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Research on Regeneration of the Historical Area Based on Typology: Taking the Historical Area of Xudi-Gaodi Street in Guangzhou as an Example

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Research on Regeneration of the Historical Area Based on Typology: Taking the Historical Area of Xudi-Gaodi Street in Guangzhou as an Example

A Dissertation Submitted for the Degree of Master

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Abstract

The regeneration of historical areas is an important content in the current urban regeneration. Historical areas have a range of historical characteristics and authentic historical remains. The preservation and use of the historical and cultural heritage of the historical areas of the city is an important task that is worthy of study.

The subject of this study is the Xudi-Gaodi Street area in Yuexiu District, Guangzhou, which is included in the sub-historical and cultural area of the southern section of the traditional central axis of Guangzhou and the cultural core of Beijing Road in Guangzhou. It has a history of over 1,000 years since the Song Dynasty, and continues its traditional commercial function while retaining its traditional appearance of the modern era. However, the buildings in the neighbourhood are dilapidated and mixed in style; unauthorised construction has destroyed the traditional street pattern and architectural texture of the neighbourhood; at the same time, the neighbourhood faces problems of inferior business types, traditional building forms and existing usage modes cannot meet the needs of modern business activities, lack of infrastructure in the neighbourhood and insufficient carrying capacity for public activities. This paper focuses on balancing the relationship between the traditional features and the demands of modern life in the conservation and regeneration of historic areas, and proposes a strategy for renovation and regeneration that is adapted to modern life.

This paper is divided into five main chapters. Chapter 1 presents the problem and introduces the concepts of typology, clarifying the significance of the typological approach to the regeneration of historical areas. Chapter 2 sorts out the theoretical approaches of western typology that are applicable to the regeneration of historical areas, and summarises and clarifies the necessity and feasibility of applying typological theory to historical areas in China; Chapter 3 presents a case study of the application of typology at three different scales: district, plot and architectural typology; Chapter 4 builds on the previous two chapters and establishes the methodology from

two levels: type extraction and type transformation; Chapter 5 takes up the theoretical study and the case study, focusing on Guangzhou.

It tested the theories and explores the practice of design based on the historical dimension, analysed the changes in the policy mechanism of Guangzhou”s old city renovation and the upper planning requirements, and proposed a typological integration with the current problems of the Xudi - Gaodi Street historical area. The typological approach was also used to the design exploration of the regeneration of the Xudi-Gaodi Street historical area.

Key words: Historical Area ; Regeneration ; Typology ; Xudi-Gaodi Street Historical area

摘要

历史地段的更新是当前城市发展建设中的重要内容。历史地段具有一定规模的完善的历史风貌以及真实的历史遗存。合理地保护和利用城市历史地段的历史文化遗产延续和发扬其特色是值得研究的重要的课题。

本文的研究对象是广州市越秀区的许地-高第街街区，包含在广州传统中轴线历史文化街区南段的子历史文化街区和广州市北京路文化核心区的范围内。从宋代发展至今具有 1000 多年的历史，延续传统的商业功能的同时保留了近代的传统风貌。然而，街区内部建筑破败，风格杂糅；违章建设的建筑破坏了街区内部的传统街巷格局与建筑肌理；同时，街区内面临业态低端，旧建筑形式与现有使用模式无法满足现代业态需求，街区内部基础设施缺乏，公共活动承载能力不足的问题。因此平衡历史地段的保护与再生中传统风貌与现代生活需求的关系，提出适应现代生活的改造更新策略是本文研究重点。

本文主要分为五个章节，第一章提出问题并引入类型学的概念，阐明类型学方法对于历史地段再生的意义。第二章梳理适用于历史地段的更新的西方类型学相关理论方法，总结并阐明类型学理论在国内历史地段中运用的必要性与可行性；第三章对实际进行案例分析，分析类型学从街区，地块，建筑类型三种不同尺度的运用；第四章在之前两章的基础上，从类型提取与类型转换两个层面建立方法论；第五章承接理论研究与案例研究，聚焦广州。对前文的理论进行检验与设计探索，从历史维度分析广州旧城改造政策机制的变化以及上位规划要求，并结合现状问题提出类型学与许地-高第街历史地段的结合点。并基于类型学方法对许地-高第街历史地段进行更新设计探索。

本文基于类型学的理论方法，构建了从提取类型到结合现代生活需要的转换更新的研究体系。实践层面完成了许地-高第街历史地段的更新与再生设计探索，理论层面提出了类型学在广州历史地段中进行适应现代生活与业态需求的类型转换与还原方法。

关键词：历史地段 ； 再生 ； 类型学 ； 许地-高第街历史地段

Catalogue

Chapter I Introduction

1.1 Research Origin

1.1.1 Value of Historical Area

The principle of complete protection and restoration of ancient buildings was first established internationally with the Athens Charter of the 1930s. In the process of implementation, the issue of cultural historical buildings protection is diverse and complex, so the second meeting of the International Parliament of Architects and Technicians Engaged in The International Congress of Architects and Technicians of Historical Monuments (ICOM) was held in Venice on May 25, 1964, and the principle of the protection of historical areas was proposed. [1]The scope of conservation area has been expanded from cultural historical buildings to the location of cultural historical buildings for overall protection. In the Venice Charter, promulgated in 1964, the importance of historical areas was raised. The Charter states that "the preservation of the historical buildings means the proper protection of “it`s surrounding environment”. The concept of "heritage buildings " in the document includes not only the building itself, but also the urban and rural environment that can witness a certain civilization, a certain significance of development, or a certain historical event." The historical areas in the Venice Charter refer to the "area around the historical buildings". The Washington Charter, adopted in October 1987, supplemented and revised the concept of historical areas, which extended from the area nearby the monuments to the area where the historical features was preserved and the center of the old town. [2]

From the promulgation of the first batch of historical and cultural cities in 1982 to the publication of the second batch of lists in 1986, the concept of preserving historical

[1] Chen Zhihua. An international charter for the conservation of heritage buildings and historical sites[J]. World Architecture, 1986, (3): 13-14.

