adapted

3) After the reform and opening-up -before urban renewal (1978 - 2016)

With the advancement of reform and opening up, Guangzhou has developed rapidly . The map of Pantang Village has changed significantly during this period. From the map, we can see that the urban construction around Pantang Village is expanding, and the types of buildings such as industrial plants and new residential areas are gradually increasing. Some individual commercial shops and small factories may also appear in Pantang Village.

In terms of transportation, the road network is constantly improving, and bus lines are extended to the vicinity of Pantang Village, strengthening its communication with other areas of the city. At the same time, the map can also show that the land use of Pantang Village has become more diversified. In addition to the reduction of traditional agricultural land, the proportion of commercial land, residential land and public service land has gradually increased. The map at this stage is of great value for studying the spatial evolution, functional transformation and integration process of Pantang Village with surrounding urban areas during urbanization and economic transformation.

Around 1985, the waterway from Liwan Lake to Duobao Bridge was covered; in 1992, a section of the waterway from Panxi Restaurant to Fengyuan Bridge was also covered. In 1999, the Liwan District Political Consultative Conference proposed a proposal to "rebuild the old Lizhi river Road". In 2007, the relevant departments decided to demolish the ancient village to expand the Liwan Lake Park, but it was shelved due to opposition from some villagers. In order to welcome the Guangzhou Asian Games and create the Asian Games landscape, on the eve of the 2010 Guangzhou Asian Games , the water of Liwan Lake was diverted into the river, and the last section of the river that was filled in 1992 was exposed again. In 2013, the proposed Xiguan Square was demolished again, but it was stopped again due to obstacles.

Figure 2.2-7 Left: Pantang Wuyue dragon boat on the Pearl River after liberation. Right: Longjin Bridge waterway under reconstruction in 2010.

Source: Liwan District Archives

According to the land survey map and aerial photography data of the period, in the early days of reform and opening up, some farmland and vegetable fields (such as the "Pantang Wuxiu" planting area) were still retained on the map, but with the advancement of urbanization, they were gradually occupied by homesteads and factories in the 1980s and 1990s. After the 1990s, informal buildings such as small processing plants and warehouses appeared on the map, mostly built by villagers themselves, mixed with residential houses, reflecting the process of "urban village". The internal lanes are tortuous and have not been widened, making it difficult for motor vehicles to pass; external connections only rely on main roads such as Zhongshan Eighth Road and Longjin West Road, and the road network density is low. There is a lack of planned green space, and only the square in front of the ancestral hall and the open space beside the river remain as social places, and some ponds are filled in and used as parking lots. As Guangzhou expands westward, the boundaries between villages and cities on the map have changed from clear to blurred, from the separation of farmland in the 1970s to the situation of being surrounded by high-rise residential and commercial buildings in 2010. Although cultural landmarks such as ancestral halls and temples (such as Renwei Temple) still exist, they are surrounded by cluttered buildings. The boundaries between villages and cities are becoming increasingly blurred due to expansion, and the overall appearance of an urban village is that of a "dirty, messy and poor" city.

Figure 2.2-8 Left: Aerial photo of Guangzhou in 1978 Right: Land survey map of Guangzhou in 1978
Source: Xiangcheng Architecture

The author used aerial images of Guangzhou from 1978 to 2016 and Guangzhou land survey maps and other image data (Figure 2.2-8) to draw a map of Pantang Village in the early days of the founding of New China and before the reform and opening up (Figure 2.2-9).

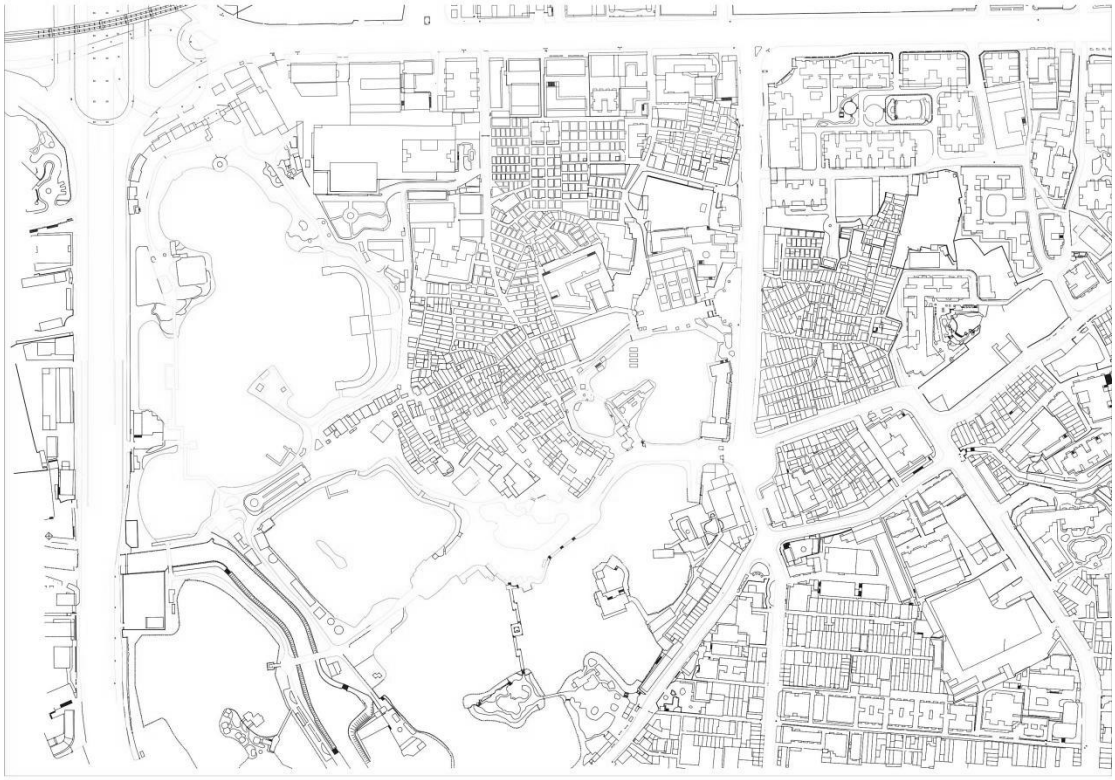


Figure 2.2-9 Map of Pantang Village after reform and opening-up and before urban renewal
Source: Author adapted

4) After urban renewal (2016 to present)

After 2016, the urban renewal practice of Pantang Village has achieved fruitful results in

historical and cultural heritage, community environment improvement and urban image enhancement through a series of actions such as public participation, physical space transformation and industrial renewal. This process not only opens up a new path for the future development of Pantang Village, but also provides valuable practical experience for the urban renewal of similar traditional villages, and inspires us to pay attention to historical and cultural protection, resident participation and sustainable development in urban renewal, so as to achieve the modernization transformation and cultural revival of traditional villages.

The micro-renewal practice of Pantang Village has restored the historical water system and pedestrian network through measures such as uncovering and restoring the streams and widening the lanes, forming a coherent "water-lane" system; the building adopts the "new Lingnan style" to control the volume and style, retaining traditional elements such as wok-ear houses and blue brick facades, while implanting light business formats such as cultural and creative studios and intangible cultural heritage exhibition halls; the upgrade of infrastructure provides a guarantee for modern life , the underground comprehensive pipeline corridor solves the problem of messy pipelines, and the separation of rainwater and sewage improves the water quality of rivers and streams, while the ground still retains traditional images such as granite paving. At the same time , ritual spaces (such as the square in front of the ancestral hall), daily spaces (such as the river and stream hydrophilic platform) and productive spaces (such as the "Wuxiu" community vegetable garden) are created to meet social needs at different levels. In the implementation process, the "partial retention + partial replacement" property rights model is innovatively adopted, and villagers are involved in design decisions through the "co-creation workshop" to ensure the social sustainability of the renewal. By 2024, the integrity of Pantang Village's historical features will be significantly improved, making it a model of "old city, new vitality". However, it also faces new challenges such as homogeneity of business formats (such as an oversupply of coffee shops) and competition for space between indigenous and foreign maker communities, which need to be further optimized through a dynamic control mechanism.

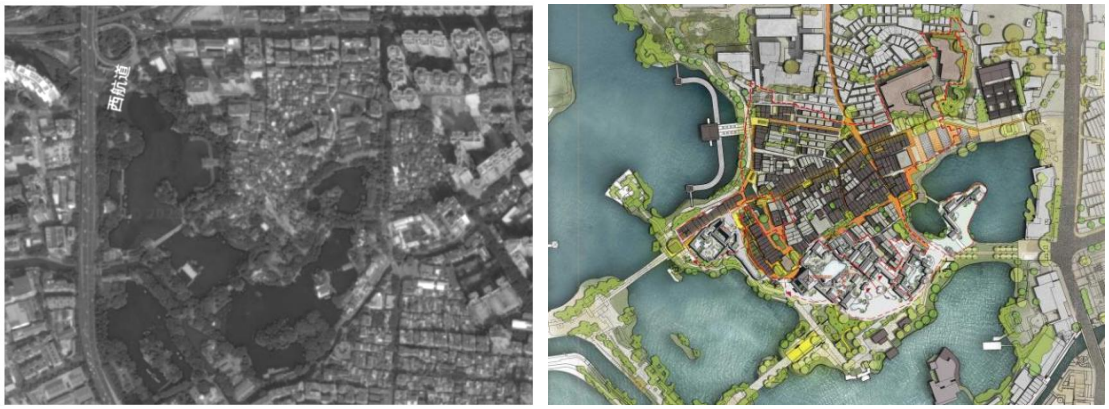


Figure 2.2-10 Left: Satellite image of Pantang Village in 2017 Right: Micro-renovation plan of Pantang Village in 2016

Source: Left: Google Maps Right: Xiangcheng Building

Through these urban maps from different periods, we can construct the historical context of Pantang Village's gradual evolution from a traditional water village to a modern urban community, providing important temporal and spatial basis for in-depth research on changes in all aspects of Pantang Village.

(2) Historical relics

1) Material remains

Renwei Ancestral Temple: First built in the fourth year of Emperor Renzong of the Song Dynasty (1052), it has a history of more than 900 years. It was renovated and expanded on a large scale during the Tianqi period of the Ming Dynasty and the Qianlong and Tongzhi periods of the Qing Dynasty. The temple faces south and covers an area of 2,200 square meters. The main building is slightly trapezoidal, 40 meters from east to west and 54 to 60 meters deep from north to south. The buildings are separated by Qingyun Lane, with a balanced and compact layout. It is a representative of ancient buildings in the south and is relatively well preserved. It is known as the first ancient temple in Lingnan. Because of its long history of preservation, typical construction technology, blue bricks and tiles, carved beams and painted buildings, it is also known as the Xiaochen Family Ancestral Hall.

Figure 2.2-11 Left: First floor plan of Renwei ancestral temple Right: Front elevation of Renwei ancestral temple

Source: Xiangcheng Architecture

Li's Ancestral Hall (Dunben Hall): Li's Dunben Hall in the Pantang Historical District is also a traditional Lingnan building. The "wok ear wall" of the Dunben Hall building is a feature of traditional Lingnan architecture. Dunben Hall was a customary place used by the Li family for worship, lighting lanterns, and dining in the old days, and it is full of ancestral hall culture. Today, these customs of Dunben Hall have faded, and the building has gone through hundreds of years of historical baptism. It is in dire straits and urgently needs protection and repair. In early 2022, the Dunben Hall was repaired in the renovation project carried out by the Liwan District Housing and Urban-Rural Development Bureau, and was revitalized as the "Pantang Hometown Museum" during the relevant exhibition.

Figure 2.2-12 Photos of the current status of Dunben hall

Source: Photo by the author

Sanguan Temple: Built in the Qing Dynasty, it is located in front of Sanguan Street. It represents the "Heavenly Official", "Earthly Official" and "Water Official" and is the spiritual temple of the original residents. The original building was only a two-story brick and wood

structure. Later, a floor and a half was added without damaging the original building. After liberation, Sanguan Temple was converted into a building for the people's commune and is still in use today. The plaque above the gate is no longer the original "Ming Dynasty Li Family", but "Pantang Third Production Team of Xijiao Brigade, Shijing People's Commune (Pantang Third Team of Xijiao Brigade)". Although the use function has been constantly changing, it is relatively well preserved as a whole.

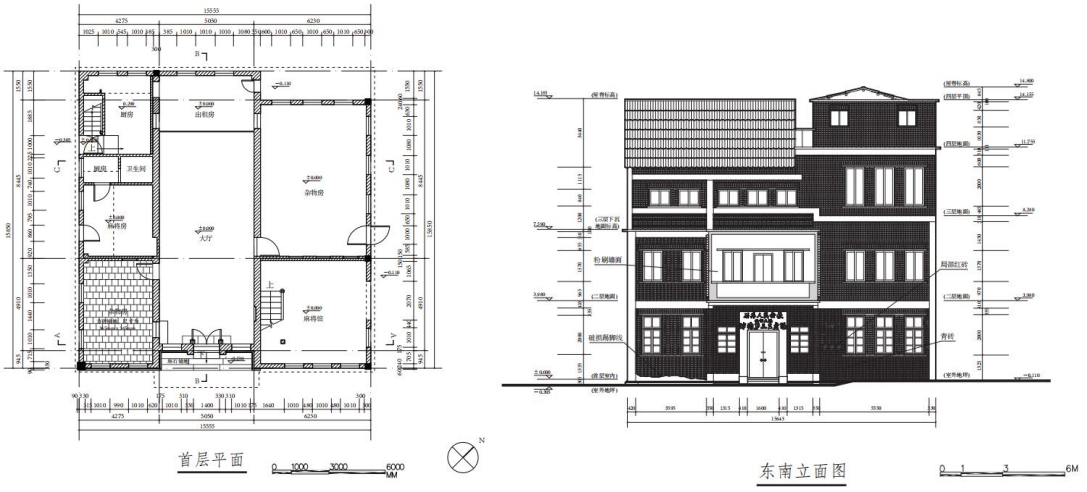


Figure 2.2-13 Left: First floor plan of Sanguan temple Right: Front elevation of Sanguan temple
Source: Xiangcheng Architecture

Panxi Wuyue Pavilion : The time of its construction is unknown. The existing main structure was built by the Huang family during the Tongzhi period of the Qing Dynasty. It is a brick and stone structure with blue bricks and gray tiles. It is about 2.5 meters high and 3.5 meters wide. The lintel is engraved with "Banxi Wuyue " and "Rebuilt in the first year of Tongzhi". The door frame is inscribed with a stone couplet "The door connects to the water source facing the North Pole, and the road welcomes the golden energy in the west". Although it is small in size, it occupies a prominent position at the intersection. It is now used as a notice booth for Pantang Wuyue Village affairs, publicizing the list of dragon boat sponsors and other matters.

Li Family Private School (Huoxia Book House) : Built in the late Qing Dynasty and early Republic of China, located in Alley 7 of Pantang Wuyue , it is a brick-and-wood structure covering an area of about 93 square meters. It is surrounded by a blue brick wall and

can only accommodate two people walking side by side in the alley. It is highly concealed and is now a residential building. The granite plaque on the lintel is engraved with "Huoxia Book House". It was once a private school for the children of the Li clan. Although the facade is dilapidated, it is the only private school building in existence. It has significant cultural value and is in urgent need of protection.

Haishan Xianguan : In the 10th year of Emperor Daoguang's reign in the Qing Dynasty, a wealthy businessman named Pan Shicheng built a famous Lingnan garden, named after the meaning of "the sacred mountain on the sea, the old house of the immortals", covering the area from Liwan Lake to the Pearl River. After Pan went bankrupt, the garden property was confiscated and later demolished and sold, and the original appearance was no longer preserved. In 1998, the government rebuilt the main building "Chuyun Building", designed by the master architect Mo Bozhi, to reproduce the historical imprint.

Granite Lanes : Pantang Wuyue , Sanyue The total length of the existing granite lanes is about 1,525 meters. The main roads include the 200-meter-long Wuyue Street, the 240-meter-long Sanyue Street, and the 125-meter-long Enzhou Street. The secondary lanes are about 1,200 meters long. The main street is 2 meters wide and the secondary lanes are 1 meter wide. They are paved with granite. The pattern is intricate and well-connected, showing the texture of the streets and lanes of the ancient village.

Pantang Wuxiu : Originated in the Tang Dynasty, it flourished in the late Ming and early Qing dynasties. It refers to the five aquatic crops of lotus root, water chestnut, water chestnut, water caltrop and wild rice shoot. Due to the fertile water quality, it has become a famous product in Lingnan. There is a saying that "food is in Guangzhou, taste is in Xiguan, and it comes from Pantang ". With the advancement of urbanization, the planting area has disappeared, and only the memory of the old Guangzhou people remains. Some private brands containing the word " Pantang " (such as shrimp-flavored slices) have been required to be removed due to trademark issues, and the protection of traditional logos is facing challenges.

According to the survey results, the number of times respondents mentioned the landmarks in Pantang Wuyue and Liwan Lake Park is as follows: Renwei Temple was

mentioned the most, reaching 17 times; followed by Shijing People's Commune (Sanguan Temple), which was mentioned 12 times; Wen Tower and Li's Ancestral Hall (Dunben Hall) were mentioned 11 times and 10 times respectively; Panxi Restaurant and Banxi Wuyue Pavilion were both mentioned 8 times; Shufen Store and Haishanxian Pavilion were mentioned 7 times and 5 times respectively; Wuyue Street was also mentioned 5 times. These data reflect the respondents' attention to different landmarks. Renwei Temple and Shijing People's Commune (Sanguan Temple) are the landmarks that respondents are most familiar with.

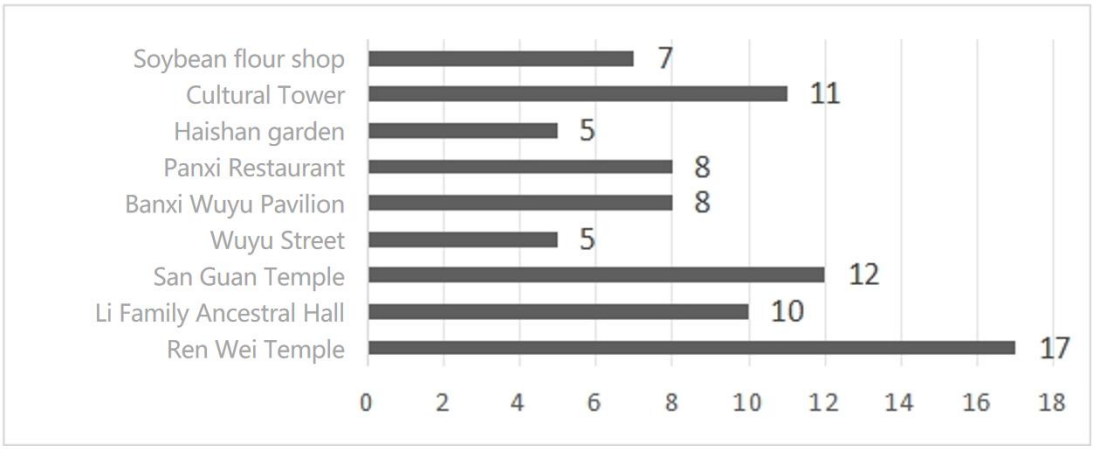


Figure 2.2-14 Number of times the main landmarks of Pantang Village were mentioned
Source: Author's own drawing

2) Intangible Relics

Pantang Beidi Festival : Pantang Beidi Festival is a unique religious folk activity that has been passed down for nearly a thousand years. In the fourth year of Huangyou in the Northern Song Dynasty (1052), as the locals mainly engaged in hydroponic farming, the people built the Renwei Ancestral Temple to worship the Beidi God in order to pray to Beidi for water protection and safety. On the third day of the third lunar month, the villagers not only worship Beidi, but also spontaneously hold temple fairs, lion dances, operas and other activities to showcase the rich local culture, and continue the tradition of praying for good weather and good harvests.

Dragon Boat Race at Dragon Boat Festival : As the earliest area in Guangzhou to carry out "Dragon Boat Race", Pantang has inherited this folk custom for more than 300 years and

is the most grand festival activity in the area. The activity includes four major links: "Starting the Dragon", "Exiting the Dragon", "Swimming the Dragon" and "Hiding the Dragon". Different from "Dragon Boat Race", "Dragon Boat Race" in Cantonese contains the fighting connotation of "Mission Rowing", showing the thousand-year dragon boat culture in the Pearl River Delta, which can be regarded as the most local folk symbol in Guangzhou.

Lion and Dragon Dance : Pantang lion dance belongs to the traditional "Southern Lion Dance", which originated in the late Ming Dynasty. It was originally a martial arts hall to show the spirit of martial arts, and later became an independent folk custom. The Southern Lion Dance emphasizes "meaning", pays attention to bridge and horse skills and abstract and vivid, which is different from the Northern Lion Dance that emphasizes "form". During festivals such as the birthday of Beidi and the Dragon Boat Festival, in front of the Renwei Temple and the Sanguan Ancient Temple, the lion dance leaps with gongs and drums, and the colorful dragon tumbles to add to the fun. It is personally performed by the villagers, showing the vitality of folk customs and cultural heritage.

Ti Si Ju" of Pantang Wuyue Village is an impromptu oral creation activity. The age is unknown. It is in the form of chanting neat and rhyming short sentences. The content covers life customs, folk allusions and even political topics. It has the functions of congratulation, entertainment and joke. Its flexible form and rich connotation have become an important carrier for rendering festive atmosphere and inheriting local culture.

2.2.2 Current situation survey

(1) Physical environment

1) Building performance

Building appearance: Pantang Village is mainly residential buildings, which maintain the traditional Lingnan architectural style as a whole, with blue bricks and gray tiles as the main colors, and the roof slope is moderate, which is conducive to drainage. Most buildings are equipped with firewalls, and the details of the shape vary slightly due to the age of the building and the family to which it belongs. After the facade renovation organized by the

government in recent years, the decoration of the building facade is relatively simple and unified. At present, there are still a small number of buildings that retain wood carvings, brick carvings and gray plastic decorations on the door lintels, window frames, wall eaves and other parts. The themes are mostly traditional elements such as flowers, birds, fish, insects, auspicious patterns, etc., but due to the erosion of time, some decorations have been damaged to varying degrees. Compared with the past, the appearance of some important buildings has been well restored in recent protection and repair projects, the colors have been restored, and the damaged decorative components have been partially replaced or reinforced. The overall appearance has been improved, but there are still some residential houses due to lack of funds for maintenance, and the appearance of the dilapidated appearance has not been significantly improved. For example, Shijing Commune has been reborn in this year's renovation and renovation. The facade has been modernized and adapted, and air-conditioning units and pipeline layout have been added, presenting an overall appearance that combines modern and traditional.

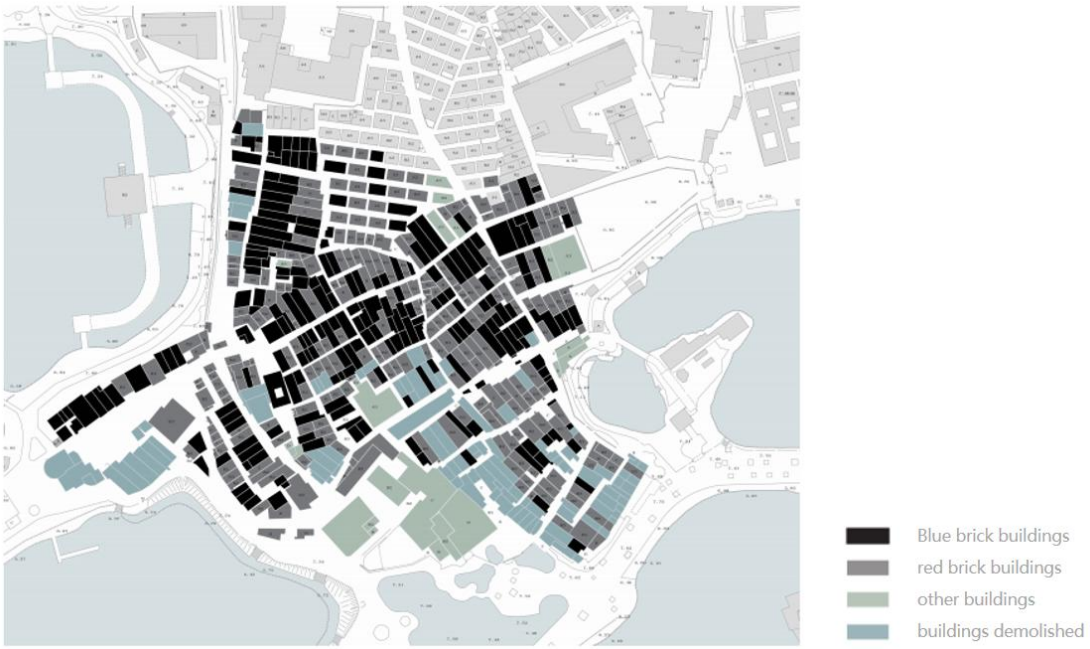


Figure 2.2-15 Pantang Wuyue building materials distribution map

Source: Adapted from Xiangcheng Architecture

Figure 2.2-16 Left: Entrance to Shijing people's commune Right: Granite alley of Enzhou street
Source: Photo by the author

Building structure: In terms of structural type, traditional residential buildings and public buildings mostly adopt a mixed brick-wood structure. The load-bearing system of traditional residential buildings is mainly brick-stone structure, and the wall plays a dual function of load-bearing and enclosure. Public cultural buildings such as Renwei Temple adopt a mixed brick-wood load-bearing structure, the main hall part adopts a wooden frame as a weighing structure, and the negative room adopts a brick-stone weighing structure. At present, most residential buildings still use wooden frame roofs covered with tiles, but some buildings have decayed and worm-eaten wooden frames due to their age, and some walls have cracked. According to the survey report of the Liwan District Housing and Urban-Rural Development Bureau in 2022, about 65% of the traditional brick-wood structure buildings in Pantang Wuyue Street have different degrees of decay of wooden components and cracking of walls, of which 20% of the buildings are identified as "partially dangerous buildings". For example, before the renovation of the Li's Ancestral Hall (Dunben Hall), its "wok ear wall" part had obvious tilt, and the wood beam worm-eaten rate reached 40%. Although local reinforcement was carried out during the micro-renovation (such as replacing 30% of the decayed wooden components), the seismic and fire resistance of the overall structure is still lower than the 2021 version of the Technical Specifications for the Protection of Historic Buildings in Guangzhou due to the limitations of traditional craftsmanship and materials. In recent renovation projects, for buildings with severe structural damage, local reinforcement or replacement of damaged components was adopted to enhance the stability of the building, but

the durability of traditional building structures is still an issue that needs to be focused on in subsequent maintenance.

Figure 2.2-17 Left: Roof after steel structure reinforcement Right: Roof during wooden structure repair
Source: Photo by the author

Building function: Traditionally, residential buildings are mainly used for living, and the internal space is divided according to the functions of the main room, bedroom, kitchen, and patio. The main room is the center of family activities, the bedrooms are distributed next to it , the kitchen is independently set up in the backyard, and the patio is used for lighting, ventilation, and drainage. The ancestral hall building undertakes functions such as sacrifices and family meetings. It has a wide space and a rigorous layout, and has functional areas such as sacrificial halls and meeting halls. With the development of the times, the functions of some buildings have changed. Some residential buildings have been transformed into shops, homestays or studios. On the basis of retaining the original appearance of the buildings, the internal space has been replanned, and functional facilities such as commercial displays and accommodation reception have been added. However, some problems have also been exposed in the process of functional transformation, such as the water and electricity transformation has caused certain damage to the original building structure, and the noise generated by commercial activities and the increase in passenger flow have caused certain interference to the living environment of the village.

Figure 2.2-18 Pantang Wuyue site function distribution map

Source: Adapted from Xiangcheng Architecture

Internal space conditions of buildings : In terms of internal space layout, Pantang Village buildings organize spatial sequences in a linear trend. The room scale is relatively small, the main room area is generally 20-30 square meters, the bedroom area is about 10-15 square meters, and the space utilization is relatively compact. Lighting mainly depends on the patio and doors and windows. The patio area accounts for about 10%-15% of the total building area, but due to the high building density, some indoor spaces are insufficiently lit. In terms of ventilation, natural ventilation channels are formed through doors, windows and patios, but during the high temperature period in summer, the indoor temperature is still relatively stuffy. In recent renovation projects, some buildings have improved lighting and ventilation conditions by adding skylights, expanding the area of doors and windows, and flexibly dividing the internal space to meet modern use needs, but in the process of space renovation, the creation and preservation of the traditional space atmosphere still needs to be strengthened.

Figure 2.2-19 Left: Wuyue Street Vegetable Store Right: Interior photo of Enzhou Street after renovation
Source: Photo by the author

2) Infrastructure and public services

Infrastructure: Measured data show that the width of the main lane of Pantang Wuyue Street is only 1.8-2.2 meters, and the secondary lane is less than 1.5 meters. In addition, more than half of the residents dry clothes in the lane, further compressing the vertical clearance to 1.6 meters, seriously affecting the normal traffic on the road. In terms of road traffic, after the renovation, the road conditions in Pantang Village have been improved to a certain extent. Traditional roads such as granite alleys have been repaired and maintained, maintaining their original quaint style, while also meeting the daily traffic needs of residents and tourists. Some areas have also been widened and optimized to meet the requirements of vehicle traffic and fire protection. For example, the intersection of Wuyue Street and Pantang Wuyue New Street has met the normal traffic needs by demolishing some buildings. In terms of water and electricity facilities, the supply of water and electricity is relatively stable and can meet the basic needs of residents' daily life and commercial activities. In the renovation of some old houses, water and electricity lines have also been updated and renovated to improve safety and reliability. In terms of the drainage system, the drainage system of Pantang Village has received attention and improvement during the renovation. The combination of traditional open ditch drainage and modern concealed pipe drainage has effectively solved the problem of rainwater discharge, reduced the occurrence of waterlogging, and protected the village buildings and residents' living environment.

Figure 2.2-20 Left: Photo of Pantang Sanyue street reconstruction Right: Photo of Pantang Sanyue downspout reconstruction

Source: Photo by the author

Public services: In terms of cultural facilities, the renovated Sanguan Temple (Shijing Commune) and the Party and Mass Service Center are more important cultural exchange venues within Pantang Village. As an important historical witness and cultural venue of Pantang Ancient Village, Sanguan Temple has been well protected and utilized. It is not only a place for folk associations such as Dragon Boat Club and Lion Dance Club to place materials, but also often holds various traditional cultural activities, inheriting and promoting the history and culture of Pantang Village. The small square opened up in front of Sanguan Temple has become an important place for villagers and tourists to participate in activities. During traditional festivals, villagers and some tourists will gather in the small square in front of Sanguan Temple to prepare and participate in folk activities. In addition, the direct-managed public housing of Pantang Wuyue has set up a party and mass service station to hold cultural exchanges, salons and other activities, enriching the cultural life of community residents and tourists and enhancing the cultural atmosphere and vitality of the community. At present, Pantang Village has added venues in education, medical care, entertainment and leisure, and the changes in Pantang Sanyue are the most obvious.

(2) Social environment

1) Population composition

Indigenous people: There are still a certain number of indigenous people living here. They are the inheritors and witnesses of the history and culture of Pantang Village. Most of

them are descendants of families who have lived here for generations. Their surnames are quite diverse, such as Li, Huang, etc. They have formed a unique village culture and lifestyle over a long period of time, and have deep feelings and a sense of belonging to Pantang Village.

New "villagers": With Pantang Wuyue being listed as a national pilot for renovation of old residential areas and the advancement of micro-renovation projects, more and more artists, cultural and creative practitioners, merchants, etc. have settled in Pantang Village. Although these people are not indigenous people in the traditional sense, they live and work in Pantang Village and have become part of Pantang Village, bringing new vitality and cultural elements to the village and promoting the integration and development of traditional and modern culture.

Tourists: As an ancient village with a history of more than 900 years, Pantang Village has attracted a large number of tourists with its unique historical and cultural features. Especially during holidays and cultural activities, the large number of tourists has brought great popularity and certain economic benefits to the local area, and further enhanced the popularity and influence of Pantang Village.

Figure 2.2-21 Analysis of clan distribution in Pantang Village
Source: Xiangcheng Architecture

According to the results of the on-site survey, the majority of the interviewees in Pantang Wuyue and Liwan Lake Park were tourists, accounting for about 84%, while shop owners accounted for the least, about 3%, and residents accounted for about 13%.

According to the age survey results of the population in Pantang Wuyue and Liwan Lake Park, the population under 25 years old accounted for the highest proportion, reaching 38%. Closely followed by the population aged 26 to 35 years old, accounting for 29%. The population aged 36 to 45 years old accounted for 17%, while the population aged 46 to 55 years old accounted for 7%. Finally, the population aged 55 and above accounted for 9%. From the data, it can be seen that the young population occupies a large proportion in Pantang Wuyue and Liwan Lake Park, and as the age increases, the proportion of the population gradually decreases, with the 46-55 age group being the least, and the population aged 55 and above increasing.

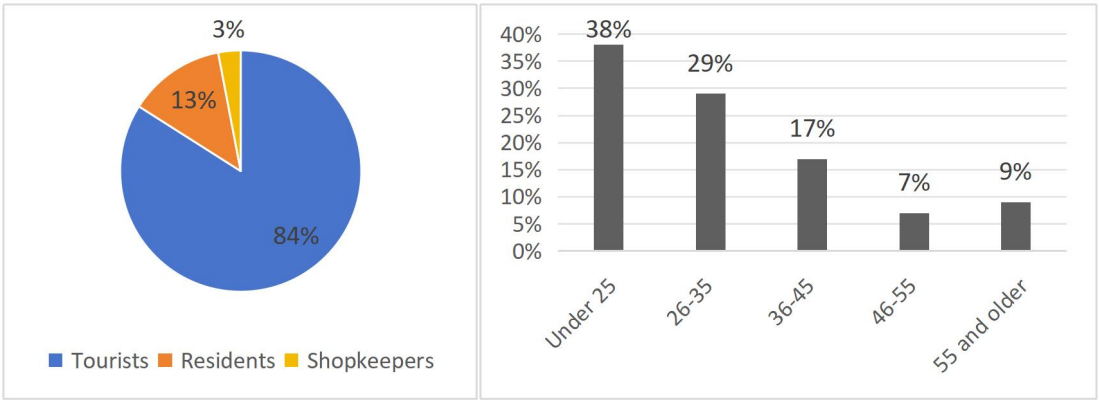


Figure 2.2-22 Population composition of Pantang Village

Source: Author's own drawing

2) Daily Behavior

With the arrival of Pantang Wuyue merchants and the integration of Liwan Lake Park and Pantang Wuyue, Pantang Village is no longer a traditional living area. The current daily life in Pantang Village includes traditional life and modern life.

a. Traditional lifestyle

Most of the indigenous people of Pantang Village maintain their traditional living habits. Due to the high density of houses and narrow streets in Pantang Village, villagers hang their clothes to dry in the streets. This causes the vertical space of the streets to be compressed, making the already narrow streets even more crowded and difficult to navigate.

Sacrifice is also an important traditional behavior in the lives of the residents of Pantang Village. During important festivals, such as the Spring Festival, Qingming Festival, and

Mid-Autumn Festival, villagers will go to ancestral halls or temples to offer sacrifices. During the activities, the elders will lead the younger generations to perform sacrificial ceremonies to pass on family culture and traditional customs. Community managers revealed that Pantang is currently preparing a young tour guide project, which aims to cultivate the third and fourth generations of Pantang children to understand Pantang culture, and then pass on Pantang culture and promote it to the outside world. In addition, Pantang Village also has some sacrificial activities related to local beliefs, such as the Renwei Temple dedicated to Pak Tai. On special days such as the birthday of Pak Tai, villagers and believers will come to burn incense and offer sacrifices, and there will also be folk performances such as dragon and lion dances to add to the fun.

In addition, some villagers still retain the habit of making traditional handicrafts. For example, they make handicrafts or specialty foods related to Pantang Wuxiu (water chestnuts, water chestnuts, water caltrops, wild rice shoots, and lotus roots). Some women make lotus root powder from fresh lotus roots, or make water chestnut cakes from water chestnuts. Some craftsmen also make traditional Lingnan handicrafts, such as weaving straw mats and making wood carvings. Some of these handicrafts are used at home, and some are sold in the village market or shops.

Figure 2.2-23 Left: Pantang Wuyue dragon boat race scene photo Right: Enzhou street horse hoof noodle shop

Source: Photo by the author

b. Modern life behavior

Along the waterfront area of Liwan Lake Park, many old houses have been converted into B&Bs. These B&Bs retain Lingnan architectural elements such as wok-ear walls and

Manchu windows. The rooms are equipped with floor-to-ceiling windows with lake views. Next to the B&B is a cultural and creative cafe with a riverside terrace.

In addition, Pantang often holds various cultural activities. During holidays, the Renwei Temple Square will hold an intangible cultural heritage market to showcase traditional crafts such as Pantang lion dance, Guangdong embroidery, and wood carving. Villagers will also offer "Wuxiu" planting experience classes to allow tourists to participate in water village farming activities. At the same time, the old buildings in the ancient village are reused: the Li Clan Ancestral Hall has been converted into a hometown museum, where art exhibitions are held regularly. With the addition of new villagers, cultures from different regions converge here. On the one hand, traditional folk customs such as Pantang lion dance and dragon boat scene have been inherited; on the other hand, modern cultural and creative concepts have also brought new ways of presenting traditional culture.

According to the survey results, the main reasons for respondents to visit Pantang Wuyue and Liwan Lake Park showed a trend of diversification. Among them, taking photos and checking in was the main motivation, accounting for as high as 32%. Many respondents chose to come here to capture the beautiful scenery and unique architecture. The second was leisure and fitness, accounting for 28%, indicating that the environment of the park and Wuyue is very suitable for various fitness activities. Taking a walk after dinner is also one of the reasons why respondents often come here, accounting for 18%. Many people like to take a walk here after dinner to enjoy the fresh air and quiet atmosphere. In addition, the respondents who came by the way accounted for 14%, indicating that the geographical location of these two places is convenient and it is easy to become part of people's daily travel. The respondents who participated in the event accounted for 6%, indicating that the park and Wuyue also held some attractive activities. The respondents who brought children and did business accounted for 4% each, indicating that this is also a place suitable for family activities and business activities. Finally, 5% of the respondents had other reasons, which further enriched the diversity of the respondents' visits.

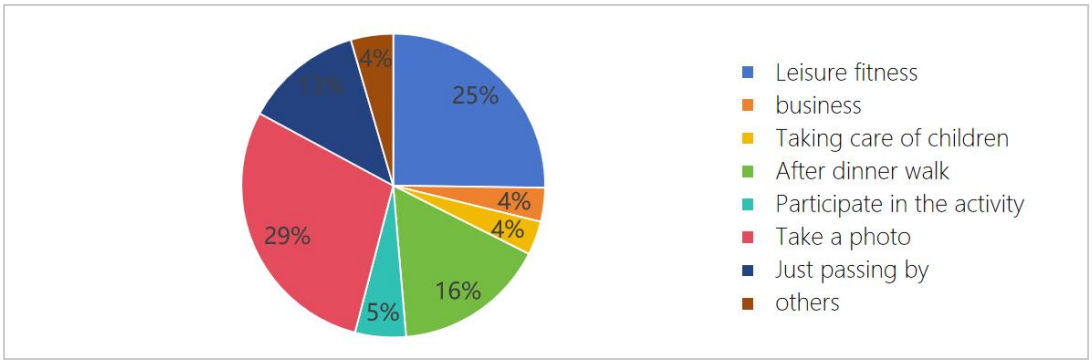


Figure 2.2-24 Activity motivation ratio of people in Pantang Village

Source: Author's own drawing

2.2.3 Problem presentation

By combing through the historical development and current situation of Pantang Village and combining it with the perspective of typo-morphology , we can summarize the following core issues:

(1) The contradiction between traditional building protection and functional renewal

Building aging and structural risks: Many traditional brick and wood structures in Pantang Village have suffered from decaying wood components and cracking walls due to their age. Although they have been partially repaired, their overall durability is still insufficient and they are in urgent need of systematic reinforcement.

Insufficient functional adaptability: The spatial layout of traditional dwellings (such as narrow patios and compact bedrooms) is difficult to meet the needs of modern commerce or cultural creation. The addition of water and electricity lines during the renovation may damage the original structure and lack the continuation of the traditional spatial atmosphere. Although the glass facade design of some shops improves lighting, it lacks ventilation and air permeability and lacks interaction with the surrounding environment. Although this renovation improves the appearance, it fails to truly achieve the integration of tradition and modernity.

Imbalance between protection and development: In commercial transformation, uniform restoration of the facades improves the style, but may weaken the diversity of architectural details. While retaining the Qing Dynasty layout, the renovation project of Pantang Wuyue

introduced business formats such as cafes and cultural and creative offices. However, the glass facades of some newly built buildings formed a sharp contrast with the traditional blue brick and tile roofs, destroying the overall style.

(2) Conflict between spatial form and contemporary usage needs

Limited street and lane scale: The granite lane is only 2-3 meters wide , and the vertical space is occupied by clothes drying, resulting in traffic congestion and poor fire and emergency access. Modern commercial activities (such as tourist gatherings and cargo transportation) further increase space pressure. The granite lanes in Pantang Village are narrow and have a large passenger flow, resulting in prominent fire hazards and difficulty in meeting the needs of modern commercial activities.

Insufficient public space: Traditional sacrificial ceremonies and folk activities (such as Beidi Festival and lion dance) rely on limited venues such as Sanguan Temple Square, while new commercial facilities (such as cafes and homestays) occupy public areas, triggering a competition for space between indigenous residents and merchants. Sanguan Temple Square is an important venue for villagers and tourists, but with the increase of commercial facilities, public space has gradually been compressed.

Fragmented transportation network: The main and secondary lanes are complicated and poorly connected to the main roads in the city. The lack of a tourist guidance system can easily cause local congestion and difficulty in finding the way . The lack of a systematic planning of Pantang Wuyue 's transportation network makes it difficult for tourists to find attractions.

(3) Dilemma of cultural inheritance caused by social structural changes

Imbalanced population structure: Aboriginal people account for only 13%, and young people (38% under 25 years old) are mainly tourists, which leads to the marginalization of traditional life behaviors (such as sacrifices and handicrafts) and the weakening of community cultural identity. The number of Aboriginal people in Pantang Village is small, which makes it difficult to continue traditional handicraft production activities.

The impact of commercialization on culture: Although the introduction of cultural and creative industries has boosted the economy, traditional brands such as “ Pantang Wuxiu” are restricted due to trademark issues, and some intangible cultural heritage activities (such as “Ti Si Ju”) are at risk of being lost due to lack of participants.

Insufficient community participation: Although the micro-renovation respects the opinions of indigenous people, the participation of residents in the subsequent management is low. The influx of businesses and tourists has changed the original social network of the community, and the indigenous people are skeptical about the long-term benefits of the renovation. Although the renovation project of Pantang Village has been recognized by the villagers, the participation of residents in the subsequent management is low, resulting in insufficient community vitality.

(4) Infrastructure and environmental sustainability challenges

Drainage system pressure: The drainage system that combines traditional open ditches with modern concealed pipes still faces the risk of waterlogging during the rainy season, affecting the safety of building foundations.

Uneven distribution of service facilities: Education and medical resources are mostly concentrated in Pantang Sanyue, and Wuyue Street is inadequately equipped to meet the dual needs of permanent residents and tourists.

Fragmentation of ecological landscape: There is a lack of transition design at the junction of Liwan Lake Park and the village. The continuity of the water landscape is interrupted by the newly built commercial buildings, which weakens the spatial image of the traditional water town.

Pantang Village are mainly reflected in the following aspects : morphological protection lags behind functional transformation, spatial carrying capacity is overloaded, cultural vitality is declining, and environmental resilience is insufficient. It is urgent to start from typo-morphology and propose a design strategy that takes into account both historical stratification and contemporary adaptability in order to achieve sustainable renewal of

traditional blocks.

2.3 Related issues and typo-morphology

The problems presented by Pantang Wuyue Street can be analyzed in depth from the perspective of typo-morphology . Typo-morphology focuses on the generation, evolution and internal logic of urban and architectural forms, and emphasizes providing a theoretical basis for urban renewal through type extraction, spatial analysis and historical layering research. Combined with the problems summarized in the previous article, its relationship with typo-morphology is mainly reflected in the following aspects:

2.3.1 Adaptability of architectural form and functional transformation

Typological continuity and adaptive transformation: Traditional Lingnan waterside architecture (such as brick-and-wood structure houses and ancestral halls) has specific spatial types (such as patio and hall layout), but modern commercial and cultural and creative functions require more open and flexible planes. Typo-morphology can analyze the spatial organization rules of the original building type and propose adaptive transformation strategies, such as optimizing the internal space flow while retaining the facade style, or realizing the organic integration of new and old functions through "typological transformation".

Explicit expression of historical stratification: Some buildings have mixed types due to multiple renovations (such as the transformation of Sanguan Temple from a temple to a commune building). Typo-morphology can sort out their historical stratification and identify core protection elements , such as structure and decoration, to avoid cultural breaks during renovation.

2.3.2 Optimization of street space form and utilization efficiency

Type extraction and scale reconstruction: Pantang 's granite lanes are typical Lingnan narrow lanes (2-3 meters wide) , and their scale conflicts with contemporary fire protection and commercial needs. Typo-morphology can propose a hierarchical traffic strategy by comparing successful cases of similar historical blocks : the core area retains the traditional

lane texture, and the edge area is moderately widened or an invisible fire passage is added.

Strengthening public space nodes: Traditional festivals rely on specific space types such as Renwei Temple Square. Typo-morphology can identify such “cultural anchor points” and enhance the carrying capacity and multifunctionality of nodes by adding movable facilities or expanding adjacent open spaces.

2.3.3 Continuation and innovation of social and cultural forms

Typology-behavior association research: Aboriginal sacrificial and handicraft activities are closely related to specific building types (ancestral halls, street shops). Typo-morphology can analyze the behavior-space matching relationship, such as implanting intangible cultural heritage workshops around the Li's ancestral hall, and integrating traditional rituals with modern display functions through the "nested design" of space types.

2.3.4 Systematic integration of infrastructure forms

Ecological type restoration: The fragmentation of the water landscape at the junction of Liwan Lake and the village can be solved by restoring the traditional "pond-stream-courtyard" spatial type sequence to strengthen the penetration relationship between the natural and built environment.

2.4 Summary

Pantang Village is located in the core area of the Guangdong-Hong Kong-Macao Greater Bay Area and is a window for displaying the history and culture of the west of Guangzhou. It is connected to Zhongshan Eighth Road and Liwan Lake Park in the north, Longjin West Road Cultural Belt in the east, Huangsha Avenue and Shamian Island in the south, and the Pearl River coastline in the west, forming a three-dimensional road network of "water and land interweaving". The terrain is a low-lying alluvial plain (5-8 meters above sea level). Historically, it relied on the Pearl River system, rainwater and groundwater to form a hydrological pattern of "three waters co-existing", giving birth to the "base pond agriculture" and " Pantang Five Shows" (lotus root, water chestnut, water chestnut, bamboo shoots, and

water chestnut) ecological industries. The existing "two horizontal and three vertical" river system has reached Class IV water quality standards after treatment, becoming the core carrier of cultural and tourism integration.

In terms of historical relics, Renwei Temple (Song Dynasty), Li's Dunben Hall, and Sanguan Temple (Qing Dynasty) carry clan beliefs; intangible cultural heritage such as Beidi's Birthday and Dragon Boat Racing continue the vitality of folk customs, while the " Pantang Five Shows" faces a crisis of inheritance due to trademark issues.

The core contradiction between Pantang Village's current problems and typo-morphology is the misalignment between historical spatial forms and modern functional requirements: insufficient architectural adaptability , overloaded street space , social and cultural imbalance , and weak infrastructure .

This chapter then gives the response path of typo-morphology , and reconstructs through morphological methods to achieve the coordination of historical stratification and contemporary adaptability: building type conversion, street scale reconstruction, behavior-space matching , and ecological type restoration. It emphasizes the need for balance between protection and development , the preservation of historical genes (wok-ear walls, granite alleys), functional space adaptation (commercial and residential symbiosis), and social and cultural resilience (indigenous people participation mechanism), to continue the value of the living heritage of Lingnan Water Village.

Chapter 3 Analysis of the Typo-morphological Characteristics and Evolution of Pantang Village

Through the analysis of the existing problems and needs of Pantang Village in the previous chapter, combined with existing historical maps, historical documents and other research materials, this paper mainly analyzes and studies the "material" spatial form of Pantang Village from the seven elements of Pantang Village's street system and streets, blocks and plots, public spaces, and architectural layouts and three-dimensional architectural forms, divided into four sections. In order to explore the mutual relationship between the various morphological elements and the laws of the "diachronic" evolution of each morphological element, each morphological element mainly includes the development background of the elements (type evolution) and the introduction of morphological characteristics. In the study of some elements, quantitative methods are combined to highlight the morphological characteristics more accurately. At the same time, in order to further analyze the "intangible" spatial form in the spatial form, historical documents and contemporary newspapers and periodicals are combined to appropriately analyze the use status and evaluation feelings of the crowd in the ancient village space. Finally, through the summary of the evolution laws of various morphological elements, the urban morphological units of Pantang Village are divided and the boundaries and scope of the protection and renewal of Pantang Village are clarified.

3.1 Street system and streets

The analysis of the street system in this section focuses on its overall structural form and internal hierarchical relationship, while the analysis of the streets focuses on the streets, street directions, D/H values, and their relationship with surrounding buildings and the environment. At the same time, the analysis of the above content will serve as a reference for subsequent update strategies.

3.1.1 From the late Qing Dynasty to the Republic of China (late 19th century-1949)

Due to the lack of accurate surveying and mapping of Pantang Village (located in the west of Guangzhou, now in Liwan District) during this period, this study mainly makes reasonable inferences based on oral history, local chronicles, aerial photos and the common characteristics of settlement forms in the Xiguan area of Guangzhou during the same period. During this period, Pantang Village still retained the traditional water village settlement pattern, but was initially affected by modern urbanization, and the street system showed a mixed feature of natural growth and local planning.

The street network of Pantang Village is mainly organically grown. The core area is developed around the ancestral hall, temple and market, forming a combination of radial and herringbone layout. Its structure has a significant water system orientation. The rivers and streams (such as the Lizhi river tributary) are parallel or staggered with the streets, forming a typical Xiguan model of "streets in front and streams in the back". Simple docks are set at the end of some streets and lanes. The street hierarchy is clear. The main street (such as the north-south road connecting Longjin West Road and the ancestral hall in the village) is about 4-5 meters wide and paved with stone slabs or rammed earth; the secondary lanes are 2-3 meters wide, mostly dirt roads or gravel roads, serving residential groups. In terms of density distribution, the core area has dense streets and lanes, such as near Renwei Temple and Sanguan Temple; the marginal areas near farmland or orchards are sparse, with many dead-end roads.

In terms of function and spatial characteristics, the main street has both transportation and commercial functions, with teahouses, grocery stores and handicraft workshops distributed along the street; the alleys are mainly residential, and some wide alleys have wells or public drying areas. The width-to-height ratio of the streets and alleys is generally greater than 1:1 (most of the buildings are 1-2-story brick and wood structures), forming a narrow and sheltered linear space that adapts to the Lingnan climate. Most of the buildings along the street are blue brick wok-ear houses or bamboo tube houses, with gables facing the street, and

simple door lintels and eaves decorations; some sections of the road have Qilou fragments (influenced by the Xiguan urban area), but they have not formed a system. They are mainly the inner street along the river (S1 type), the outer street along the river (S2 type), the lakeside road (S3 type) and the general alley (S4). S1, S2, and S3 type streets rely on river shipping and dock transactions, and at the same time, to meet the travel of a large number of residents and businessmen, so the road width is relatively wide, with the widest point reaching 6 meters. Since S4 type alleys mainly meet the travel needs of local residents, the road width is relatively narrow. The width of Wuyue Street and Enzhou Street is about 3 meters.

The formation of this spatial form was influenced by both geographical constraints and social structure: the village was restricted by rivers and swamps, and the direction of the streets followed the terrain to avoid low-lying areas; at the same time, the clan settlement model strengthened the centripetal road network centered on the ancestral hall.

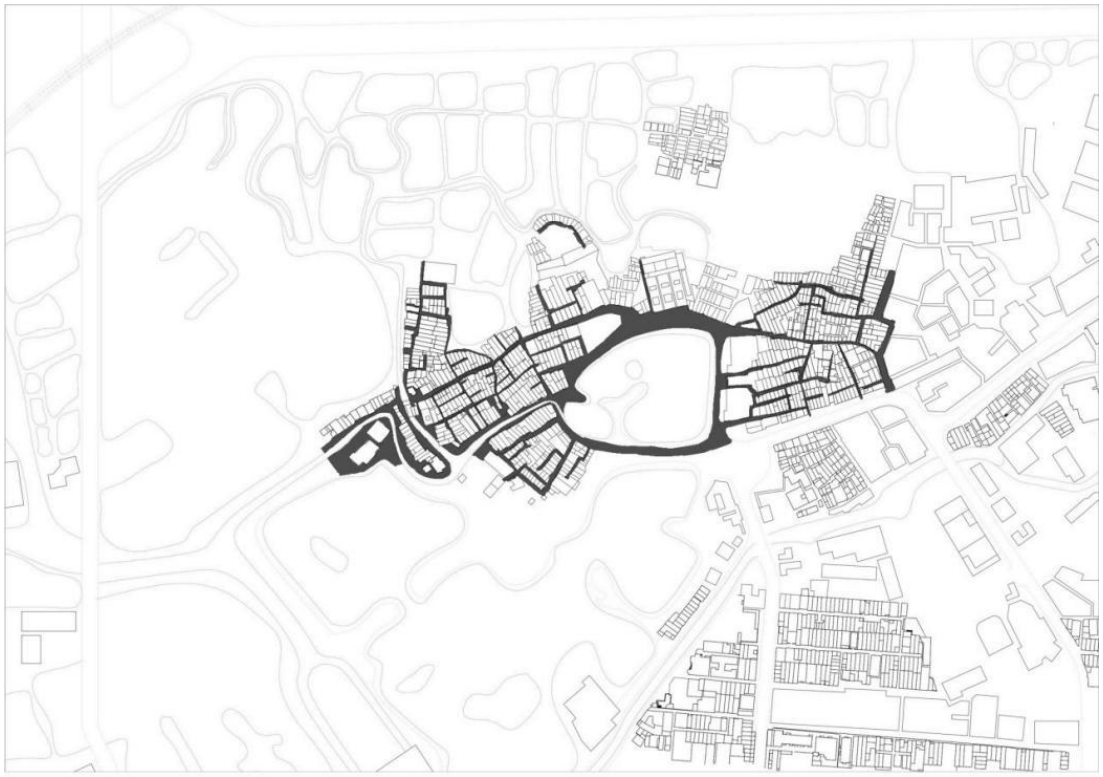


Figure 3.1-1 Street system of Pantang Village in the late Qing Dynasty
Source: Author's own drawing

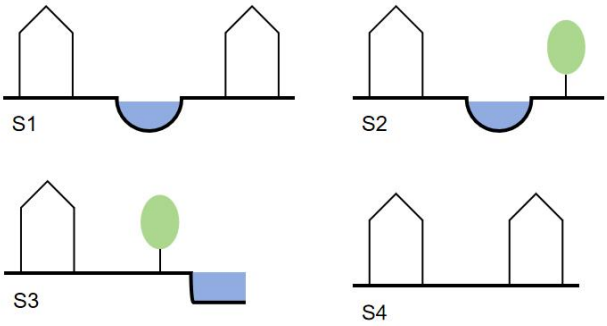


Figure 3.1-2 Street morphology of Pantang Village in the late Qing Dynasty
Source: Author's own drawing

3.1.2 Early years of the founding of New China - before reform and opening up (1949-1978)

The street system of Pantang Village during this period showed typical characteristics of the transition from traditional water village settlement to modern urban space. Since systematic surveying and mapping data for this period is still scarce, this study attempts to restore the street form of this special historical node through local archives, oral history, and horizontal comparison of urban development patterns in the Xiguan area during the same period.

In terms of overall structure, Pantang Village still maintains a herringbone-shaped street network with the ancestral hall and the supply and marketing cooperative as the core, but the production transformation during the collectivization period has made some areas present a more regular spatial layout. The main street connecting Longjin West Road has been widened to 5-6 meters and paved with cement or gravel to accommodate the growing traffic needs of bicycles and carts, while most secondary lanes still maintain the traditional scale of 2-3 meters.

Around 1960, 157 large and small channels were rebuilt with a total length of 1,867 meters. The Maji River, Enzhou North, Nanheng, Doufumu River, Baisui River and other rivers that run through the jurisdiction were built into reinforced concrete channel box sewers, and the original old stone slab open channels were replaced by tile pipe culverts. With the advancement of Guangzhou's river and creek regulation project in the 1970s, some waterways

were filled or diverted, causing partial changes to the original typical pattern of "streets in front and rivers in the back". However, historical traces of alleys and rivers interweaving in parallel can still be seen in areas such as Pantang Wuyue. In addition, Zhongshan 8th Road, which was built in 1960, was completed, and the section of Zhongshan 7th Road from Gaoji to Liwan East to connect with Zhongshan 8th Road was also completed at the same time. This trunk line connects to the Pearl River Bridge and becomes an important western exit for Guangzhou's land transportation, prompting the planning of Wuyue New Street and Pantang Road in the next research phase.

In terms of street types, the street types in Pantang Village are mainly traditional streets (S types). Among them, the inner street on the river bank (S1 type) and the outer street on the river bank (S2 type) have evolved into the variant inner street on the river bank (S1 ' type) and the outer street on the river bank (S2 ' type) due to the river cover. The variant inner street on the river bank (S1 ' type) is similar to the general lane (S4 type) in use and appearance, and only differs in paving materials. The lakeside road (S3 type) and the general lane (S4 type) are relatively intact. The lakeside road (S3 type) has a lower width-to-height ratio due to the widening of the space in front of the temple, and the width-to-height ratio of some general lanes (S4 type) has increased with the addition of buildings.

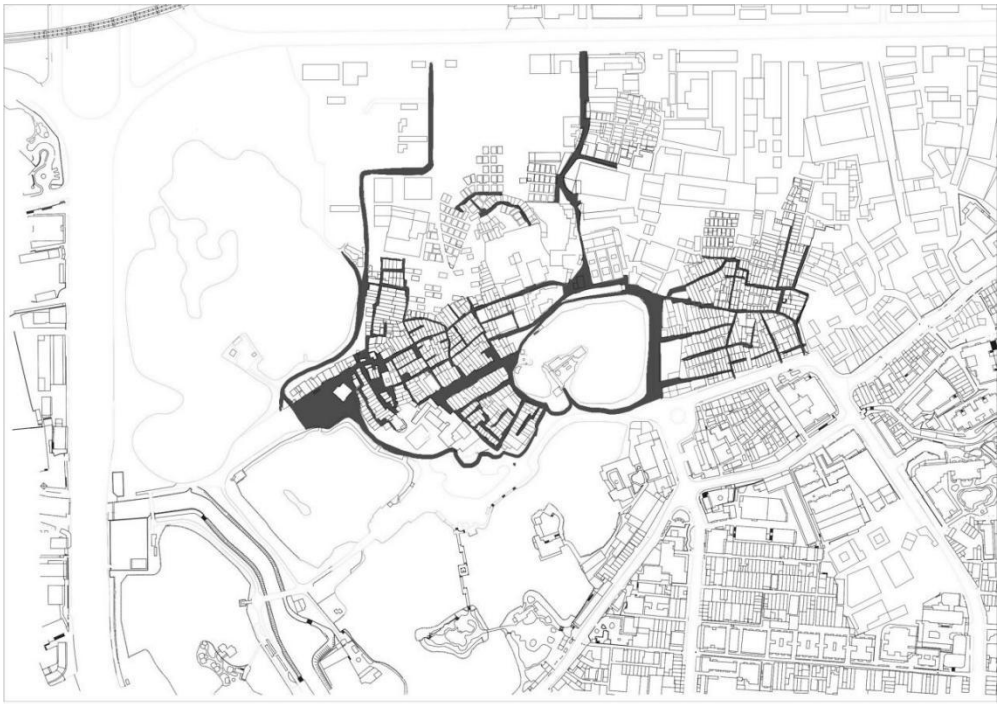


Figure 3.1-3 Street system of Pantang Village after the founding of New China
Source: Author's own drawing

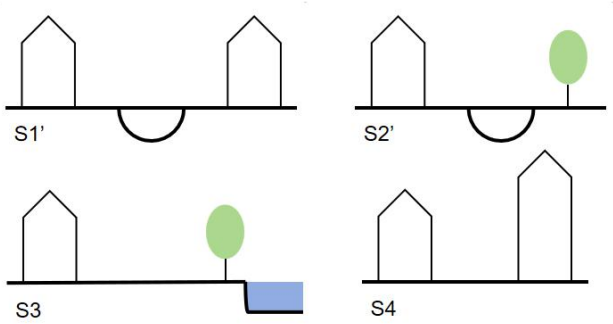


Figure 3.1-4 Street morphology of Pantang Village after the founding of New China
Source: Author's own drawing

3.1.3 After the reform and opening-up - before urban renewal (1978 - 2016)

With the deepening of urban renewal in Guangzhou, Pantang Village has developed into a characteristic block with both historical features and modern functions in the years after the reform and opening up. This study systematically examined the street system and street type characteristics of this stage through field research, satellite image analysis and urban planning data.

In terms of the overall pattern, Pantang Village has formed a "three horizontal and three vertical" trunk road network framework. Among them, Zhongshan Eighth Road and the newly planned Pantang Road-Longjin West Road constitute the main external connection channels, with a road width of 8-15 meters and asphalt concrete paving. The internal branch road system retains the traditional texture, and the 2-3 meter wide granite lanes are winding and tortuous, forming a sharp contrast with the newly built roads. After the river system was renovated, a landscape waterway with a width of 3-5 meters was formed, which is parallel to the street to form a characteristic waterfront space.

The width-to-height ratio of the streets is clearly differentiated, with traditional lanes maintaining a scale of 1:0.8-1.2, while new roads reach a modern urban scale of 1:3-5. In terms of architectural interface treatment, the historical blocks use traditional elements such as blue brick facades and Manchu windows, while the new areas are mainly made of modern

materials, but they are coordinated through color and volume control.

In terms of street types, during this period, due to the planning and construction of Pantang Road, a new street type (Q type) appeared in Pantang Village. This type was greatly influenced by the superior planning and economy, and it suddenly formed a new street type during the evolution of the street system and street types in Pantang Village. At this time, the covered inner street on the edge of the river (S1 ' type) and the covered outer street on the edge of the river (S2 ' type) in the traditional street type (S type) changed compared with the previous period. After the river regulation project, the water quality of Lizhi river River and its tributaries improved, and some of the rivers and streams that were once covered gradually re-emerged. At this time, the traditional street type (S type) showed a coexistence mode of inner street on the edge of the river (S1 type), outer street on the edge of the river (S2 type) and inner street on the edge of the river (S1 ' type), and outer street on the edge of the river (S2 ' type). At the same time, due to the demolition or collapse of some buildings caused by the demolition plan in 2013, the width-to-height ratio of the general lane (S4 type) in the traditional street type (S type) changed.

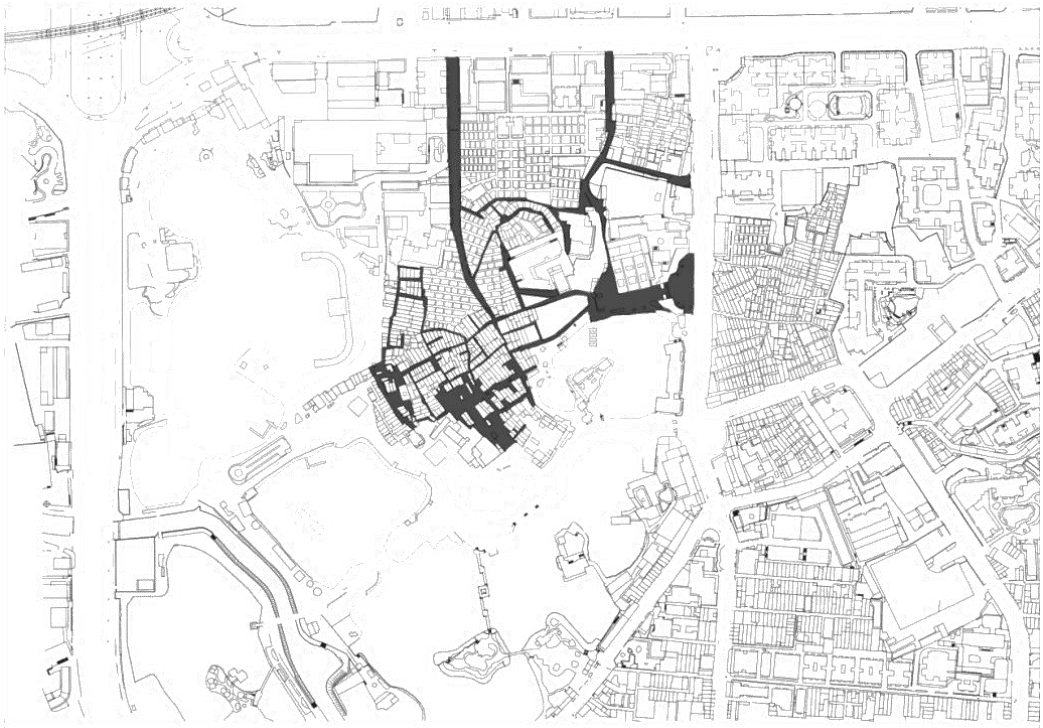


Figure 3.1-5 Street system of Pantang Village after the reform and opening up
Source: Author's own drawing

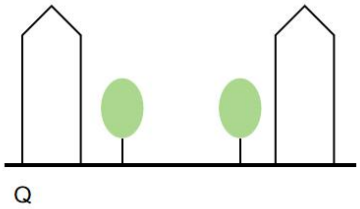


Figure 3.1-6 New Street Type (Q Type)
Source: Author's own drawing

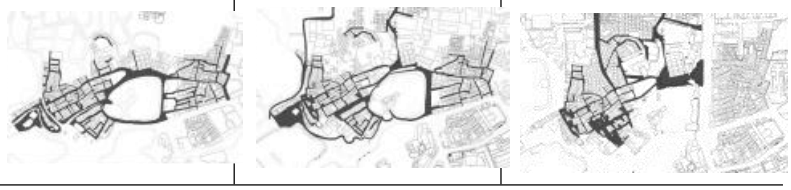
3.1.4 Evolution of street systems and street types

Through the analysis of the street system and street morphology, it can be seen that there are currently two types of street systems and four types of streets in Pantang Village . Among them, the street system types are divided into "fishbone" street system (J type) and "grid" street system (K type). The "fishbone" street system runs through the entire research period. At different times, it has evolved to meet the large traffic needs brought about by the increase in population and trade. There are currently two types of streets in Pantang Village : traditional street type (S type) and new street type (Q type), among which S type includes inner street (S1 type), outer street (S2 type), lakeside road (S3 type) and general lane (S4 type) . The two types of streets, lakeside road (S3 type) and general lane (S4 type) , run through the entire research, while inner street (S1 type) and outer street (S2 type) disappeared at the end of the second stage . At the same time, the evolution process of the new street type (Q type) is a phenomenon of mutation under urban planning. In this type of process, planning and economic forces are the dominant factors, and other social factors assist in the completion of its evolution, such as the extension and widening of street pavements, the establishment of green belts on both sides of the streets, etc. At the same time, it can be found that the characteristics of the two street types S3 and S4 are relatively stable throughout the research period.

(1) Street system type process

Table 3.1-1 Pantang Village street system type process data Source: Author's own drawing

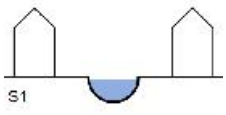
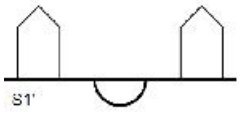
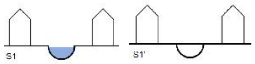
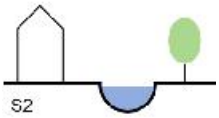
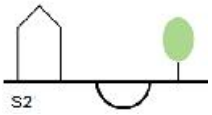
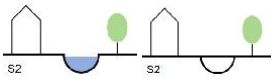
type	Ming and Qing Dynasties	Late 19th century - 1949	1949-1978	1978-2016

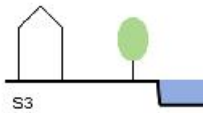
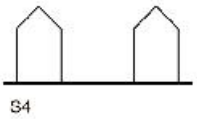
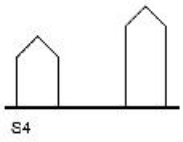
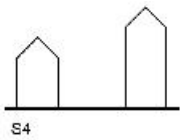
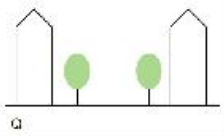
Fishbone (J)		1. Significant water system orientation 2. Rivers (such as Lizhi river tributaries) parallel or intersecting with streets 3. “ Front Street and Back Flow ”	1 Street spreads northward as the residential area expands 2. Some waterways were filled or diverted	1 New street planning breaks the original pattern (Pantang Road, Wuyue New Street) 2The streets near Renwei Temple are getting bigger 3. Part of the river is flooded again
				
process	→			
Grid (K)			1 New residential area on the north side and distribution around the factory	1Modern real estate and road planning 2Orderly expansion of traditional residential areas
				
process	→			

(2) Street type process

Table 3.1-2 Evolution of street types Source: drawn by the author

type		Ming and Qing Dynasties	Late 19th century - 1949	1949-1978	1978-2016
S	Riverside Inner Street (S1)		1. Road width is 6-10 meters 2 The street shape is relatively regular 3. Both sides are one-story residential	1 River surges up the cover 2 S1 evolves into variant S1' 3. Building height increases, 0.5 < D/H < 1.5	1. Part of the river channel re-emerges to S1 type, and S1 and S1' coexist 2Other features continue from the previous stage

			buildings, 1 < D/H < 2		
					
process			→	‖	→
Riverside Outer Street (S2)			1. The road width is 4-8 meters, and one side of the street is green space. 2 The street shape is relatively regular 3. Both sides are one-story residential buildings, 0.5＜ D/H＜2	1 River cover 2 S2 evolved into variant S2' 3. Building height increases, 0.5＜ D/H＜1	1. Part of the river channel re-emerges to S2 type, and S2 and S2' coexist 2 Other features that continue from the previous stage
					
process			→	‖	→
Lakeside Road (S3)			1. The road width is 4-8 meters, and one side of the street is a swamp. 2 The street shape is relatively regular 3 One side is a one-story residential building, 0.5＜ D/H＜2	1. The road width is 4-15 meters, and one side of the street is Liwan Lake. 2. Irregular waterfront space 3. Building height increases, 1＜D/H ＜2	Continuing the characteristics of the previous stage

					
	process	→			
	General roadway (S4)		1. The width of the road is 3-5 meters 2 The street shape is relatively regular 3. Both sides are one-story residential buildings, 0.5＜D/H＜2	1. The width of the road is 2-3 meters 2 The street shape is relatively regular 3. There are 2-3-storey residential buildings on both sides, 1＜D/H＜3	Continuing the characteristics of the previous stage
					
	process	→			
New Street Type (Q)					1. Road width is 8-15 meters 2The street is very neat and tidy, with trees planted on both sides 3. Both sides are 2-3 storey commercial buildings, 1＜D/H＜2
					
process		→			

3.2 Block and plot

Since blocks are enclosed by streets, there is an inseparable relationship between the formation of blocks and streets. The evolution of street systems and streets has been described

in detail in the previous section and will not be repeated in this section. The main focus of the typo-morphology study of the blocks in Pantang Village is on the physical characteristics of the blocks, including the size, aspect ratio, direction, proportion of the blocks, and the arrangement and combination of the plots within the blocks in Pantang Village. The morphological type analysis of the plots in Pantang Village is similar to that of the blocks, except that the spatial layout and the size, shape, and area of the plots are different. At the same time, the shape of the plots has an impact on the layout and form of the buildings. Therefore, in this study, the characteristics of the plot area will also be considered. The analysis of these contents in Pantang Village will provide reference significance and reference value for the subsequent renewal strategy of Pantang Village.

3.2.1 From the late Qing Dynasty to the Republic of China (late 19th century-1949)

(1) Evolution of morphological types

Before the founding of the People's Republic of China, the blocks of Pantang Village were mainly surrounded by rivers, lanes and main village roads, showing a natural texture of organic growth. Influenced by the water network system, the size and shape of the blocks have significant characteristics: small scale, most of them are long and narrow, and the length-to-width ratio is generally between 1.5:1 and 4:1, which is closely related to the linear development mode along the river bank or lane. The main axis of the block mostly follows the direction of the river or the main lane, and the overall shape is southwest-southeast dumbbell, which is consistent with the terrain and historical path. The boundaries are mainly natural river banks and artificial masonry lanes, which are clear but irregular. Some blocks are squeezed into polygonal outlines due to terrain or building groups.

The plot division within the block further reflects the refinement and adaptability of land use. The plot area varies significantly: the plots along the river are mostly narrow and long due to farming or dock functions, while the plots in the core area of the village are relatively square, with sizes concentrated in the range of 100-300 square meters. The arrangement is mainly dense splicing, distributed along the lanes and water systems, with clear hierarchy

between public lanes and private branch lanes. The plot depth is usually 10-15 meters, and the width fluctuates between 5-8 meters due to the needs of family units. The shape of the plot directly restricts the layout of the building. Narrow and long plots often form "bamboo tube house"-style linear buildings, while square plots often have courtyard houses or townhouses, and the building coverage rate is generally 60%-70%.

Figure 3.2-1 Pantang Village block in the late Qing Dynasty

Source: Author's own drawing

Figure 3.2-2 Pantang Village plot in the late Qing Dynasty
Source: Author's own drawing

(2) Morphological characteristics

In terms of blocks, there were 31 blocks in Pantang Village during this period , which were generally composed of residential, public facilities, farmland and orchard plots . The blocks in Pantang Village during this period were divided into strip traditional blocks (F type) and mixed irregular blocks (G type). The largest block area reached 4761.4 square meters. During this period, the area of Fblock gradually increased, and the aspect ratio fluctuated greatly. The aspect ratio of block 1 reached 7.5 . Due to terrain restrictions, the aspect ratio of most blocks exceeded 3.0. Including block 15 near the 18th room on the northwest side , its area also reached 2188.7 square meters , which is much larger than other blocks .

In terms of plots , compared with the restoration map of 1933, the plots are gradually divided from the periphery to the inside, and the average area is reduced . Taking block 1 as an example, the plots in this block are mainly residential, and the plots are parallel to each other due to the shared wall on the non-street side . The plot area is mostly between 100 square meters and 300 square meters. Taking block 15 as an example, this block is mainly residential plots . Due to the influence of the terrain and water system , the plots are mainly irregular rectangles, and there is no obvious spatial layout pattern to follow, presenting a "mixed collage" layout. Its plot density is larger than that of block 1, but the average area is smaller, mostly between 50 square meters and 150 square meters. In general, as of 1949 , Pantang Village was mainly residential land. Due to the increasing demand for housing, a large amount of agricultural and forestry land was divided into residential land. On both sides of the river , due to the existence of public load-bearing walls, the ownership of some plots is limited by shared walls, and the plots are mainly parallel. Such spatial arrangement can also create more space for commercial activities for Pantang Village , which will not only promote the development of Pantang Village , but also promote the subdivision of Pantang Village plot .

3.2.2 Early years of the founding of New China - before reform and opening up (1949-1978)

(1) Evolution of morphological types

Compared with the period before the founding of the People's Republic of China, the block and plot forms of this period have changed on the basis of retaining the historical spatial framework, showing the dual influence of the collectivized economic model and the early urbanization process. While continuing the original river-lane framework, the block system has been adaptively adjusted due to production needs and infrastructure transformation, while the plot layout has undergone functional differentiation and reorganization due to collective economy and population growth.

In terms of block morphology, the most significant changes are reflected in three aspects: first, scale reconstruction. To meet the needs of collective production, some adjacent narrow blocks were merged to form larger units, adjusting the average length-width ratio from 2:1-4:1 before the founding of New China to 1.5:1-3:1; second, orientation change. The newly built main roads have changed the main axis direction of about 30% of the blocks from simply following the river to the "river-road juxtaposition" mode parallel to the road; third, boundary regularization. The natural river bank channelization rate reached 40%, and the lanes were transformed into straight lines to reduce the boundary curvature by 25% compared with before the founding of New China. However, the core area still retains the traditional organic texture. These adjustments not only reflect the actual needs of production and life at that time, but also reflect the gradual improvement of the historical spatial pattern.

The use of plots showed a clear trend of functional differentiation: production plots were concentrated on the outskirts of the village, with a single plot area of 500-800 square meters, mainly used for collective warehouses or processing plants; mixed plots of "lower bunks and upper houses" appeared on both sides of the main lanes such as Wuyue Street and Enzhou Street, with a width of 8-10 meters to meet business needs; residential plots increased in area and the number of floors increased (generally from 1 to 2 floors) due to the landing of water residents. This change directly reflects the characteristics of the social and economic

transformation at that time: collectivized production prompted the merger of scattered plots, the increase in the proportion of non-agricultural employment gave rise to complex functional plots, and population growth promoted the vertical expansion of residential space.

The spatial evolution during this period was mainly driven by three factors: institutionally, collectivized production required intensive land use; technically, the popularization of agricultural machinery promoted the widening of lanes (from an average of 1.5 meters to 2.5 meters); and socio-economic development promoted functional mixing.

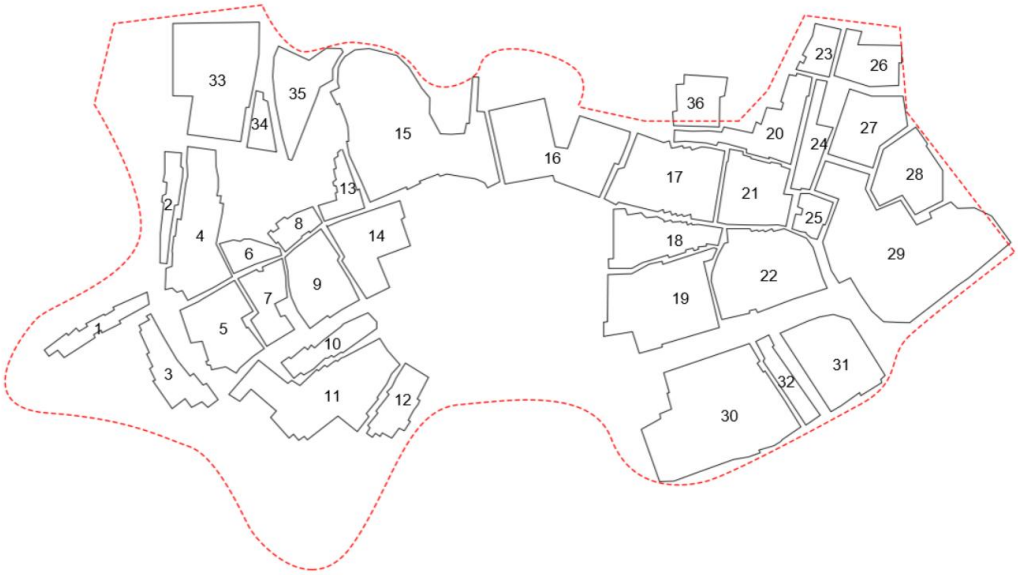


Figure 3.2-3 Pantang village block after the founding of New China

Source: Author's own drawing

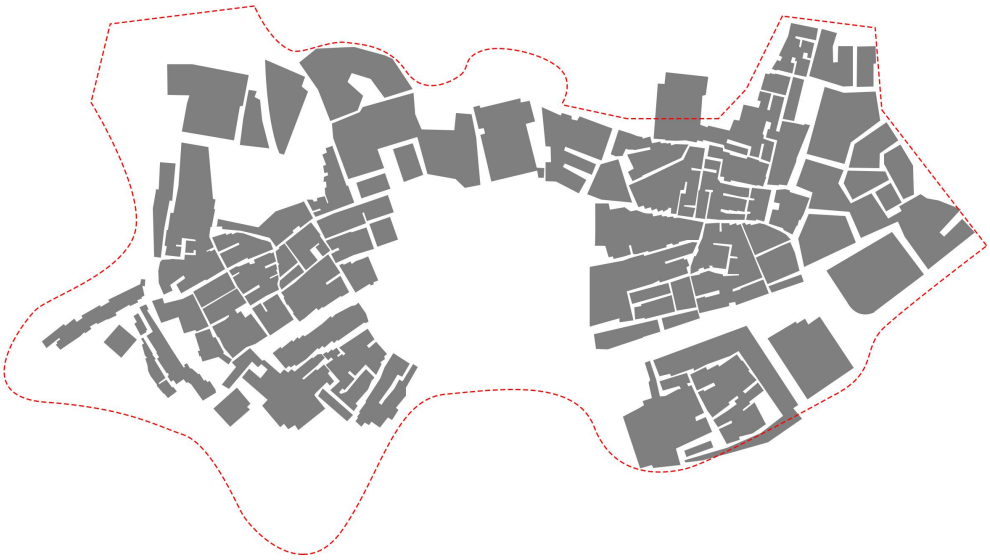


Figure 3.2-4 Pantang Village plot after the founding of New China
Source: Author's own drawing

(2) Morphological characteristics

During this period, the number of blocks in Pantang Village reached 34. Among them, the F type block continued the block morphological characteristics of the previous period. The original blocks 1-30 were basically consistent in shape and size due to the water town topography and traditional road network of Pantang Village . Due to the increase in the resident population during this period and the land transaction system, more irregular land uses were generated in the area and residential spaces were formed . Blocks 33, 34 , 35, and 36 on the northwest and northeast sides of Pantang Village were formed by newly built residential areas . Blocks 34 and 35 were irregular in shape due to the restrictions of the terrain and the existing blocks, and sharp corners appeared on the streets .

In terms of plots , the number of plots increased to 128 during this period. On the one hand, this was due to the further subdivision of plots in Pantang Village , and on the other hand, the construction of Zhongshan Eighth Road led to the related construction volume. Among them, the traditional residential plot M1 type and the traditional ancestral hall plot M2 type both maintained the same characteristics as the previous research period. In Pantang Village , due to the construction of public service facilities such as the township government,

grain station and food processing plant, the public service plot type (type 0) appeared, and its plot area was generally large, ranging from 1,500 square meters to 3,000 square meters. The construction of Zhongshan Eighth Road also brought a large number of residential buildings. These modern residential buildings with typical functionalist characteristics present morphological characteristics that are completely different from the original plot types, and their plot areas are mostly below 300 square meters.

3.2.3 After the reform and opening-up - before urban renewal (1978- 2016)

(1) Morphological evolution

Compared with the previous period, the block and plot forms of Pantang Village after the reform and opening up continue the texture of the traditional water village. At the same time, due to the intervention of urban expansion, commercial development and cultural protection policies, it presents a complex feature of "organic renewal" and "functional reconstruction".

In terms of block form, the most significant changes are reflected in the three dimensions of scale stratification, functional orientation and interface diversification. The core protection area maintains the traditional scale of F and G type blocks, and the newly built area has composite blocks of more than 200m. About 40% of the riverside blocks have been transformed into "cultural and tourism composite axes", and their functions have shifted from simple traffic connections to taking into account both commercial streamlines and landscape corridors. In terms of interface treatment, the core area maintains a traditional continuous street wall line rate of more than 80%, while the newly built area reduces the line rate by means of setbacks and square implants. At the same time, elements such as Qilous and eaves corridors are used to maintain a sense of spatial enclosure.

The use of plots shows obvious characteristics of refined stratification. The cultural and commercial plots are concentrated along the main lanes and rivers, with the width of a single block extended to 10-15 meters, and the "yard nesting" model is adopted to support the cultural and tourism industry; the residential plots, while retaining the basic units, respond to rental needs through additional construction and internal subdivision; the public plots are

integrated into scattered land, forming micro service nodes of 300-500 square meters.

Figure 3.2-5 Pantang village block after reform and opening up

Source: Author's own drawing

Figure 3.2-6 Pantang Village plot after reform and opening up

Source: Author's own drawing

(2) Morphological characteristics

In terms of blocks , the number of blocks in this period was 34. The traditional block type (F type) has hardly changed , and its block characteristics still continue the traditional morphological characteristics, whether in terms of block length-width ratio or other block

morphological characteristics. The mixed irregular block type (G type) has changed greatly in form due to the merger of plots and the redivision of streets and lanes . Due to the merger of plots and streets and lanes on the east side of Pantang Village , the area of G type blocks has been further increased, but overall it still continues the morphological characteristics of the original type. The newly emerged large grid-shaped blocks (H type) are mainly rectangular in form, and their length-width ratios are mostly between 1.5-3.0. In order to meet the diversified needs of Pantang Village , the emergence of communities, schools, multi-story residential buildings, and commercial streets have accelerated the construction and development of H type, and its largest block area exceeds 100,000 square meters.

In terms of plots , the number of plots reached 149, of which the vast majority of the added plots came from newly planned development land, including various public service facilities such as schools, stations, and hospitals, as well as residential communities, commercial streets and other types of buildings. Most of these plots exceeded the size of traditional plots in Pantang Village . Among them, the newly added plots in Pantang Village generally occupied the block area, and these plots had obvious planning traces. Among them, the newly added residential plots (N type) were all over 4,000 square meters. At the same time, the morphological characteristics of the modern commercial plot type (P type) were different from the previous plot types in Pantang Village . Taking the newly built R&F Plaza S area as an example, its plot area reached 105,693 square meters, far exceeding the area of other plots in Pantang Village . The emergence of this type of plot shows that the urban development of Pantang Village has entered a period of rapid development, and also reflects its plot division dominated by economic interests .