[2] Li Chen. The generation, interpretation and analysis of the concept of "historical and cultural district"[J]. Planner, 2011, 27(4): 100-103.

areas was gradually put forward and clarified.[3] According to our current regulation and policy system, historical and cultural heritage can be protected at three levels: historical and cultural city-historical and cultural district-cultural relic protection units. [4]The district level as the second level plays the role of connecting the city with the heritage building. Historical and cultural districts are legal names, which require the city to retain more abundant relics[5], which can reflect the traditional features or local characteristics of a certain historical period more completely and realistically. Historical districts and historical areas are general names. The concept of the historical area has lagger range than the concept of a historical and cultural district

Historical areas retain the formal features and architectural fabric of traditional cities to varying degrees, reflect the characteristics of cities, or accumulate the historical and cultural values at different historical stages; However, for various historical reasons, there are often problems such as lack of infrastructure, architecture dilapidated and low living conditions. [6]In the rapid economic and social development, A large number of historical areas of the original plan layout, the road direction is gradually destroyed and the traditional buildings have been transformed in order to live in a better condition, causing severe damage to the district because they cannot carry the functions of modern urban life for a while. The protection and regeneration of historical areas are of great significance for preserving the characteristics of traditional urban features, perpetuating important historical memory, improving the quality of life in the community and adapting historical district to the needs of modern life.

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[3] Wang Jinghui. The Preservation for the Historic District: Concept and the Method [J]. Urban Planning, 1998, (3): 34-36, 63.

[4] Wang Jinghui. Policy and planning for the conservation of urban historical and cultural heritage[J]. Urban Planning, 2004, (10): 68-73.

[5] [Yue]152013-2/2. Regulations on the protection of historical and cultural cities (Draft for examination) [S]. Guangzhou: Guangzhou Urban Planning and Design Institute / Beijing Qinghua Tongheng Planning and Design Research Institute Ltd,2016

[6] Dong Yinan. Conservation And Regeneration of the Xiaoxihu Historical Area, Nanjing [D]. Southeast University, 2019.

1.1.2 Introduction of Typological Methods

There have been different research methods since ancient times. Typology can be defined as the theory of describing a set of characterized objects with the same formal structure. [7]The specific application of typology is embodied in two stages, one is as a cognitive method, that is, the abstraction stage of the type, the application to the existing type form, The deep structure (such as historical causes of space, behavioral characteristics of residents) is gradually derived from the surface structure (expressive vocabulary such as building color, material, scale, etc. expressive vocabulary) by comparative analysis. Secondly, as a mean of design practice, which is to restore the type, giving new vitality to the type, to reconstruct the fragments left by the historical development, and to "restore" the architectural type to the real " livable world".[8]The deep structure of the type shall be put into the specific context, synthesizing various influencing factors, and the new surface structure is gradually derived until the new form is produced.

Historical areas often have complex business formats, buildings in historical areas have specific functions such as residence and life, traditional architectural features and internal spatial structure have evolved to varying degrees in order to meet actual needs. Therefore, the renewal of the historical area cannot simply restore the buildings in the historical area to the traditional state, but maintain and develop the use function of the district, keep it alive, and adapt the traditional district to the needs of modern city life and function through adaptation and transformation. Historical areas often gather different ages, different types of buildings and structures, and because of the construction activities in the neibourhood, the simultaneous pages with greater richness show a mixed state. In order to improve the people”s livelihood and inject new vitality into the neighborhood, how to coordinate with the real historical relics of the

[7] Wang, Lijun. Architectural typology [M]. Third Edition.Tianjin: Tianjin University Press. 2005

[8] Wang Lijun, Peng Yigang. Constructing with type: typological design methods and the composition of architectural forms[J]. Journal of Architecture, 2001, (8): 42-46.

historical area, it is necessary to extract the deep features of the traditional building and restore the traditional building type to meet the actual demand.

Therefore, by combing the Western typological method, this paper explores the method suitable for the regeneration of the historical area. At the same time, based on the analysis of typological case studys, adapting traditional types to modern life.

1.1.3 Research Object

The object of this paper is the Xudi-Gaodi Street historical area in Yuexiu district, Guangzhou, located at the intersection of the traditional axis of guangzhou"s old city and the Pearl River, including the sub-historical and cultural district of the southern section of the historical and cultural district of guangzhou"s traditional central axis and the cultural core area of Beijing Road in Guangzhou[9]. Xudi-Gaodi Street has a history of more than 1,000 years, since the emergence of Gaodi Street in the Song dynasty, the South City has undergone a process of gradual transformation from outside the city to the inside, until the middle and late Qing Dynasty, the formal pattern of the South City was fixed.[10] In the following one hundred years at the end of the Qing Dynasty and the beginning of the Republic of China, the city of Guangzhou underwent tremendous changes, and the feudal city that developed for more than 1,000 years was rapidly transformed into a modern city. The area where Gaudi Street is located has preserved a large number of historical streets. However, There are many problems with Highland Street. First of all, at the level of spatial form, the internal branches and alleys of the district are narrow, the issues of private construction is serious, the urban fabric is damaged, and the open space is not energetic enough. On the street interface, the image of The Street of Gaudi Street is chaotic and discontinuous, mixing modern style buildings. At the level of business function, the overall format of Gaodi Street

[9] Wu Junda,Zhang Jie. A study on differentiated regeneration strategies based on business models - an example of Guangzhou Gaodi Street historical district[J]. Urban Planning, 2018, 42(9): 79-87.