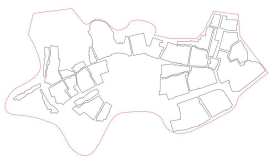
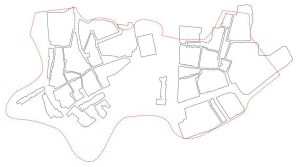
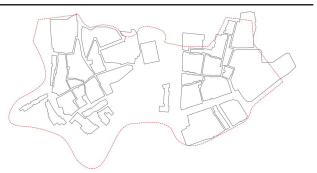
3.2.4 Evolution of block and plot types

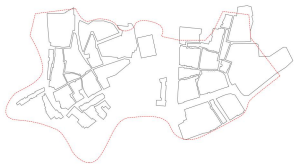
(1) Block morphological type process

Through the above research and analysis, we can know that Pantang Village has three different types of blocks in the three research periods : strip traditional block (F type), mixed irregular block (G type) and large grid block (H type). Among them, F and G types run

through the three research periods, while H type only appears in the third research period. However, due to its different street division pattern, the area of H type is larger than other types of blocks . In the historical evolution of Pantang Village , the form and size of G type blocks have undergone various changes, and the main reason is policy factors.

Table 3.2-1 Evolution of block morphological types Source: drawn by the author

type	Ming and Qing Dynasties	Late 19th century - 1949	1949-1978	1978-2016
Strip traditional block (F)		1Affected by the morphology of swamps and rivers, the length-to-width ratio of blocks increases 2. The length-to-width ratio of the block is between 1.0 and 7.5.	1. The residents on the water come ashore, the village expands, and new blocks are built according to the river and terrain. blocks in the southwest area 3. Other blocks remain consistent	1. Some buildings on the southwest side were demolished, resulting in reduced block integrity block changes near Renwei Ancestral Temple interrupt the continuity of the herringbone texture 3. Other blocks remain consistent
				
process	→			
Mixed irregular block (G)		1. The directions of the ancestral hall and the residential buildings are inconsistent, resulting in an angle 2 No clear street outline	1. Grid layout houses are added on the northwest side, but due to the terrain and river channels, irregular blocks are formed. 2The aspect ratio of the newly created block changes 3. Other blocks remain consistent	1. The northwest factory and cultural and educational land blocks are merged and reorganized 2. Other blocks remain consistent
				

process	→			
Large grid block (H)				1 The commercial and residential areas of Zhongshan 8th Road on the north side are developed, and the blocks are in a grid pattern. 2block aspect ratio is between 1.0-3.5 3. Other blocks remain consistent
				
process				→

(2) Plot type process

In terms of plot , there are four plot types in Pantang Village : traditional plot type (M), public service plot type (O) , modern residential plot type (N), and modern commercial plot type (P). The traditional plot type (M) is further divided into traditional residential plot (M1) and traditional clan plot (M2), which has continued since the Qing Dynasty. Both the N type and the O type began in the second research period. The P type originated in the third research period, and the plot area exceeds that of other types.

Table 3.2-2 Plot type evolution process Source: drawn by the author

type		Ming and Qing Dynasties	Late 19th century - 1949	1949-1978	1978-2016
Traditional plot (M)	Traditional residential plot (M1)		1Influenced by the herringbone-shaped streets, plots are mostly comb-shaped 2 Short side street layout 3. Rectangular shapes are mainly used at street	1 The shape is mostly comb-shaped, with a few determinant residential areas on the north side. 2Other features continue from the previous stage	1A large residential plot appears on the north side 2. Part of the residential plot on the south side was demolished 3 The west side of Sanyue plot is

			intersections and terrain height differences.		occupied by Pantang Road, and the area is reduced
					
	process		→		
	Traditional clan plot (M2)		1 Plots are mostly rectangular, with an aspect ratio between 1.0 and 2.5 2 Commonly seen at the entrance of the village and near the dock	1Religious buildings converted into production brigade activity spaces 2Parts of the ancestral hall were destroyed 3Other features that continue from the previous stage	1Some ancestral halls are used as residential areas due to unclear ownership. 2Other features continue from the previous stage
					
	process		→		
Public Service Plot (N)				1 is mainly rectangular, and the northwest side is mainly irregular plot 2 plot area between 200-1000 square meters	1 New plot is distributed along Pantang Road and Zhongshan 8th Road 2 plot is rectangular and its area gradually increases
					
process				→	
Modern residential plot (O)				1 plot is irregular and concentrated on the north side 2. There is a clear boundary with the	1. Near Zhongshan 8th Road on the north side, real estate development and large-scale

			traditional residential plot	residential areas are rapidly developing. 2 Area increase
				
process				
Modern business plot (P)			Panxi Restaurant and other plots began to appear	1 Along the street, there are commercial plots on both sides of Wuyue New Street and Pantang Road
				
process				

3.3 Public space

This section takes the public open spaces in the Pantang Village block and surrounding areas as the research object, covering religious and cultural spaces, public squares, green spaces and markets. The public spaces in Pantang Village have significant functional complexity: for example, its developed water network is not only a carrier of transportation, but also undertakes multiple functions such as festivals and social interactions; the riverside wharf is not only a commercial node, but also a place for residents' daily leisure and community interaction ; the green space is both a production space and a leisure space . The green space in this section includes farmland, rivers, Liwan Lake Park, etc. The analysis results will be applied to the subsequent renewal design of public spaces.

3.3.1 From the late Qing Dynasty to the Republic of China (late 19th century-1949)

During this period, Pantang Village retained a complete Lingnan water village public

space system, and its space types and organizational methods profoundly reflected the spatial logic of the "God-Man-Nature" trinity of traditional villages . Through the analysis of four typical spaces, namely, ancestral hall cultural space (I type), square space (L type), market space (R type) and green space (T type), we can systematically grasp the characteristics of public space during this period and its evolution trend.

(1) Morphological evolution

Based on existing historical archives and field survey data, the basic composition and characteristics of the public space in Pantang Village from 1900 to the mid-1950s are objectively described as follows:

Clan cultural space: Existing architectural data show that there were open spaces in front of the Renwei Temple (first built in the Song Dynasty) and some clan halls. In the 1920s, the "eliminating superstition" movement restricted activities in some temples, but folk beliefs continued; during the Anti-Japanese War (1938-1945), some temples were damaged and simply restored after the war.

Square space: The concept of "square" in Pantang Village is different from that of modern urban squares. They are usually multifunctional open spaces naturally formed by important buildings (temples, ancestral halls) or traffic nodes (bridges, docks), and their functions can be flexibly changed with time and demand, such as production, festivals, socializing, transportation, etc. This type of space is not large in scale, but is used frequently. Existing image data show that the width of the main lanes in the village is between 1.2 and 2 meters, and the average area of the lane intersection is less than 10 square meters. This space is mostly used by residents as a temporary resting point. The bridgehead area of the stone bridges connecting the two sides of the river (such as Longjin Bridge, Penglai Bridge, etc.) is a traffic node and a gathering place for people, so small open spaces are often formed, which become miniature "squares" for villagers to stay for a short time, talk, and small vendors to set up stalls. Around important docks and docks, small open spaces for people to wait and rest will also be formed during the intervals between loading and unloading of goods.

Market space: the "water market" formed along Pantang Creek, and the grocery stores and teahouses on the main street of the village, such as the predecessor of "Panxi Restaurant". In the 1930s, due to the expansion of Guangzhou city, some farmland was converted to commercial planting, giving rise to small flower markets; the wartime economy was depressed and the market shrank. The Japanese occupation in 1938 interrupted the transportation of pond fish, which explains why the temporary vendor market appeared at this time. The case of the vegetable market being replaced by the supply and marketing cooperative just reflects the institutional reshaping of the rural exchange space by the "unified purchase and marketing" policy.

Green space: According to the survey report of Guangzhou Agriculture and Forestry Bureau in 1955, the existing area of Fengshui forest around the village is about 3 mu, about 2,000 square meters, and the main tree species are banyan and kapok. Compared with the "Pantang Ten Mu Ancient Forest" recorded in the "Nanhai County Chronicles" in 1905, the area has been significantly reduced. The community altar green space is mostly scattered small worship sites, and the area of a single site is usually no more than 5 square meters. The existing wharf ruins along the Liwan River and Pantang River show that the average width of the wharf in the 1950s was 1.5-3 meters, and the building material was red sandstone strips. According to the archives of Guangzhou Port Authority in 1954, the relocation of the inner port function has led to the gradual change of the traditional "front wharf and back house" space model. Photos of the wharf taken in 1957 show that most of the buildings along the water are simple brick and wood structures, which are different from the early water village style.

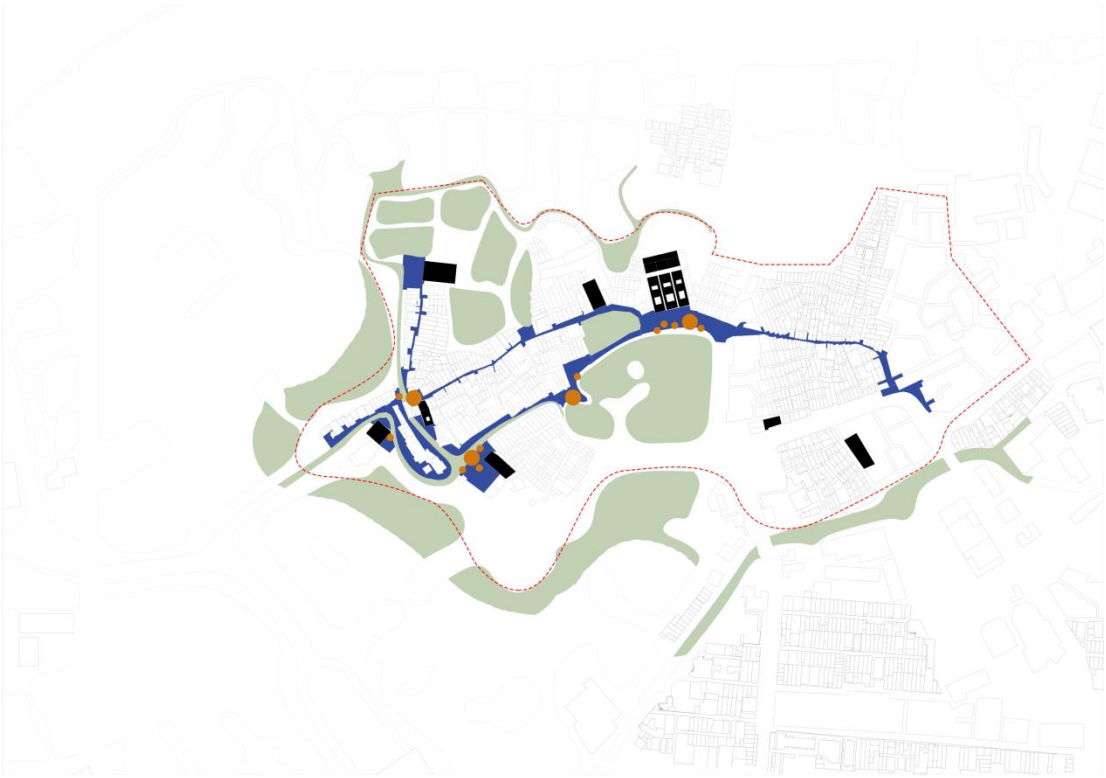


Figure 3.3-1 Public space in Pantang Village in the late Qing Dynasty
Source: Author's own drawing

（2）Morphological characteristics

The public space of Pantang Village from 1900 to the mid-1950s showed the following characteristics: the clan cultural space was centered on the Renwei Temple and the clan temple, with an open space in front. Although affected by the "breaking superstition" in the 1920s and the damage during the Anti-Japanese War, folk beliefs continued. The square space was a multifunctional open space attached to buildings and nodes: the front of the temple, the intersection of the lanes, the bridgehead and the surrounding of the pier formed a micro social node with flexible use, which had the functions of rest and hawker trading. The market space was mainly composed of the "water market" in the river and the shops on the main street. In the 1930s, the expansion of the city gave rise to a small flower market; the wartime economic depression and the occupation of the Japanese army led to the interruption of pond fish, and the temporary vendor market emerged. The green space includes Fengshui forests around the village, scattered community altars and river piers. The relocation of the inner harbor gradually disintegrated the "front pier and back house" model, and the waterfront buildings

became simpler.

The overall appearance is characterized by natural growth and mixed functions, with a small spatial scale but high utilization rate. The traditional structure has evolved partially due to the impact of war, urbanization and economic policies.

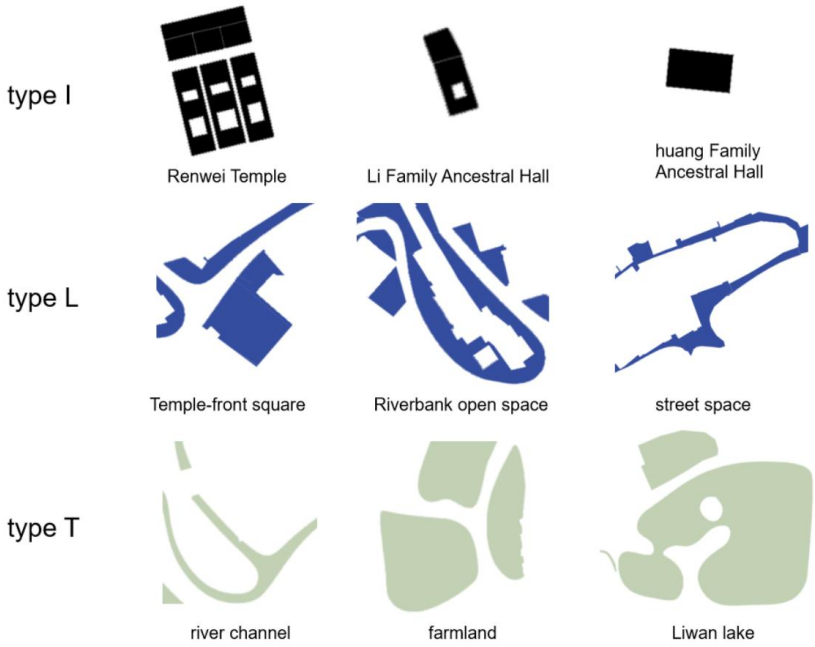


Figure 3.3-2 Types of public spaces in Pantang Village in the late Qing Dynasty
Source: Author's own drawing

3.3.2 Early years of the founding of New China - before reform and opening up (1949-1978)

(1) Morphological evolution

Pantang Village from 1949 to 1978 was in a critical period of social transformation. Under the continuous influence of collectivized production and socialist transformation, the village public space system underwent significant reconstruction. According to the Guangzhou Urban Construction Archives and interviews with villagers, the public space during this period showed the typical characteristics of weakened traditional functions and the coexistence of new collective spaces. Its evolution process reflects the logic of social governance in a specific historical stage. The public spaces of this period can be summarized as follows:

Religious and cultural space: According to the "Liwan District Chronicles (1840-1990) " , although traditional places such as Renwei Temple maintained a rectangular plane layout, their use functions changed significantly. In 1958, during the "Eliminate the Four Olds" movement, most temples and ancestral halls were converted into production team warehouses, schools or demolished. All students from private schools represented by Haoxia Shushe were transferred to primary schools, and all private schools were closed . At this time, religious and cultural spaces were limited to "temporary warehouses" or "political learning places". Building maintenance records show that farm tools were commonly piled up under the eaves, reflecting the decline of traditional religious activities. Religious space seemed to disappear during the collectivization period, but the villagers' behavior of moving the Five Immortals Temple to their homes for worship shows that cultural space has shifted rather than disappeared.

Square: The newly emerged open-air cinemas and supply and marketing cooperatives constitute new public service nodes. The 1977 commercial network planning map shows that the service radius of the supply and marketing cooperatives covers 85% of the villagers' houses, replacing the social function of traditional shops. According to the survey report of the rural work team of Liwan District in 1976, the grain drying field and the square in front of the cooperative warehouse became the main types of public space. Surveying and mapping maps show that this type of space is mostly regular rectangle (200-500 ㎡), transformed from the traditional ancestral hall square, and the ground is generally hardened with cement. The production team offices and collective warehouses are concentrated around the space, and their functions are completely turned to agricultural production and material distribution. At this time, the docks by the river and the space under the big banyan tree were not completely occupied, and they still served as informal public spaces for villagers to cool off and socialize.

Market space: Under the planned rationing system, free trade was prohibited. The traditional "water market" disappeared, and the state-owned supply and marketing cooperative (Shijing People's Commune) became the only legal trading point. It was in this context that the Sanguan Ancient Temple in Pantang Village was converted into a production team site.

Today, the words "Pantang Third Production Brigade of the Xijiao Brigade of Shijing People's Commune" are still engraved above the main entrance of the Sanguan Ancient Temple, which is the mark left to us today by that period of history.

Green space: Since the 1960s, Guangzhou's urban expansion has required a large amount of land, and part of the Pantang River has been filled (for example, the artificial excavation of Liwan Lake in 1958 and the diversion of part of the water system), resulting in a reduction in natural green space. The area included in Liwan Lake Park was originally agricultural land of the Pantang Third Production Brigade of the Western Suburbs Brigade. After the excavation of Liwan Lake, this area was transformed into municipal land . In the 1970s, small factories such as textile factories and hardware factories appeared around the village , encroaching on farmland or wasteland, and the function of green space turned to production attachment. The Guangzhou Water Conservancy Bureau's 1975 report pointed out that the silted section of Pantang River reached 65% of the total length, resulting in the abandonment of 12 traditional docks, of which 7 were converted into garbage dumping sites. In the mid-to-late 20th century, Guangzhou carried out environmental management of waters such as Liwan Lake and Lizhi river. Traditional fishing and farming life could no longer be sustained, prompting water residents to turn to shore for a living, and since then, river and creek shipping has declined.

Compared with the previous period, the public space of Pantang Village from 1949 to 1978 showed three significant evolutionary trends. The first is the politicization and production of functions. The traditional ritual space was given new functions such as "criticism meeting" and "study meeting". The grain drying field became the most dynamic public space in the village, reflecting the characteristics of the era of "taking grain as the key link". The second is the collectivization of spatial ownership. The edges of private plots were taken over for collective use, the boundaries between public and private became blurred, the siltation of rivers led to the decline of waterfront publicness, and some docks even became garbage dumping sites. The third is the coexistence of traditional and modern facilities. New public facilities such as open-air cinemas and radio speakers are superimposed on traditional street spaces, and supply and marketing cooperatives have replaced some traditional shops to

form new social nodes.

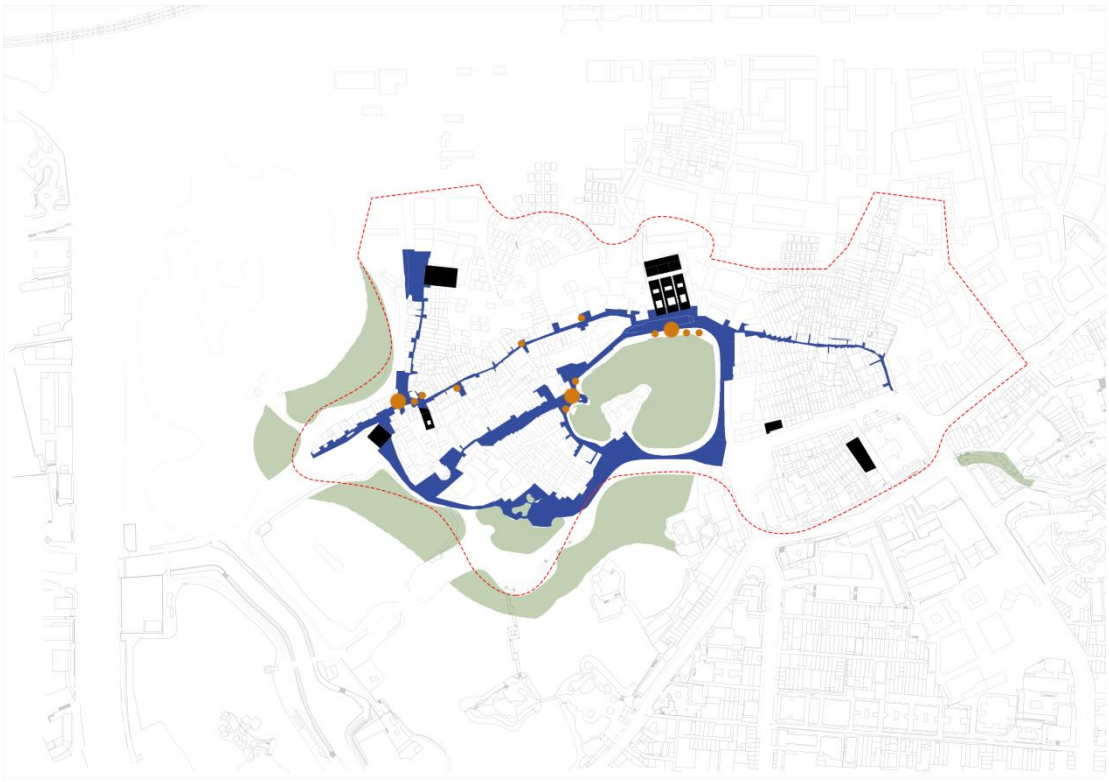


Figure 3.3-3 Public space in Pantang Village after the founding of New China

Source: Author's own drawing

（3）Morphological characteristics

Between 1949 and 1978, the public space of Pantang Village was significantly reconstructed under the background of collectivization and socialist transformation, showing the characteristics of weakened tradition and coexistence of new collective space. Religious and cultural spaces (such as Renwei Temple) were politically transformed into warehouses or learning places, and traditional rituals were forced to go underground. New square spaces emerged, and regular grain drying fields and squares in front of supply and marketing cooperatives replaced ancestral hall squares, becoming core agricultural production, material distribution and social nodes (such as open-air movie theaters). Market space was completely monopolized by state-owned supply and marketing cooperatives, traditional "water markets" disappeared, and related buildings (such as Sanguan Ancient Temple) were converted into production team sites. Green space was greatly reduced due to urban expansion (such as the excavation of Liwan Lake), silting and landfill of rivers and streams, and encroachment by

small factories, and the natural landscape and fishing and farming functions declined. Overall, it shows an evolutionary trend of highly politicized and productive spatial functions, collective ownership blurring the boundaries between public and private, and the coexistence of new and old facilities, which deeply reflects the logic of social governance in a specific historical stage.

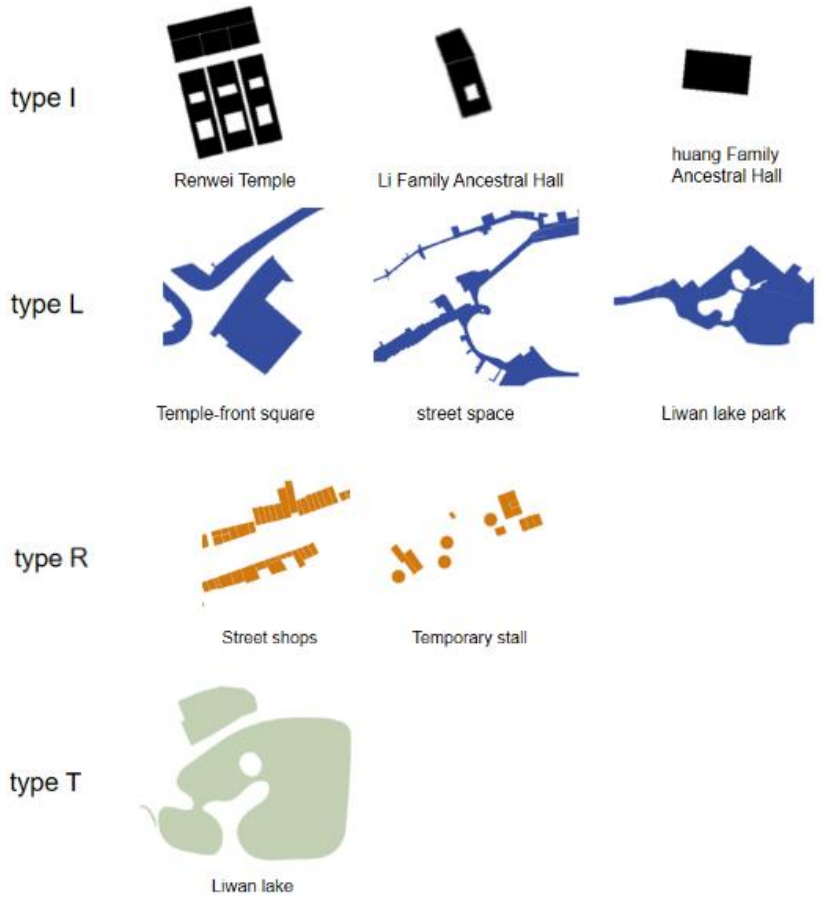


Figure 3.3-4 Types of public spaces in Pantang Village after the founding of New China
Source: Author's own drawing

3.3.3 After the reform and opening-up - before urban renewal (1978- 2016)

From 1978 to 2016, Pantang Village was in the process of accelerated urbanization, and its public space system showed a multi-faceted and complex transformation. According to the survey data of Guangzhou Urban Planning, Survey and Design Institute and the archives of Liwan District's urban renewal, the evolution of public space during this period was mainly affected by three factors: the promotion of urban renewal policies, the rise of cultural tourism industries, and the modernization of residents' lifestyles.

(1) Morphological evolution

Religious and cultural space: After the reform and opening up, traditional temples such as Renwei Temple gradually resumed religious activities. In 1983, Renwei Temple was listed as a cultural relic protection unit in Guangzhou, and was renovated on a large scale after the 1990s. The Li Clan Ancestral Hall was restored from a production team warehouse or residence to a family cultural venue, but some small ancestral halls are still occupied due to property rights issues. Religious space also has tourism functions, such as the Beidi Festival, which attracts tourists and coexists with traditional sacrificial activities. According to the 2015 cultural relics survey data, the area of the renovated Renwei Temple complex has expanded to 2,500 square meters, and the annual number of tourists received has reached 180,000.

Square space: Traditional riverside piers such as the "Shishitou Wharf" along the Lizhi river were transformed into landscape platforms. The "Shishitou Wharf" was originally a platform for water residents to load and unload goods. After the 1980s, it gradually became a social space for villagers to cool off and chat. It is about 3-5 meters wide. As the work of water residents going ashore progresses, self-built houses have become denser, encroaching on the original open space, resulting in the compression of the original public space.

Market: From the late 1970s to the early 1980s, there were still scattered water trades at Pantang Wharf and along the river banks, where fishermen sold freshwater fish, vegetables and fruits. However, with the advancement of the policy of bringing residents on land, this basically disappeared after the 1990s. Some riverside wharves along the Lizhi river were transformed into temporary vendors gathering places, selling agricultural and sideline products without fixed stalls. Since the 1980s, Pantang Wuyue Street has naturally formed an open-air market, mainly with stalls selling vegetables, meat, and daily necessities, and seriously occupying the road for business.

Green space: Liwan Lake Park was expanded several times from the 1980s to the 2000s and became the core public green space of Pantang Village, replacing the leisure function of traditional farmland. Due to the needs of urban construction and development, the farmland in

Pantang was basically expropriated, and the paddy fields that planted the historically famous Pantang "Five Shows" specialty products - lotus root, water chestnut, water caltrop, water chestnut, and bamboo shoot gradually disappeared. In the 1990s, Lizhi river Creek became a "stinky river" due to urban sewage discharge, and the drainage ditch connecting Pantang Wuyue Creek to Liwan Lake Park was changed to a culvert. Before the 2010 Asian Games, the water body was restored through pollution control projects, and trails and landscape greening were added along the coast .

Figure 3.3-5 Public space in Pantang Village after the reform and opening up
Source: Author's own drawing

(2) Morphological characteristics

Between 1978 and 2016, the public space of Pantang Village showed a multi-faceted and complex transformation under the accelerated urbanization: Religious and cultural spaces (such as Renwei Temple and Ancestral Hall) were restored under the promotion of repair and cultural protection, combining traditional sacrificial and tourism functions, and expanding in scale and influence. The function of traditional square space (such as river pier) changed from a productive pier to a social place, but the space shrank later due to the density of self-built

houses. The market space underwent drastic changes, water transactions disappeared, river piers evolved into temporary stalls, and naturally formed open-air markets (such as Wuyue Street) faced the problem of occupying the road. The green space was fundamentally replaced, and Liwan Lake Park was expanded to become a core leisure green space, replacing the disappeared farmland and water body functions; Lizhi river Creek experienced pollution and governance, and was transformed from a "stinky river" to a landscaped waterway, with additional trails and greening, reflecting the intervention of environmental remediation.

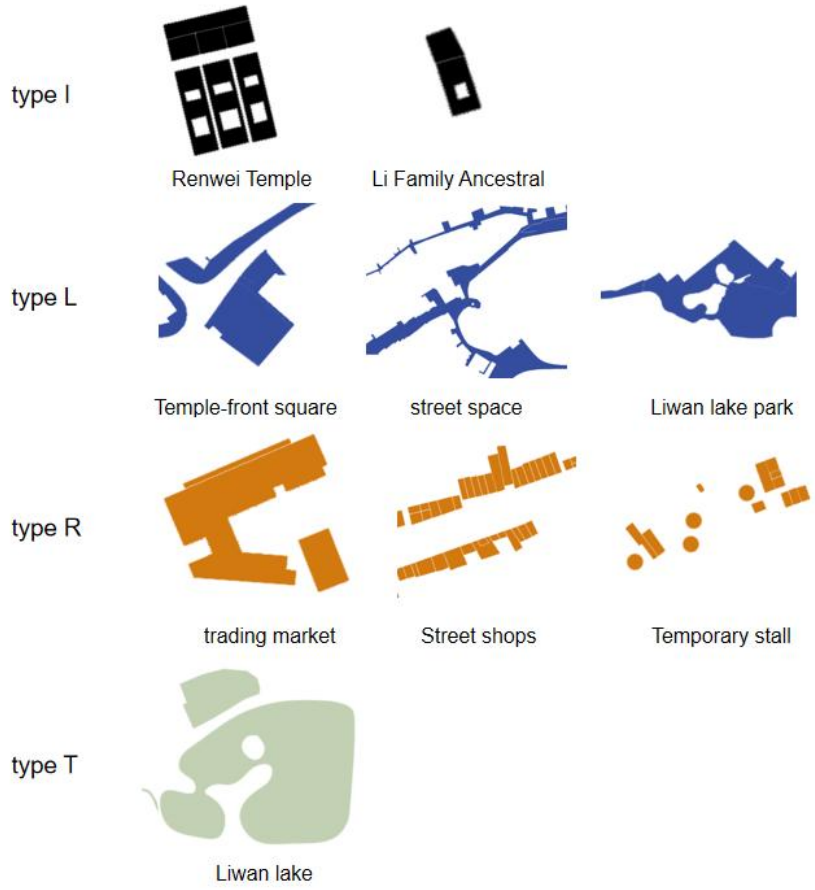
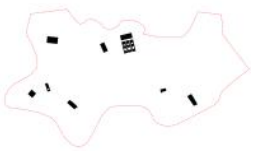
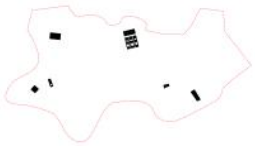


Figure 3.3-6 Types of public spaces in Pantang Village after the reform and opening up
Source: Author's own drawing

3.3.4 Evolution of public space types

Table 3.3-1 Evolution of public space morphology Source: drawn by the author

type	Ming and Qing Dynasties	Late 19th century - 1949	1949-1978	1978-2016

Religious and Cultural Space (I)		1. Generally near water or main roads, convenient for residents and waterborne visitors 2Faith centers are also social and entertainment venues	1Renwei Temple is used as a school and police station 2 All private school students were transferred to primary schools, and all private schools were closed. 3. Community forums were cleared, and faith faded	1 Traditional temples such as Renwei Temple gradually resume religious activities 2. It also has tourism functions 3Small ancestral halls are still occupied due to property rights issues
				
process		→	||	→
Market (L)		1Open-air trading near the pier 2Temporary market in front of Renwei Temple 3Shops and vendors in the streets	1 Mainly river wharf markets and open-air agricultural trade 2Panxi Restaurant Horseshoe Cake Store	1Traditional waterfront markets disappear due to the decrease in water residents 2 Wuyue Street spontaneously formed open-air stalls and occupied the road for business 3. Temporary small indoor market
				
process		→		
Square (R)		1. The space in front of the temple (Renwei Temple, Sanguan Temple) has multiple functions 2Street corner square and leisure space under the banyan tree	1The space in front of the temple was used as a grain drying ground for the production team, etc. 2 Only informal social spaces such as the docks and the open space in front of the	1 New planned squares have been added, such as the Pantang Ancient Village Archway Square 2The traditional riverside space was transformed into a landscape platform

			ancestral hall remain	
				
process	→			
Greenland (T)		1 Mainly productive green land (farmland, pond) 2. Rivers and streams are important production and living spaces	1. Explore Liwan Lake Park 2 Residents on the water gradually moved ashore, and river navigation declined	1Farmland was expropriated 2 Improve the drainage system and turn Lizhi Creek into a culvert 3. Pollution control projects to restore water bodies
				
process	→			

3.4 Architectural layout and three-dimensional building form

This section will rely on topographic maps to mainly study the functional layout of land use, building layout, and building density within the property plot of each time period, supplemented by analysis and description of building volume, plane and facade form, and building decoration. The analysis results will serve as a reference for the renovation design or reconstruction of the building in Chapter 5.

3.4.1 From the late Qing Dynasty to the Republic of China (late 19th century-1949)

(1) Morphological evolution

The Pantang Village complex in 1955 fully demonstrates the spatial organization wisdom and construction skills of traditional Cantonese dwellings. In terms of architectural layout, the village presents distinct functional zoning characteristics: the plots along the river mostly adopt the "front shop and back house" model, with shops or workshops on the first floor and

residential space on the upper floor; the core area is mainly residential, interspersed with public buildings such as ancestral halls and temples; the peripheral plots have both residential and agricultural production functions. From the perspective of layout form, the architectural layout types of Pantang Village during this period can be divided into three layout modes: comb-type (A), linear landscape type (B), and scattered point type (C). In the core area, the architectural layout is relatively regular, with bamboo tube houses as units, spreading forward, backward, left and right, and combined with a narrow street system to form a typical comb-type layout mode of Lingnan water villages. In the area close to the river, affected by the river morphology, the buildings in this place present a linear landscape layout, such as the building groups near Wuyue Eight Alleys and Sanguan Temple Front Street present linear characteristics according to the trend of the river. In addition, Pantang Village also has a scattered layout mode (C), which includes courtyard type (C1) and centralized type (C2). The ancestral hall type is a typical representative of the courtyard layout. This type of building is usually a three-room and two-corridor floor plan, with a narrow patio surrounded by surrounding buildings or walls. This type of building has strong privacy and can ensure sunshade and ventilation for the building unit. The centralized type is usually a public building or ancestral hall building. This type of building is used for large gatherings and activities, with a large building volume and concentrated space.

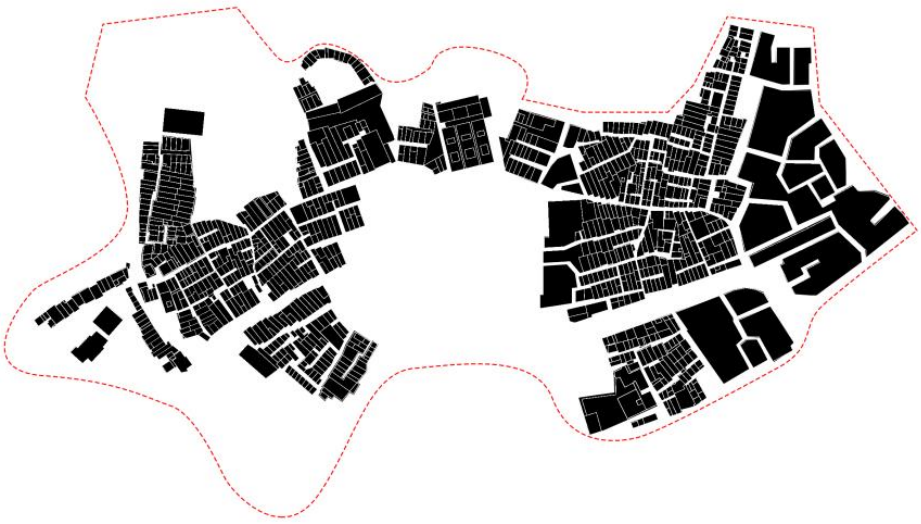


Figure 3.4-1 Architectural layout of Pantang Village in the late Qing Dynasty
Source: Author's own drawing

The three-dimensional shape of the building fully reflects the regional characteristics and climate adaptability. The main building is generally 1-2 stories high, with the eaves height controlled below 5 meters, and together with the single-story ancillary buildings, it forms a patchwork roof outline. The buildings along the river extend to the water surface through cantilevers, Qilous, etc., forming a unique waterfront interface. The facade treatment adopts a "three-stage" division: blue brick footing, white lime wall body, tile roof, with square small windows and gray plastic window lintel decoration. The roof form is mainly a hard mountain purlin double-slope roof, and important buildings use hip roofs or curved roofs. The roof slope is stable between 1:1.5-1:2, showing a mature form specification.

Figure 3.4-2 Three-dimensional shape of buildings in Pantang Village in the late Qing Dynasty
Source: Author's own drawing

In terms of construction technology, the buildings in Pantang Village use hollow blue bricks to build load-bearing walls (30-40 cm thick), cedar purlins to support tile roofs, and the foundation is mainly stone-built shallow foundations. The decorative details are mainly reflected in the gray plastic brick carvings on the door lintels and window lintels, as well as the painted eaves panels and wooden carved partitions in the hall. These features together constitute a complete traditional construction technology system, reflecting the high maturity

of folk construction technology.

From the perspective of evolutionary trends, the buildings of this period still retain the form characteristics of the late Qing Dynasty and the early Republic of China. The spatial organization strictly follows the ventilation and lighting system with the patio as the core. The distance between buildings fully considers the requirements of climate adaptability, and the group layout clearly reflects the clan blood relationship. Although there is a trend of decorative simplification and functional adjustment in some parts, such as the commercialization of the ground floor functions of buildings along the river and the subdivision of the three-room and two-corridor layout, the new buildings as a whole still continue the traditional craftsmanship and have not been significantly affected by modern architecture.

(2) Morphological characteristics

Due to the lack of historical maps, we can only restore the architectural layout and morphological characteristics of the three-dimensional building forms of this period through on-site surveys, relevant documents, villagers' oral history, and reasonable speculation.

According to on-site investigation, the existing residential buildings of the Qing Dynasty in the Pantang Village are mainly distributed linearly along Wuyuezhi Street and Miaoqian Street. The exterior walls of the buildings are mostly built with oyster shell ash mixed with yellow mud. The typical wok-ear-style fire-proof walls can be seen on the gables. Together with the blue brick houses in the surrounding Longjin West Road and Fengyuan Street historical blocks, they constitute the core area of the traditional settlement of Xiguan. Since the middle of the Qing Dynasty, Pantang residents have generally adopted the Lingnan traditional "row-style comb-style layout". This architectural form is directly derived from the water network terrain and humid climate of the Pearl River Delta. As a low-lying area formed by alluvial deposits, Pantang has been crisscrossed with rivers and ponds in history. In order to save land and adapt to the waterside life of "going out on a boat and returning home on stones", the ancestors built a row-style layout. The walls are made of blue bricks and brushed

with oyster shell mortar, which can not only insulate and prevent moisture, but also resist typhoons. The formation of this row-style layout is also related to the special human history. In the middle and late Qing Dynasty, a large number of boat people gradually settled on land. As the main settlement in the west of the city, Pantang needed to accommodate the new population within the limited land space. The original single-family courtyard layout could not meet the demand, so it evolved into multiple parallel townhouses: adjacent houses shared gables, forming a compact pattern of "wall to wall, door to door", leaving only narrow alleys on the street as access.

In terms of the three-dimensional form of buildings, before 1949, the buildings in the Pantang Village block were mainly one to two stories high and were mainly residential buildings, which continued the characteristics of traditional Lingnan residential buildings. Therefore, during the research period, the architectural layout of Pantang Village mainly presented several types: traditional three-room and two-corridor residential buildings (U), traditional bamboo tube houses (V), Qilous (W), and ancestral temple buildings (X). Among them, traditional bamboo tube houses and ancestral temple buildings were developed from traditional three-room and two-corridor residential buildings (U).

Traditional three-room and two-corridor dwelling (U): The basic type of three-room and two-corridor dwelling is a two-entry and one-yard layout. The main house has no front porch but overhanging eaves. The main hall opens directly to the patio. The two rooms are bedrooms, which open to the main hall. There is a simple shrine for placing tablets on the back eaves wall of the main hall, and the two rooms have attics. The corridor house is arranged orthogonally to the main house, with a patio in between. One side of the corridor house has a main entrance that opens to the cold alley, and the other side corridor house is a kitchen, which generally has a side door to the side alley. The corridor houses all have door openings that open directly to the patio.

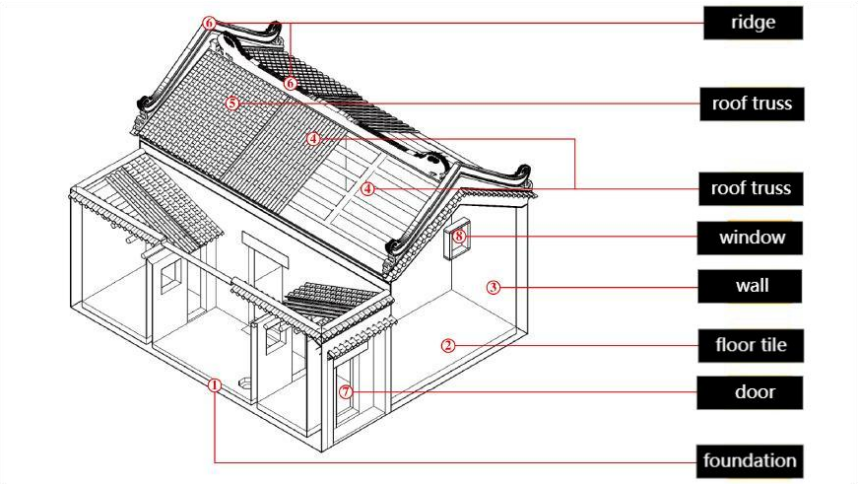


Figure 3.4-3 Traditional three-room and two-corridor building type

Source: Xiangcheng Architecture

Traditional bamboo tube house (V): Traditional bamboo tube house is a single-bay townhouse, with a width of 3-4 meters and a depth of 7-20 meters. It is a single-family residential building formed under the concept of nuclear family, and the residents are mainly ordinary citizens with average living conditions or slightly poor financial conditions. The traditional bamboo tube house is entered by the main facade door, and is divided into three functional parts: hall, room, and kitchen. Generally, a patio is set up every 10 meters for ventilation and lighting. The kitchen is usually arranged at the end of the house, forming a spatial sequence of "door-hall-room-(patio)-kitchen, corridor on the side". Brick-wood structure is often used, built with blue bricks, and the facade decoration is relatively simple, with no windows or only a small window above the main door. Pantang Wuyue No. 10 Riverside Street Residential Style Typical traditional bamboo tube house residential building, single bay, one floor, covering an area of 80 square meters, brick-wood structure.