[10] Zhao Yiyun. The morphological evolution of the Gaodi Street neighbourhood in the southern city of Guangzhou in the late Qing and Republic of China[D]. South China University of Technology, 2012.

dominated by the wholesale market is relatively simple and out of date, and the serious phenomenon of building additons brings many problems such as traffic, fire protection, health, and public security.

1.2 Review of Relevant Studies

1.2.1 Related Research on Typology

1）Foreign Studies

The study of modern architectural typology has a long history. The first to transpose typology to architecture was the ancient Roman architect Vitruvius. And from the 15th and 16th centuries typology went through "archetypal typology", "paradigmatic typology", and developed into "third typology". The architecture of contemporary Western architectural typology consists of two main parts: the new rationalist architectural typology that looks for "archetypes" in history; and the new regionalist architectural typology that looks for "archetypes" in the region.

Vitruvius separated six elements from architecture, and proposed that architecture is "an imitation of the truth of nature", and attributed imitation to human nature and behavior, believing that analogy or comparison is an inevitable method after the transplantation of imitation theory in architecture. The theory of architectural typology was initially not a design operation, but a way of knowing and thinking.

（1）Archetype Typology

The germination of architectural typology can be traced back to the ideal city model of the Italian Renaissance architects of the 15th and 16th centuries, and to the classification and summary of the architectural elements, the Palladian architectural paradigm, and the roads and bridges, as well as the Rome he examined, by the Italian architect Andrea Palladio in his four books on architecture. The concept of typology became clear during the French Enlightenment.

Wiedler summarized the architectural concepts of 1750-1830 and proposed the concept of first typology in 1976. According to Vidler, the architects of the

Enlightenment sought to recognize the abstract principles, or types, of art forms by seeking the origins of architecture, namely the Rational Order of Nature or "Abstract Nature. [11] Abbe Laugier, following in the footsteps of Vitruvius, argued that architecture had its origins in the primitive hut, implying geometric laws as an architectural principle; the "purely formal" design schemes of the French Enlightenment architects Claude-Nicolas Ledoux and Jenne-Louis Boullee also had a distinctly formal character. The "purely formal" design schemes of the French enlightenment architects Claude-Nicolas Ledoux and Jenne-Louis Boullee also had a clear "typological" idea. In the early 19th century, the de Quincey school established a more complete theory and design system on typology, and he pointed out the "definition of type" by distinguishing the concept of "type" and "model". "He considered type as the "origin".

(2) Paradinging Typology

After the second industrial revolution in the 19th century, a large number of products began to be mechanized and standardized[12], and architecture was also inevitably included in this category for reform, at this time, architects represented by Corbusier Lie and Westerlaus were influenced by the social environment and began to think about the theory of architectural typology in a new way. "Type" began to develop into "paradigm". By the beginning of the 20th century, the core ideas of architectural typology theory were "people, housing, efficiency" and "materials, machines, efficiency" advocated in the context of the era, which can be seen that the focus of this era was on efficiency", which is also the main characteristic of architectural typology under modernism and a vision of the times.

（3）The Third Typology

[11] Guo, Pengyu, Ding, Wowo. Towards a Synthetic Typology:The Comparison between the Third Typology and Typomorphology [J]. The Architect, 2017, (1): 36-44.

[12] Zhang Pan. Type and Typology of Italian School——From Muratori to Aldo Rossi[J]. Architecture and Culture, 2020, (4): 168-169.

The typological "paradigm" formed under the development of modernism theory devalued the architectural forms and the historical factors contained in them, so after World War II typological thought took critical thinking as the core, forming the third typology represented by the new rationalism, and thus the contemporary typology began to gradually form and improve. Aldo Rossi believes that the elements of architectural forms and styles, the organization of urban structures, urban history and culture, and the way of life of people should be considered in the process of typological research, and the typological theory should be flexibly applied in the design process; Rob Krier discussed urban morphology and spatial types through the typological approach, trying to reconstruct the public sphere of the city, and looking for the types of urban space from historical types. Saverio Muratori, Gianfranco Caniggia, on the other hand, uses typo-morphology as an analytical tool for understanding urban growth and expansion, maintaining the continuity of the house with the "dominant type" to harmonise the old and new buildings with the urban fabric. Establishing a methodology from reading to design. [13]The third typology emphasizes the continuity of urban form and history, treating the city as a place where elements are assembled and the root of the emergence of new forms.

-	Time	Representatives	Publications	Main points
Typological theory before the modern architectural movement	Late 1st century B.C.	Vitruvius	《De architectura》	Architecture is the truth of imitating nature；Analogy or comparison is an inevitable method after the theory of architectural transplantation imitation
	16th century	Andrea Palladio	《I Quattro Libri dell”Architettura》	Discovering architectural patterns and systematization principles from classical cases
	18th	Abbe Laugier	《Essai sur	Architecture originated from

[13] Chen Jintang, Yao Sheng, Tian Yinsheng. The Theory and Localization About Typo-morphological Approach [J]. International Urban Planning, 2017, 32(2): 57-64.

	century		L”architecture》	thatched huts, everything exists out of necessity, such as the most basic structural skeleton of the building is the beauty, the rest of the complex decoration is superfluous, the harmony of beauty exists in the most basic pattern
		Claude-Nicolas Ledoux and Jenne-Louis Boullee	-	In-depth study of the characteristics of classical architecture and the search for old standard types of architecture from classical architecture, they tried to recover the symbolic nature of architecture.
	Early 19th century	De Quincey	《Encyclopedia of Architecture》	The distinction between the concepts of "type" and "model" points to the "definition of type", which he considers to be the "origin".
Paradigm Typology	Late 19th - early 20th centuries	Le Corbusier	-	The evolution of "types" (including) models into paradigms, reflecting the need for mass production, treating the production of new types as the central subject, and people as the root of new types
The third typology	The late 1960s	Saverio Muratori	《An Actionable Study of the Urban History of Venice》，《An Actionable Study of the Urban History of Rome》	Typology informs the work of architects, viewing type as a formal structure that reflects the inherent continuity of cities of different sizes; type is primarily used as an analytical tool
		（Gianfranco Caniggia）	《Interpreting Basic	Proposes basic tools for formal typology analysis; divides cities according to

			Architecture》	four hierarchical scales; classifies various urban structures into basic classes
		Aldorossi	《Urban Architecture》	The concept of typology is expanded to include elements of style and form, urban organization and structure, urban history and culture, and human lifestyles. The idea of "similarity city" and analogy design
		Rob Krier	(Urban Space, 1975）, (Architectural Composition, 1988)	Discussing urban morphology and spatial typology through a typological approach, trying to reconstruct the public sphere of the city and looking for typologies of urban space from historical examples

Table 1-1 Overview of foreign typology development

（Source: Made by the author）

2）Domestic Research

Regarding the study of typology, China started in the late 1980s, and scholars introduced architectural typology by focusing on how to reflect the transmission of cultural phenomena in urban design, and how to maintain the continuity of the culture and the pending signs. Wei Chunyu explained the concept, characteristics, research focus and the process of using typology in design in his study of architectural typology, and proposed the concepts of "formal type" and "functional type"[14], and analyzed the typological approach to analyze urban public space and deal with architectural clusters.

[14] Wei Chunyu. A study of architectural typology [J]. Architecture in Central China, 1990, (2): 81-96.

Shen Kening proposed "meta-design" and "object design" [15]in Typological design. In his book "Architectural Typology and Urban Morphology" he argues that architectural typology and urban morphology are interrelated and dialectically unified. Typology discusses the regularity of architectural entities and spatial forms, while morphology studies the co-temporal relationship of various types in a specific socio-cultural and material and physical environment, especially in the city, so that typology and morphology are mutually exclusive. [16], Through the interpretation of foreign scholars" theories. There are also some related literature published by some famous scholars and professors, giving their own research views and opinions on typology. Ma Qingyun, in his article "The Concept of Type and Architectural Typology"[17], has elaborated on the concept of typology and the research methods, and he has also made his own understanding and expressions on the application and interpretation of typological theories by architects in different periods, which has provided a lot of basic information for the research on Chinese typology. Zhu Pei"s articles on "Neo-Rationalism and Post-Modernist Architectural Thought" and "Typology and Aldo Rossi" focus on the typological study of Neo-Rationalism. Through his comparative analysis, he briefly introduces the typological ideas of Raphael Moneo, while explaining in relative detail the architectural ideas and actual works of the Italian architect-theorist Aldo Rossi. Han Dongqing"s study of typological maps explains the role and value of Muratori"s typological maps in the study of urban texture and urban development, etc. There are also many students from various universities in China who have done research on the theory and application of typology. For example, Sheng Ye from Tongji University in his article "The Research and Application on Typology in the Historical District Renewal"discussed and analyzed some cases of historical district renewal in China

[15] Shen, Kening Typology in design [J]. World Architecture, 1991, (2): 65-69.

[16] Shen Kening. Architectural typology and urban morphology [M]. Beijing: China Construction Industry Press. 2010

[17] Ma Qingyun. The concept of type and architectural typology [J]. The Architect, 1990, 38: 14.

from the perspective of typology. and proposed analogies, interpretations and deductions of historical districts.[18] Dong Yinan from Southeast University in his PhD thesis " The Typo-morphology Approach to the Conservation and Regeneration of the Xiaoxihu Historical Area, Nanjing" proposed the typological approach to the hierarchical study of historical areas and the application in practical projects. Chao Yibo of Xi”an University of Architecture and Technology Research on the public open space of Shun chengxiang in Xi”an based on Krier`s typology theory.[19]

1.2.2 Related Research on Historical Area in China

For the conceptual analysis and development of historical areas, Wang Jinghui in “ The Preservation for the Historic District: Concept and the Method “ introduces in detail the evolution of the international concept of historical areas and clarifies the principles and methods of conservation of historical areas in China. Li Zhen in “A Review of the Research on Historic Conservation Protection in China” summarised the five levels of research on historical and cultural districts since the 1980s. Li Chen, in “ The generation, interpretation and analysis of the concept of "historical and cultural district “, analysed the development of the concepts of historical and cultural districts and historical areas and identified the similarities and differences in the nature of the concepts and the objects they refer to; Zhang Jie, in “ Study on Connotation and Delineating of Protection Areas of “ Historic distrcts”, Zhang Jie identifies the emergence, development, links and connotations of the concepts of historical areas and historical and cultural districts. [20]

The second is an introduction to the principles of historical area conservation. Ruan Yisan in “ The Study on Some Issues Related to the Conservation and Planning for the Historic Streets and Areas in China “, summarised cases of successful renovation and conservation of historical

[18] Sheng Ye. The Research and Application on Typology in the Historical District Renewal [D]. Tongji University, 2008.