Figure 3.4-4 Traditional bamboo house building type

Source: Left: Reference [20] Right: Xiangcheng Architecture

The traditional terraced bamboo tube houses were later developed into terraced houses, including bamboo tube house apartments, front yard bamboo tube house houses, bamboo tube house collective houses, and stacked bamboo tube house collective houses.

The bamboo tube apartment is called an apartment because it is a form of unrelated families living together in one building. The building is divided into households by layers, and each household has an independent entrance. Each floor of the bamboo tube apartment is based on "living room-room-kitchen-(toilet)" as a basic unit, and the functional space within the independent living unit is relatively complete. No. 91 Fengyuanzheng Street is a typical bamboo tube apartment with three floors. The stairs are on one side of the building, directly facing the outside.

Figure 3.4-5 Bamboo apartment building type

Source: Left: Reference [20] Right: Photo by the author

The building base of the front yard bamboo house does not cover the entire plot, but forms a relatively private small courtyard at the front of the house. Compared with other types of bamboo houses, the front yard bamboo house has more land utilization space. No. 19 Pantang Wuyue Outer Street is a typical front yard bamboo house, two-story, brick and wood structure, 4 meters wide and 12 meters deep.

Figure 3.4-6 Front yard bamboo house building type
Source: Left: Reference [20] Right: Xiangcheng Architecture

After the traditional bamboo tube houses were integrated with commercial functions, they developed into Qilou (W) and other ground-floor commercial buildings during the Republic of China period.

The term "Qilou" is a modern product. Previously, it was mostly referred to as "Qilou with legs". It officially appeared in the "Guangzhou City Revised and Prohibited Building Regulations" in 1932, referring to the passage under the corridor of street houses. The three basic conditions of passage as the main functional use, whether the width meets the conditions for forming a passage, and whether there is space under the eaves are generally used to test whether it is an Qilou. The forms of Qilou come from various sources. This section discusses the Qilou form of buildings developed on the basis of the bamboo tube house form, that is, the Qilou form that was built in large numbers after the reform movement during the Republic of China in the 20th century. The residential building at No. 19 Sanguanmiaoqian Street, Pantang Wuyue, is a typical Qilou building type, with a two-story brick and wood structure. The function of the building is to live, and it does not include commercial functions on the ground floor.

Figure 3.4-7 Qilou-style bamboo house building type

Source: Left: Reference [20] Right: Xiangcheng Architecture

The ground floor shop building is developed from the traditional bamboo tube house, and its plane shape is similar to the traditional bamboo tube house. The shop building with shop in front and house in back keeps the original bamboo tube house layout mode, only the front hall function is replaced by the shop, and the other layouts remain unchanged; the shop building with shop below and house above has a greater change, and the commercial and residential space is completely separated. The ground floor is completely used as a shop, and the residential function is transferred to the upper floor.

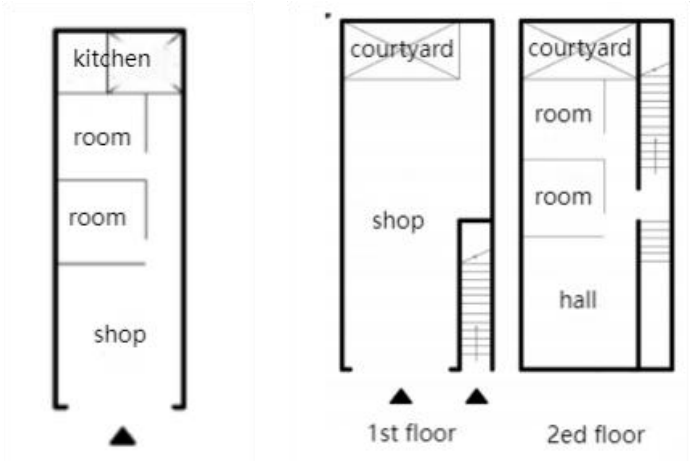


Figure 3.4-8 Building types of ground floor shops (left: shop in front and house in the back; right: shop below and house above)

Source: Reference [20]

Ancestral temple buildings (X): The ancestral temple buildings in Pantang Village include Renwei Ancestral Temple, Sanguan Temple, Li Clan Ancestral Hall, Huang Clan Ancestral Hall, Liang Clan Ancestral Hall, Guangyuan Hall, Wangdao Hall, etc. Among them,

Renwei Ancestral Temple is the largest, highest specification, and most complete.

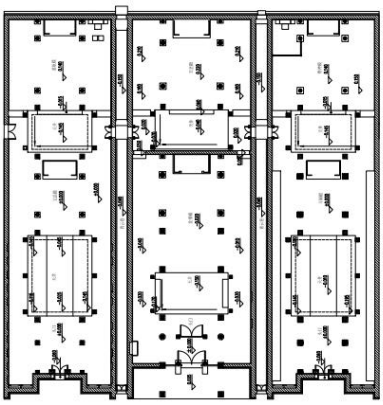


Figure 3.4-9 Plan of Renwei ancestral temple
Source: Xiangcheng Architecture

3.4.2 Early years of the founding of New China - before reform and opening up (1949-1978)

(1) Morphological evolution

The architectural form of Pantang Village in 1978 was in the transition period between tradition and modernity, showing distinct characteristics of the collectivization era. In terms of architectural functional layout, the village space has undergone a profound reconstruction: the proportion of traditional residential functions has decreased, and the collective production function has increased rapidly. Religious spaces such as ancestral halls and temples have been transformed into production team warehouses, and shops along the river plots have been transformed into grain stations or supply and marketing cooperatives. This functional transformation has given rise to a binary spatial structure of "production group + residential group", in which the collective production area is centered on an average of 800 square meters of grain drying fields and granaries. Although the residential area retains the traditional layout, the building density has risen to 70%, reflecting the unique spatial organization logic of the planned economy period.

In terms of building layout types, the previous stage of building layout types were continued, and a small number of new buildings were built. In this stage, Pantang Village began to have square (D) layout patterns, which were distributed outside the village and were new buildings built by the Dan people after they came ashore.

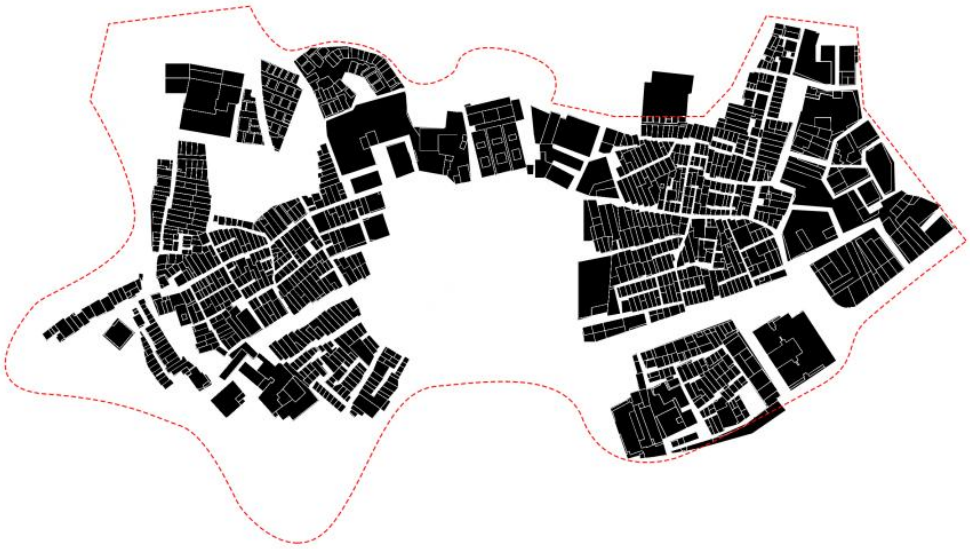


Figure 3.4-10 Pantang Village architectural layout after the founding of New China
Source: Author's own drawing

The architectural form showed a clear pragmatic tendency during this period. Most of the newly built collective buildings were single-story rectangular planes (length-width ratio 2:1), and the eaves height was strictly controlled between 3.2-3.5 meters, which formed a sharp contrast with traditional houses. The spontaneous construction of houses was common, especially the appearance of 2-3 three-story brick-concrete structure "educated youth buildings", which broke the traditional skyline of the village for the first time. The facade treatment tended to be simplified, the gable decoration was reduced, the gray plastic window lintel was reduced, a few blue brick walls were replaced by red bricks or cement, and some traditional wooden doors and windows were replaced by steel windows. These changes together constituted the special architectural style of the transitional period.

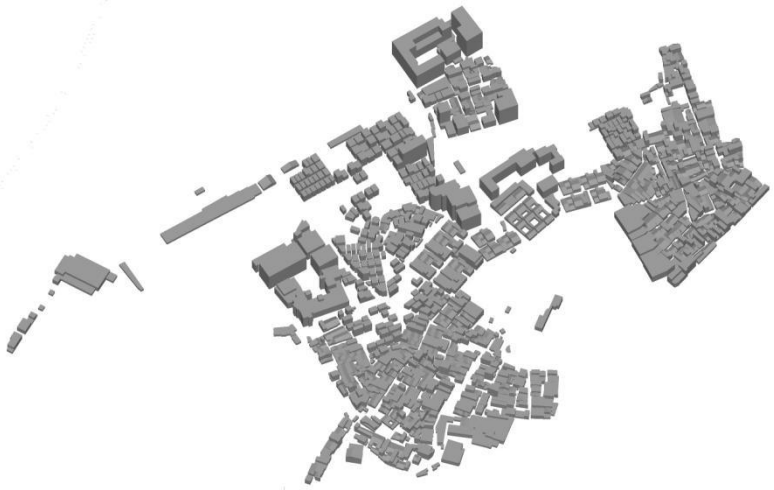


Figure 3.4-11 Three-dimensional shape of buildings in Pantang Village after the founding of New China
Source: Author's own drawing

The construction technology system presents the characteristics of alternation between the old and the new. Although the traditional buildings maintain the hollow wall and wooden frame system, the maintenance status continues to deteriorate; the newly built collective buildings began to adopt brick-concrete structures, but still retained the double-slope roof form, forming a unique "modern structure-traditional form" hybrid model. The spatial adaptability transformation is more significant: 20% of the patios in the core area are closed to expand the living area, 35% of the main rooms of the houses also serve as production team meeting rooms, and the average width of public alleys is reduced due to occupation. These changes not only reflect the special socio-economic conditions at the time, but also reflect the survival wisdom of residents in dealing with space shortages.

This architectural evolution was mainly driven by both policy and economy. Collectivization directly gave rise to new types of buildings, the "Four Olds" movement led to large-scale man-made destruction of decorative components, and housing shortages triggered a wave of spontaneous construction. At the same time, the planned supply of building materials restricted the continuation of traditional craftsmanship, insufficient maintenance funds accelerated the aging of buildings, and the use of simple building materials (cement tiles, asbestos tiles) increased, highlighting the profound impact of economic conditions on architectural form.

(2) Morphological characteristics

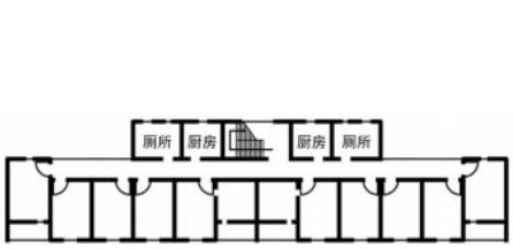
Due to the use of new materials such as bricks, along with the urban development of Pantang Village, two new building types were added to Pantang Village during this period, namely multi-story residential buildings (Y) and public buildings (Z).

Multi-storey buildings (Y): In the late Qing Dynasty and the Republic of China, Pantang Village also had multi-storey residential buildings, but they were relatively low in number and volume, and did not damage the architectural texture of the surrounding townhouses. The multi-storey houses in the early days of the People's Republic of China had undergone significant changes compared to those during the Republic of China and the Qing Dynasty, mainly in terms of plot shape, floor plan, number of floors, and ventilation and lighting methods. The architectural style also changed from traditional to modern. Multi-storey buildings are divided into outer corridor houses, inner corridor houses, and stairwell houses.

After the founding of the People's Republic of China, external-corridor residences were arranged side by side, connected by corridors. These units were generally incomplete, with shared bathrooms and kitchens located at either end of the corridors. Because the corridors primarily served as transportation spaces, residents primarily used them for drying clothes and rarely used them for other purposes.

The inner corridor style house is connected by a corridor with parallel households on both sides. Compared with the outer corridor style house, it is more intensive, but the ventilation and lighting are poor.

Stairwell- style housing is developed on the basis of improving corridor-style housing. Residents are arranged with the stairwell as the center. A strip layout is generally adopted. The maximum number of households on each floor can be up to 4 , subject to the limitation of lighting requirements .



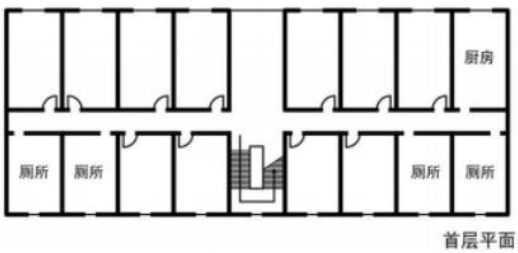


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Figure 3.4-12 Typical multi-storey residential floor plan (left: external corridor type, right: internal corridor type)

Source: Reference [20]

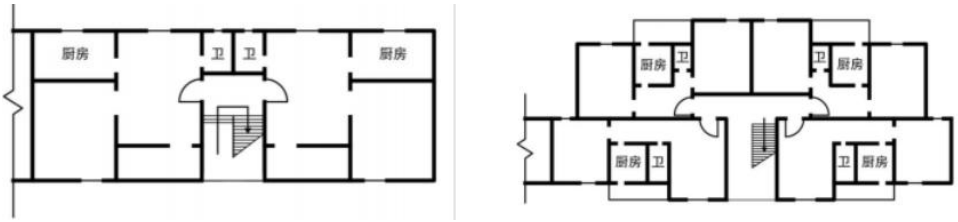

Figure 3.4-13 Typical floor plan of multi-storey residential building with staircases (left: two households per staircase, right: four households per staircase)

Source: Reference [20]

New public buildings also appeared during this period, such as school buildings and office buildings. In terms of architectural form, public buildings, like commercial real estate projects, are one of the best quality buildings in the block. Most of the building plans are regular rectangles, and some are L-shaped or concave. There are not many floors and the overall volume is small. The building facades are not overly decorated. The exterior walls are divided into floors by horizontal or vertical lines, with uniform horizontal windows, mainly flat roofs, and simple eaves. The exterior walls of the buildings are mostly made of materials such as water-brushed stone or gray sand, and decorative moldings are rarely used. This type of building shape is coordinated with the internal structure, has strong applicability , and is widely used in various functional needs, basically showing the characteristics of modernist functional buildings .

3.4.3 After the reform and opening-up - before urban renewal (1978- 2016)

(1) Morphological evolution

Since 2016, the architectural development of Pantang Village has shown a distinct feature of giving equal importance to protection and innovation. In terms of functional layout, the village has completed the transformation from a traditional residential area to a cultural and tourism complex space, with the proportion of residential functions reduced to 45% and commercial service functions rapidly increased to 35%. This transformation is reflected in the renovation of 60% of traditional dwellings, of which 28% have been converted into specialty shops and 15% have been transformed into homestays. At the same time, 5 new public

cultural facilities have been added, forming a circle structure of "cultural and tourism core area + mixed transition area + residential living area". The building density in the core protection area is strictly controlled at 55%, and the commercial continuity along the street interface reaches 75%, which not only ensures the integrity of the historical features, but also meets the needs of modern industrial development.

In terms of architectural layout, the freestyle (E) layout type appeared during this period. This type, relying on the progress of building construction technology and materials, is not restricted by the building span and structural system, and presents a free form. It usually appears as public buildings and commercial buildings to meet the requirements of spatial functions and terrain.

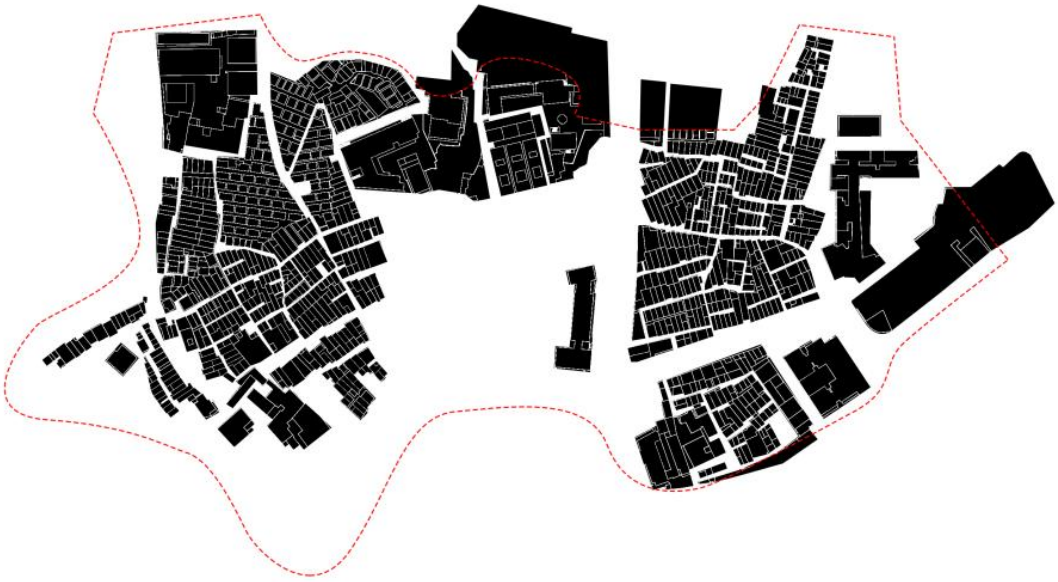

Figure 3.4-14 Architectural layout of Pantang Village after the reform and opening up
Source: Author's own drawing

The control of the building form shows a refined protection strategy. Through a strict height limit policy, the eaves height of the core area is controlled below 5.5 meters, and the buildings in the coordination area do not exceed 3 floors (10.5 meters). The new buildings adopt a fragmented treatment method, and the average single building area is controlled within 120 ㎡, continuing the 1:1.2-1.5 width-to-depth ratio of traditional buildings. In terms of facade style, the restoration rate of blue brick walls of traditional buildings reached 85%,

and the reconstruction rate of wok-ear gables was 42%; the new buildings developed a "new Lingnan" style, cleverly integrating modern materials such as steel structure and glass with traditional elements such as Manchu windows, realizing the contemporary translation of historical vocabulary.

The construction technology system presents an organic fusion of tradition and modernity. 60% of the traditional buildings retain the original wood structure, and 40% are reinforced with steel structures; although the new buildings use reinforced concrete frames, they strictly maintain the traditional roof slope of 1:1.8. In terms of space transformation, nearly half of the patios are converted into landscape courtyards, and one-third are covered with glass roofs; half of the buildings have new internal stairs, which improves the comfort of use while respecting the historical pattern.

This evolution is mainly driven by three factors: historical and cultural protection policies, the development needs of the cultural tourism industry, and the demand for improving the quality of community life. However, it also faces multiple contradictions such as protection requirements and modern functional requirements, commercial development and living environment, authenticity preservation and transformation and innovation. The "micro-transformation" technical system and hierarchical protection system (class I buildings are protected in their original state, class II buildings are protected in their appearance, and class III buildings are coordinated in their style and appearance) formed through practical exploration have provided valuable experience for the sustainable development of historical blocks. In the future, it is necessary to establish a flexible conversion mechanism for building functions, improve technical guidelines to refine control requirements, and strengthen community participation in co-construction and co-governance in order to achieve a dynamic balance between protection and development.

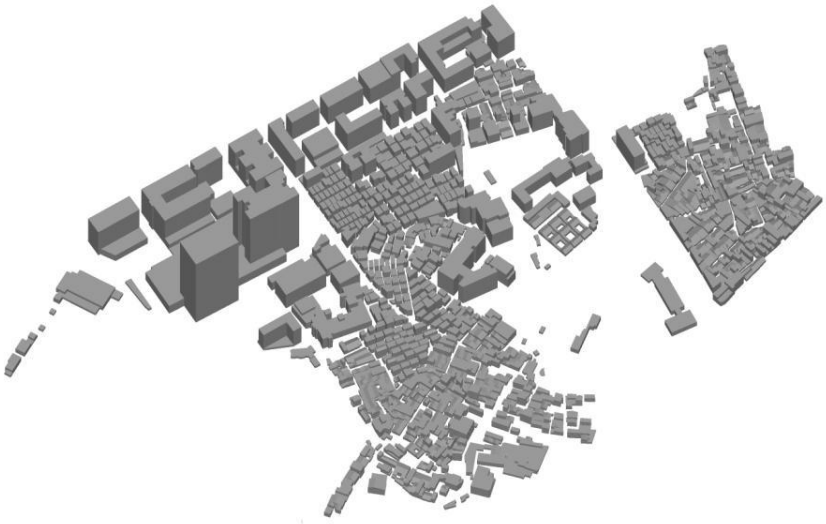

Figure 3.4-15 Three-dimensional shape of buildings in Pantang Village after the reform and opening up
Source: Author's own drawing

(2) Morphological characteristics

During this period, the building types in Pantang Village still included the above-mentioned types. In addition, a new building type appeared - high-rise commercial complex (Z), which was mainly distributed on both sides of Zhongshan Eighth Road and Longjin West Road. Among them, a large number of multi-story residential buildings were built on both sides of the newly built Pantang Road. Most of the buildings were two to four stories high, and because they were close to the Renwei Ancestral Temple, most of the first floor was shops. On both sides of Zhongshan Eighth Road, due to the relatively flat terrain, several high-rise commercial complexes were newly built, with regular building layouts and rectangular plots. This type of building is the result of the fusion and mutation of multi-story residential buildings and ground-floor commercial buildings.

3.4.4 Evolution of architectural layout and three-dimensional building forms

(1) Building layout type process

From the late Qing Dynasty to the Republic of China, Pantang Village formed three core layout patterns: comb-type layout (A), where bamboo tube houses are densely arranged in the core area and connected in series through narrow alleys to form the texture of a Lingnan water village; linear landscape type (B), which extends linearly along the river according to the

shape of the river (such as Wuyue Eight Alleys); scattered type (C), which includes three-room and two-corridor courtyards with strong privacy (C1) and centralized ancestral halls (C2).

In the early days of the founding of the People's Republic of China (1949-1978), the traditional layout was continued, but the square type (D) was added to the peripheral Dan settlement area. There was a major transformation in function: the ancestral hall was transformed into a warehouse, and the riverside shops were transformed into grain stations, forming a "production-residence" dual structure.

After the reform and opening up (1978-2016), technological development gave rise to free-style (E) layout, and public and commercial buildings broke through geometric constraints. Traditional bamboo houses were transformed into shops and homestays in large numbers, forming a "cultural tourism core area-mixed area-residential area" circle structure.

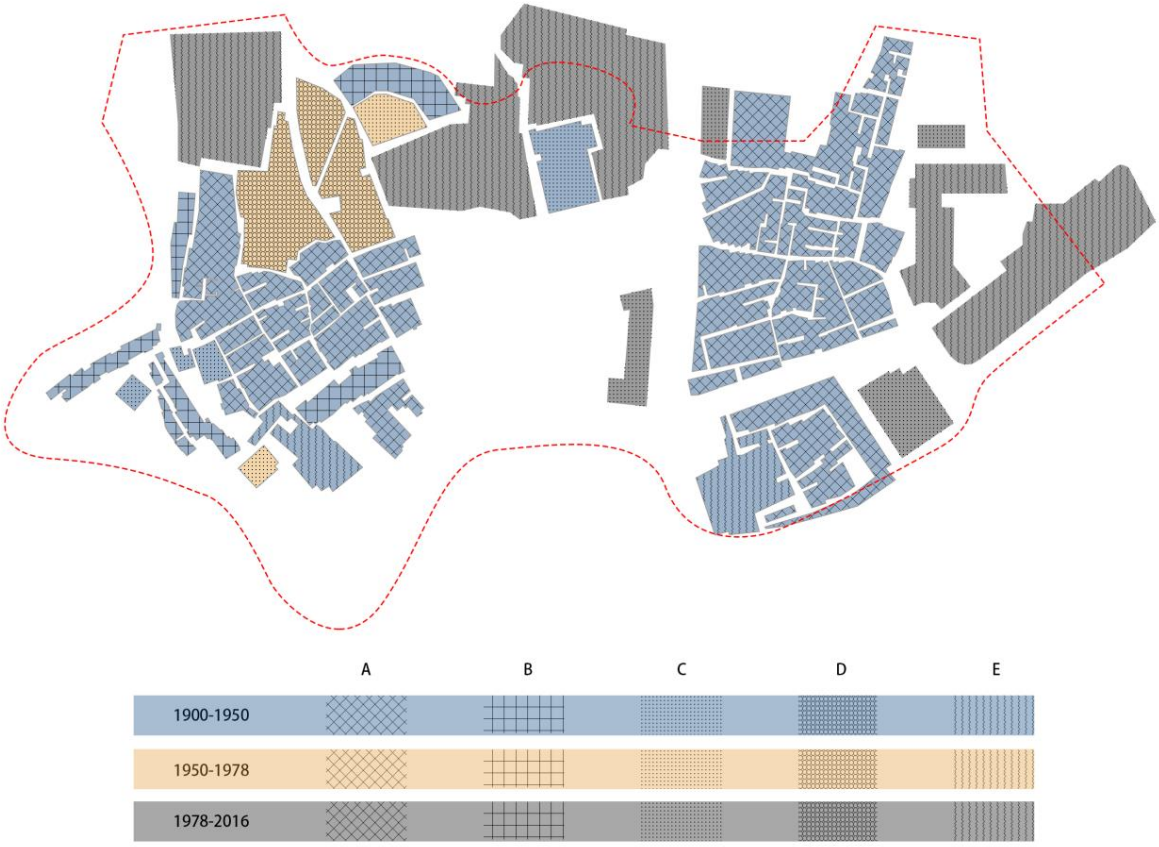

Figure 3.4-16 Pantang Village building layout type

Source: Author's own drawing

（2）Architectural 3D shape type process

In the late Qing Dynasty and the Republic of China, the shape strictly followed the regional climate adaptability: generally 1-2 floors (eaves height ≤ 5 meters), hard mountain double-slope roof (slope 1:1.5-1:2); riverside buildings expanded the waterfront interface through cantilevered platforms and Qilous; the facade presented a three-section "blue brick footing-white lime wall-tile roof", and the decoration was mainly gray plastic brick carving, forming a complete traditional construction system. At this time, the building type was based on the traditional three-room two-corridor (U) and bamboo tube house (V), and derived complex types such as Qilou (W) and ground-floor shops, reflecting the adaptation to the water network terrain and commercial needs.

Between 1949 and 1978, the form took a pragmatic turn: newly built collective buildings adopted a single-story rectangular plane (eaves height 3.2-3.5 meters), which contrasted with traditional residential buildings; the spontaneous construction of residential buildings led to the three-story "educated youth building" breaking through the traditional skyline for the first time; the facade decoration was greatly simplified, some blue brick walls were replaced by red bricks/cement, and wooden windows were gradually changed to steel windows. The building type broke through the tradition and gave birth to multi-story residential buildings (Y) (external corridor type , internal corridor type , staircase type) and simple public buildings (Z), reflecting the demand for space intensification during the collectivization period.

From the reform and opening up to the eve of renewal, the form entered a period of balance between protection and innovation: the core area was strictly limited in height (eaves ≤ 5.5 meters), and the new building volume was fragmented (single building < 120 ㎡) to continue the traditional proportion; the traditional buildings restored the blue brick walls and wok-ear gables, and the new projects developed the "New Lingnan" style - steel structure glass and traditional Manchu windows. High-rise commercial complexes (Z) appeared along the main roads, integrating residential and commercial functions, marking the shift of layout from adapting to the terrain to serving the modern economy.

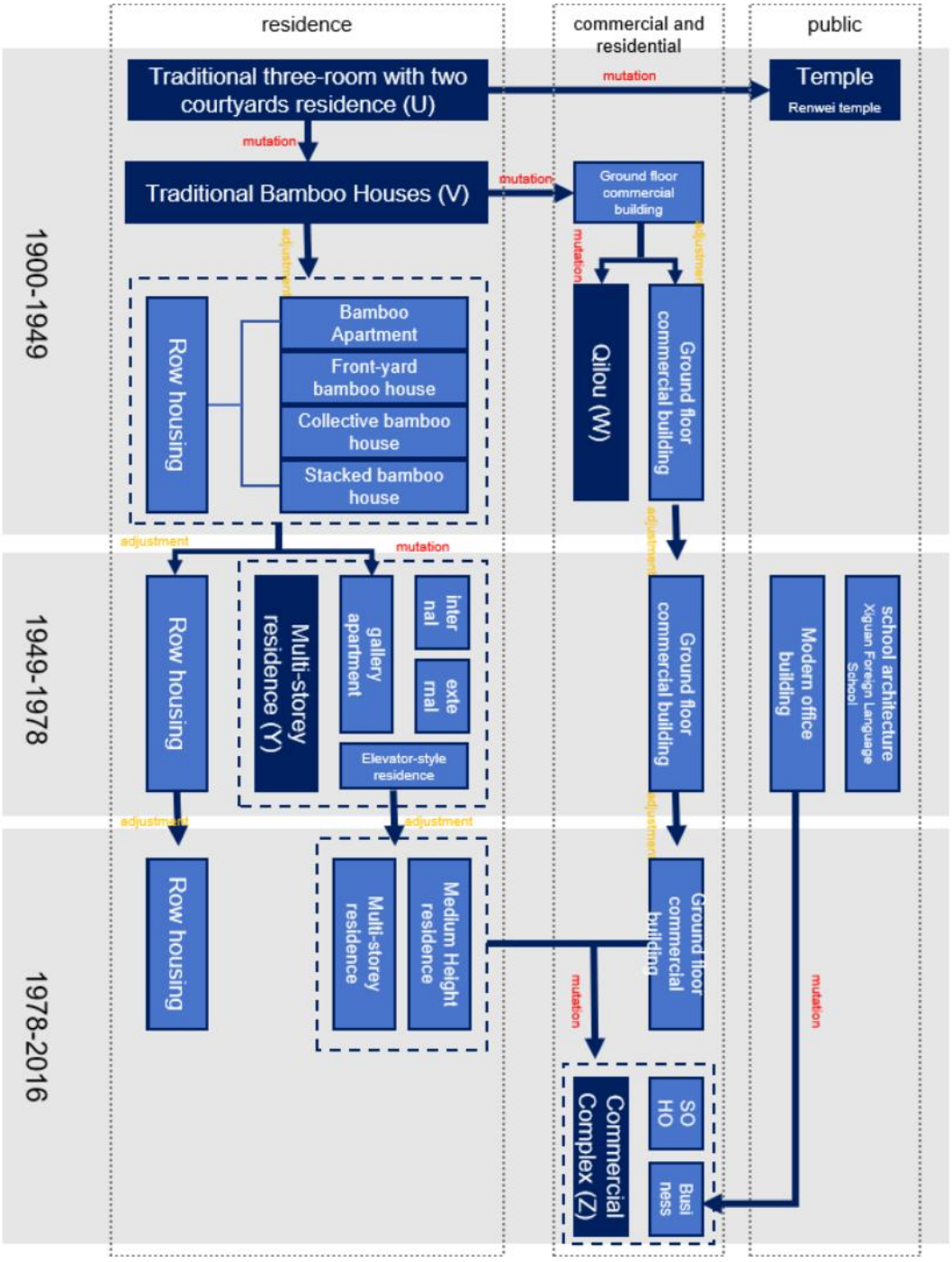

Figure 3.4-17 Pantang Village building type process

Source: Author's own drawing

3.5 Dynamic mechanism of the evolution of Pantang village morphology

Pantang Village is the result of the interaction of multiple dynamic systems. Based on the typo-morphology analysis method, combined with historical documents (Liwan District Annals, Guangzhou Historic Block Protection Plan, etc.) and field research data, this section

constructs a multidimensional framework to systematically explain its transformation mechanism from a traditional water village settlement to a modern historical block . The research data mainly comes from surveying and mapping data and historical map comparison, and the dominant dynamics and spatial responses of each stage are revealed through diachronic comparison.

3.5.1 The leading role of policy and planning

During the collectivization period (1950s-1978), land reform led to the merger of production plots , the average length-width ratio of blocks dropped from 4:1 to 3:1, and collective spaces such as threshing grounds replaced traditional ancestral hall squares. The river filling project in the 1970s caused the waterway to disappear, resulting in a partial change in the "street in front and river in the back" pattern.

After the reform and opening up (1978-2016), the policy of paid land use released huge momentum. The commercial use of homesteads has become a common phenomenon. Along the main streets such as Longjin West Road and Pantang Road, the proportion of commercial functions on the first floor of buildings has jumped from less than 10% to more than 60% (sample survey in 1995), forming a typical "lower-floor and upper-floor residential" vertical mixed function plot , and the commercial vitality of the block interface has been significantly enhanced.

中國共產黨中央委員會
關於公佈中國土地法大綱的決議
（一九四七年十月十日）

中國土地法大綱
（中國共產黨全國土地會議一九四七年九月十三日通過）

中國共產黨晉察冀中央局印發

Figure 3.5-1 Historical data on land reform

Source: National Museum of China
(https://www.chnmuseum.cn/zp/zpml/gmww/202112/t20211214_253215_wap.shtml)

3.5.2 Basic drivers of economy and society

(1) Economic model transformation directly shapes spatial functions

During the agricultural economy period (until 1978), the spatial form was closely adapted to intensive farming along the river. Narrow blocks (2:1-4:1) and small plots (generally less than 200 ㎡) facilitated direct access to the river for water, transportation and farming. The river was the lifeline of production and life.

After the market-oriented reform, the non-agriculturalization of industries has dramatically changed the demand for space. Commercial and family handicraft industries have given rise to larger and more regular plots . The contiguous development led by collective economic organizations has formed a new production unit of 500-1000 square meters, breaking the traditional small residential land model.

Figure 3.5-2 Old photo of the boat people in Lizhi river
Source: Liwan District Archives

(2) Social structural changes shape spatial density and function

Population pressure (after 1978): Rapid urbanization has led to a surge in population, and with the project of returning Dan people to the city, there is a strong demand for homesteads. Building density has soared, and the height of traditional single- and double-story buildings has been broken. Three-story "educated youth buildings" (built using the policy of returning educated youth) have become a common type, and the space has expanded vertically.

Upgrading of consumption demand (after 2016): Tourism development reshapes public

space. To meet the leisure experience needs of tourists, new public spaces such as waterfront landscape trails such as the Lizhi river Yongfuchong section and small cultural squares have been systematically introduced, and the traditional lane function that only meets traffic has been transformed into a complex space that combines traffic, landscape, and leisure.

Figure 3.5-3 Photos of Lizhi river construction
Source: Internet pictures (https://dp.pconline.com.cn/photo/list_1972359.html)

3.5.3 Dual impacts of technology and nature

(1) Innovation in construction technology significantly changes the material form

Material and structural replacement (after 1978): Brick-concrete structures quickly replaced traditional hollow walls due to their convenient construction, cost advantages and greater spatial flexibility. The red brick replacement rate reached 30% in the early 1990s , such as the late buildings on Sanguanmiao Street. This changed the building facade texture and load-bearing logic.

Application of protective technology (after 2016): Modern technology serves the regeneration of tradition. Steel structure reinforcement technology is used for concealed reinforcement of beams , and innovative means such as micro hidden elevator shafts are used in some renovated homestays . Under the principle of minimal intervention, the safety and functional modernization of traditional wooden structures , such as the partially preserved "Mingzi House", are achieved, promoting revitalization and utilization.

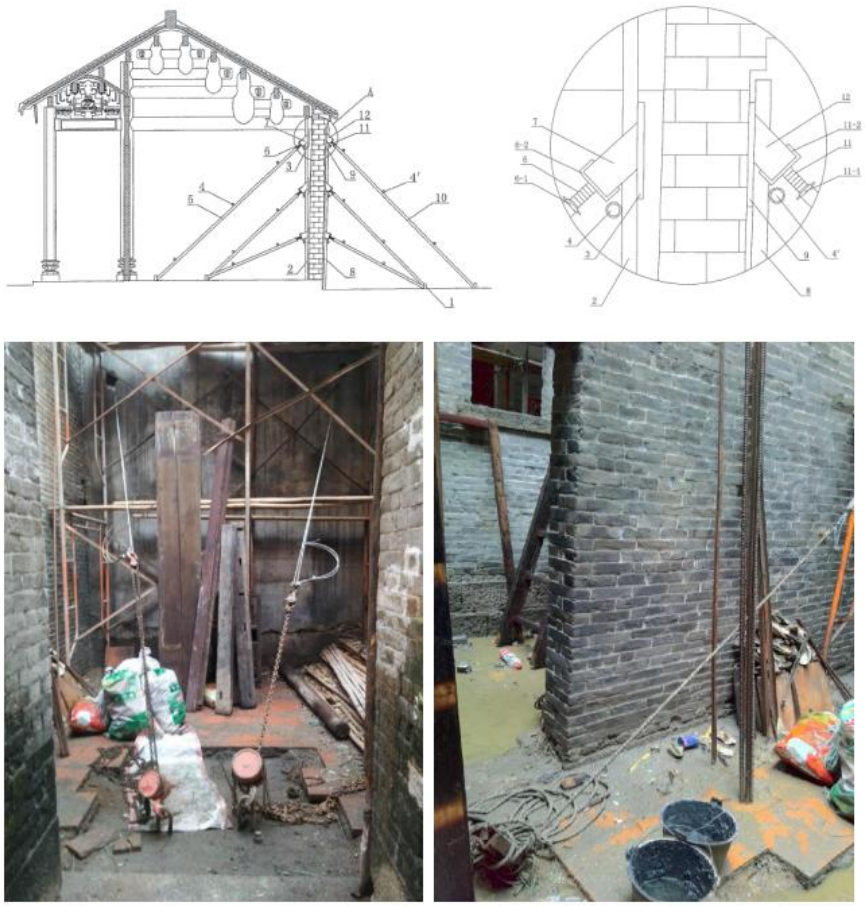

Figure 3.5-4 Illustration of double-sided straightening of building wall
Source: Xiangcheng Architecture

(2) The natural environment provides the basis and constraints

The double-edged sword of water system changes: Historical river siltation and pollution have caused about 15% of waterfront buildings to be abandoned and dilapidated , such as some remains of "stilted houses". Although the water system restoration after 2016 rebuilt the landscape trail system, the loss of authenticity of the historical waterway network caused by landfill has profoundly affected the integrity of the overall water system pattern of the village.

Continuation and adaptation of climate adaptability: Traditional wisdom continues to play a role. The width-to-height ratio of streets and alleys , the layout of patios, and the ventilation of cold alleys have always been effective strategies for coping with the hot and humid climate of Lingnan. In modern renovation, for example, maintaining a roof slope of 1:1.8 effectively retains the advantages of the sloping roof in guiding heat pressure ventilation. The application of technology needs to respect and integrate natural constraints.

Figure 3.5-5 Photo of the Lizhi River channel being uncovered after re-emergence
Source: Internet pictures (https://dp.pconline.com.cn/photo/list_1972359.html)

3.5.4 Phase characteristics of the dynamic mechanism

The power combinations in each period show significant differences , as shown in the following:

(1) Slow natural evolution period (before the founding of the People's Republic of China):

Pantang Village has been evolving slowly and naturally, with farming and fishing as its core, and dominated by natural geography (water network) and social structure (clan). The village has grown steadily and organically within the framework of the water system.

(2) Policy-enforced period (1950-1978) :

The state will intervened strongly (land reform, collectivization, river management), and the policy mandatory nature combined with the demand for agricultural collectivization drove spatial regularization, collectivization, and functional unification.

(3) Market and urbanization driven period (1978-2016):

Reform and opening up have released market vitality, and the transformation of land policies, the shift of economic models to non-agricultural areas, and the rapid population growth have worked together to form the typical characteristics of high-density development, mixed commercial and residential functions, and commercialization of lower-level and upper-level residential spaces.

(4) Cultural orientation update period (after 2016):

Under the guidance of protection planning policies, cultural capital (historical heritage value) has become the core driving force, economic momentum has shifted to cultural and tourism consumption, social demand has focused on quality improvement and cultural identity, and technological applications have served the protective restoration and functional upgrading of heritage.

This dynamic balance mechanism of " policy guidance-economic adaptation-social demand-technical support - natural constraints " provides an empirical case for the sustainable renewal of historical blocks. The nonlinear interaction and stage-by-stage dominance of this multi-dimensional dynamic not only shapes its unique spatial accumulation, but also provides valuable empirical experience for how historical blocks can balance protection and development, inheritance and innovation in the process of modernization and achieve sustainable organic renewal. Its core revelation is that successful renewal must deeply understand and coordinate these five fundamental forces, and on the premise of respecting historical genes and natural endowments, guide spatial forms to achieve the symbiosis of cultural heritage and contemporary vitality through precise policy intervention, adaptive technology application and multi-subject participation.

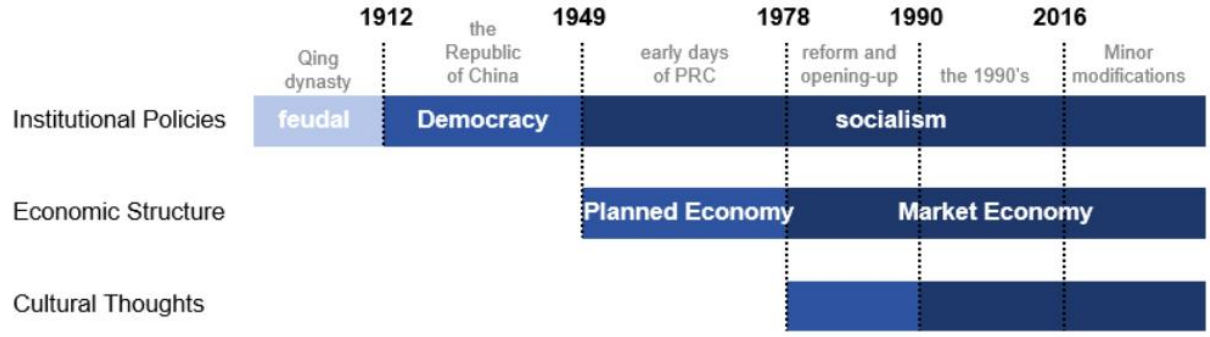

Figure 3.5-6 Dynamic stages of evolution of Pantang village morphology

Source: Adapted from reference [56]

3.6 Problems and reflections on the evolution of Pantang village morphology

3.6.1 Alienation and fragmentation of spatial texture

(1) Disorder of historical accumulation

The merger of plots during the collectivization period and the commercial development after the reform and opening up led to a structural break in the traditional block system. Between 1978 and 2016, the average size of the core area blocks expanded by 2 to 3 times, but the original fishbone-shaped water network was cut off, and some lanes became dead-end roads due to privatization. Compared with the gradual renewal of Suzhou Pingjiang Road, the cultural and tourism development of Pantang Village after 2016 has restored some river interfaces, but the scale conflict between the newly built Q-shaped commercial street (8-10 meters wide) and the traditional lanes (2-3 meters wide) has weakened the historical continuity of the space.

(2) Fuzzification of typological characteristics

The popularity of modern building materials has mixed the language of traditional building facades. Sampling shows that among the buildings that survived after 2010, only half of them retain complete characteristic elements such as wok-ear gables and brick-carved door lintels. Some "micro-renovation" projects excessively pursue visual uniformity and use standardized blue brick veneers, resulting in the loss of authenticity of construction technology. This is in contrast to the "original craftsman training" model adopted by Foshan Lingnan Tiandi.

3.6.2 The lag of functional adaptation

(1) Spatial competition between residence and commerce

Cultural tourism development has driven the conversion of about 60 residential buildings into shops, but the remaining residential buildings have become less livable due to aging infrastructure. A 2022 resident survey showed that the permanent population in the core area

has decreased compared to 2015, reflecting the risk of community hollowing out caused by functional replacement. In contrast, Shanghai Tianzifang has achieved the organic continuation of residential functions through the "living and business symbiosis" leasing model, and this experience is worth learning from for Pantang Village in subsequent renewal.

(2) Intergenerational gap in public space

Social spaces such as traditional ancestral hall squares have been replaced by tourist-oriented "landscape nodes". Although the newly built waterfront trails have improved the tourist experience, they lack carriers for local residents' daily activities (such as drying clothes, markets, etc.). Field surveys show that tourists mainly use public spaces between 10:00 and 18:00, while the spontaneous use rate of residents has dropped significantly, reflecting that public spaces are obviously insufficient in serving residents' daily lives. This phenomenon not only weakens the cohesion of the community, but also leads to conflicts between residents and tourists in the rhythm of leisure.

3.6.3 Technical gaps in the construction system

(1) Crisis of inheritance of traditional crafts

The popularity of modern building materials has reduced the use of traditional techniques such as hollow walls and plaster sculptures, while new "antique" buildings mostly use reinforced concrete frames with blue brick veneers, resulting in a deviation in structural logic from historical prototypes. In contrast, the Kurashiki Bikan Historical Quarter in Japan has ensured the living inheritance of woodworking techniques through the "Traditional Architect" certification system, highlighting the importance of the continuation of the technical system.

(2) Weakening of climate adaptability

In order to maximize the commercial area, some new buildings have transformed patios into atriums, increasing the depth ratio from 1:1 to 1:2.5, resulting in reduced natural ventilation efficiency. The passive cooling system of the traditional Lingnan architecture "cold alley-patio" has not been systematically inherited, reflecting the neglect of regional wisdom in

technological updates.

3.6.4 Reflection: Value trade-offs in morphological evolution

The renewal dilemma of Pantang Village is essentially the result of a game between authenticity protection, economic feasibility, and social sustainability. Excessive commercialization leads to the commodification of space, while rigid protection rules may inhibit community vitality. The subsequent design of Pantang Wuyue Street needs to be based on the essence of typology and explore the following balance paths:

Spatial dimension: Repair the broken texture through the “type-variant” model and distinguish between protective blocks and adaptive update units;

Functional dimension: construct a flexible plot of "mixed residential and commercial" to retain the spatial carrier of residents' daily needs;

Technical dimension: Establish a grafting system between traditional crafts and modern technology, such as using 3D scanning to restore brick carving patterns and steel structures to reinforce wooden frames.

3.7 Summary

Based on typo-morphological theory , this chapter systematically analyzes the spatial morphology of Pantang Village from the two dimensions of materiality and immateriality , sorts out the context and characteristics of its historical evolution, and explores the dynamic mechanism driving the morphological evolution and the core issues currently faced. The study found that the morphological evolution of Pantang Village showed obvious diachronic laws, and its dynamic mechanism was diverse and complex, and the current problems of spatial alienation and functional adaptation needed to be solved urgently.

Pantang Village is the result of the interaction of five factors: policy, economy, society, technology, and nature. Among them, policy and planning are the core driving forces, such as the merger of plots during the collectivization period , commercial development after the reform and opening up, and the control of building density and style by conservation planning;

economy and society constitute the basic factors, marketization promotes functional mixing, and population growth promotes the increase of building density; technology and nature form a double constraint, construction technology innovation changes the material form, and natural conditions such as river siltation restrict the spatial pattern. The interaction of these factors has shaped the spatial form of Pantang Village and will continue to affect its future development path.

Although the spatial form of Pantang Village is constantly evolving, it still faces multiple challenges: the alienation of spatial texture is manifested in the disorder of historical stratification and the blurring of typological characteristics, which leads to the fragmentation of traditional texture; the lagging functional adaptation is reflected in the game between residence and commerce, the intergenerational fault of public space, highlighting the challenge of social sustainability; the technical fault is reflected in the crisis of traditional craft inheritance and the weakening of climate adaptability, suggesting the loss of regional wisdom. These issues provide an important basis for the formulation of subsequent protection and renewal strategies.

This chapter not only provides a systematic framework for understanding the morphological evolution of Pantang Village, but also lays a theoretical foundation for subsequent design practice. By dividing morphological units, clarifying protection boundaries, and combining dynamic mechanisms with problem reflection, future updates need to seek a balance in spatial restoration, functional flexibility, and technical translation to achieve an organic integration of historical features and modern life.

Chapter 4 Effectiveness Evaluation of Protection and Utilization of the Pantang Village from the Perspective of Typo-morphology

Pantang Village started with the "co-creation" micro-renovation in 2016, and now faces new challenges such as the renovation of historical buildings, the gap in cultural heritage, and the integration of commercial ecology. Every step of Pantang Village's development reflects the complexity and long-term nature of the protection and utilization of historical blocks. How to scientifically evaluate the effectiveness of protection and utilization and promote the sustainable development of the ancient village while respecting the authenticity and integrity of the historical blocks is a topic worth exploring at present.

This chapter will start from the perspective of typo-morphology, refer to the literature research on post occupancy evaluation of historical blocks, and construct a multi-dimensional indicator system. Through professional evaluation and public satisfaction survey, the transformation effect of Pantang Village is systematically analyzed, its experience and shortcomings are summarized, and reference is provided for the protection and regeneration of similar historical blocks, exploring feasible paths that emphasize both protection and development.

4.1 Theoretical basis

4.1.1 Basic concepts

Post occupancy evaluation, or Post Occupancy Evaluation (POE for short), refers to a set of systematic evaluation procedures and methods for buildings and their environment after they have been built and used for a period of time. Originated from Europe and the United States in the 1960s, its theory, methods and practice have become mature in Europe and the United States, and many firms have carried out market-oriented post occupancy evaluation business.

4.1.2 Basic paradigm

Zhu Xiaolei proposed a subjective evaluation system of "structure-humanity" and summarized five evaluation paradigms .

Table 4.1-1 Comparison of the focus, research methods, and advantages of the five evaluation paradigms

Source: Adapted from reference [58]

Evaluation Paradigm	Focus	Research Methods	Advantages
Behaviorism paradigm	The relationship between behavior and environment	Observation method, behavior map method, questionnaire method	Objective and easy to operate
Cognitive Paradigm	The influence of user psychological needs on environmental evaluation	Cognitive map method, simulation method, oral report method	Understand the actual needs of users
Performance Evaluation Paradigm	Equipment operating conditions and physical environment	Management related methods	The information is more comprehensive
Social Paradigm	The impact of historical background and social phenomena on the environment	Questionnaire method, interview method, experimental method, literature research method	Have a more macro understanding of space
Phenomenological holistic evaluation paradigm	The relationship between spatial perception and place spirit	Survey, observation, experiment	Focus on the connotation of space

4.1.3 Process and methods

(1) Workflow

The workflow of post occupancy evaluation is mainly divided into three steps: evaluation preparation stage, evaluation implementation stage and evaluation summary stage.

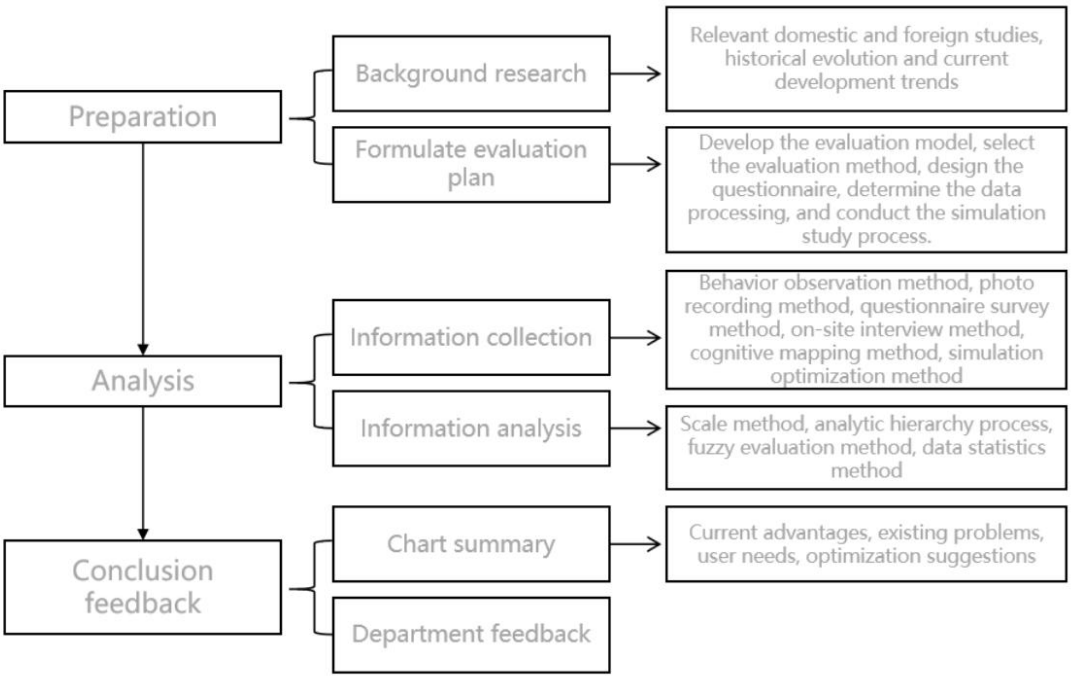

Figure 4.1-1 Post occupancy evaluation flow chart

Source: Adapted from reference [58]

(2) Research methods

post occupancy evaluation of the built environment can be classified into two stages. The first category is about information collection methods, and the second category is about information analysis methods .

Table 4.1-2 Comparison of information collection methods for POE research Source: Adapted from reference [58]

Information Collection Methods	Specific form	advantage	shortcoming
Action Observation	Behavior maps, charts and records	Experience the atmosphere of the place and gain a deeper understanding of the crowd activities	The subjective factors of the observer affect objectivity
Questionnaire method	Closed and open-ended questions	Diverse and flexible forms, high degree of freedom and high efficiency	The options are not comprehensive enough and difficult to analyze in depth
On-site interview method	Structured, semi-structured, and unstructured questions and answers	Completing potential elements, high degree of freedom, easy to operate	Highly subjective and difficult to quantify

Cognitive Mapping	Mind map, enclosure annotation, photo recognition, big data image recognition	Visual impression	Lack of unified drawing standards, drawing is difficult
Photographic Recording	Take photos of the same scene at time intervals	Provide sufficient on-site evidence	Limitations of the equipment
Literature Analysis	Analysis of existing data	Form professional prediction	Many of the documents are biased
Simulation Optimization Method	Synthesis, renderings, simulation, VR, etc.	Visualize the possibilities	There is a certain degree of technical difficulty

Table 4.1-3 Comparison of information analysis methods for POE research Source: adapted from reference [58]

Analytical methods	Theoretical basis	Data Expression	Analysis objectives
Scale method (Ritter scale, SD method)	psychology	Space Effect Rating Table	Quantification of Descriptive Feelings
Analytical Hierarchy Process	Operations Research	Multi-layered factor	Classification of influencing factors
Fuzzy evaluation method	Fuzzy Mathematics	Fuzzy Relation Vector Matrix	Comprehensive evaluation of satisfaction
Statistical analysis of data	Mathematics, Statistics	Mean, standard deviation, etc.	The inherent laws of data

4.2 Index system

4.2.1 Current status of research and application of post occupancy evaluation in historical districts

Post occupancy evaluation (POE) originated in Europe and the United States in the 1960s. It was originally used to evaluate the use effect of the building environment. It emphasizes starting from the user's perspective and analyzing the use of buildings or spaces through systematic evaluation methods. With the deepening of research, POE has gradually expanded from a single building type to urban-scale spatial environments, such as streets, squares, and historical blocks. Foreign POE research has become more mature, forming a "planning -design -use -POE -optimization" cycle model. Domestic scholars have also gradually introduced POE theory, combined with local reality, and explored its application in the protection and renewal of historical blocks.

Post occupancy evaluation (POE) in historic blocks mainly focuses on systematic evaluation of the spatial environment after construction in order to understand the user experience and satisfaction. For example, through questionnaire surveys, interviews, field observations and other methods, users' perceptions and feedback on the spatial environment of historic blocks are collected to discover deficiencies in the design and provide a scientific basis for subsequent protection and renewal.

Representative applications of post occupancy evaluation in historic districts are as follows:

Evaluation of the protection and utilization of the Pingjiang Historical and Cultural Block in Suzhou . The protection and utilization status is described, including the protection operation model, protection mechanism and policy , to evaluate whether it complies with the principles of authenticity, integrity and continuity of life in the protection of the block . In addition, questionnaires and interviews with relevant users - residents, operators and tourists - are used to evaluate the protection and utilization status [61].

The post-occupancy evaluation study of Jinyu Lane in Quanzhou was based on the theory of micro-renewal and post-occupancy evaluation . The evaluation model was constructed through the analytic hierarchy process, and the use status after micro-renewal was analyzed by combining field research and other methods. In view of the spatial environment, commercial revitalization, community governance and other issues, optimization suggestions such as property rights activation and commercial planning were put forward, providing a reference for the protection and renewal of historical areas [34].

Post occupancy evaluation of sitting and resting spaces in Sanfang and Qixiang, Fuzhou. Using environmental behavioral methods, field observations, interviews and questionnaire surveys were conducted on five typical sitting and resting spaces. The activity types and behavioral characteristics of users were analyzed, and six primary evaluation indicators and 21 secondary evaluation indicators were selected for satisfaction evaluation . [22] The study proposed optimization suggestions in terms of humanized design, noise treatment, infrastructure management and other aspects of the space .

Research on the evaluation of the renewal of Nantou Ancient Town in Shenzhen. Taking Nantou Ancient Town as an example, this paper constructs a comprehensive renovation type urban village renewal evaluation system from six aspects: living environment, supporting facilities, block space, history and culture, economy and commerce, and social humanities [26]. The importance-performance analysis method (IPA) is used to select three types of public subjects, namely residents, merchants, and tourists, for evaluation. The commonalities and differences of the evaluation results are compared, and the existing problems and causes in the renewal of Nantou Ancient Town are analyzed. It is proposed that in the future, optimization should be carried out in four aspects: focusing on the development of diversified business formats, improving current living conditions, improving supporting facilities, and enhancing the display of historical culture.

Post occupancy evaluation of micro-renewal in Guangzhou Overseas Chinese New Village: Starting from the user's perspective, this study uses the post occupancy evaluation research method to study the residents' evaluation after the micro-renovation of Overseas Chinese New Village. Through case studies, the experience and shortcomings of micro-renewal in historical blocks are analyzed and summarized, and the next step of renewal strategy and suggestions are proposed, aiming to provide important decision-making reference information for the protection of historical blocks [40].

4.2.2 Establishment of post occupancy evaluation indicators

The factors that affect the use of historical blocks are very complex. In existing studies, the division and selection of factors that affect the use of historical blocks vary. The author consulted relevant literature and sorted out the division of index factors for post occupancy evaluation of historical blocks in recent years , as shown in Table 4.2-1 .

Table 4.2-1 Classification of post-occupancy evaluation indicators for historical blocks in relevant literature

Source: drawn by the author

Sources	Study subjects	Influencing factors
Zhang Dian, 2013 [59]	Chinese Baroque Historic District	Historical buildings, environmental facilities, transportation, spatial scale, participation in social activities, historical context, personal emotions

Zhang Guanghan , Wei Xiangli, 2016 [61]	Suzhou Pingjiang Historical and Cultural District	Historical function, block characteristics, relationship with the city center, functional positioning, tourism content, spatial pattern characteristics, renovation time
Zhang Yi, 2018 [63]	Study on the Protection and Renewal of Nanjing's Historic Districts	Architectural environment, spatial scale, traffic environment, natural environment, infrastructure, business atmosphere, general social characteristics, participation in social activities, operation management, historical context, personal emotions
Huang Houyu, 2020 [34]	Goldfish Lane, Quanzhou	Architectural level, spatial level, related supporting facilities, business benefits, resident benefits, business atmosphere, historical context, community affairs, social relations, and resident psychology
Fan Linzi, Wang Danyang, Yue Jiaying, 2022 [22]	Three Lanes and Seven Alleys in Fuzhou	Infrastructure, plant configuration, humanistic spirit, overall layout, spatial quality, environmental perception
Gu Siming , Malaysia Airlines, Wang Mohan, 2022 [26]	Evaluation of the Renovation of Nantou Ancient Town	Living environment, supporting facilities, neighborhood space, history and culture, economy and commerce, and social humanities
Luo Zizhe , Feng Hongbin, 2022 [40]	Guangzhou Overseas Chinese New Village Modern Historical Block	Traffic space, public space, overall architectural style, basic supporting facilities, residents' psychology, historical context, community interaction

As can be seen from the above table, the post-occupancy evaluation indicators of historical blocks are basically centered around "people" and "environment" and the interaction between the two [50]. Based on this, the author determined the three dimensions of this evaluation - material level, social level, and user level. Material level: mainly includes natural environmental factors, artificial material factors, and built environmental factors around the research object (such as transportation, basic supporting facilities, buildings, etc.); social level: mainly includes general characteristic factors, social activity factors, and operation and management factors; user level: mainly includes factors of users' feelings about historical

culture and personal psychological feelings (such as cultural uniqueness, personal emotions, attitudes, etc.). In the selection of evaluation indicators, this article refers to the indicator system of post-evaluation of historical block protection and utilization by Dr. Wang Linxing [50]. On this basis, the author focused the evaluation object on the morphological type unit of Pantang Village , and finally formed a top-down four-level evaluation system according to the hierarchical analysis method, which was successively refined into 38 evaluation factors, as shown in Table 4.2-2 .

The basic goal of the evaluation of the protection and utilization of the Pantang Village block is to evaluate the implementation effect of the protection and utilization after implementation based on the morphological type analysis by using the post-evaluation method . The indicator system of this section is mainly developed from six levels: B1 morphological context continuation , B2 morphological environmental quality , B3 morphological facility adaptation , B4 morphological function adaptation , B5 morphological social structure , and B6 morphological image shaping .

Among them, B1 morphological context continuation emphasizes the street system pattern and street frame and plot organization of Pantang Village, and evaluates the fishbone pattern texture, grid pattern texture, strip traditional street frame, mixed irregular street frame, large grid street frame, traditional plot, public service plot and other morphological type units respectively; in B2 morphological environment quality, for the street type environment, public space type environment, building layout environment and building decoration type, traditional street types such as Riverside Inner Street, Riverside Outer Street, etc. and new street types, public space types such as religious and cultural space, market, square, green space, etc., building layout types such as comb type, linear landscape type, scattered type, etc. are evaluated respectively; B3 morphological facilities In the adaptation, the focus is on the concealment and integration of water supply and drainage, power supply, etc. in different types of areas, as well as the matching degree of road traffic, slow traffic, etc. in different forms of areas; in the B4 form function adaptation, the rationality of the distribution of business formats in different types of plots is highlighted, such as traditional residential plots,

modern commercial plots, etc., as well as the relationship between business formats and historical culture, innovation and creativity in different forms of areas; in the B5 form social structure, the emphasis is on the continuation of social structure in traditional plots and the manifestation of public participation in form protection decision-making; B6 form image shaping combines the representativeness of iconic interfaces, buildings, and landscapes in different form types, emphasizing the role of publicity and planning in highlighting the characteristics of Pantang Street.

Table 4.2-2 post-occupancy evaluation index system for the protection and utilization of historical blocks Source: drawn by the author

Evaluation target layer	First-level evaluation factors	Secondary evaluation factors	Evaluation Factor
A Post-occupancy Evaluation Index System for the Protection and Utilization of Pantang Village Blocks from the Perspective of Typo-morphology	B1 Continuation of morphological context	C1 Street System Layout	D1 Street System Authenticity
			D2 Street system type preservation
		C2 street texture continues	D3 Street Texture Integrity
			D4 Street historical recognizability
		C3 plot organization continues	D5 Land type preservation
			D6 plot organization logic continuity
			D7 plot boundary clarity
	B2 Form Environmental Quality	C4 Street type environmental coordination	D8 Street Elevation
			D9 Street Furniture
			D10 Street Paving
		C5 Public space type environmental coordination	D11 Public Space Interface
			D12 Public Space Facilities
			D13 Public space greening
		C6 Building layout and environmental coordination	D14 Building Layout Type
			D15 Building Group Relationship
		C7 Architectural Decoration Type	D16 element type application
			D17 Color Control Effect
	B3 form facility adaptation	C8 Municipal Facilities Adaptation	D18 Facility concealment
			D19 Facility-Texture Integration
			D20 disaster prevention system form adaptation
			D21 Municipal facilities typology
		C9 Traffic facilities adaptation	D22 Road Traffic
			D23 Public transportation

			D24 Slow Traffic
			D25 Parking facilities
	B4 morphological and functional adaptation	C10 Business Type-Space Type Adaptation	D26 Business Type-Space Type Adaptation
			D27 Business Space Form Utilization
		C11 Business Features and Innovation	D28 Historical Space Narrative Presentation
			D29 Folk craft space carrier preservation
	B5 Morphological Social Structure	C12 Community Space Continuation	D30 Social Structure Spatial Mapping
			D31 Place type identity
		C13 Public participation mechanism	D32 Typed Participation Mechanism
			D33 Comprehensiveness of public participation
	B6 Shape Image Shaping	C14 iconic space	D34 type interface symbol
			D35 Representative types of landmark buildings
			D36 Landscape type symbolism
		C15 Promotion Planning	D37 Promotion Channel
			D38 Promotion Frequency

4.3 Evaluation method

4.3.1 Differences in the subjects of Post-Occupancy Evaluation of Pantang Village

The protection and utilization of Pan Tang Wu Yue is a multi-subject joint participation process, involving multiple groups such as government agencies, experts, ordinary residents and tourists. Government agencies usually entrust experts to conduct professional evaluations, and ordinary people, as users of the block, will also evaluate based on their own lives and experiences. Therefore, the post-occupancy evaluation subjects of Pan Tang Wu Yue micro-renovation can be mainly divided into two categories: experts and ordinary people.

(1) Expert evaluation: Professional perspective ensures the continuity of historical value and technical rationality

In terms of the restoration of cultural relics and architectural features , experts can judge

whether the renovation follows the principle of "not changing the original state of cultural relics" from the perspectives of architecture, history, and cultural relics protection. For example, whether the renovation of Li's Dunben Hall retains the original structural craftsmanship, and whether the reconstruction of the gatehouse of Sanguan Temple conforms to the historical form, to avoid distortion of historical information due to commercial transformation. Experts can evaluate whether the spatial framework after the renovation, such as the axis of Wuyuezhi Street and Riverside Street, continues the pattern of the Qing Dynasty, and whether the linkage between festival spaces such as Shejitan Square and the front site of Sanguan Temple and the dragon boat attraction route is scientific, to ensure that the traditional logic of "water-road-architecture-folk customs" is not destroyed.

In terms of technology and engineering, experts can test the authenticity of the "repairing the old as it was" process, as well as the impact of renovation techniques such as dredging and tidying up on the texture of streets and alleys, to avoid excessive modernization that damages the style of the ancient village. From an engineering perspective, it is assessed whether the "three lines underground" and "firefighting facility upgrades" meet the standards, such as whether the monitoring coverage eliminates security blind spots (such as the improvement in sense of security mentioned by villager Huang Youxiong), whether the municipal pipe network solves the problem of waterlogging, and ensure that the renovation has both cultural protection and people's livelihood improvement functions.

In terms of long-term protection and development, experts can provide feasible solutions for projects that have not been completed due to funding or policy restrictions during micro-renovation, promote the systematic restoration of historical landscapes such as water-controlling stone lions and the Altar of the Land and Grain, and avoid cultural rupture caused by "half-finished projects". Combining the perspectives of sociology and economics, experts can evaluate the fit between commercial formats and local culture, and recommend the introduction of native formats such as the "Pantang Five Beauties" planting experience and dragon boat making workshops to prevent excessive homogenization and avoid the "barbecue street" phenomenon that villagers are worried about .

(2) Public evaluation: Local perspective ensures community identity and continuity of life

In terms of historical memory and life feedback , as witnesses of history, the public can intuitively feel whether the renovation preserves "homesickness". For example, Huang Youxiong, a villager from Wuyue Village, Pantang, emphasized that "not demolishing old buildings is to preserve culture", and Li Yanjun believed that "early micro-renovation can retain more people". Such evaluations directly reflect the impact of renovation on the sense of belonging to the community. Residents can give feedback on the effects of infrastructure improvements, such as whether the flatness of the road is convenient for the elderly to travel (Li Shengquan mentioned that "the road is well paved"), whether the community canteen and health station meet the needs of the aging population, and avoid renovations that "focus on appearance rather than substance".

In terms of the sustainability test of the public participation mechanism , public evaluation can test whether the "resident-government-expert" consultation mechanism is effective. For example, Uncle Quan mentioned that "the co-creation committee held fewer meetings in the later period", reflecting the lack of sustainability of decision-making participation; and Rui Guangye's team mobilized villagers' narratives through the "Pantang Five Agreements Oral History", proving that non-official forces can supplement the depth of public participation. The participation of the younger generation in lion dance and dragon boat, and whether the elderly's "storytelling" can attract tourists directly reflect whether the transformation has stimulated cultural awareness. If it only relies on government promotion and lacks active participation from the public , such as "free teaching of kung fu but no one learns", it means that the inheritance chain still needs to be strengthened.

In terms of public opinion calibration on the balance between business and residence , the public can provide feedback on whether the entry of business formats affects the quality of living, such as whether the rental pressure of cultural shops leads to "more people but less money", or whether the interaction between new and old villagers , such as some shop owners "drinking tea and chatting every day" with Uncle Quan, forms a healthy community ecology. Residents' perception of tourist flow and the degree of commercialization can help draw

protection red lines to avoid excessive tourism squeezing out the original living ecology, such as Li Yanjun emphasized that "only when people live can culture be preserved."

(3) Collaboration between experts and the public: Building a comprehensive and dynamic evaluation system

In terms of making up for the limitations of a single perspective , experts can discover technical flaws in the restoration of cultural relics and avoid situations where inferior materials are used as good ones , while the public can capture cultural ruptures at the emotional level , such as the removal of old trees leading to the "disappearance of memory landmarks". The combination of the two can form a "technical-emotional" dual-dimensional assessment. Experts focus on the durability and safety of the renovation project , while the public cares about the sustainability of intergenerational inheritance, jointly promoting the transformation from "hardware update" to "living protection".

In terms of strengthening the community identity of multi-party governance : expert demonstration provides technical authority for the transformation, and public participation provides a basis for public opinion . For example, the co-creation committee includes 7 village representatives, and the two jointly ensure the "professionalism" and "legitimacy" of the policy implementation. At the same time , the problem of continuous motivation in problem rectification is solved. For example, in response to the public's reflection of "insufficient funds for cultural relics repair", experts can provide financing solutions; in response to the "commercial formats deviating from local culture" pointed out by experts, the public can recommend native merchants to settle in, forming a closed loop of "discovering problems-solving problems".

The core value of this dual evaluation system is to ensure that the "cultural genes" of the historical blocks are not destroyed through expert evaluation, and to ensure that the transformation serves "people's needs" through public evaluation. The two together constitute the triangular balance of "protection-life-development". In this study, we will collect expert evaluations and ordinary public evaluations respectively, and conduct comparative analysis to explore the similarities and differences between the two, so as to more accurately evaluate the

overall effect of the Pan Tang Wuyue micro-transformation, and provide reference experience for the protection and revitalization of similar historical blocks in the future.

In the evaluation of the micro-renovation of Pantang Wuyue, the opinions of experts and ordinary people often differ in the following aspects:

Table 4.3-1 Comparison of evaluation preferences between experts and ordinary people Source: drawn by the author

	expert	Ordinary people
Differences in focus	Experts are more concerned about whether the historical and cultural value of Pan Tang Wu Yue is fully protected, such as the authenticity of building repairs and the continuity of historical context.	Ordinary people are more concerned about the convenience of daily life, such as whether the roads are smoother, whether the commercial facilities are complete, and whether the environment is more livable.
Differences in aesthetic preferences	Experts are often critical of "fake antique" buildings, believing they undermine historical authenticity.	Some ordinary tourists and residents may have a favorable impression of these newly built "antique" buildings, believing that they are more ornamental and even help to enhance their tourism appeal.
Evaluation of the physical environment	When inspecting, experts usually pay more attention to the coordination of the overall spatial layout and architectural style, such as whether the proportion scale and color matching of Lingnan architecture are followed.	Ordinary people are more concerned about the actual usage experience, such as the comfort of traffic in the streets, the completeness of parking facilities, and whether the street lighting is sufficient.
Evaluation of function usage	Experts tend to evaluate whether the renovated blocks have multiple functions and whether they promote industrial development while protecting culture.	Ordinary residents are more concerned about whether daily functions are improved, such as whether the vegetable market is retained and whether the business meets the needs of residents.
Planning and protection evaluation	Experts emphasized the long-term nature of block protection and believed that micro-renovation should avoid excessive commercialization to ensure the cultural authenticity of Pan Tang Wu Yue.	However, some residents and businesses may be more inclined to support commercial development, hoping that the neighborhood can attract more tourists and drive economic benefits.

4.3.2 Evaluation method with experts as the main body

(1) Data source

The post-occupancy evaluation of the historic blocks in this section is mainly conducted by experts. Five researchers with certain professional knowledge (architectural design,

heritage protection, urban planning, community operation, etc.) were invited to evaluate the use of the blocks after protection and utilization. The evaluation results were quantified using the Liet scale method (5 = very satisfied/very good, 1 = very dissatisfied/very poor). The evaluation results are statistically as follows:

Table 4.3-2 Expert evaluation satisfaction table Source: drawn by the author

Indicator name	Very satisfied	Satisfied	generally	Less satisfied	Very dissatisfied
D1 Street System Authenticity	0	2	3	0	0
D2 Street system type preservation	0	1	2	2	0
D3 Street Texture Integrity	0	2	2	1	0
D4 Street historical recognizability	1	2	2	0	0
D5 Land type preservation	0	2	1	2	0
D6 plot organization logic continuity	0	1	3	1	0
D7 plot boundary clarity	0	2	2	1	0
D8 Street Elevation	0	2	3	0	0
D9 Street Furniture	0	3	2	0	0
D10 Street Paving	0	2	2	1	0
D11 Public Space Interface	0	2	3	0	0
D12 Public Space Facilities	0	2	3	0	0
D13 Public space greening	0	2	2	1	0
D14 Building Layout Type	1	2	1	1	0
D15 Building Group Relationship	1	2	2	0	0
D16 element type application	1	2	2	0	0
D17 Color Control Effect	0	2	2	1	0
D18 Facility concealment	0	2	2	1	0
D19 Facility-Texture Integration	0	1	2	2	0
D20 disaster prevention system form adaptation	0	1	1	2	1
D21 Municipal facilities typology	0	1	3	1	0
D22 Road Traffic	0	0	1	1	2
D23 Public transportation	0	2	1	2	0
D24 Slow Traffic	0	1	1	2	1
D25 Parking facilities	0	0	2	2	1
D26 Business Type-Space Type Adaptation	0	1	2	2	0
D27 Business Space Form Utilization	0	1	2	2	0
D28 Historical Space Narrative	0	1	3	1	0

Presentation					
D29 Folk craft space carrier preservation	0	2	2	1	0
D30 Social Structure Spatial Mapping	0	2	2	1	0
D31 Place type identity	0	2	2	1	0
D32 Typed Participation Mechanism	0	1	3	1	0
D33 Comprehensiveness of public participation	0	2	3	0	0
D34 type interface symbol	0	1	3	1	0
D35 Representative types of landmark buildings	0	3	1	1	0
D36 Landscape type symbolism	0	3	2	0	0
D37 Promotion Channel	0	1	3	1	0
D38 Promotion Frequency	0	1	2	2	0

(2) Weight calculation

Through the ranking of the importance of evaluation indexes by five professional researchers, the relative weight vector of each index was calculated using the Delphi method and hierarchical analysis method .

Table 4.3-3 Weight vector of expert evaluation indicators after protection and utilization Source: drawn by the author

Primary indicators and weights	Secondary indicators and weights	Level 3 indicators	Weight
B1 Continuation of morphological context 0.3477	C1 Street system pattern 0.0895	D1 Street System Authenticity	0.0447
		D2 Street system type preservation	0.0447
	C2 street texture continues 0.1558	D3 Street Texture Integrity	0.0779
		D4 Street historical recognizability	0.0779
	C3 plot organization continued 0.1024	D5 Land type preservation	0.0341
		D6 plot organization logic continuity	0.0341
		D7 plot boundary clarity	0.0341
B2 Form Environmental Quality 0.2058	C4 street type environmental coordination 0.0802	D8 Street Elevation	0.0267
		D9 Street Furniture	0.0267
		D10 Street Paving	0.0267
	C5 Public space type	D11 Public Space Interface	0.0130

	environmental coordination 0.0389	D12 Public Space Facilities	0.0130
		D13 Public space greening	0.0130
	C6 Building layout and environmental coordination 0.0584	D14 Building Layout Type	0.0292
		D15 Building Group Relationship	0.0292
	C7 Architectural Decoration Type 0.0284	D16 element type application	0.0142
		D17 Color Control Effect	0.0142
B3 form facility adaptation 0.1181	C8 municipal facilities adaptation 0.0675	D18 Facility concealment	0.0169
		D19 Facility-Texture Integration	0.0169
		D20 disaster prevention system form adaptation	0.0169
		D21 Municipal facilities typology	0.0169
	C9 traffic facilities adaptation 0.0506	D22 Road Traffic	0.0127
		D23 Public transportation	0.0127
		D24 Slow Traffic	0.0127
		D25 Parking facilities	0.0127
B4 morphological and functional adaptation 0.0860	C10 Business Type-Space Type Adaptation 0.0287	D26 Business Type-Space Type Adaptation	0.0143
		D27 Business Space Form Utilization	0.0143
	C11 Business characteristics and innovation 0.0573	D28 Historical Space Narrative Presentation	0.0287
		D29 Folk craft space carrier preservation	0.0287
B5 Morphological Social Structure 0.1541	C12 community space continues 0.1101	D30 Social Structure Spatial Mapping	0.0550
		D31 Place type identity	0.0550
	C13 Public participation mechanism 0.0440	D32 Typed Participation Mechanism	0.0220
		D33 Comprehensiveness of public participation	0.0220
B6 Shape Image Shaping 0.0883	C14 iconic space 0.0505	D34 type interface symbol	0.0168
		D35 Representative types of landmark buildings	0.0168
		D36 Landscape type symbolism	0.0168
	C15 Promotional Planning 0.0378	D37 Promotion Channel	0.0189
		D38 Promotion Frequency	0.0189

(3) Fuzzy comprehensive evaluation

According to the fuzzy operation of the above secondary indicators, combined with the

weight vectors of the indicators at all levels, the evaluation scores of the indicators at all levels are calculated (Table 3.3-4). The results show that the total expert satisfaction rating of the Pan Tang Traditional Folk House Historical Block after protection and utilization is 3.471 points, which is classified as "general" and close to the critical value of "relatively satisfied" of 3.5, indicating that professionals have a fair degree of recognition of the protection and utilization effect of the block. Among them, the B2 morphological environmental quality index scored 4.002 and the B3 morphological facility adaptation index scored 4.150, indicating that the material environment improvement work of Pan Tang Village has been highly evaluated by professionals, but the B4 morphological function adaptation index (score 3.233) and the B5 morphological social structure index (score 2.157) are low, indicating that the professional evaluation performance of this block in terms of industrial function and social structure is not good.

Table 4.3-4 Expert evaluation index score results after protection and utilization Source: drawn by the author

Overall goal	Overall score	First level indicator	Evaluation score	Secondary indicators	Evaluation score
A Post-occupancy Evaluation Index System for the Protection and Utilization of Pantang Village Blocks from the Perspective of Typo-morphology	3.471	B1 Continuation of morphological context	3.572	C1 Street System Layout	2.6
				C2 street texture continues	4.2
				C3 plot organization continues	3.467
		B2 Form Environmental Quality	4.002	C4 Street type environmental coordination	4.266
				C5 Public space type environmental coordination	4.667
				C6 Building layout and environmental coordination	3.1
				C7 Architectural Decoration Type	4.2
		B3 form facility adaptation	4.150	C8 Municipal Facilities Adaptation	4.75
				C9 Traffic facilities adaptation	3.35
		B4 morphological and functional adaptation	3.233	C10 Business Type-Space Type Adaptation	2.3
				C11 Business Features and Innovation	3.7

		B5 Morphological Social Structure	2.157	C12 Community Space Continuation	2.1
				C13 Public participation mechanism	2.3
		B6 Shape Image Shaping	3.445	C14 iconic space	3.404
				C15 Promotion Planning	3.5

(4) Satisfaction-Importance evaluation

The importance of the secondary evaluation indicators (weight values are uniformly multiplied by 100) is set as the horizontal axis, and the vertical axis is the satisfaction of professionals with the indicators. The indicator satisfaction evaluation results and importance values in the indicator system are placed in the coordinate axis (Figure 4.3-1). The coordinate axis value of the horizontal axis is set as the mean of the overall evaluation results , 3.47. Indicator satisfaction higher than the overall mean is considered to be high, otherwise the satisfaction is low; the coordinate value of the vertical axis is set to 6.67, which is the result of dividing the overall weight 100 by the number of indicator items 15. Indicator importance is higher when the weight is higher than the mean, otherwise it is considered to be low. All the above indicators can be divided into four categories according to the satisfaction-importance coordinate quadrant:

High importance-high satisfaction: This type of indicator represents that it is very important in the minds of professionals and has a high satisfaction after reuse. The main representative indicators include C2 street texture continuity , C4 street type and environmental coordination , C8 municipal facilities adaptation , etc., and it is necessary to continue to maintain the performance of this type of indicator;

Low importance-high satisfaction: This type of indicator represents indicators that are not very important in the minds of professionals but have high satisfaction after reuse. The main representative indicators include C5 public space type environmental coordination , C7 building decoration type , C11 business characteristics and innovation , C15 publicity planning, etc., and performance in this type of indicator also needs to be maintained.

High importance-low satisfaction: This type of indicator represents indicators that are

very important in the minds of professionals but have low satisfaction after reuse. The main representative indicators include C12 community space continuation , C1 street system pattern , C3 plot organization continuation , etc. Subsequent optimization and improvement work needs to be carried out from these angles as a priority.

Low importance - low satisfaction: This type of indicator means that it is not very important in the minds of professionals and the satisfaction after reuse is also low. The main representative indicators include C6 building layout and environmental coordination , C10 building layout and environmental coordination , C14 iconic space, C13 public participation mechanism , etc. In the subsequent optimization and improvement work, this part of the work should not be prioritized, but should be gradually improved to avoid waste of resources.

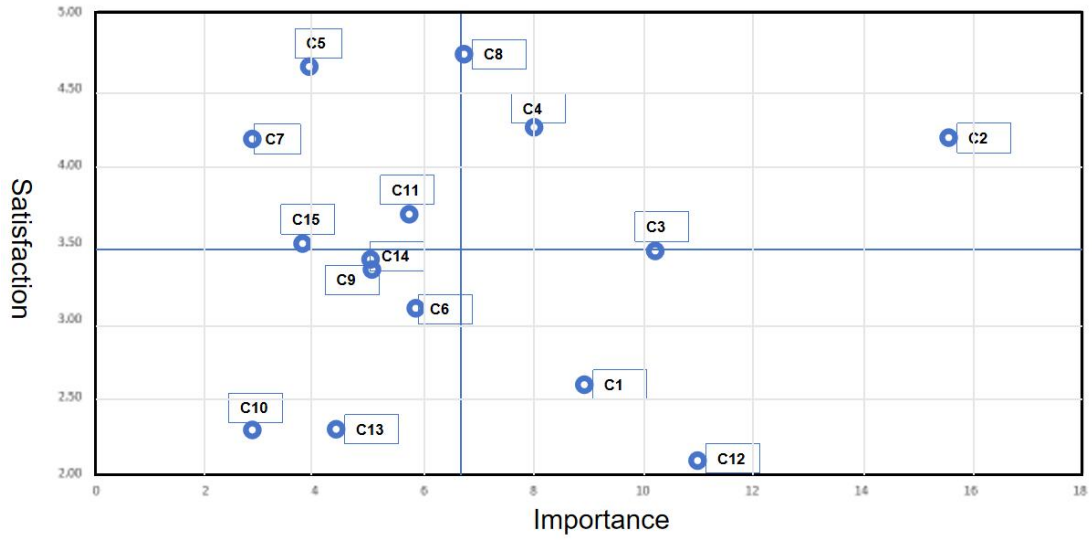

Figure 4.3-1 Expert evaluation of importance-satisfaction index classification chart

Source: Author's own drawing

4.3.3 Evaluation method with ordinary people as the main body

(1) Indicator system

The post-occupancy evaluation index system for the protection and utilization of historical blocks constructed in the previous article has a total of 38 indicators at the factor level. For ordinary people, some of these indicators require certain professional knowledge to understand, and the meanings of some indicators may be difficult for them to distinguish. Therefore, the 38 indicators at the factor level are merged and streamlined, and finally a total

of 21 evaluation indicators are obtained (Table 4.3-5). The indicator structure of the target level and the criterion level remains unchanged.