[19] Chao Yibo. Research on the public open space of Shun chengxiang in Xi'an guided by typology theory [D]. Xi'an University of Architecture and Technology, 2018.

[20] Li Chen. The generation, interpretation and analysis of the concept of "historical and cultural district [J]. Planner, 2011, 27(4): 100-103.

districts in China. He summarised the experience and mistakes of the regeneration of historical districts, pointed out the problems of the protection of the appearance of historical districts and the renewal of architectural protection, and proposed the criteria of historical integrity, living integrity and appearance integrity to determine the scale of the scope of protection of historical districts. In 1987, Zhu Zixuan"s publication "Planning for the Conservation and Renewal of the Historic Areas of Tunxi Old Street" was the first to adopt a four-level approach to the conservation of Tunxi Old Street by dividing it into a core conservation zone, an environmental impact zone, an architectural control zone and a landscape coordination zone, and later in 1996 the "Planning for the Conservation and Improvement of Tunxi Old Street" simplified the scope of protection of the Old Street into three levels: a core conservation zone, an architectural control zone and a landscape coordination zone. [21]

Finally, in terms of specific methodological approaches, many scholars in China have explored the application of typological methods to the conservation of historic areas, for example, Zhu Ying used typological methods to carry out conservation urban design for the Dajing Lane Traditional Street Cluster Reserve in Hangzhou； Many scholars in China have also conducted research on the property rights system in the historical area. Dong Yinan, Han Dongqing and other researchers have studied the property rights structure and the specific use of historical areas through the method of typological maps, using typo-morphology as a means to study and guide the design; Community participation has also attracted the attention of many scholars, such as Zheng Lijun and Yang Changming"s "Public Participation in the Dynamic Conservation of Historic Districts"; In addition, with the continuous improvement of science and technology, some scholars have also applied many new technological tools to the conservation planning of historic and cultural districts in recent years. For example, Yang Qiancong and Zou Shan have applied digital survey technology to the conservation and renovation of historic areas, and have proposed new digital survey

[21] Zhu Zixuan. Protection and improvement planning of Tunxi Old Street [J]. Journal of Architecture, 1996, (9): 10-14.

tools and methods for the field of architecture. Pang Qiancong and other scholars introduced the technology of laser remote sensing and elaborated on the application of laser data-based reconstruction and conservation of historic districts. Hu Mingxing and Dong Wei in “Study on the application of Gis technology in conservation planning of historic districts” researched Gis using in historical districts.

1.3 Concept Definition

Historical and cultural districts: The city is rich in preserved relics, which can reflect the traditional features or local characteristics of a certain historical period in a relatively complete and authentic manner. There are many cultural relics, modern historical sites and historical buildings, and areas of a certain size. Historical and cultural districts is a legal name.

Historical areas: Historical areas are internationally versatile and can cover different geographical areas within the country, different relics and areas of different levels of protection involving material and intangible cultural relics. It is an illegitimate concept as opposed to historical and cultural districts.

Architectural typology: Typology is a category formed by the common characteristics of objects, a general pattern and law of a class of things, typical of them. The theory of architectural typology emphasises collective memory, archetypes and the transformation and deduction of archetypes, whereby types can be interpreted by means of new construction methods to form new types with a historical homology. Applied to traditional architecture, it is a comprehensive analysis of the building, extracting the deeper structure of the building and exploring the cultural significance of the region in traditional architectures

1.4 Research Objectives, Significance and Basic Principles

1.4.1 Research Objectives

On the dimension of western typology as a city-architecture connecting bridge, this

paper compares the theoretical methods of western typology, analyzes the application of typology at China and abroad, and proposes specific methods of typology extraction-typological transformation-localizing regeneration in Chinese historical areas. It further explores the localization of typology; at the same time, it explores the methods and possibilities of type interpretation while preserving the historical appearance and meeting the needs of modern life.

1.4.2 Research Significance

(1) Theoretical significance

The localization of typology must be combined with a large number of studies on Chinese urban pattern and architectural types, and it is necessary to extend the theory of typology, propose specific methods of the analysis and typological regeneration in domestic historical areas. And at the same time, propose specific methods of the typological renewal of historical areas to adapt to modern life.

(2) Practical significance

This paper studied from different scales on Gaodi Street in Guangzhou, and through the analysis of the spatial structure and architectural typology within the historical area of Xudi-Gaodi Street, proposed a conservation and regeneration strategy that adapts to the development of business and living needs; and through the form of guidelines, guiding the regeneration of the historical area. And proposed different typology deductions ,offering bottom-up possibilities. Proposed typological approach to the regeneration of historical areas that adapts to the needs of new life and businesses.

1.4.3 Research Framework and Content

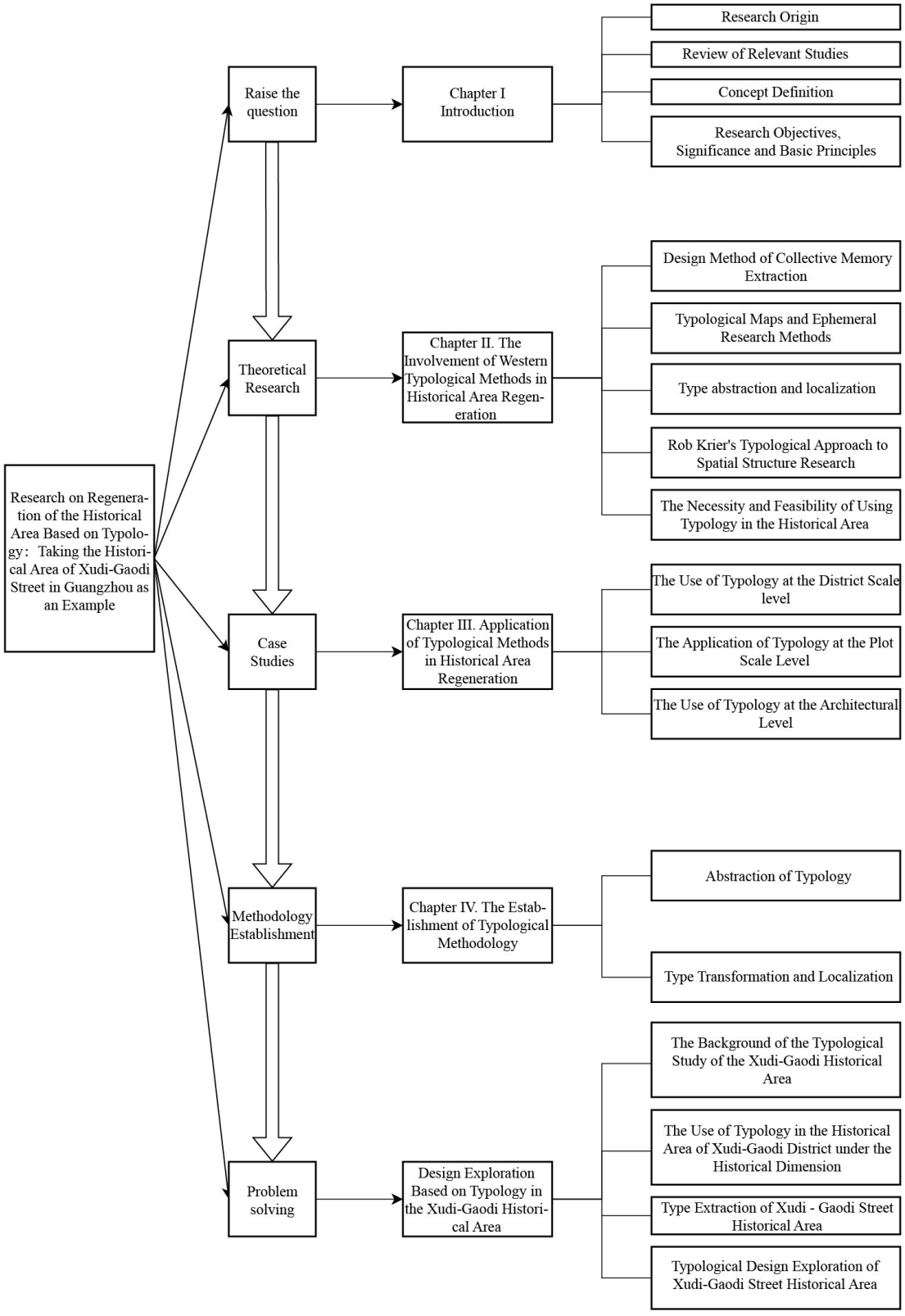

Figure 1-1 Framework and content

（Source:Made by the author）

1.4.4 Research Methodology

(1) Document Research:

Through the study of historical archives and documents of Xudi-Gaodi street historical area, sort out the historical and cultural background of this study, and analyze the social development and spatial structure and fabric change of Xudi-Gaodi street historical area in various historical periods. On the other hand, to compile and study the current research status and the achieved research results of domestic and foreign architectural typology theories as an important theoretical support for this study.

(2) Case Study:

The interpretation of the construction background, renewal mode and supporting policies of relevant domestic and foreign cases will provide reference value for the Xudi - Gaodi Street historical area.

(3) Field Research:

Before the design practice, research and problems of the current situation of Gaodi Street are organized and summarized, combined with the theoretical methods of landscape ecology and urban design, and the distribution and characteristics of natural space and human landscape space are recorded, so that the development direction and constraints of the design object can be sorted out. In the process of design practice, additional research will be conducted on the insufficient and ambiguous contents of the preliminary research.

(4) Typology Practice Research:

Typology has a systematic approach to research. This paper analyses historical areas from an ephemeral perspective through theoretical approaches related to western typology, combined with the application of typological methods in practical cases.

Chapter II The Involvement of Western Typological Methods in Historical Area Regeneration

2.1 Design Method of Collective Memory Extraction

Aldorossi is the leader of the neo-rationalist architectural practice movement and one of the founders of neo-rationalism. His theory is derived from an examination of architectural and urban issues. His theory can be summarized in two main ideas: first, the typology of rationalism and historicalism, and second, the idea of "analogical design". The second is the idea of "analogical design", which focuses on extracting typologies from history, and evoking memory in city.[22]

In Rossi”s theory of the analogous city, the term "collective memory" is used exclusively to describe the state of memory of human urban life. Rossi attempts to evoke the idea of eternal use through the simplicity of the forms of urban artifacts. Rossi believes that the city as the seat of collective memory, the place where the group and the individual are intertwined"[23], Rossi's typological theory treats the city as a place where elements are assembled and the root of the emergence of new forms. The city itself is a class, the terminal form of a hierarchy of architectural types. As part of the organic whole of the city, any architectural creation should not be separated from its group, the city, but should be integrated with the existing historical spatial forms of the city. Simplification is the basic means to get the type, so the type is different from any historical form of architecture, but has a historical element, an essence associated with history. Rossi believes that a work is successful if it can shake the psychological structure of people who have accumulated history and evoke a deep impression of the archetype. Taking history as the starting point of his theory and practice.