Table 4.3-5 Protection and utilization post-occupancy public evaluation index system Source: drawn by the author

A Post-occupancy Evaluation Index System for the Protection and Utilization of Pantang Village Blocks from the Perspective of Typo-morphology	B1 Continuation of morphological context	C1 Street System Layout	D1 Street system authenticity and preservation
		C2 street texture continues	D2 Street texture recognizability
		C3 plot organization continues	D3 land type preservation
			D4 plot boundary clarity
	B2 Form Environmental Quality	C4 Street type environmental coordination	D5 Street facades and paving
		C5 Public space type environmental coordination	D6 Public Space Facilities
		C6 Building layout and environmental coordination	D7 Building Layout Type
			D8 Building Group Relationship
		C7 Architectural Decoration Type	D9 Architectural Color and Element Types
	B3 form facility adaptation	C8 Municipal Facilities Adaptation	D10 Municipal facilities
		C9 Traffic facilities adaptation	D11 Road Traffic Conditions
			D12 Public transportation situation
			D13 Slow Traffic Conditions
			D14 Parking facilities
	B4 morphological and functional adaptation	C10 Business Type-Space Type Adaptation	D15 Business space utilization
		C11 Business Features and Innovation	D16 Historical Space Narrative Presentation
	B5 Morphological Social Structure	C12 Community Space Continuation	D17 Social structure spatial mapping
			D18 Place type identity
		C13 Public participation	D19

		mechanism	Comprehensiveness of public participation
	B6 Shape Image Shaping	C14 iconic space	D20 Block Image Iconic
		C15 Promotion Planning	D21 Block Promotion Effect

(2) Data sources

This section of the study focuses on the use of questionnaires and field visits to obtain data. A total of 200 surveys were sent out and 200 surveys were collected, of which 183 were effective , with a total efficiency of 91.5 % .

Table 4.3-6 Summary of public evaluation data after protection and utilization Source: drawn by the author

Indicator name	Very satisfied	Satisfied	generally	Less satisfied	Very dissatisfied
D1 Street system authenticity and preservation	70	82	27	4	0
D2 Street texture recognizability	82	75	26	0	0
D3 land type preservation	28	85	60	10	0
D4 plot boundary clarity	56	72	38	16	1
D5 Street facades and paving	71	82	34	1	0
D6 Public Space Facilities	66	722	43	2	0
D7 Building Layout Type	26	75	62	18	2
D8 Building Group Relationship	42	85	44	14	0
D9 Architectural Color and Element Types	63	81	35	3	1
D10 Municipal facilities	29	79	69	6	0
D11 Road Traffic Conditions	36	84	57	6	0
D12 Public transportation situation	24	68	65	23	3
D13 Slow Traffic Conditions	56	73	48	4	1
D14 Parking facilities	52	72	54	4	2
D15 Business space utilization	36	71	70	5	1
D16 Historical Space Narrative Presentation	51	79	44	8	1
D17 Social structure spatial mapping	17	56	68	34	8
D18 Place type identity	44	72	55	12	0
D19 Comprehensiveness of public participation	15	56	72	33	3
D20 Block Image Iconic	25	69	63	25	2

D21 Block Promotion Effect	36	71	55	18	3

(3) Mean analysis

According to the statistical results of the questionnaire survey, the overall public satisfaction rating after the protection and utilization of the Pantang Wuyue Historical Block was 3.81 points, graded as "relatively satisfied", indicating that users have a high degree of recognition of the protection and utilization effects of the block.

Table 4.3-8 Average score of public evaluation after protection and utilization Source: drawn by the author

Evaluation factors		Minimum	Maximum	Evaluation score		Sorting
C1 Street System Layout	D1 Street system authenticity and preservation	2	5	4.2077	4.2077	2
C2 street texture continues	D2 Street texture recognizability	3	5	4.3005	4.3005	1
C3 plot organization continues	D3 land type preservation	2	5	3.7104	3.8087	14
	D4 plot boundary clarity	1	5	3.9071		9
C4 Street type environmental coordination	D5 Street facades and paving	3	5	4.2077	4.2077	3
C5 Public space type environmental coordination	D6 Public Space Facilities	2	5	4.1202	4.1202	4
C6 Building layout and environmental coordination	D7 Building Layout Type	1	5	3.5847	3.7213	17
	D8 Building Group Relationship	2	5	3.8579		10
C7 Architectural Decoration Type	D9 Architectural Color and Element Types	2	5	4.0765	4.0765	5
C8 Municipal Facilities Adaptation	D10 Municipal facilities	2	5	3.6940	3.6940	15
C9 Traffic facilities adaptation	D11 Road Traffic Conditions	2	5	3.8306	3.8156	11
	D12 Public transportation situation	1	5	3.4863		19
	D13 Slow Traffic Conditions	2	5	4.0164		6
	D14 Parking facilities	2	5	3.9290		8
C10 Business Type-Space Type Adaptation	D15 Business space utilization	1	5	3.7432	3.7432	13

C11 Business Features and Innovation	D16 Historical Space Narrative Presentation	1	5	3.9344	3.9344	7
C12 Community Space Continuation	D17 Social structure spatial mapping	1	5	3.2077	3.4973	twenty one
	D18 Place type identity	2	5	3.7869		12
C13 Public participation mechanism	D19 Comprehensiveness of public participation	1	5	3.2459	3.2459	20
C14 iconic space	D20 Block Image Iconic	1	5	3.5301	3.5301	18
C15 Promotion Planning	D21 Block Promotion Effect	1	5	3.6448	3.6448	16
average value	3.8106					

(4) Determination of indicator weights

Since the weight assignment process was conducted through interviews, the author explained the focus of this study to the interviewers before collecting the forms, emphasizing the influence of the morphological type of Pantang Village. According to the ranking of the importance of each indicator by the users in the questionnaire survey, the importance ranking of indicators at different levels was obtained (Table 4.3-9).

Table 4.3-9 Index importance ranking results Source: drawn by the author

Indicator name	Continuation of morphological context	Morphological environment quality	Form facility adaptation	Morphological and functional adaptation	Morphological social structure	Shape image creation
Importance score	43	64	38	22	18	12
Indicator name	Street system pattern		Continuation of street texture		Continuation of plot organization	
Importance score	31		87		62	
Indicator name	Street type environmental coordination	Public space type environmental coordination	Building layout and environmental coordination	Architectural decoration type		
Importance score	97	16	58	17		
Indicator name	Municipal facilities adaptation		Traffic facilities adaptation			
Importance	127		54			

score		
Indicator name	Business format-space type adaptation	Business characteristics and innovation
Importance score	47	133
Indicator name	Community space continues	Public participation mechanism
Importance score	95	93
Indicator name	Iconic Space	Promotion Planning
Importance score	115	68

Based on the above survey results, the weights of each indicator in the evaluation system are calculated (Table 4.3-10).

Table 4.3-10 Weight vector of public evaluation indicators after protection and utilization Source: drawn by the author

B1 Continuation of morphological context 0.2404	C1 Street System Layout	0.0429	D1 Street system authenticity and preservation	0.0429
	C2 street texture continues	0.1171	D2 Street texture recognizability	0.1171
	C3 plot organization continues	0.0802	D3 land type preservation	0.0401
			D4 plot boundary clarity	0.0401
B2 Form Environmental Quality 0.2896	C4 Street type environmental coordination	0.1469	D5 Street facades and paving	0.1469
	C5 Public space type environmental coordination	0.0241	D6 Public Space Facilities	0.0241
	C6 Building layout and environmental coordination	0.0884	D7 Building Layout Type	0.0442
			D8 Building Group Relationship	0.0442
	C7 Architectural Decoration Type	0.0298	D9 Architectural Color and Element Types	0.0298
B3 form facility adaptation 0.2022	C8 Municipal Facilities Adaptation	0.1057	D10 Municipal facilities	0.1057
	C9 Traffic facilities adaptation	0.0960	D11 Road Traffic Conditions	0.0240
			D12 Public transportation situation	0.0240
			D13 Slow Traffic	0.0240

			Conditions	
			D14 Parking facilities	0.0240
B4 morphological and functional adaptation 0.1148	C10 Business Type-Space Type Adaptation	0.0312	D15 Business space utilization	0.0312
	C11 Business Features and Innovation	0.0835	D16 Historical Space Narrative Presentation	0.0835
B5 Morphological Social Structure 0.0929	C12 Community Space Continuation	0.0478	D17 Social structure spatial mapping	0.0239
			D18 Place type identity	0.0239
	C13 Public participation mechanism	0.0454	D19 Comprehensiveness of public participation	0.0454
B6 Shape Image Shaping 0.0601	C14 iconic space	0.0393	D20 Block Image Iconic	0.0393
	C15 Promotion Planning	0.0210	D21 Block Promotion Effect	0.0210

(5) Satisfaction-Importance evaluation

The importance of the secondary evaluation index (weight values are uniformly multiplied by 100) is used as the horizontal coordinate system, the evaluation conclusions of the respondents are used as the vertical coordinate system, and the satisfaction evaluation conclusions and importance values of each indicator are positioned in the coordinate axis (Figure 4.3-2). The coordinate axis value of the horizontal axis is set to 3.81, which is the mean of the overall evaluation results. Indicator satisfaction higher than the overall mean is considered to be high, and vice versa. The coordinate value of the vertical axis is set to 6.67, which is the result of dividing the overall weight 100 by the number of indicator items 15. Indicator importance is higher when the weight is higher than the mean, and vice versa. All the above indicators can be divided into four categories according to the satisfaction-importance coordinate quadrant:

High importance-high satisfaction: This type of indicator represents that it is very important in the minds of users and the satisfaction after reuse is high. The main representative indicators include C4 street type environmental coordination, C2 street outline texture continuity, C11 business characteristics and innovation, C9 traffic facility adaptation, etc. It is necessary to continue to maintain the performance of this type of indicator;

Low importance-high satisfaction: This type of indicator represents indicators that are

not very important in the minds of users but have high satisfaction after reuse. The main representative indicators include C1 street system pattern, C7 building decoration type, etc., and performance in this type of indicator also needs to be maintained.

High importance-low satisfaction: This type of indicator represents that it is very important in the minds of users but the satisfaction after reuse is low. The main representative indicators include C8 municipal facility adaptation, C6 building layout and environmental coordination, C3 plot organization continuity, etc. Subsequent optimization and improvement work needs to be carried out from these angles as a priority.

Low importance-low satisfaction: This type of indicator means that it is not very important in the minds of users and the satisfaction after reuse is also low. The main representative indicators include C10 business format-space type adaptation, C15 publicity and planning, C13 public participation mechanism, C12 community space continuation, etc. In the subsequent optimization and improvement work, this part of the work should not be prioritized, but should be gradually improved to avoid waste of resources.

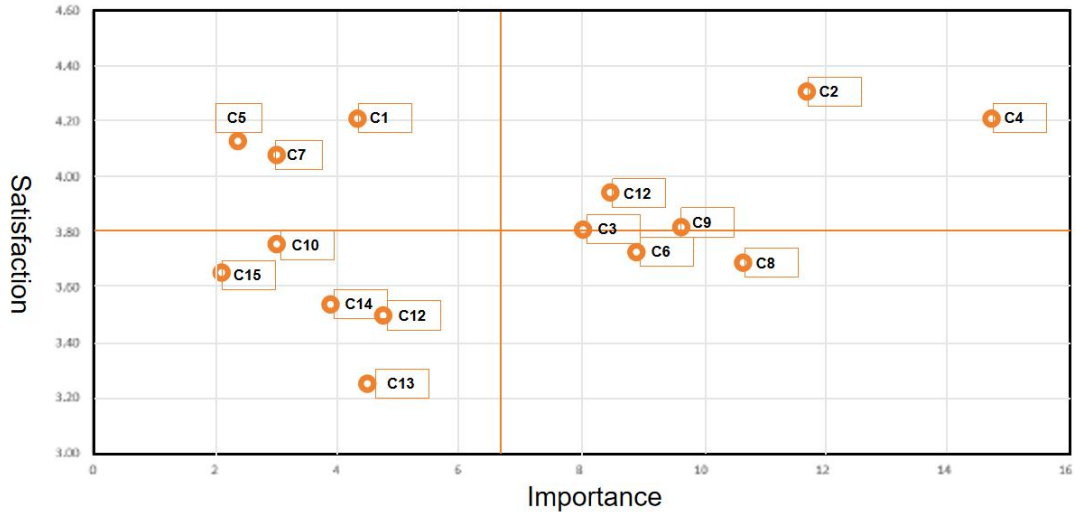

Figure 4.3-2 Classification of indicators of public evaluation importance and satisfaction

Source: Author's own drawing

4.3.4 Comparative study

(1) Common characteristics

In the quadrant of high importance and high satisfaction, the indicators with a high

degree of consensus between the two evaluation subjects include C2 street texture continuity and C4 street type environmental coordination. From this perspective, the historical buildings, environmental elements and street facades of this block have been valued and highly recognized by professionals and ordinary users. In the quadrant of low importance and high satisfaction, the indicators with a high degree of consensus between the two evaluation subjects include C7 building decoration type, which means that these aspects are not very important to professionals and ordinary users but perform well. In the quadrant of high importance and low satisfaction, the only indicator with a certain degree of consensus between the two evaluation subjects is C3 plot organization continuity. Therefore, in the subsequent optimization and improvement, the continuity of the block's pattern texture, corresponding to the fishbone and grid network continuity, is the top priority of the work. In the quadrant of low importance and low satisfaction, the indicators with a high degree of consensus between the two evaluation subjects include C13 public participation mechanism, etc. This indicator level needs to be optimized in the subsequent work, but the priority of the work is relatively low.

(2) Differences and characteristics

The differences in the two types of subjects' cognition on key indicators need to be paid special attention to, especially in the type units with significant differences in importance and satisfaction:

1) Street system pattern (C1)

Professionals: high importance - low satisfaction , herringbone and grid systems provide inadequate protection ; Public: low importance - high satisfaction , local scene experience dominates .

Sources of the differences: The public has a weak understanding of historical texture , especially the form before renovation, and the evaluation focuses on fragmentary scenes , such as the comfort of the inner street of S1 . Managers have cognitive biases: they once advocated "demolishing non-protected buildings to highlight key points" , which destroyed

the integrity of traditional strip blocks and mixed irregular blocks .

2) Continuation of community space (C12)

Professionals: high importance – low satisfaction , believe that the social structure is broken ; Public: low importance – low satisfaction , weak interest correlation .

Nature of the conflict: Professionals emphasize the historical value of the traditional street community structure , such as the traditional strip street ; the public is more concerned about the material environment , such as the three-room and two-corridor living experience and the vitality of commercial plots .

3) Municipal facilities adaptation (C8)

Commonality: high importance , indicating that both sides recognize the necessity of infrastructure ; Difference: high satisfaction among professionals and low satisfaction among the public

Key findings: The effectiveness of facility improvements , such as the concealment of underground pipelines in traditional plots, was affirmed by professionals ; public evaluation may be unreliable: tourists find it difficult to perceive technological improvements, and indigenous people are more concerned about ease of use , such as D18 facility-texture integration

4) Traffic facilities adaptation (C9)

The public: high importance , focusing on accessibility and parking needs on the new street ; professionals: low importance , advocating protection first ;

Typological explanation: The public values the experience of coupling the slow-moving system with the texture , such as the traditional street type and the new street type ; professionals worry that traffic reconstruction will destroy the comb-like layout spatial sequence

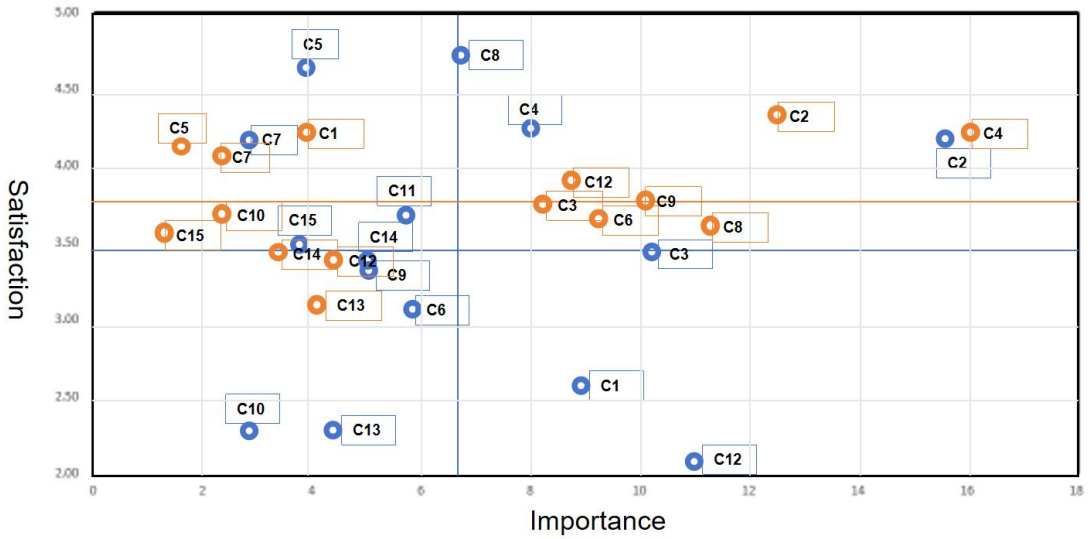

Figure 4.3-3 Comparison of importance and satisfaction between experts and the public

Source: Author's own drawing

4.3.5 Optimization direction

(1) Key optimization directions

1) Narrative presentation of historical space

At present, Pan Tang Village already has cultural venues such as Liwan Lake Park and Renwei Temple, which partially display the Lingnan water village culture and traditional folk customs. As a water village with a long history in Guangzhou's Xiguan, Pan Tang has nurtured many local celebrities, such as Zhang Weiping, a poet in the Qing Dynasty, and representatives of the Lingnan School of Painting. Existing old houses such as "Li's House" and "Liang Family Ancestral Hall" also carry rich historical memories. It is recommended to add special introductions to local historical figures in Pan Tang on the basis of existing cultural displays, and set up story signs at nodes such as Xiguan Mansion and Wuxiu Bridge, combining celebrity anecdotes with the tourist routes of Longjin West Road and Pan Tang Road to enhance cultural narrative.

2) Preservation and Utilization of Folk Craft Space Carriers

Currently, the business formats in the village are mainly teahouses and handicraft shops, but there are still insufficient local intangible cultural heritage experience projects such as the "Five Beauties of Pantang" (lotus root, water chestnut, water chestnut, bamboo shoot, and

water chestnut), agricultural culture, Cantonese embroidery, and other local intangible cultural heritage experience projects. The previously opened "Pantang Dragon Boat Cultural Experience Hall" failed to continue due to operational problems. In the future, it can focus on introducing interactive projects such as Cantonese opera private clubs and Cantonese tea art, combined with folk festivals such as Dragon Boat Festival and Beidi Festival, and design immersive experience activities to avoid tourists staying at the superficial level of "eating in Xiguan".

3) Continuation of community space

With the process of urbanization, the proportion of original residents has gradually decreased. It is recommended to encourage the descendants of Pan Tang to return and participate in business through policies. At the same time, the Pan Tang Village Committee should take the lead in organizing the "Pantang Cultural Heritage Society" to cooperate with local merchants and left-behind residents to carry out activities such as Cantonese cultural salons and ancestral hall banquets to strengthen the community identity of "waterside neighbors".

4) Iconic Space

For some of the disappeared rivers and farmland textures, historical change explanation signs can be added along the Lizhi river, and the old style of "green water in the bay and red lychees on both sides" can be displayed through old photos. The blue brick alleys and granite roads that have been preserved should be marked more clearly, such as visually strengthening the names of streets and alleys such as "Sanguan Temple Front Street" and "Wuyue Street".

(2) Secondary optimization direction

1) Optimization of transportation facilities

Improve the connection convenience between Zhongshan 8th Road, Longjin West Road and the village entrance; optimize the stop frequency of bus routes (such as Routes 66 and 8) at Pantang Station; add shared bicycle parking spots at the south gate of Liwan Lake Park; rectify the phenomenon of random parking of electric vehicles in the village, especially

strengthen management around Renwei Temple Square.

2) Public space facilities

By utilizing existing spaces such as the Pan Tang ancient stage and Feng Shui Pond, we will add landscape pieces with Lingnan characteristics (such as wok-ear wall art installations and lion dance theme sculptures), and combine them with night lighting to create a "Liwan Fisherman's Singing" check-in point.

3) Construction of public participation mechanism

With reference to the experience of Yongqingfang, we developed the "Pantang Guide" applet and set up a "Friends" feedback module; gradually established the "Pantang Cultural Governance Council" composed of villagers, merchants and experts , implemented a deliberation and consultation system for micro-renovation projects, and held regular offline discussions in the "Pantang Discussion Hall".

4.4Pantang Village evaluation and summary

4.4.1 Evaluation of Pantang Village after reconstruction

(1) Transformation results and positive evaluation

1) The continuation of historical context has achieved remarkable results

Pantang Wuyue strictly follows the "micro-renovation" model, preserving the " Wuyue " settlement structure of the Qing Dynasty and the Lingnan traditional style of granite streets and lanes, blue bricks and tiles to the greatest extent. Through the meticulous restoration of historical elements such as the Sanguan Temple, Wuyue Pavilion, and water-controlling stone lions, the architectural details of the Qing Dynasty were restored and the symbolic meaning of Feng Shui was strengthened. At the same time, the " Pantang Wuyue Oral History" (collecting the collective memory of 41 villagers) completed by the community in 6 years and weekly martial arts lion dance teaching, Beidi birthday and other folk activities have achieved living inheritance. In terms of space activation, historical buildings such as the Li Clan Ancestral Hall have been transformed into cultural exhibition halls, and cultural squares and murals

have been set up at street nodes, making the block a "readable" outdoor classroom.

Figure 4.4-1 The first tea party of Pantang Wuyue micro-renovation
Source: Xiangcheng Architecture

2) Comprehensive improvement of environmental quality

Street facade: Adopting the principle of "restoring the old as it was", the blue brick walls were cleaned and repaired, brick carvings, gray plastics and other decorations were restored, and the style of store signs (wooden plaques + traditional fonts) was unified to avoid visual interference from modern commerce.

Public space: pocket parks were added after the demolition of illegal buildings (such as the square in front of the Sanguan Temple), the connection between the village and the Liwan Lake water system was rebuilt, and the water-friendly platform reproduced the "water village meeting" scene and became a carrier for activities such as dragon boat performances.

Night lighting: Warm-toned lighting highlights traditional elements such as the wok-ear walls, while antique palace lanterns and smart energy-saving systems take into account both style and practicality.

3) Infrastructure modernization and upgrading

The "three-wire underground" project was fully implemented to eliminate the clutter of pipelines, and the rainwater and sewage diversion system was updated to solve the problem of

waterlogging. The optimization of the slow-moving system (flat paving, guide system) improved the walking experience, but due to the narrow alleys, there are still challenges for motor vehicle traffic and shared transportation connection.

4) The integration of industry formats and culture has begun to show results

After the transformation, the industry has become one with cultural tourism as the core, local specialty catering (Pantang Wuxiu) and cultural and creative retail coexisting. Intangible cultural heritage experience stores (Guangdong embroidery, Guangdong color) and characteristic cultural tourism routes (connecting ancestral halls and water town style) have strengthened the cultural connotation of the industry. The entry of emerging formats such as 1200bookshop has enhanced commercial vitality, but the sustainability of the business model of traditional crafts needs to be strengthened.

(2) Existing contradictions and optimization directions

1) Challenges of cultural heritage and community maintenance

Insufficient participation of young groups: It is difficult to maintain long-term reliance on public welfare forces , and the younger generation has limited knowledge of local culture.

Changes in community structure: The development of tourism has led to the need to balance the relationship between indigenous people and business groups. The proportion of indigenous people will decrease in 2022, and businesses will face the issue of staying or leaving when their leases expire . Some residents are worried about environmental changes.

Insufficient depth of historical presentation: Existing cultural venues have weak narratives about local historical figures (such as the Qing Dynasty poet Zhang Weiping) and events, and need to add story signs to deepen the experience.

2) Lack of sustainable governance mechanism

The co-creation committee lost its operating basis due to "no projects" (Table 4.4-1), and residents' participation was uneven, with young people having low willingness to participate. Cultural relic repairs (such as ancestral halls) were shelved due to insufficient funds, and no co-construction and operation mechanism was designed, resulting in cultural inheritance

relying on spontaneous private initiatives (such as community planners raising funds to repair stone lions and compiling oral histories).

3) Issues of coordination between industry and space

The depth of business integration is insufficient: the introduction of high-end industries is limited, and the digital transformation of time-honored brands is difficult; some commercial spaces squeeze out residents' social areas.

Weak international influence: publicity focuses on superficial visual presentation (food, check-ins), lacks in-depth communication of history and culture, and is insufficient in international identification and promotion.

(3) Core experiences and lessons learned from the transformation process

Table 4.4-1 Pantang transformation practices and contradictions Source: Author compiled from online data

time	Practical steps	Core Outcomes/Events	Logical relationships and key challenges
2007	Demolition Crisis (Starting Point)	Due to the expansion of Liwan Lake Park, Pantang Wuyue was included in the expropriation and demolition scope; 50% of the residents moved out, and those left behind were mainly elderly people.	Background dilemma: Historical settlements are facing the crisis of demolition, community cohesion is disintegrating, and collective memory is on the verge of being broken.
September 2013	Second Demolition Plan	The "Xiguan Square" project planned to demolish 13,000 square meters, but it was not fully implemented.	Continuing crisis: Stagnation in demolition has led to further decline of the village, and residents are hopeless about their future.
2016	Policy shift: micro-transformation started	With the implementation of the "Guangzhou Urban Renewal Measures", Pantang Wuyue became Guangdong's first micro-renovation project with the purpose of "preservation".	Turning point: From “demolition and reconstruction” to “preservation”, providing a policy basis for community participation.

Early 2017	Breaking down the trust barrier	Community planners used the “Beidi Birthday” folk activity to reach out to villagers and establish an initial presence.	Key breakthrough: Using culture as a bond to break residents’ wariness of the government.
May 2017	First Resident Meeting (Conflict Phase)	The tea party was collectively questioned by residents and was "scolded" for two hours; planners set up a base in the village for long-term communication.	Trust building: Through continuous dialogue, misunderstandings are resolved and residents move from resistance to expressing their demands.
September-October 2017	Participatory planning started	Initiate a public space transformation conference; collect historical photos and hold the " Pantang Memory Exhibition".	Deepening participation: Activating the collective memory of residents and transforming historical pride into motivation for transformation (e.g. repairing ancestral halls and demolishing park walls).
2018	Institutional Innovation: Co-creation Committee Established	Seven village representatives joined the committee and participated in the decision-making of micro-renovation; village supervisors discovered cultural relics (the gate stones of Sanguan Temple) and promoted the renovation.	Empowerment mechanism: Residents shift from "passive acceptance" to "active decision-making", and the demand for cultural relics restoration emerges from the bottom up.
End of 2019	Micro renovation completed	The repair of dilapidated buildings, restoration of Wuyue Pavilion and expansion of Sanguan Temple Square were completed; dozens of cultural shops were introduced.	Hardware achievements: The physical space update was completed, but new contradictions emerged: - Insufficient funds for historical restoration (ancestral halls and gatehouses are on hold) - The public participation mechanism stagnates when the project is completed.

2020-2023	Post-transformation period: Civilian forces continue to strengthen	- Community planners spontaneously raised funds to repair the water-control stone lions and the stone tablets of the community - Compiled " Pantang Wuyue Oral History" (100,000 words) - Established the "Home Transformation and Social Innovation Center" to try cross-sector collaboration	Innovation continues: Achievements: Public welfare forces complement cultural heritage challenge: - Lack of official status makes it difficult to coordinate multiple parties - It is difficult for business and culture to coexist (insufficient customer flow in shops, cultural relics are not open to the public)
2022-2024	A new round of cultural relics restoration started	Start the "Cultural Relics Restoration and Environmental Improvement Project"; launch bidding for cultural heritage revitalization services in 2024.	Mechanism limitations: - Engineering focused on hardware repairs and did not design a co-construction and maintenance mechanism - The Co-creation Committee lost its operating basis due to "no projects".
2024	Key nodes and future challenges	- 5 of the 41 narrators of the oral history have passed away - The five-year lease of the business tenants expires and they are faced with the choice of whether to stay or leave. - The continuity of the cultural relics restoration project is not clear	Urgent needs: A cross-sector collaboration platform (culture/business/community) needs to be established to solve: - Sustainable operation and maintenance - Coordination of interests of multiple parties

Table 4.3-1 reveals the key turning points in the transformation process. Policy redemption: In 2016, the Guangzhou Renewal Measures halted demolitions and turned to Guangdong’s first “micro-renovation” project, providing a basis for community participation; Rebuilding trust: In 2017, planners used the "Birthday of Beidi" event to get in touch with villagers, and through long-term communication in the village, they resolved doubts (the first residents' meeting was "scolded for two hours") and promoted participatory planning; Resident empowerment: In 2018, a joint creation committee consisting of 7 village representatives was established to achieve bottom-up decision-making (such as the discovery

of cultural relics in Sanguan Temple by village supervisors to promote repairs); Dilemma of sustained efforts by the private sector: After 2020, non-profit organizations (such as the "Fanwu Enterprise Social Renovation Center") tried to collaborate across fields, but due to the lack of official status, it was difficult to coordinate multiple parties, and it was difficult for business and culture to coexist (insufficient customer flow in shops and cultural relics were not open to the public).

Pantang Wuyue has become a model of micro-renovation of historical blocks through the refined renovation of "restoring the old as it is", living cultural heritage and residents' co-governance mechanism. Its achievements in historical preservation, environmental improvement and cultural tourism integration have been recognized by professionals and the public . For example, the renovation of historical elements and street facades are both "high importance-high satisfaction" indicators. However, the deep inheritance of cultural context is listed as "high importance-low satisfaction", and sustainable governance mechanisms and long-term industrial integration are still core challenges. In the future, it is necessary to build a "culture -commerce -community" collaboration platform, strengthen the historical narrative experience, and improve the residents' co-construction system to achieve a dynamic balance between protection and development.

4.4.2 Comparison between transformation results and evolution trajectory

(1) Spatial restoration and historical evolution

In the process of space transformation, "micro-transformation" played an important role. Through the "repair the old as it is", traditional architectural features such as granite streets and wok-ear walls were restored, reversing the situation of unreasonable changes in space and avoiding the historical traces from becoming messy. However, the transformation also has shortcomings. Although the appearance of the building has been restored to its original state, local historical stories such as Zhang Weiping have not been fully excavated and displayed, resulting in insufficient cultural inheritance.

(2) Transformation of driving mechanism

The driving force of the transformation has changed from relying on the dual drive of policy and economy to the joint collaboration of policy and community. Residents actively participated in the transformation. For example, some villagers found cultural relics during the supervision process, which was a highlight of the transformation. But there are also lessons. The co-creation committee was unable to play a role in the end because it did not have long-term and stable project support. This shows that in order to achieve sustainable management, there must be a sound institutional guarantee.

(3) Difficulties in Functional Adaptation

In the course of historical development, the regional function has changed from simple residence to a mixture of multiple functions. After the transformation, new problems have emerged: the development of cultural tourism and commerce has occupied too much space, squeezing the original living space of residents. The reason is that when industries are integrated, the needs of the original residents are not fully considered. For example, the area where residents have daily social activities is occupied by shops, which poses challenges to the sustainable development of society.

(4) Advantages and disadvantages of technical translation

During the renovation process, the infrastructure was upgraded, such as laying three underground wires and installing smart lighting equipment, which solved the problems of chaotic pipelines and easy waterlogging in the past. However, traditional crafts such as Cantonese embroidery and Cantonese porcelain only exist in the form of experience stores, and have not been well integrated with modern technology and business models, and have not formed a complete business chain.

(5) Breakthroughs and failures in governance evolution

The Beidi Festival in 2017 was an important turning point. It built trust among community residents and demonstrated that cultural activities can effectively encourage residents to participate in community construction. However, there is a problem of

over-reliance on private forces in the transformation process. For example, the community building center replaces the official mechanism, but due to unclear responsibilities and powers, it is difficult to coordinate the interests of all parties, which ultimately makes it difficult to advance some work.

Table 4.4-2 Comparison of Pantang Village transformation results and evolution trajectory Source: Author's own drawing

Comparison Dimensions		Historical evolution (1900- 2016)	Results after minor renovation (after 2016)	Comparative Analysis
Spatial morphology evolution	Street system	Fishbone shape → Local regularization → "three horizontal and three vertical" modern road network	Preserve the granite streets and alleys of the Qing Dynasty and restore the traditional texture	The historical framework is retained, but the modern road network is replaced by traditional textures
	Block and plot	Narrow → Regularized	No large-scale merging of plots , maintaining the original scale	Maintain stability , avoid further regularization, and protect historical patterns
	Public Space	Ceremonial space → productive square → landscape leisure space	Restore the riverside platform and add a pocket park	Functional return , transformation from productive to living and cultural space
	Building layout	Residential-oriented → mixed functions, "Lingnan style → New Lingnan "	Repair the blue bricks and tiles to control the visual interference of modern business	Traditional revival , from modern translation back to traditional expression
Power Mechanism	Core driving force	Policy (collectivization/commercialization) + economy (marketization)	Policy (micro-transformation of the "Renewal Measures") + community participation	From economic dominance to policy guidance and resident co-governance
	Social factors	Population growth drives up density and mixed functions	The proportion of indigenous people has decreased, and the problem of commercial	Continuing challenges : changes in community structure continue to affect the sense of belonging to

			leases has become prominent	the space
	Technical constraints	Construction technology innovation, river siltation	Three underground wires, rainwater and sewage diversion, intelligent energy-saving lighting	Technological progress helps improve environmental quality
Core Issues	Spatial Alienation	Historical layers are out of order and typological characteristics are unclear	Texture fragmentation is alleviated, but the depth of cultural heritage is insufficient	The restoration of the physical space was successful, but the cultural narrative is still weak
	Functional Adaptation	Competition between residence and commerce, generational gap in public space	Business formats squeeze residents' social areas, and young people have low participation	The problem persists , and the contradiction of mixed functions has not been fundamentally resolved
	Technology gap	Crisis of traditional crafts and weakening of climate adaptability	Intangible cultural heritage experience stores are introduced, but the business model is unsustainable	Attempts to break through , cultural translation begins, sustainability needs to be strengthened
Governance Model		Government planning-led	“Co-creation Committee” empowers residents → later becomes ineffective due to absence	Innovation and difficulties : bottom-up mechanisms are successful but difficult to maintain

4.4.3 Lessons learned

(1) Experience and challenges in transformation practice

Pantang Village has formed a systematic renewal path from four aspects: space, governance, culture, and industry. In terms of spatial restoration, the texture destruction caused by excessive functionalism from 1978 to 2016 was curbed , the fishbone-shaped streets and lanes of the Qing Dynasty were preserved, the granite pavement was restored, and the water-friendly platform was rebuilt to return to the memory of the water town, but the restoration of the architectural style did not simultaneously complete the reconstruction

of the cultural narrative. The governance mechanism broke the government's unilateral dominance. The "Birthday of the Northern Emperor" event in 2017 activated community participation through folk rituals, and the village supervision system promoted the protection of cultural relics. However, the co-creation committee failed due to lack of institutional support and needed legal protection , such as community funds and co-governance conventions. Cultural inheritance abandoned the translation of abstract symbols and built a living inheritance system through the compilation of the " Pantang Wuyue Oral History" and the transformation of the Li Clan Ancestral Hall into an exhibition hall. However, the participation of young groups was insufficient and the intangible cultural heritage business was fragile, which needed to be combined with economic sustainability. Industrial integration adopts a hierarchical management system for business formats. The core area retains the " Pantang Five Shows" local catering, new business formats are introduced in the periphery to form a cultural buffer zone, and pocket parks are reserved for residents' social space. However, high-end industries are missing, and the narrative needs to be upgraded to an international one.

(2) Enlightenment of universal update

Pantang Village is an experiment in the reconstruction of social relations . By reversely repairing the space, activating the community entities, and hierarchically controlling the business formats, the residents are transformed from "objects of transformation" to cultural production entities, and commercial profits are fed back to heritage protection, breaking out of the "protection-development" binary opposition. It proves that "micro-renovation" is not only about repairing the old as it was, but also about achieving the resilient evolution of historical blocks by reconstructing social networks, providing a systematic solution of "material restoration-community empowerment-industry collaboration". Through the experience of Pantang Village, we can summarize the inspiration for the universal renewal of similar historical and cultural blocks:

Spatial transformation should give priority to restoring the accuracy of traditional

textures. The cultural value of traditional streets and alleys is higher than traffic efficiency.

Sustainable governance relies on a combination of policy empowerment, cultural stickiness and clear responsibilities and rights. Without any one of them, the mechanism will be ineffective.

The revitalization of culture needs to go through the path of “archiving of collective memory, normalizing folk practices, and industrializing cultural products”, and cultivate an economic closed loop based on oral history.

Industrial symbiosis is based on the rights of indigenous peoples, achieving social and economic win-win results through cultural capital premium and avoiding community division.

4.5 Summary

The post occupancy evaluation of the protection and utilization of historical blocks , and constructs a systematic research framework based on the transformation of Pantang Village. Based on the theory of post occupancy evaluation (POE), a post occupancy evaluation index system for the protection and utilization of historical blocks is constructed . From the six aspects of historical context continuation, environmental quality improvement, infrastructure improvement, industrial format upgrading, community relationship maintenance, and urban image shaping, 38 specific indicators are refined to provide a quantitative basis for the evaluation of the transformation of Pantang Village.

In terms of evaluation methods, the evaluation differences between experts and ordinary people were compared. Experts used Likert scale and fuzzy comprehensive evaluation to point out that Pantang Village performed well in terms of historical element renovation and environmental quality, but there were deficiencies in industrial formats and community relations; the public evaluation was conducted through questionnaire surveys, showing a high degree of recognition for the improvement of the material environment, but a low level of satisfaction with the continuation of social structure and public participation channels.

Based on the evaluation results, the optimization direction of Pantang Village renovation is proposed, focusing on strengthening the display of historical figures and events, traditional

folk crafts experience, local community cultivation and historical pattern texture traces, and secondarily optimizing transportation facilities, iconic space shaping and public participation mechanisms. Finally , the achievements and contradictions of Pantang Village renovation are summarized. Through the "micro-renovation" model, it has achieved remarkable results in the continuation of historical context and the improvement of environmental quality, but it faces challenges such as insufficient in-depth inheritance of context and the absence of sustainable governance mechanisms. The universal renewal inspirations such as spatial texture restoration, community empowerment governance, cultural revitalization and industrial symbiosis are extracted, emphasizing that the essence of historical block renewal is the reconstruction of social relations, and the unity of material restoration and the evolution of social network resilience must be achieved.

Chapter 5 Pantang Wuyue Optimization and Reconstruction Design Strategy

5.1 Pantang Wuyue overall renovation design strategy

5.1.1 Guiding ideology

(1) Planning background

Pantang Wuyue Historical and Cultural Block is located in Liwan District, Guangzhou. It is an important part of Guangzhou Xiguan's historical and cultural heritage. It was formed in the middle and late Qing Dynasty and embodies the characteristics of the commercial settlements in Lingnan water towns, where "water and land run parallel, shops in front and houses in the back". As the only settlement in the central urban area of Guangzhou that has preserved the complete Qing Dynasty pattern, texture and typical simple features, Pantang Wuyue not only carries rich historical memories, but is also an important sample for studying the evolution of Lingnan traditional architecture and urban form.

The Pantang Wuyue neighborhood faces challenges in four aspects: building protection, space utilization, cultural heritage, and infrastructure in the process of urbanization. The buildings are seriously aging, and there is insufficient funding for renovation. The modern needs and traditional styles conflict during the renovation. Narrow alleys and commercial occupation lead to traffic congestion and conflicts with public space. The loss of indigenous people has marginalized traditional culture, and commercialization has weakened community vitality. Imperfect infrastructure has exacerbated environmental pressure. These problems highlight the deep-seated contradictions of lagging historical protection, space overload, cultural decline, and insufficient environmental resilience. In response to the above problems, it is necessary to combine policy guidance and theoretical support to explore sustainable renewal paths.

At the policy level, the project strictly follows the texture protection requirements of the "Regulations on the Protection of Historical and Cultural Cities, Towns and Villages" (2017)

and the "Micro-transformation + Functional Activation" path proposed in the "Guangzhou Historical Building Protection and Utilization Pilot Work Plan" (2020) to ensure the legality and standardization of the planning implementation. At the same time, the project is guided by the "Pantang Wuyue Historical and Cultural Block Protection Plan" (2022) to delineate the scope of the 8.2-hectare core protection area, providing a clear spatial boundary for subsequent implementation.

On the theoretical level, the planning adopts the typo-morphology method of the Italian Muratori-Caniggia school, deconstructs the four-level morphological unit of "base-plot-building-component", and combines Conzen's layering theory to identify the temporal and spatial superposition relationship between the bamboo tube houses of the Republic of China (1920s), the planned economy warehouses (1960s) and contemporary self-built houses , providing a scientific basis for the protection and renewal of historical blocks. In addition, the planning also draws on Rossi's "Urban Architecture" (1982) on the concept of "logical translation of typological structure", emphasizing the logical continuation and cultural inheritance of historical space.

(2) Planning objectives

The protection and renewal of Pantang Wuyue Historical and Cultural District is not only a rescue restoration of historical heritage, but also a contemporary response to the traditional urban form and lifestyle of Lingnan. The plan aims to achieve the authenticity, integrity and sustainability of the historical district through systematic and refined strategies, and provide a replicable practical example for the protection and revitalization of Guangzhou's historical and cultural districts. Specific goals include:

Authenticity protection: On the basis of respecting historical texture and spatial scale, historical buildings are repaired and protected to ensure the integrity of historical elements such as architectural form, materials, and craftsmanship. Antique reconstruction is prohibited, and the principle of "restoring the old as it is" is emphasized.

Typological translation: Through the typo-morphology method, the four-level

morphological units of “base-plot-building-component” are deconstructed, and historical genes such as the span of bamboo tube houses (4-5 meters) and courtyard sequences (patio-hall-kitchen) are extracted to guide new construction and renovation and achieve the logical continuation of historical space.

Community resilience: Retain more than 60% of the indigenous people through property rights replacement, encourage residents to participate in community co-construction, improve the quality of life and cultural identity of residents, and build a sustainable development neighborhood where "people-city-culture" coexist.

Enhancement of cultural functions: Increase the proportion of cultural business from 12% to 40%, introduce intangible cultural heritage workshops, art creation spaces, traditional handicraft exhibitions, etc., promote the integration of culture and commerce, and enhance the cultural appeal and economic vitality of the block.

Spatial scale restoration: Through renovation and restoration, the width-to-height ratio of the main street will be restored to the historical range of 0.8-1.2, the traditional street pattern will be reshaped, the living environment will be improved, and the accessibility and comfort of the walking space will be enhanced.