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[22] Zhu Pei. Typology and Aldo Rossi [J]. Journal of Architecture, 1992, (5): 32-38.

[23] Aldo Rossi. Urban architecture [M]. Translated by Huang Yijun. Beijing: China Construction Industry Press. 2006: 42-43

2.2 Typological Maps and Ephemeral Research Methods

The Italian typo-morphology, represented by Muratori and Caniglia, played an important role in the post-war reconstruction of Italy in the 1950s and 1960s, inheriting the idea of 18th century building typology and using historical sources and field research to measure in detail and draw complete ground floor plans of buildings in the traditional town centres of Venice, Rome and Como. The drawings clearly represent the Italian cities and buildings built mainly of masonry: the double line represents the heavy walls, broken at the window and door openings; the dotted line with the “x” symbol indicates the courtyard, distinguishing it from the interior spaces(Figure 2-1). This mapping-based ground floor plan was named the “typological map”. They also produced a conjectural typology map, based on archaeological maps and documentary sources, to explain the evolution of historical urban form and building types through a comparative study of drawings from different periods. It also explores how the essential characteristics of the existing typology can be continued in new designs, passing on the history and adapting to new needs. And Caniggia draws out the synchronic variations and diachronic variations of the dominant architectural typologies through his study of different cities. This school aims to explain how urban structure and form is formed and developed, and to provide a basis for identifying the types of buildings to be protected and developed in the future and the urban form they constitute. At a methodological level, the typological map is an interpretive study that does not require absolute precision in drawing, but is more concerned with spatial relationships; in practice, the typological map serves as a bridge between the past and the future, between cognition and design.[24]

[24] Dong Yinan, Han Dongqing, Yang Shen, et al. The Making and Application of Typological Map Adaptive to Conservation and Regeneration of Historical Districts in China——A Case Study of the Xiaoxihu Area in Nanjing[J]. Journal of Architecture, 2019, (2): 81-87.

Figure 2-1 Typological maps of Muratori and Caniggia
（Source: Reference [16]）

2.3 Type Abstraction and Localization

New Rationalist Architect Rafael Moneo critically inherited the understanding of type and typology from his predecessors. Moneo argues that type is not just a diagram with a geometric meaning, but should explore more about human behavior, that type is a medium for transmitting historical and cultural information, and that the fundamental point of type is the care for people. He believes that type is not an unchanging and inflexible mechanism, but changing and transforming, and opposes the arbitrary dismemberment and arbitrary use of type that carries historical information and human lifestyles. According to Moneo, the content of the development and evolution of type can be understood on two levels. The first level is the transformation of type itself in response to actual and external conditions, and the second level is the abstraction of type and the making of a localized representation of type. [25]

（1）Abstraction of types

According to Moneo, type is between reality and abstract geometry, type as an inner formal structure, the geometry of reality is the " reason " and the geometry of abstraction is the " result ". [26]His abstraction of type is on the one hand a geometric abstraction, and on the other hand an abstraction of the characteristics of type in

[25] Wang Lijun, Liu Zhenyao. Humanities, Place, and Memory: tudy on the Architecture Typology Theory and Practice of Rafael Moneo [J]. The Architect, 2017, (2): 68-76.

[26] Rafael Moneo. On Typology[J]. Oppositions, 1978(13).

relation to culture and lifestyle. [27] For example, in the design of the National Museum of Roman Art, he chose to extract the Basilica multi-column and longitudinal flow patterns for the exhibition rooms in order to evoke the memory of Rome; he extracted the light features through the Roman arches and the top of the Pantheon for the Roman Art Museum. The top lighting pattern and the Basilica planar pattern are an abstraction of the type, abstracting the deep characteristics of the type in terms of function and practical use(Figure 2-2).

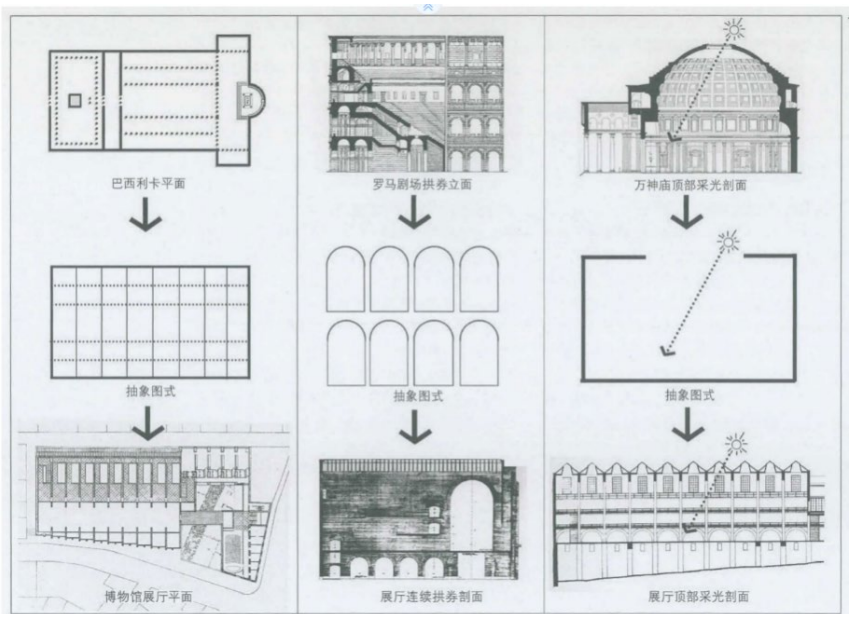


Figure 2-2 Moneo's extraction and transformation of types
（Source: Reference [17]）