5.1.2 Design strategy

(1) Street systems and streets

1) Street classification

Based on the analysis of morphological types and the results of post-occupancy evaluation, the overall concept of determining the "fishbone-like" street system (Type J) as the main street system and the "grid network" street system (Type K) as the secondary street system was established. Moreover, the current road grades in Pan Tang Wuyue were reclassified. First, the main roads in Pantang Wuyue are Wuyue Zhijie and Wuyue Xinjie-Wuyue Sanxiang; the secondary roads are Wuyue Nanhengxiang, Wuyue Wuxiang, Wuyue Qixiang, Wuyue Baxiang, etc. According to the street pattern and original living habits, the dead-end roads are opened to form a continuous road network. The park route is

delineated to strengthen the connection between Liwan Lake Park and Pantang Wuyue. The route of restoring the river is determined to restore the street style of the water town.

Figure 5.1-1 Road classification
Source: Author adapted

2）Floor design

Respect the construction techniques and materials of different ages and repair the pavements of different ages. Other streets should be paved with permeable paving, and non-motorized lanes and motorized lanes can use permeable asphalt pavement or permeable cement concrete pavement. For streets with re-emerging rivers, sunken green spaces, grass-planted ditches, and rainwater wetlands should be set up along the streets to regulate, purify and utilize rainwater. Streets with more ample space, such as the riverside streets, can be designed with integrated rainwater collection and landscape.

Figure 5.1-2 Floor design

Source: Author adapted

3）Road section

The width of main streets should be restored to 3 meters, and the width of secondary streets should be controlled between 1.5-2 meters to ensure that the street space scale meets the requirements of historical style. Internal roads should meet the daily use needs of residents and other personnel, and the road section width of the park roads should be reasonably set in combination with public spaces such as green spaces.

For general tunnels (type S4) and inner streets along the flood zone (type S1), land composite utilization is carried out in blocks, liberation and plots to form a mix of horizontal and vertical functions. Through multiple functions, travel destinations can be provided within the range of convenient walking access, thereby increasing the proportion of walking trips and the intensity of street activities. Active functions should be set up on the first floor of commercial and life service streets to form a relatively continuous active interface. Commercial, cultural and other facilities should be set up along non-traffic streets without affecting traffic needs and daily use of residents.

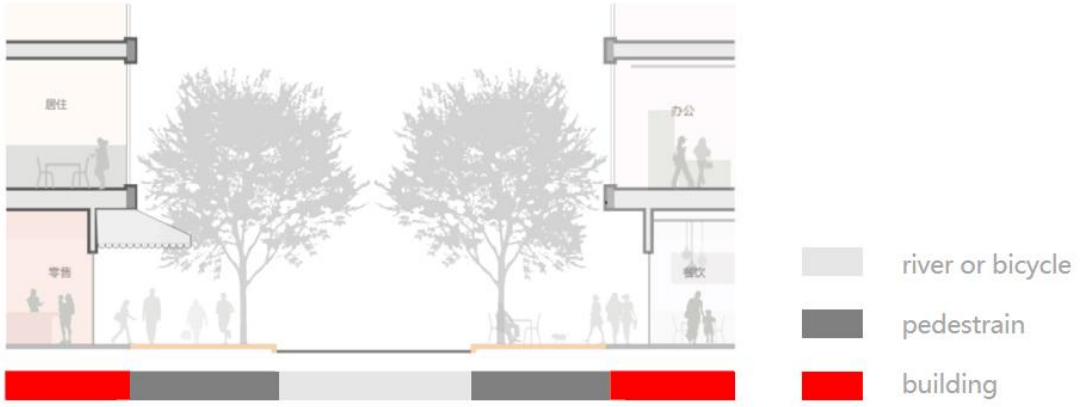

Figure 5.1-3 Cross-section of general lanes and inner streets along the river bank
Source: Adapted from reference [44]

For the riverside outer street (type S2) and the lakefront road (type S3), street trees are planted along the road, and building eaves, Qilous, and awnings are installed to provide shade and shelter for pedestrians and non-motor vehicles. The lowest part of the movable awning/rain canopy should be at least 2.5 meters away from the sidewalk and shall not exceed the sidewalk. The net width shall not exceed 2.5 meters, and no vertical pillars shall be installed below. It is recommended to use translucent materials for fixed rain awnings. The net height of the lower side of the awning from the sidewalk is not less than 3.5 meters, and the overhang width shall not exceed the sidewalk. Such streets are generally non-traffic streets, and public seats and rest nodes should be set up along the street to form a place for communication and guide pedestrians to stay. It is encouraged that the ground floor and setback space of commercial streets and community service streets be kept at the same elevation as the sidewalk to form an open and continuous indoor and outdoor activity space.

Figure 5.1-4 Section of Chongbian Outer Street and Lakeside Road
Source: Adapted from reference [44]

For streets along the resurfacing river, green building technology is combined with the original river route to design sponge streets in the block. If the normal traffic on the street is not affected and there is sufficient space, recreational spaces can be set up along the river to increase the interest of the resurfacing river and improve the spatial vitality of the resurfacing river.

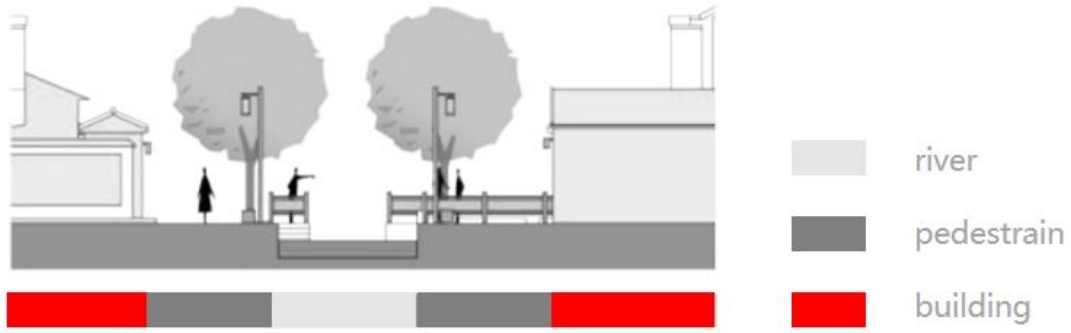

Figure 5.1-5 Cross section of recurrent river channel
Source: Adapted from reference [27]

4）Street interface, facade design

Illegal buildings and buildings under public ownership that do not conform to the laws of morphological types will be demolished to ensure the continuity of the street interface and the continuity of the texture.

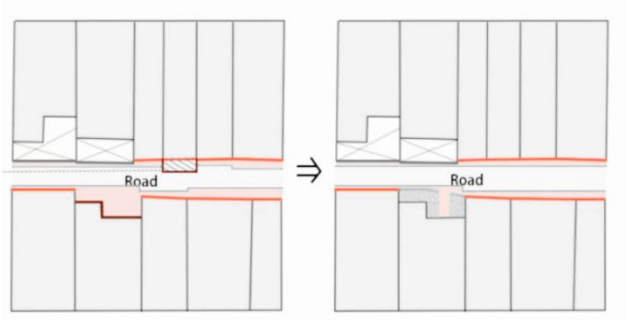

Figure 5.1-6 Street interface repair strategy

Source: Author adapted

In the facade design, the facade color of the streets and alleys is controlled, and it is recommended to restore the traditional spatial images such as the granite pier and the oyster shell wall. New buildings in the historical style area should continue the texture and feel of traditional building materials in the historical block, and use large areas of glass materials with caution. The facade elements such as the proportion of facade division and the window-to-wall ratio should be coordinated with the surrounding historical buildings. Due to the inconsistency of the property rights and construction years of the Pantang Wuyue building, the street skyline presents an irregular trend. In the process of protection and utilization, the special characteristics of the building should be respected to avoid straightening the building outline.

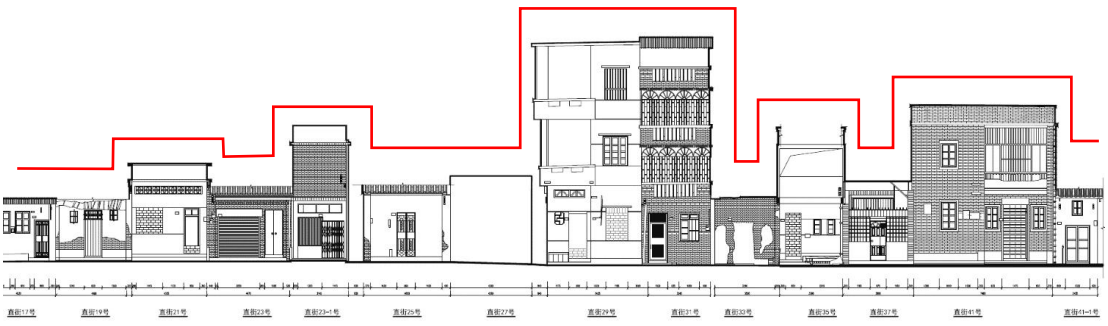

Figure 5.1-7 Street facade renovation strategy

Drawing source: adapted from Xiangcheng Architecture

(2) Block and plot

1) Block division

Based on the evolution pattern of the reference form types, the existing streetscapes need

to be adjusted to enhance the traffic efficiency of the existing streets. There is a serious phenomenon of unauthorized construction in the core residential area of Pan Tang Wuyue. The focus is on sorting out the strip-style traditional streetscapes (Type F) and mixed irregular streetscapes (Type G), such as Wuyue Wujia, Wuyue Nan Horizontal Street, and Wuyue Qiyao Streets. With reference to the clearer road boundaries in the evolution process, the blocks are redefined. And for the areas where the blocks are damaged, such as Wuyue Outer Street, the original blocks are hinted through paving, building components and signage to restore the historical scenes and living habits.

Figure 5.1-8 block division diagram
Source: Author adapted

2) Plot reorganization

According to the property rights and the current use of the plot, Pantang Wuyue plot was reorganized to provide a basis for the subsequent zoning design. According to the building type and historical value, the plot was divided into repair, improvement, preservation, renovation and demolition categories, and protection and renewal strategies were formulated respectively. Through plot division and space integration, the layout of traditional residential groups was optimized to improve space utilization and publicity. On the premise of preserving

the value of historical buildings, the use efficiency and quality of life of the plot were improved through functional replacement and partial transformation.

Figure 5.1-9 plot reorganization
Source: Author adapted

(3) Public space

Based on the usage needs of the residents in Pan Tang Village and the historical activity spaces, the public spaces in Pan Tang Wujiao are mainly located around spaces with religious and cultural characteristics (type I), such as the San Guan Temple; around spaces with historical and cultural significance (type R), such as the square in front of Renwei Temple; and around green spaces (type T), such as Riverside Street. When designing public spaces, these core nodes can be centered around, and the open spaces in Pan Tang Wujiao can be connected to form a continuous whole.

At the same time, the design should also focus on the treatment of transitional space to strengthen the connection between Liwan Lake Park and Pantang Wuyue . Considering the differences in behavior between tourists and residents, it is necessary to properly handle the balance between movement and stillness, public and private space, so that different groups of people can have a good experience in this space.

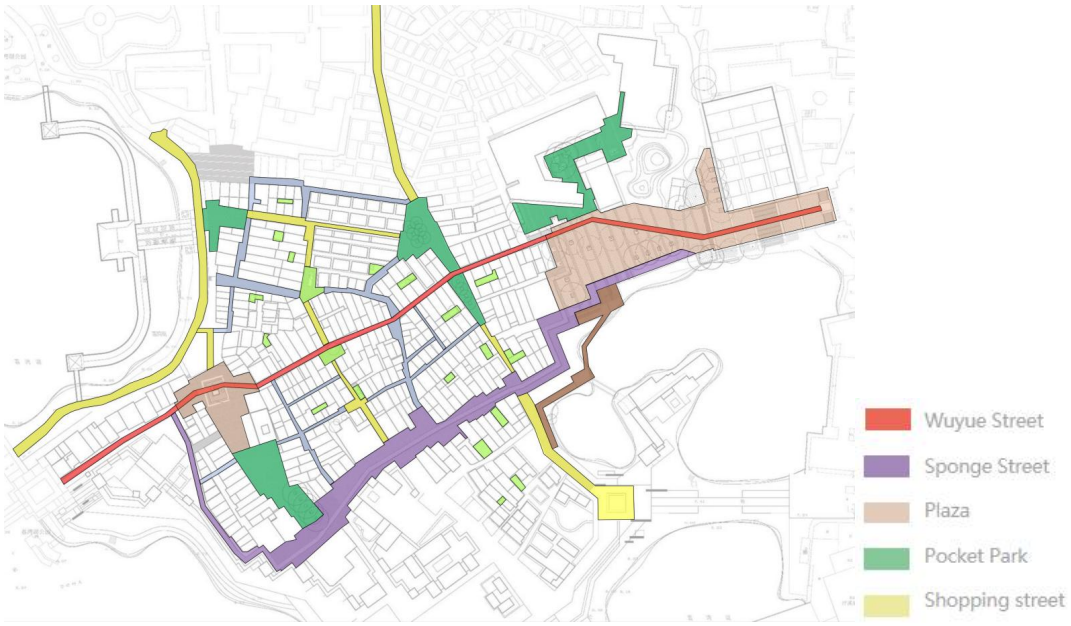

Figure 5.1-10 Pantang Wuyue Public Space Overall Strategy

Source: Author adapted

1) Religious and cultural space

The historical nodes such as Sanguan Temple, Wuyue Pavilion and Haoxia Book House were repaired and revitalized to restore their functions as public spaces. In response to the problem of commercial occupation of Renwei Temple Square, the business boundaries of merchants were redefined and an exclusive activity area for indigenous people was added.

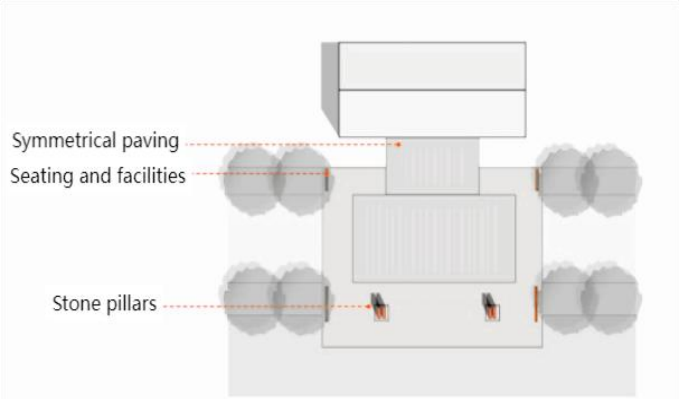

Figure 5.1-11 Layout of the square in front of the ancestral hall

Source: Author adapted

2) Market space

The cultural and social functions of the market space are enhanced through embedded service facilities, cultural exhibition halls, intangible cultural heritage workshops, etc. The

Pantang Wuyue market space is concentrated on both sides of Wuyue Zhijie and Wuyue Xinjie, and its cross-sectional design can refer to the street system and street design strategy.

3) Square space

New public spaces such as squares and pocket parks are built on idle land in the village to form a public square space system that combines "points, lines and surfaces". According to the current situation of Pantang Village, five main types of square space locations are proposed, including entrance squares, open spaces between houses, beside streets, under big trees and beside waterfronts, and each type will also intersect with each other.

The open space between houses should adopt a surrounding greening layout or a single tree in the center to form a shaded space under the tree. In places where buildings are dislocated or streets are widened, large-scale square spaces can be formed in combination with roads. Large-scale squares are places for neighborhood exchanges that have both functional landscapes and rich spatial levels.

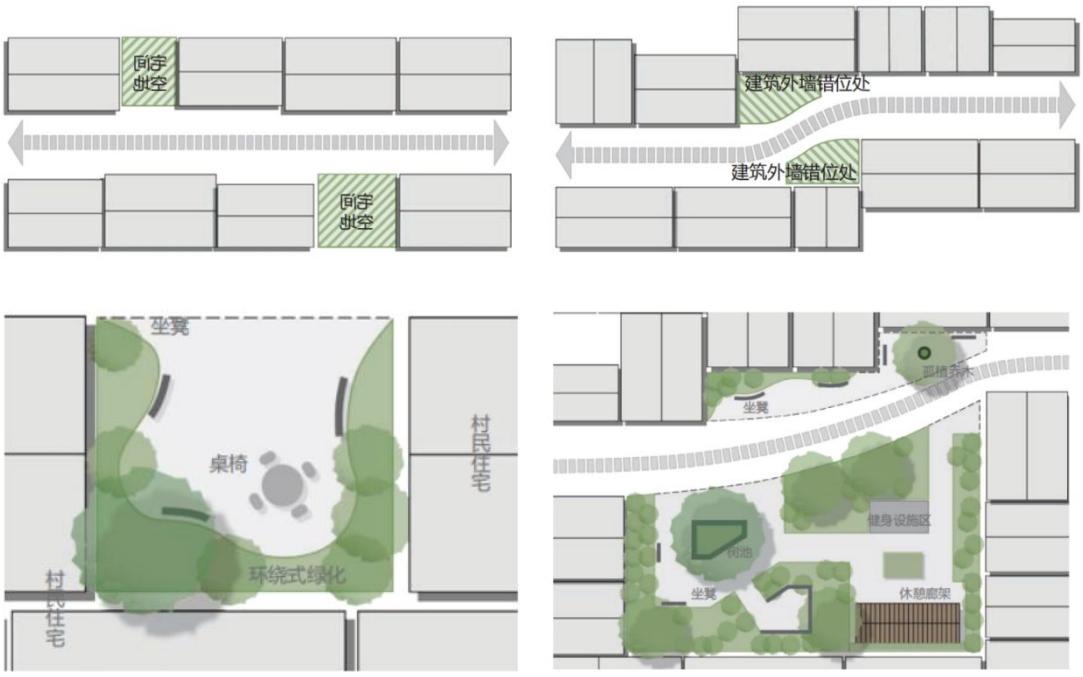

Figure 5.1-12 Layout of public space between houses

Source: Adapted from reference [27]

The square space along the waterfront is usually arranged in combination with the open space between houses and the space under trees. Clear boundaries of facility belts and

pedestrian areas are defined to ensure that the various functions do not interfere with each other. Existing water piers, docks and other facilities are utilized to enrich the forms of revetments, actively expand water-friendly activity venues, and enhance the vitality of the space on both sides of the river.

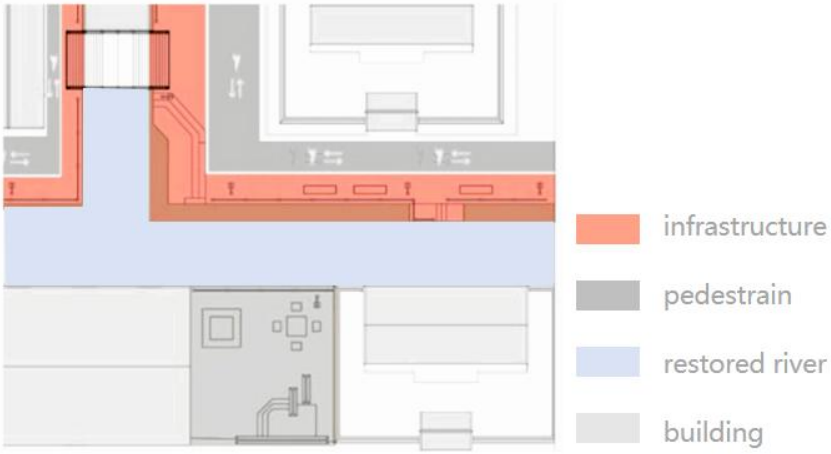

Figure 5.1-14 Waterfront space layout
Source: Adapted from reference [27]

4) Green space

The green space of Pantang Wuyue adheres to the principle of restoring the water town ecosystem. By rejuvenating the river and implementing the sponge street strategy, the ecosystem of Liwan Lake is reconnected with the ecosystem of Pantang Wuyue, and the water town pattern of Pantang Village continued from the Qing Dynasty is restored. The open space at the end of Wuyue Street is used to set up a landmark node space and connect it through the rejuvenated river. At the same time, the open space between houses is transformed to enrich the form of small-scale green space.

Figure 5.1-15 Green space layout

Source: Author adapted

(4) Building layout and three-dimensional building form

1) Building layout

On the basis of respecting historical evolution, the building layout is delineated according to the current status of the building, and different building layout forms are planned and designed according to the layout characteristics to improve the building's utilization efficiency and cultural value.

For traditional buildings, as much of the architectural style as possible should be preserved, including architectural layout, architectural decoration, architectural outline, etc. Without destroying the traditional style of the building, the function of the building should be replaced, and emerging industries such as bookstores and cultural and creative stores should be appropriately introduced.

For general buildings, they can be renovated according to the site requirements. Function replacement can be actively carried out to maximize the use value of the building. Renovation can be combined with public service functions, such as general commodity sales, convenience service stations, etc.

For architectural relics, whether to restore them will be decided based on the specific location of the site. In areas such as Wuyue Outer Street where the architectural layout has

changed significantly and the block integrity has been greatly reduced, the architectural layout and complete blocks can be repaired in combination with public spaces such as green spaces between houses to restore living habits and improve road continuity.

Figure 5.1-16 Pantang Wuyue building layout
Source: Author adapted

2) Architectural three-dimensional form

There are four types of buildings in Pantang Wuyue: traditional three-room and two-corridor houses, traditional bamboo houses, multi-storey houses, and ancestral temple buildings. This section focuses on the first three types of buildings and explores the design strategies for the three-dimensional form of Pantang Wuyue buildings.

The relationship between the ground floor of the building and the street: According to the author's research, the first floor entrance door of Pantang Wuyue's building is close to the road, which poses a certain safety hazard and occupies road space. Therefore, when designing the building form, the retreat between the ground floor of the building and the street was considered, and the wall close to the street was retreated inward by 1.5 meters.

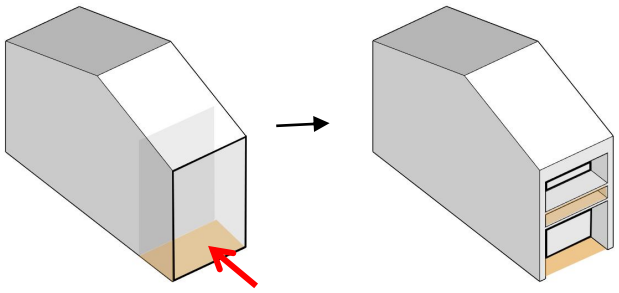

Figure 5.1-17 Schematic diagram of building ground floor setback
Source: Author's own drawing

Building structure: As Pantang Wuyue is a relatively old building, in the reconstruction project, if the original structure does not meet the use requirements, it is recommended to build a new structure within the original structure. The outline of the new structure should maintain a certain distance D from the original wall, at least 100mm. The internal stairs of the reconstructed building are attached to the new structure and should be appropriately widened to meet the latest building design specifications.

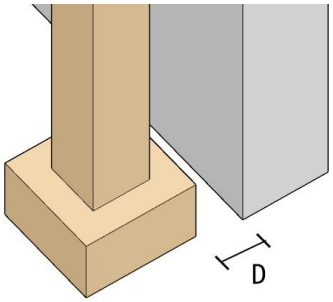

Figure 5.1-18 Schematic diagram of the setback between the new and old structures
Source: Author's own drawing

Facade shape control: extract the necessary components and features of the facade of Pantang Village, build and simplify it in a modern way to a certain specification, and improve the facade image and living quality. The facade color and materials should be coordinated with the traditional colors and materials of Pantang Village. The facade can add air conditioning units according to usage needs, and cover them with blinds or other components. Doors and windows can be appropriately enlarged, but glass curtain walls should not be used

entirely to avoid destroying the overall style of the street.

Figure 5.1-19 Schematic diagram of facade structure

Source: Author's own drawing

Roof form and building height control: Most Pantang Wuyue are bamboo houses with sloping roofs, and their eaves heights range from 3.5 to 12 meters. For buildings with good current conditions and high historical value, it is recommended to retain the original roof form and not to change to flat or sloping roofs at will. The slope of the sloping roof θ is controlled between 25°-30° to ensure that the building height and roof form are consistent with the historical style. In terms of height control, it should not exceed the height of the original building, and at the same time ensure that it does not hinder the lighting of surrounding buildings. The height H of the new building shall not exceed the highest value of the surrounding buildings. If it is a reconstruction, it shall not exceed the height of the original building.

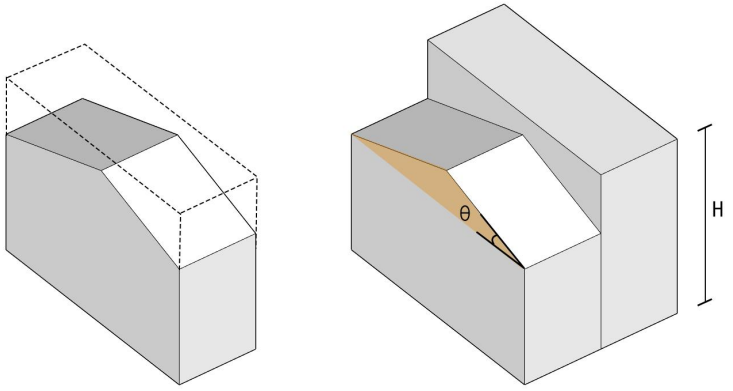

Figure 5.1-20 Schematic diagram of roof form and building height
Source: Author's own drawing

3) Building samples

No. 191, Longjin West Road, evolved from a traditional townhouse with bamboo tubes. It is a typical "shop below and house above" townhouse with ground floor commercial buildings. The building is about 4 meters wide and 10 meters deep, with three floors in some parts and a brick-wood structure. Its original structure was a public wall on both sides, which was renovated and added with new structural columns. The span of the new structural column is 3000mm×3600mm, and the outer contour of the new structural column is 100mm away from the original wall. The roof is made of concrete structure, which is suitable for part of the accessible roof. The critical interface of the bottom floor of the building is set back 1.5 meters to form a transitional space for entering the house, and an accessible ramp is added using the setback space. On the facade, the window area is increased, and the overhanging eaves are used for sunshade. The overhanging eaves are used as the space for placing the air conditioner outdoor unit, covered with khaki blinds to maintain the coordination of the facade color and elements. The roof form is a combination of flat slopes, and there is an accessible roof on the third floor. During the renovation, the height and position of the three-story stairwell were controlled to minimize the damage of the raised stairwell to the continuity of the street facade. The original skylight is enlarged in the sloping roof part, and the shape of the skylight is controlled to match the roof and interior space.

The following figure is a drawing of the building at No. 191 Longjin West Road, which

is used to demonstrate the specific application of the above design strategies:

Figure 5.1-21 Comparison of before and after optimization design

Source: Author's own drawing

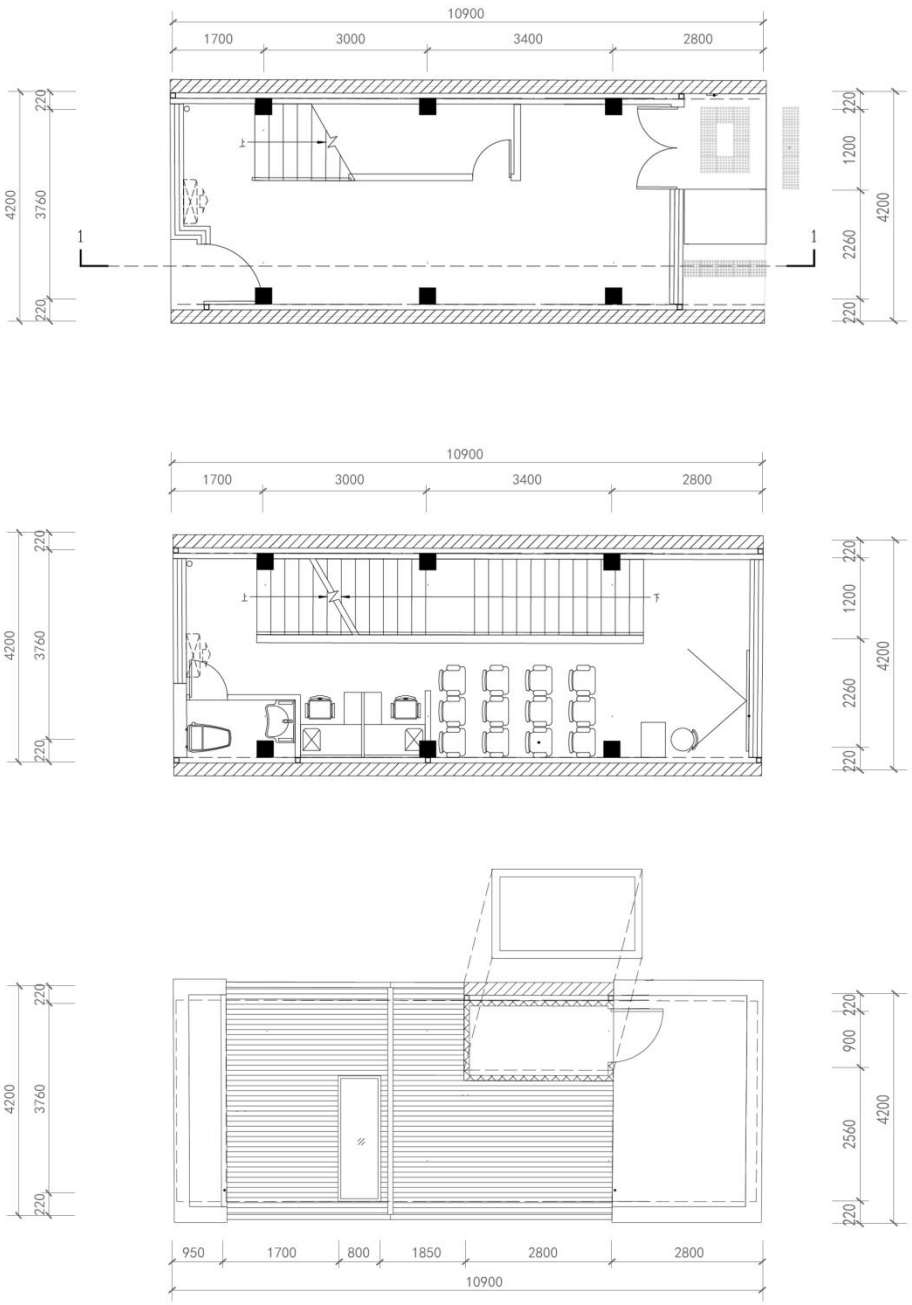

Figure 5.1-22 First, second and third floor plan

Source: Author's own drawing

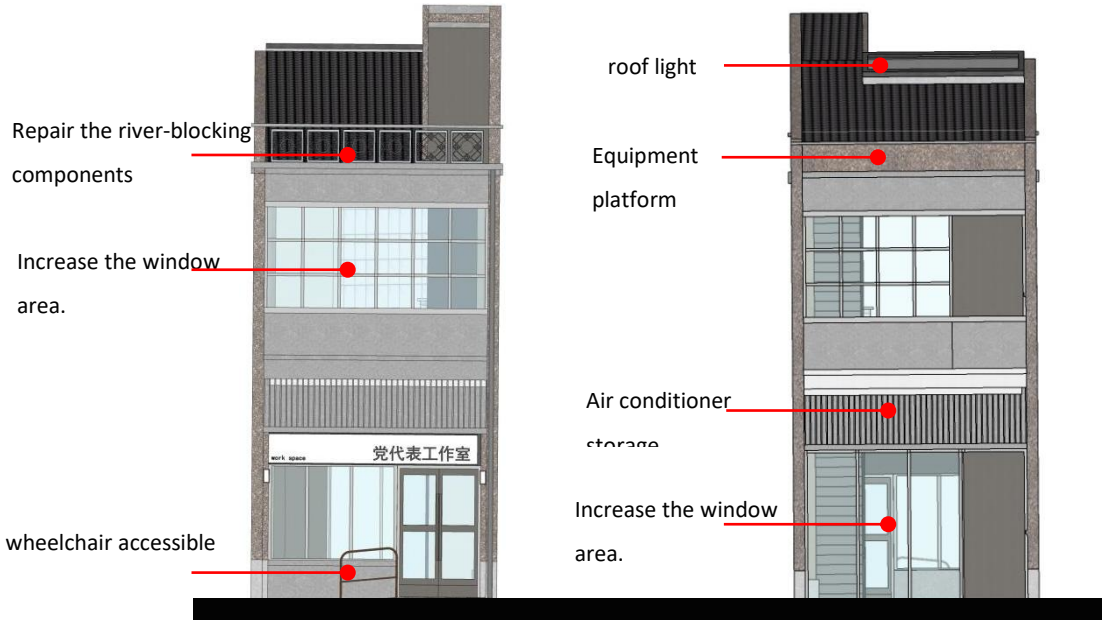

Figure 5.1-23 Front and back elevations

Source: Author's own drawing

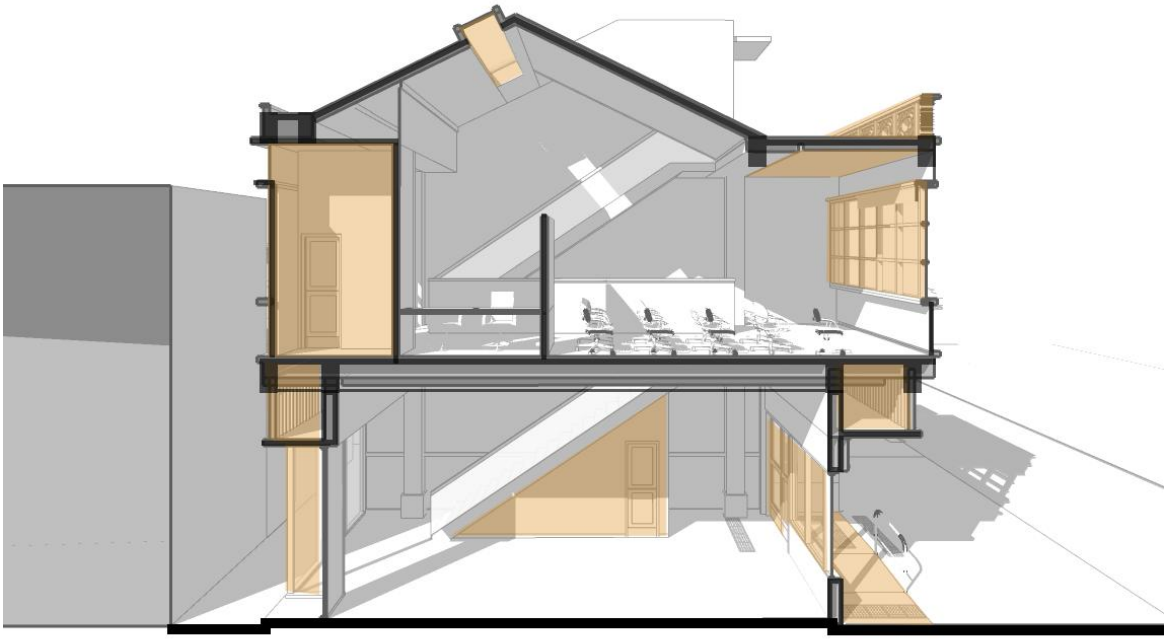

Figure 5.1-24 1-1 Sectional perspective view

Source: Author's own drawing

5.2 Wuyue optimization design

According to the current situation of the site, the historical value of the building, and property rights, this optimization design selects two areas, A and B, for design. This section

will discuss the street interface, street section space, plot function, public space, building layout, and three-dimensional form in the area, and try to apply the above analysis and research to the real site, taking areas A and B as representatives.

WuyueA District is located in the southeast corner of Pantang Wuyue. This area has a typical comb-style layout, and the building type is mainly bamboo tube houses. Its south side is Riverside Street, and the original river channel has been covered. Its east side is Wuyue Outer Street, close to Liwan Lake, and the southeast corner was once an important wharf in Wuyue.

Wuyue B District is located at the intersection of Wuyue New Street and Wuyue Street, and is a must-go node for tourists to enter Wuyue. 100 meters east of B District is the square in front of Renwei Ancestral Temple, which is the place where the most people gather in Pantang Village. About 500 meters north along Wuyue New Street is the subway entrance of Zhongshan Eighth Road. The area has a high building density, high historical value and good preservation.

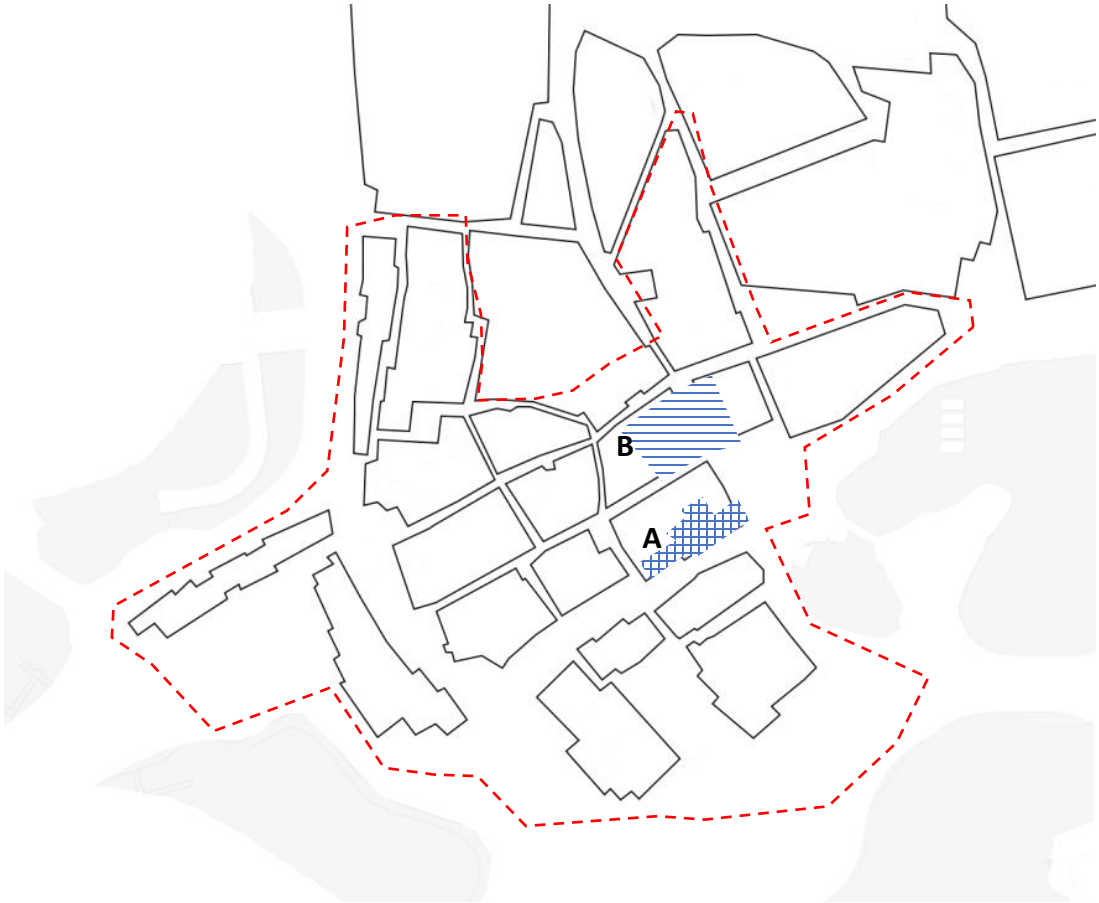

Figure 5.2-1 Location of A and B areas

Source: Author's own drawing

5.2.1 Wuyue A area optimization design

Figure 5.2-2 General plan of area A

Source: Author's own drawing

In terms of block design, Area A retains the building outline as the boundary of the block, and appropriately retreats the building's facade walls along the street. At the same time, the street space that was originally privately designated by residents is returned to the street, and buffer space is reserved for buildings and streets, as shown in the yellow area in the figure below. Buildings with low architectural value and poor preservation are demolished and transformed into street corner gardens or green spaces between houses to increase the richness of the block and the area of public space, as shown in the green part in the figure below. For the "Fuyong River Channel" on Riverside Street, its outline is designed according to the block, and the spatial layout is carried out considering the street nodes and the aspect ratio of the streets. Since the Fuyong River Channel is covered with grilles, it ensures the infiltration and circulation of rainwater without hindering the movement of pedestrians on both sides of the

street, so the "Fuyong River Channel" is still part of the street and can be used.

Figure 5.2-3 Wuyue A block diagram

Source: Author's own drawing

In the street section space design, the concept of sponge street is introduced in Area A. Combined with the original river system trend, street section space planning is carried out under the current building conditions. The following figure (Figure 5.2-4) is a perspective view of commercial building N and the green space between houses on the south side. In terms of architecture, the retreat of the facade along the street and the arrangement of green space between houses have greatly increased the width of the street; a terrace is set on the second floor of the building, which together with the sloping roof and green space forms an open and upward-guiding spatial image. The original street height-to-width ratio is partially broken to enhance people's walking experience in the streets.

Figure 5.2-4 Wuyue A District Street Section

Source: Author's own drawing

In the plot design, the traffic volume on the street corners on both sides is large, and the possibility of people staying is also increased due to the setting of street corner green space, so commercial space P is arranged here; the traditional residential function M1 is retained in the middle of the street, and some buildings are re-arranged and designed in combination with artist studios to form a modern residential space O. The functions of the surrounding buildings are also arranged according to the same principle.

Figure 5.2-5 Wuyue A area plot diagram

Source: Author's own drawing

In the street facade design, the facades in Area A have strong continuity, and the building heights are relatively consistent, with most of them being two stories high. The facade windows are enlarged to increase the lighting for the narrow and long bamboo tube house layout, while the proportion of facade windows is controlled to less than two-thirds to avoid the use of large areas of glass that would cause the building image to be inconsistent with the overall street style. The facade materials continue to use the original blue bricks and wood, and new materials such as khaki aluminum blinds are added to modify the building facades.

Figure 5.2-6 Wuyue A District Elevation

Source: Author's own drawing

In terms of the three-dimensional form of the building, Area A is designed according to different building types. For traditional residential buildings, this design retains the original exterior form and optimizes the layout of the building's internal space; for public service buildings and commercial buildings, this design makes significant changes to the building's facade and form to adapt to the building's character and usage requirements. For example, for the public service building in the southeast corner, a canopy is set up at the corner along the street, combined with the facade retreat, to form a transition space from the street to the building, increasing the publicity of the building.

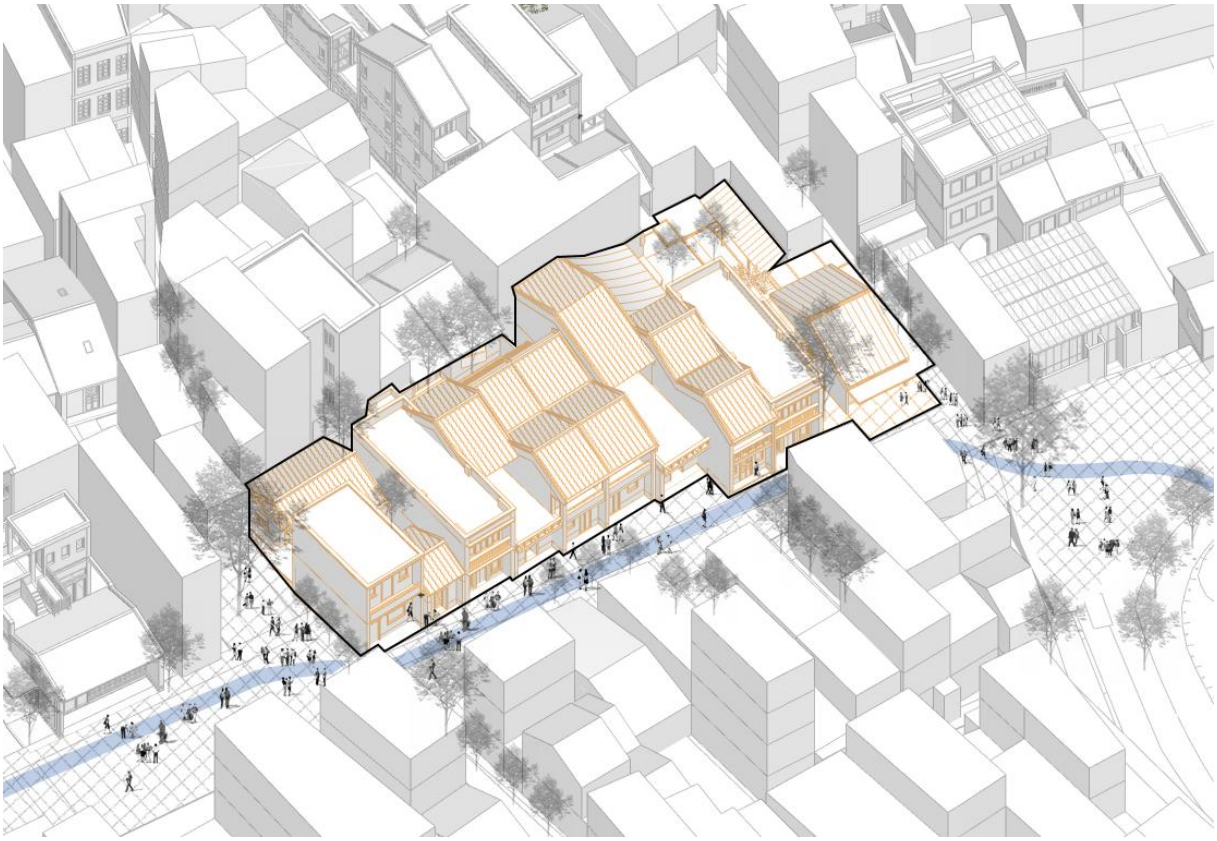

Figure 5.2-7 Axonometric drawing of Wuyue A area

Source: Author's own drawing

5.2.2 Wuyue B area optimization design

Figure 5.2-8 Axonometric drawing of Wuyue B area

Source: Author's own drawing

In terms of blocks, the streets in Area B are narrow and at a certain angle. This design increases the street width and traffic experience by demolishing some corner buildings and retreating the walls along the street. The northeast corner of Area B is an important traffic node of Pantang Wuyue, which receives a large number of people, especially tourists coming from Renwei Ancestral Temple on the east side. This design demolished a single-story building on the southwest side of the intersection of Wuyue New Street and Wuyue Straight Street and arranged it into a corner park. It is used to receive people and form spatial nodes to avoid single blocks and poor experience.

Figure 5.2-9 Wuyue B block diagram

Source: Author's own drawing

In terms of plot design, the layout principle of Area B is consistent with that of Area A. The southeast corner is close to Liwan Lake Park, and a public service plot N is set up to

serve as a tourist service center and supporting facilities; the intersection of Zhi Street and Xin Street is combined with the square space to set up a commercial function P; the southwest side has narrow streets and lanes with less traffic. The traditional residential function M1 is retained, and its internal space is renovated and designed to meet modern usage needs.

Figure 5.2-10 Wuyue B area plot diagram

Source: Author's own drawing

In the street facade design, the facade skyline of Area B is richer, with a floor height of 1-3 floors. The roof forms are a combination of flat and sloping roofs. Although some buildings have the same number of floors, their building heights are also different due to different building grades. For example, in the middle part, the double-bay single-story double-sloped building has a higher building grade and a higher floor height than the buildings on both sides. The door is a sliding door. This building is preserved and restored, retaining the original facade shape and door and window components. For other buildings, adaptive facade design is carried out according to the functional requirements of the renovation.

Figure 5.2-11 Wuyue B District Elevation

Source: Author's own drawing

In the three-dimensional form of the building, due to the high building density in Area B and less available ground space, a large number of accessible roofs are added to the roofs of the buildings to balance the demand for ground activity space.

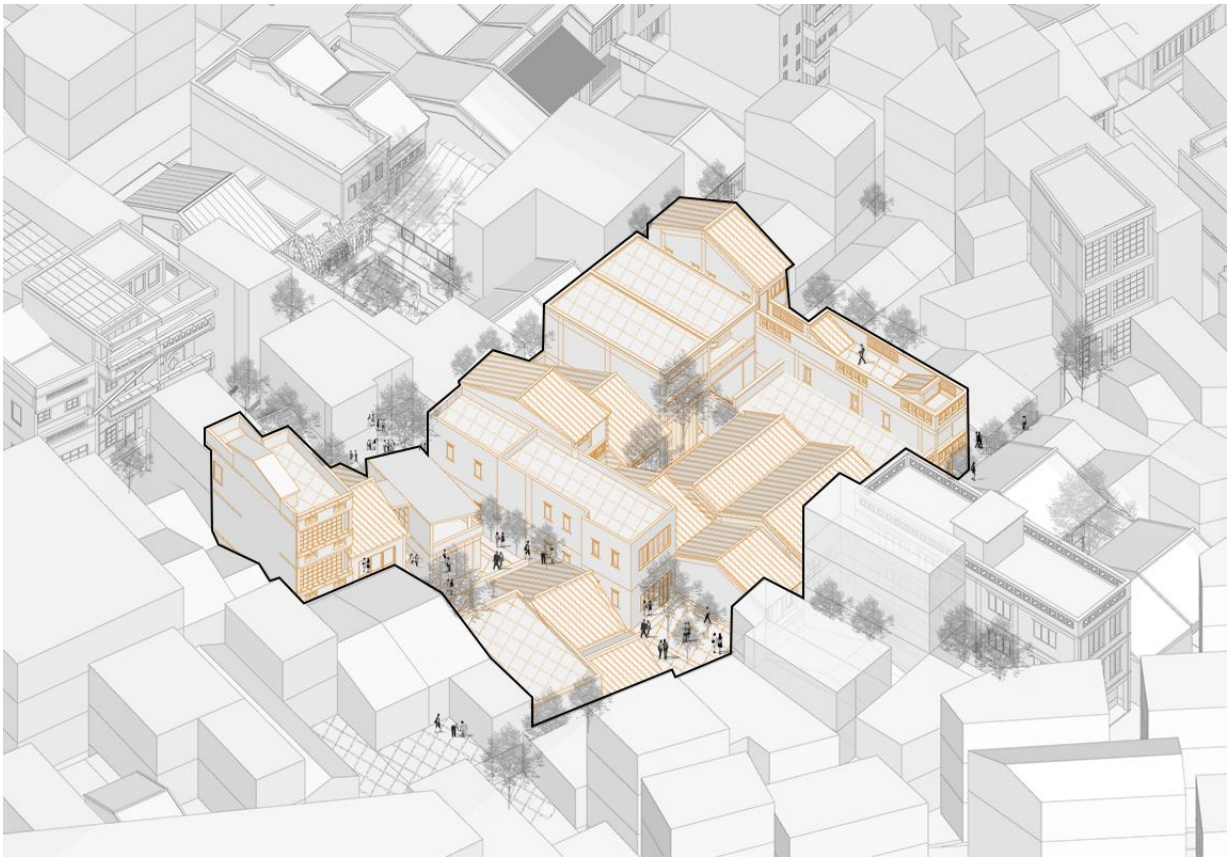

Figure 5.2-12 Axonometric drawing of Wuyue B area

Source: Author's own drawing

In the building section, the following figure shows a narrow bamboo house on the west

side of Area B. The building is a bamboo house with two households connected end to end. The two households enter from both sides, and the middle is a shared washing and kitchen space. In the design of the building section renovation, the relationship between the privacy and public of the two households is emphasized. While ensuring privacy, the space in the middle is shared. A public space is set up on the first floor of the middle part, and the floor slab is removed on the second floor to form a small patio to increase the lighting and ventilation of the building. Side high windows are set in the building on the left to increase the lighting area, while catering to the sloping roof form of the building on the right to form a smooth roof shape.

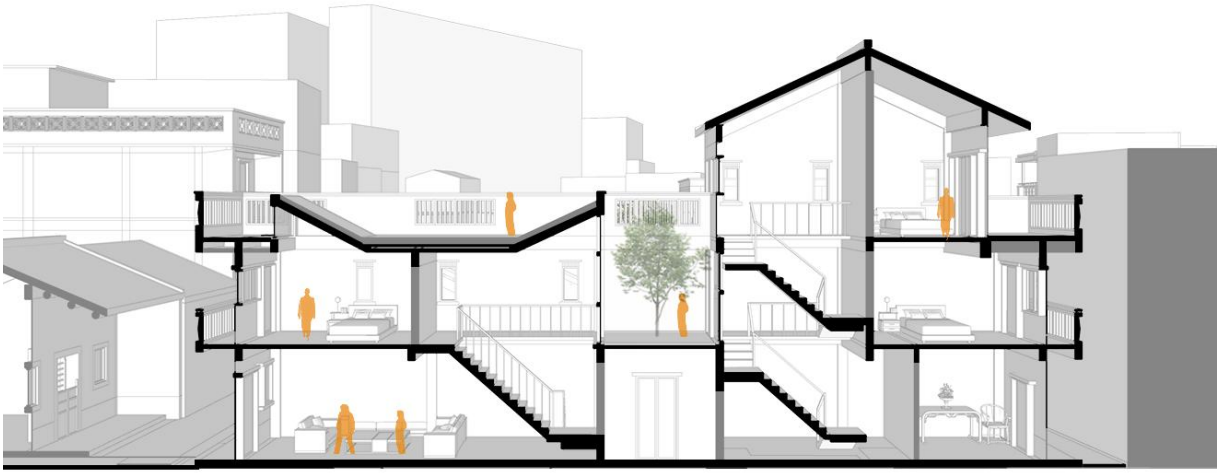

Figure 5.2-13 Wuyue B District Building Section
Source: Author's own drawing

5.2.3 Overall design

Wuyue's overall design follows the design strategy of 5.1.2 and is adjusted and adapted to the actual site. Wuyue generally respects the original spatial pattern of the site. In the figure below, A and B are historical buildings and famous ancient trees respectively; C is a heritage park arranged according to the traditional architectural plan, suggesting the original outline and spatial scale of the site; D is a re-emerging river channel, which has been optimized and turned into a sponge street, fully restoring the ecological effect and spatial characteristics of the riverside street without affecting traffic.

Figure 6.2-12 Wuyue master plan
Source: Author's own drawing

5.3 Planning implementation and management

5.3.1 Planning guidance and policy support

(1) Upper-level planning and positioning

Incorporated into the dual systems of "historical and cultural city protection" and "micro-renovation pilot" in Guangzhou. In 2016, Pantang Wuyue was listed as one of the first micro-renovation projects in Guangzhou, and in 2018 it was upgraded to a national pilot for the renovation of old residential areas, clarifying its core goal of "preserving the settlement pattern of the Qing Dynasty and revitalizing cultural resources."

Linking with the “Plan for the Construction of a Vibrant Cultural, Commercial and Tourism Zone in Liwan District” (2022), as a key node of the “Lingnan Culture Exhibition Platform”, it will work with Liwan Lake Park to create a “living museum without walls”.

(2) Special policy empowerment

Funding mechanism: Establish a "state-owned platform-led + social capital introduction" model. The government will undertake the renovation of infrastructure and public housing, and residents will renovate private properties themselves. A cultural and tourism enterprise relief fund will be launched to support the sustainable operation of merchants.

Business format control: Formulate the " Pantang Wuyue Business Format Introduction Guidelines" to strictly control the scale of commercialization. Reject chain fast food brands from entering, require that cultural business formats account for more than 80 % , and ensure "one store, one feature" (such as wood carving intangible cultural heritage studios, independent bookstores).

Property rights innovation: Adopt the "BOT model" (build-operate-transfer) to revitalize public properties. For example, Vipshop Charity Foundation built and operated the "Spring Terrace" Museum, the government retained the property rights, and the company obtained a 20-year operating right.

(3) Technical standard guarantee

Prepare the " Pantang Wuyue Restoration Technical Manual" to specify the restoration techniques for traditional elements such as blue brick walls, tubular tile houses, wooden doors and windows, and prohibit renovations that damage the style, such as glass curtain walls.

Relying on the "Guangzhou Memory" digital platform, complete the three-dimensional mapping and archiving of historical buildings to provide accurate data support for repairs.

5.3.2 Planning evaluation and adjustment

During the implementation of the plan, a "phased evaluation - dynamic feedback - flexible adjustment" mechanism is established to ensure that the project responds to actual needs:

(1) Phased implementation and effect evaluation

Phase I (2017-2018): Focus on infrastructure (three-line improvement, drainage network) and repair of dilapidated buildings. The evaluation found that the laneway traffic efficiency increased by 40%, but the conflicts between merchants and indigenous residents became

prominent.

Phase II (2018-2019): Targeted public spaces (small markets, activity centers) and cultural venues (martial arts halls, dragon boat stations) were added, and the wall between Pantang and Liwan Lake was demolished to achieve scenic integration. The evaluation showed that the number of tourists increased by 1.12 million and the return rate of indigenous people increased by 15%.

(2) Problem-oriented adjustment strategy

Spatial conflict: In order to address the problem of commercial occupation of Renwei Temple Square, the business boundaries of merchants were redefined and an exclusive activity area for indigenous people was added.

Cultural inheritance gap: Introducing the "Living Intangible Cultural Heritage Inheritance Plan", jointly opening youth training courses with the lion dance team, and reviving the right to use the " Pantang Five Shows" trademark.

Imbalance in business formats: In 2021, the rental gradient will be adjusted, and rent reductions will be implemented for traditional handicraft studios (≤100 yuan/㎡) to optimize the cultural industry ecology.

(3) Inclusion in the statutory protection system

The 2024 Guangzhou “Ten Ancient” Census will list Pantang Wuyue as a demonstration area, and promote the inclusion of 6 ancient villages and 89 ancient alleys in the pre-protection list to avoid the risk of constructive damage.

5.3.3 Public participation mechanism

Pantang Wuyue innovates the "co-creation" model to achieve collaboration among the government, residents and professionals:

(1) System design: a platform for full participation in the entire process

Establish a " Pantang Wuyue Co-creation Committee" whose members include indigenous people (13%), new merchants, planners and street representatives, and set up a

public opinion council to be responsible for daily consultations.

Adopting “participatory planning and design”: planners stayed in the village for one year, completed 46 interviews and 4 group discussions, and drew a “ Pantang Historical Memory Map” as a blueprint for transformation.

(2) Innovative participation forms and tools

Spatial decision-making: In response to the dispute over the location of the Sanguan Temple gate couplet, a 1:1 model was made for residents to try out and reach a consensus through physical experience.

Cultural Revitalization: Residents independently planned the “Old Photo Exhibition” and participated in the entire process from collection to exhibition layout, which led to the creation of a community cultural public account.

Merchant autonomy: Establish a "Manager Alliance", write the " Pantang Appointment" MV, hold Mid-Autumn Festival treasure hunt and other activities to strengthen community identity.

(3) Achievements and Challenges

Results: The satisfaction rate of indigenous residents exceeds 90%, and the co-construction rate between merchants and indigenous residents reaches 70% (such as co-management of courtyards and shared soups). In 2024, it will be selected as one of the "Replicable Experiences in the Protection and Utilization of Historical and Cultural Blocks" by the Ministry of Housing and Urban-Rural Development.

Challenges: Insufficient participation of young groups (only 20% of participants were under 30 years old), and coverage needs to be expanded through digital tools (such as the “ Pantang Cloud Discussion” applet).

5.4 Summary

This chapter proposes an optimization and renovation strategy for the Pantang Wuyue historical and cultural block, especially for the core area Wuyue Street. The renovation is

based on relevant laws and regulations and protection plans, combined with foreign cutting-edge theories, and defines five core goals: authenticity protection, typological translation, community resilience, cultural function enhancement, and spatial scale restoration.

The specific design strategy is based on four core elements: (1) Street system: optimize graded roads, repair historical paving, build sponge streets, restore the scale of primary and secondary streets, and improve the walking experience through continuous interfaces, shade facilities and rest areas. (2) Block and plot: divide the plot types such as repair, improvement and preservation according to the historical form and property rights to improve the efficiency of space utilization and publicity. (3) Public space: connect historical nodes such as Sanguan Temple and Renwei Temple Square to create a spatial network combining "points, lines and surfaces", design different functional areas such as religious culture, squares, and green spaces, and balance the dynamic and static zoning and the needs of the crowd. (4) Building level: control the height and roof form of new buildings, and improve the efficiency and cultural connotation of historical buildings through functional replacement.

A zoning design plan was formulated for Wuyue Street, implementing strategies in aspects such as street protection, plot adjustment, space creation and building control, and ensuring operability through design drawings.

The implementation of the plan has established three guarantees: (1) Planning and policies: clarify the planning positioning, innovate the funding mechanism (state-owned platform + social capital), control the business types (culture accounts for more than 80%), explore the property rights model (BOT), and formulate technical standards. (2) Dynamic evaluation and adjustment: evaluate the implementation effect in stages, and solve spatial conflicts, business imbalances and other problems in a timely manner. (3) Public participation: establish a "co-creation committee", adopt participatory planning, innovate participation tools, and improve the satisfaction of indigenous people and the rate of community co-construction.

The transformation strategy proposed in this chapter integrates theoretical support, sophisticated design, innovative mechanisms, and public participation, aiming to achieve

multiple goals of historical preservation, community vitality, cultural heritage, and environmental improvement, providing a "Pantang model" that can be used as a reference for the renewal of historical and cultural blocks across the country.

Conclusion

1 Research Summary

1.1 Theoretical research part

This study has constructed an urban morphological analysis framework with Chinese characteristics. With typo-morphology as the core, it integrates the spatial analysis method of Conzen's urban morphology and the diachronic perspective of Caniggia's architectural typology to form a four-dimensional research system of "three-dimensional space + time dimension". In view of the complex characteristics of China's historical blocks, the study has made two theoretical innovations: first, based on the morphological element system proposed by Chen Fei, combined with the reality of fragmented historical materials, complex property rights, and diversified construction systems in Pantang Village, a multi-source information cross-validation mechanism was established, which to a certain extent filled the historical material gap in the study of historical blocks; second, it broke through the traditional static analysis paradigm, revealed the diachronic shaping mechanism of spatial morphology by dynamic forces such as policy regulation, economic transformation, social change, technological innovation, and natural ecology , explained the dialectical relationship between historical stratification and contemporary adaptability, and provided theoretical support for dynamically grasping the laws of urban morphological evolution.

1.2 Practical research part

Taking Pantang Village as an empirical research object, this paper presents the evolution characteristics of its spatial form through systematic analysis . At the same time, three core contradictions of Pantang Village are summarized : the fragmentation of historical texture leads to spatial alienation, the lagging functional adaptation leads to social sustainability challenges, and the fault of traditional construction technology causes style conflicts. In response to the above problems, the study combines post occupancy evaluation (POE) with

case reference, proposes optimization strategies, and applies them to the design practice of Wuyue Street to form a replicable technical path.

2 Research Innovation

In terms of methodology, we try to combine "typo-morphology + POE evaluation" to form a closed loop of "type repair-usage feedback" to provide a scientific basis for accurately positioning update needs.

In terms of theoretical application, we break through the regional limitations of Western typo-morphology theory, discuss the localized analysis path for China's property rights system and construction system , and balance historical protection and revitalization.

3. Insufficient research

In terms of historical data, the validity of map document information from the late Qing Dynasty to the Republic of China period is relatively low, resulting in some morphological evolution analysis relying on inference from textual data , which affects the accuracy of the research .

The POE evaluation samples are mainly tourists , and fail to fully cover groups such as residents and cultural and creative practitioners. The accuracy of demand analysis needs to be improved.

4 Research Prospects

In future research, the " typo-morphology + POE evaluation " framework will be applied to other waterside settlements in the Pearl River Delta to test the adaptability of the theory. At the same time, the correlation between business layout, passenger density and spatial satisfaction will be quantified by combining spatial big data with POE results. In addition, community governance should be improved, a tripartite interest balance mechanism of "indigenous people-new business-government" should be established, and a sustainable community governance model should be explored.

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Appendix

Pantang and Liwan Lake Park Satisfaction Survey Questionnaire

Dear Respondents:

Hello! Thank you very much for participating in this survey on satisfaction with the Pantang and Liwan Lake areas. This questionnaire does not involve personal privacy, and all data will be strictly confidential and used only for research purposes (comprehensive evaluation of the preservation and utilization of Pantang Village and the surrounding historic districts). Thank you for your support! We look forward to an even brighter future for Pantang Village!

Respondent's Basic Information

Your status: [Single-Choice] *

○ Resident of Pantang or Liwan ○ Shopkeeper in Pantang Wuyue ○ Tourist (non-resident or shopkeeper)

Your age: [Single-Choice] *

○ Under 25 ○ 26-35 ○ 36-45 ○ 46-55 ○ 55 and older

Why are you here: [Multiple-Choice] *

□ Leisure and fitness

□ Business

□ Bringing children

□ After-dinner walk

□ Attending an event

□ Taking photos and checking in

□ Dropping in

□ Other

What time do you usually spend here: [Multiple-Choice] *

□ 6-9 AM

□ 9-12 PM

□ 1-4 PM

□ 5-7 PM

□ 7-9 PM

□ 10-12 PM

How long have you lived or lived here? [Single-Choice] *

○ 1-3 years

○ 3-5 years

○ 5-10 years

○ 10-20 years

○ 20 years or more

Depends on the first or second option in (Question: Your identity)

Which landmarks are most memorable to you? [Multiple Choice] *

□ Renwei Temple

□ Li Clan Ancestral Hall (Dunben Hall)

□ Shijing People's Commune (Sanguan Temple)

□ Wuyue Street

□ Banxi Wuyue Pavilion

□ Panxi Restaurant

□ Haishanxian Pavilion

□ Wen Tower

□ Rice Noodle Shop

How many times have you been here? [Single Choice] *

○ First time

○ 2 or 3 times

○ 3 or 10 times

○ 10 or more times

Depends on the third option in (Question: Your identity)

How long does it take to walk from your home to Liwan Lake Park? [Single Choice] *

○ Within 10 minutes

○ 10-20 minutes

○ More than 20 minutes

What means of transportation did you take? [Single Choice] *

○ Subway

○ Bus

○ Private Car

○ Bicycle

○ Walking

What is your overall impression of Pan Tang and Liwan Lake today? [Single Choice] *

Very Dissatisfied ○1 ○2 ○3 ○4 ○5 Very Satisfied

Satisfaction Questionnaire

Are you satisfied with the overall layout (continuation) of Pan Tang Village and Liwan Lake

Park? [Single Choice] *

Very Dissatisfied ○1 ○2 ○3 ○4 ○5 Very Satisfied

What aspects do you think need improvement? [Multiple Choice] *

□ Functional Zoning

□ Water System and Greening

□ Transportation Network

□ Settlement Distribution

□ Integration of Cultural Relics and Modern Landscapes

□ Interweaving of Religious and Secular Landscapes

Depends on (Question: What is your overall impression of the overall layout (continuation) of Pan Tang Village and Liwan Lake Park?) 1st & 2nd options

Are you satisfied with the traditional texture (continuation) of Pan Tang Village and Liwan Lake Park? [Single Choice] *

Very Dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What aspects do you think need improvement: [Multiple Choice] *

□ Street layout

□ Building layout

□ Architectural style

□ Building materials

□ Traditional crafts and commerce

□ Traditional festivals and folk activities

Depends on (Question: Are you satisfied with the current traditional texture of Pan Tang Village and Liwan Lake Park (continuation...)? Options 1 or 2

Are you satisfied with the current architectural renovations in Pan Tang Village and Liwan

Lake Park? [Single Choice] *

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What aspects do you think need improvement: [Multiple Choice] *

□ Building appearance

□ Building structure

□ Building function

□ Building environment (indoors, surrounding area)

Depends on (Question: Are you satisfied with the current architectural renovations in Pan Tang Village and Liwan Lake Park...)? Options 1 or 2

Are you satisfied with the current environmental renovations in Pan Tang Village and Liwan Lake Park? [Single Choice] *

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What areas do you think need improvement: [Multiple Choice] *

□ Architectural preservation and restoration

□ Street space quality improvement

□ Traffic flow and parking facilities

□ Pedestrian continuity, enjoyment, and accessibility

□ Green landscape layout and coordination with architecture

□ Public spaces (squares and waterfront areas)

□ Signage and route guidance

Depends on (Question: What are your thoughts on the current environmental improvements in Pan Tang Village and Liwan Lake Park...) options 1 and 2

Are you satisfied with the preservation of historical figures and cultural heritage in Pan Tang Village and Liwan Lake Park? [Single Choice] *

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What areas do you think need improvement: [Multiple Choice] *

□ Surname and genealogy continuity

□ Family craft inheritance

□ Celebrity commemoration and cultural space construction

□ Local legends and folk tales dissemination

□ School education and cultural institution dissemination

Depends on (Question: What is your opinion on the current context of historical figures in Pantang Village and Liwan Lake Park...) options 1 and 2

Are you satisfied with the current context of historical events in Pantang Village and Liwan Lake Park? [Single Choice] *

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What aspects do you think need improvement? [Multiple Choice] *

□ Commemorative activities and rituals

□ Literary works and artistic expression

□ Historical relics and spatial reproduction

Depends on (Question: What is your opinion on the current context of historical events in Pantang Village and Liwan Lake Park...) options 1 and 2

Are you satisfied with the current context of folk crafts in Pantang Village and Liwan Lake Park? [Single Choice] *

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What aspects do you think need improvement? [Multiple Choice] *

□ Family and Apprenticeship Inheritance

□ Community and Regional Cultural Heritage

□ Museums and Cultural Centers

□ Industrial Integration and Innovative Heritage

Depending on (Question: Are you satisfied with the current folk crafts and cultural heritage of Pan Tang Village and Liwan Lake Park...) Options 1 and 2

Are you satisfied with the current door and window designs of Pan Tang Village and Liwan Lake Park? [Single Choice] *

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What aspects do you think need improvement? [Multiple Choice] *

□ Style restoration and inheritance

□ Cultural symbol integration

□ Energy conservation, insulation, ventilation and lighting

□ Decorative details and craftsmanship

Depending on (Question: Are you satisfied with the current door and window designs of Pan Tang Village and Liwan Lake Park...) Options 1 and 2

Are you satisfied with the current shop signs of Pan Tang Village and Liwan Lake Park? [Single Choice] *

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What aspects do you think need improvement? [Multiple Choice] *

□ Fusion of Style and Culture

□ Balanced Size and Proportion

□ Clear Information Presentation

□ Optimized Lighting Design

Depends on (Question: Are You Satisfied with the Current Shop Signs in Pan Tang Village

and Liwan Lake Park...) Options 1 or 2

Are You Satisfied with the Current Facade Decorations in Pan Tang Village and Liwan Lake Park? [Single Choice] *

Very Dissatisfied ○1 ○2 ○3 ○4 ○5 Very Satisfied

What Areas Do You Think Need Improvement? [Multiple Choice] *

□ Use of Traditional Elements

□ Color Combination

□ Material Selection

□ Decorative Details

□ Planting Combination

□ Lighting Design

□ Cultural Display and Signage

Depends on (Question: Are You Satisfied with the Current Facade Decorations in Pan Tang Village and Liwan Lake Park...) Options 1 or 2

Are You Satisfied with the Current Paving (Paving) Materials in Pan Tang Village and Liwan Lake Park? [Single Choice] *

Very Dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What aspects do you think need improvement: [Multiple Choice] *

□ Revival of traditional materials

□ Improved material performance (anti-slip, water-permeable)

□ Aesthetics and texture

□ Durability and ease of enclosure

Depends on (Question: What are your thoughts on the current paving (paving) in Pan Tang Village and Liwan Lake Park...) 1st or 2nd option

Are you satisfied with the current paving (paving) colors in Pan Tang Village and Liwan Lake Park? [Single Choice] *

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What aspects do you think need improvement: [Multiple Choice] *

□ Responds to the Lingnan cultural color system

□ Harmonizes with the surrounding environment

□ Distinguishes between different functional areas (pedestrian/vehicle, public/private)

□ Color guidance (direction of travel and key attractions)

Depends on (Question: What are your thoughts on the current paving (paving) in Pantang Village and Liwan Lake Park...) Option 1 or 2

Are you satisfied with the current paving (paving) patterns in Pantang Village and Liwan Lake Park? [Single Choice] *

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What aspects do you think need improvement? [Multiple Choice] *

□ Themed area division (waterfront with ripples and fish patterns, handicraft area with woven paper-cut patterns, etc.)

□ Functional area guidance (gathering, flow, winding)

□ New materials (permeable, luminous, etc. combined with traditional patterns)

□ Visual aesthetics

Depends on (Question: What are your thoughts on the current paving (paving) in Pan Tang Village and Liwan Lake Park...) Option 1 or 2

Are you satisfied with the current green plazas in Pan Tang Village and Liwan Lake Park? [Single Choice] *

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What aspects do you think need improvement? [Multiple Choice] *

□ Adjust the size and layout of the plaza

□ Integrate with the preservation of historical relics

□ Add seating, sunshades, and other facilities

□ Smooth connections between venues, entrance and exit locations, and accessibility

□ Diversity and seasonality of greenery

□ Nighttime lighting atmosphere and safety

Depends on (Question: Are you satisfied with the current green plazas in Pantang Village and Liwan Lake Park...) Options 1 or 2

Are you satisfied with the current landscape features in Pantang Village and Liwan Lake Park? [Single Choice] *

(Sculptures, pavilions, trellises)

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What aspects do you think need improvement? [Multiple Choice] *

□ Interactive communication and enhanced experience

□ Echoing the style and reflecting local characteristics

□ Environmentally friendly materials and reuse

□ Management and maintenance

Depends on (Question: Are you satisfied with the current landscape features in Pantang Village and Liwan Lake Park...) Options 1 or 2

Are you satisfied with the current nighttime lighting layout in Pantang Village and Liwan Lake Park? [Single Choice] *

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What areas do you think need improvement? [Multiple Choice] *

□ Strengthen key locations such as entrances

□ Emphasize functional zoning (commercial, leisure, cultural exhibition)

□ Enhance waterfront lighting

□ Emphasize building outlines and distinctive features

□ Safety, energy efficiency, etc.

Depends on the first or second option (Question: What are your thoughts on the current nighttime lighting in Pantang Village and Liwan Lake Park?)

Are you satisfied with the color of the current nighttime lighting in Pantang Village and Liwan Lake Park? [Single Choice] *

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What areas do you think need improvement? [Multiple Choice] *

□ Adjust the saturation of red lanterns in Liwan Lake Park

□ Emphasize functional zoning (commercial, leisure, cultural exhibition, important landmarks)

□ Seasonal color psychology (winter, summer)

□ Integrate traditional Pan Tang colors

Depends on (Question: Are you satisfied with the current nighttime lighting in Pan Tang Village and Liwan Lake Park...) Options 1 and 2

Are you satisfied with the current water supply and drainage facilities in Pan Tang Village and Liwan Lake Park? [Single Choice] *

(Downspouts, surface drainage, etc.)

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What areas do you think need improvement? [Multiple Choice] *

□ Conceal exposed rainwater pipes

□ Conceal sewage ditches

□ Improve the flood storage and regulation function of Liwan Lake

Depends on (Question: Are you satisfied with the current water supply and drainage facilities in Pan Tang Village and Liwan Lake Park...) Options 1 and 2

Are you satisfied with the current power supply and communication facilities in Pan Tang Village and Liwan Lake Park? [Single Choice] *

(Power outages, cell phone signal, etc.)

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What areas do you think need improvement: [Multiple Choice] *

□ Aesthetics of cable poles and distribution boxes

□ Integrated communication lines to avoid haphazard construction

□ Intelligent construction and management, such as monitoring and sensors

Depends on (Question: What are your thoughts on the current power and communication facilities in Pantang Village and Liwan Lake Park...) Option 1 or 2

Are you satisfied with the current gas and sanitation facilities in Pantang Village and Liwan Lake Park? [Single Choice] *

(Gas, garbage collection, public toilets, etc.)

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What areas do you think need improvement: [Multiple Choice] *

□ Strengthen leak detection and maintenance

□ Optimize the number and location of trash cans

□ Improve public toilets and make them smarter

□ Update sanitation equipment

□ Avoid operations during peak hours

Depends on (Question: Are you satisfied with the current gas sanitation facilities in Pantang Village and Liwan Lake Park...) Options 1 or 2

Are you satisfied with the current disaster prevention facilities in Pantang Village and Liwan Lake Park? [Single Choice] *

(Fire Prevention, Flood Control)

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What areas do you think need improvement? [Multiple Choice] *

□ Maintain clear fire escapes

□ Update firefighting equipment

□ Strengthen building seismic resistance

□ Upgrade drainage and flood control systems

□ Build shelters

□ Early warning systems

Depends on (Question: Are you satisfied with the current disaster prevention facilities in Pantang Village and Liwan Lake Park...) Options 1 or 2

Are you satisfied with the current road traffic in Pantang Village and Liwan Lake Park? [Single Choice] *

Very dissatisfied ○1 ○2 ○3 ○3 ○4 ○5 Very satisfied

What aspects do you think need improvement: [Multiple Choice] *

□ Pedestrian and vehicle separation, dedicated pedestrian lanes

□ Internal road widening

□ Internal road loop

□ Liwan Lake Park entrance access

□ Zhongshan 8th Road subway entrance access

□ Renwei Temple entrance access

□ Pantang Road-Longjin West Road access

Depends on (Question: Are you satisfied with the current road access between Pantang Village and Liwan Lake Park...) 1st or 2nd option

Are you satisfied with the current public transportation between Pantang Village and Liwan Lake Park? [Single Choice] *

(Bus, subway, taxi, shared bikes)

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What aspects do you think need improvement: [Multiple Choice] *

□ Adjustments to bus routes and stops

□ Special tourist routes and scenic area sightseeing buses

□ Addition of water buses

□ Transfers or shuttles from subway entrances to scenic areas

□ Temporary stops for taxis and ride-hailing services

□ Shared bike parking

Depends on (Question: Are you satisfied with the current public transportation in Pantang Village and Liwan Lake Park...) Options 1 and 2

Are you satisfied with the current slow-moving transportation in Pantang Village and Liwan Lake Park? [Single-choice question] *

(Pedestrians, bicycles, electric vehicles)

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What areas do you think need improvement? [Multiple-choice question] *

□ Path planning and connectivity

□ Pedestrian width and rest facilities

□ Separate bicycle lanes

□ Accessible access and full coverage of facilities

□ Adjustments to bicycle and electric vehicle parking spaces

Depends on (Question: Are you satisfied with the current slow-moving transportation in Pantang Village and Liwan Lake Park...) Options 1 and 2

Are you satisfied with the current parking facilities in Pantang Village and Liwan Lake Park? [Single Choice Question *

(Bicycles, Electric Scooters, Cars)

Very Dissatisfied ○1 ○2 ○3 ○4 ○5 Very Satisfied

What areas do you think need improvement: [Multiple Choice Question] *

□Add more ground parking lots

□Designate dedicated bicycle and electric scooter parking areas to avoid occupying sidewalks

□Strengthen the no-entry signs for shared bikes at the entrances to Liwan Lake Park and Pantang Wuyue

Depends on the first and second options of (Question: Are you satisfied with the current parking facilities in Pantang Village and Liwan Lake Park...)

Are you satisfied with the comprehensiveness of the current business types in Pantang Village and Liwan Lake Park? [Single Choice Question] *

Very Dissatisfied ○1 ○2 ○3 ○4 ○5 Very Satisfied

What areas do you think need improvement: [Multiple Choice Question] *

□ Increased diversity of dining options, enhancing the experience

□ Bringing together traditional handicraft merchants and establishing a communication

platform

□ Commercializing folk culture, developing peripheral products, and themed tourism projects (dragon boat racing)

□ Creation and sales of Pan Tang branded cultural and creative products (e-commerce, specialty stores)

□ Establishing creative studios and hosting art events

□ Improving and upgrading the tourism industry, including visitor services, accommodation, and leisure shopping

Depending on (Question: What is your overall opinion of the current industries in Pan Tang Village and Liwan Lake Park?) Options 1 and 2

Are you satisfied with the current business operations of various industries in Pan Tang Village and Liwan Lake Park? [Single-choice question] *

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What areas do you think need improvement? [Multiple-choice question] *

□ Optimize transportation and parking systems

□ Enhance store image

□ Expand business models and channels

□ Strengthen Pan Tang's brand building

□ Market-oriented operations, encouraging social capital participation in development and operations

□ Improve surrounding service quality

Depends on (Question: What is your opinion of the current business operations of various industries in Pan Tang Village and Liwan Lake Park...) Options 1 and 2

Are you satisfied with the current connection between various industries in Pan Tang Village and Liwan Lake Park and their historical and cultural heritage? [Single Choice] *

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

Are you satisfied with the current level of innovation and creativity in various industries in Pan Tang Village and Liwan Lake Park? [Single Choice] *

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What areas do you think need improvement? [Multiple Choice] *

□ Cross-industry integration, including food, accommodation, sports, and culture

□ Technology application and digitalization, including live Cantonese opera broadcasts and smart neighborhood guides

□ Product feature updates and customized services

Depending on (Question: What are your thoughts on the current innovation and creation of various industries in Pan Tang Village and Liwan Lake Park...) Options 1 and 2

Are you satisfied with the continued social structure of Pan Tang Village and Liwan Lake Park? [Single Choice] *

(Family structure, social class, industry, economy, cultural traditions)

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What areas do you think need improvement? [Multiple Choice] *

□ Encouraging residents to participate more in community affairs

□ Cultivating and attracting local talent

□ Supporting local industries and social organizations

□ Employment for local residents

Depending on (Question: What are your thoughts on the current social structure of Pan Tang Village and Liwan Lake Park...) Options 1 and 2

Are you satisfied with the current level of community identity in Pan Tang Village and Liwan

Lake Park? [Single Choice] *

Do you enjoy local culture? Do you consider yourself a part of the community? Do you participate in community activities?

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What areas do you think need improvement? [Multiple choice] *

□ Cultural heritage activities and educational outreach

□ Community activities and social platform development

□ Providing high-quality public spaces to promote neighborhood communication

Depends on the first and second options in the question: How much do you identify with the current Pan Tang Village and Liwan Lake Park communities...?

Are you satisfied with the current public participation regulations in Pan Tang Village and Liwan Lake Park? [Single choice] *

Participant qualification review, fair and orderly participation procedures, legal and compliant procedures, and effective supervision.

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What areas do you think need improvement? [Multiple choice] *

□ Participant qualification review

□ Strengthen information disclosure and communication

□ Legal and compliant participation methods

□ Supervision of the participation process

Depends on (Question: What are your thoughts on the current public participation regulations in Pan Tang Village and Liwan Lake Park...) Options 1 and 2

Are you satisfied with the comprehensiveness of public participation in Pan Tang Village and Liwan Lake Park? [Single-Choice] *

Participating groups, participating matters, participating channels

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What areas do you think need improvement? [Multiple-Choice] *

□ Encourage participation from people of different ages, genders, occupations, and social classes

□ Diversify participation activities, including cultural and creative industries, event planning, and ecological protection

□ Broaden participation channels and strengthen online and other promotional channels

Depends on (Question: What are your thoughts on the current comprehensive public participation regulations in Pan Tang Village and Liwan Lake Park...) Options 1 and 2

Are you satisfied with the iconic interfaces (roads and water bodies) in Pan Tang Village and Liwan Lake Park? [Single-Choice] *

Very dissatisfied ○1 ○2 ○3 ○3 ○4 ○5 Very satisfied

What aspects do you think need improvement: [Multiple Choice] *

□ Site entrances and exits

□ Pavement and street furniture, scenic area signage

□ Water quality

□ Waterfront quality

Depends on (Question: What are your thoughts on the current iconic landmarks of Pantang Village and Liwan Lake Park? (...) 1st and 2nd options)

Are you satisfied with the current iconic buildings of Pantang Village and Liwan Lake Park? [Single Choice] *

Renwei Temple, Li Clan Ancestral Hall, Wuyue Pavilion, Wen Tower, Panxi Restaurant, etc.

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What aspects do you think need improvement: [Multiple Choice] *

□ Integration of building appearance and environment

□ Improved building function and spatial quality

□ Cultural exhibitions and events

□ Accessibility

□ Supporting service facilities

Depends on (Question: Are you satisfied with the current landmark buildings of Pan Tang Village and Liwan Lake Park...) Option 1 or 2

Are you satisfied with the current landmark landscapes of Pan Tang Village and Liwan Lake Park? [Single Choice] *

Liwan Lake, Lizhi Creek, Wuyue Street, etc.

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What aspects do you think need improvement? [Multiple Choice] *

□ Landscape quality, reflecting unique culture

□ Daily maintenance (cleanliness and tidiness)

□ Festive atmosphere

□ Supporting service facilities

□ Accessibility

Depends on (Question: Are you satisfied with the current landmark landscapes of Pan Tang Village and Liwan Lake Park...) Option 1 or 2

Are you satisfied with the current promotional channels for Pan Tang Village and Liwan Lake Park? [Single Choice] *

Internet, newspapers, television, billboards, etc.

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What areas do you think need improvement: [Multiple Choice] *

□ Social media (WeChat official accounts, Weibo, Douyin, Xiaohongshu, etc.)

□ Advertising on travel websites and search engines

□ Outdoor advertising, subways, bus stations, etc.

□ Collaboration with airports, hotels, etc., to place billboards and brochures

Depends on (Question: Are you satisfied with the current promotional channels for Pan Tang Village and Liwan Lake Park...) Options 1 and 2

Are you satisfied with the current promotional frequency for Pan Tang Village and Liwan Lake Park? [Single Choice] *

Very dissatisfied ○1 ○2 ○3 ○4 ○5 Very satisfied

What areas do you think need improvement: [Multiple Choice] *

□ Daily updates, social media vlogs, etc.

□ Seasonal sightseeing guides

□ Holiday and special anniversary promotion, dragon boat races, etc.

□ Social hot topics and marketing events

Depends on (Question: Are you satisfied with the current promotional frequency for Pan Tang Village and Liwan Lake Park...) Options 1 and 2

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