（2）Localization of Types

Unlike Rossi's obsession with geometric representation, Moneo's concept of architectural typologies embodies the idea of a more flexible typological transformation. The process of localization changes the typology, bringing the abstract type into the specific environment and responding appropriately to the site. [28]For example, in the design of the National Museum of Roman Art, in order to meet the needs of the exhibition and to fit the top lighting of the museum, Moneo transformed the single

[27] Wang Lijun. A Study on the Generalized Architectural Typology [D]. Tianjin University. 2002

[28] Wu Fang. An analysis of Rafael Moneo's typological ideas[J]. The Architect, 2004, (1): 54-61.

opening of the Pantheon, the prototype of the building, into a light system with multiple continuous light openings; in the aspect of the relationship between the city and the building, in the design of the Gronio City Hall, Moneo changed the traditional axis-symmetrical typology of the city hall in order to allow the public to enter the building. The design of the building is integrated into an incomplete shape and opens up to the city. In the National Museum of Rome, the typology evolves quantitatively in response to the exhibition building, while in the Gronio City Hall, the relationship between the typology and the environment is transformed in response to the need to express publicness and accessibility, so that the typological character is transformed.

Moneo's typological approach brings the abstracted archetypal characteristics to the practical space, and the design adapts the localization to meet the practical use of the building, while maintaining a good connection between the building and the urban environment.

2.4 Rob Krier's Typological Approach to Spatial Structure Research

There are also two very important neo-rationalist typologists, Luxembourg architects Rob Krier and Leon Rob Krier. Among them, Rob Krier is dedicated to the study of urban spatial structure, and he also attaches great importance to the preservation of historical culture. After studying numerous European streets and urban plaza, Rob Krier analyzes urban spaces from four aspects: planar type, sectional type, interface type, and spatial combination.

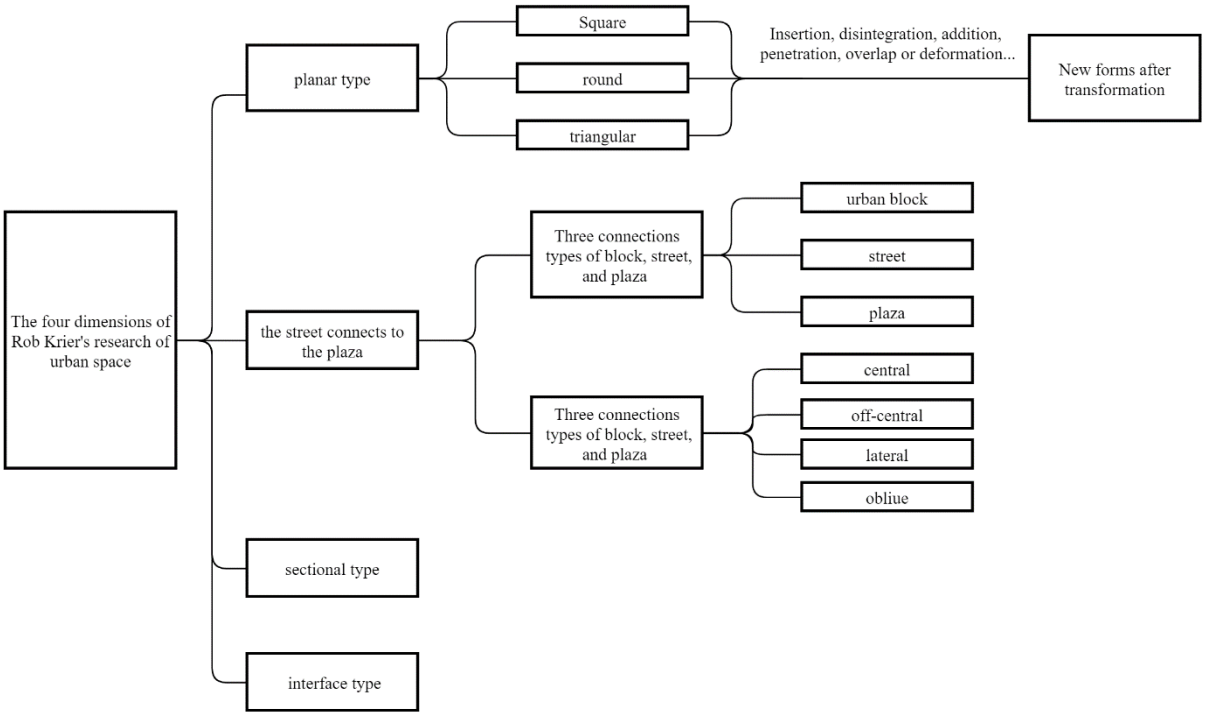


Figure 2-3 Rob Krier 's research dimensions on urban space
（Source: Made by the author）

Rob Krier believes that the study of section and elevation types should be focused on the vertical dimension, and summarizes the section types and elevation types from a large number of examples. He argues that the form of the building's section affects the quality of urban space, and that various new types can be derived from the large number of variations in the building's sections. In his book Urban Space, Rob Krier analyzed and summarized the form of the urban space profile. In the book, Rob Krier lists 24 types of urban space interface profiles, such as those with traditional sloping roof slopes, flat roof profiles and so on.

Rob Krier further analyzed and summarized the types of interfaces in urban space after the sections. He argues that the interface of urban space is also important for the quality of urban space. Among the elevation types, he classifies urban interfaces into different types through the relationship between windows（or openings in elevation） and solid walls.(Figure 2-4)

Krier's typology method has a general character to accommodate flexibility and change

in the city. And try to establish a precise form to the continuity of urban space and architecture.[29]

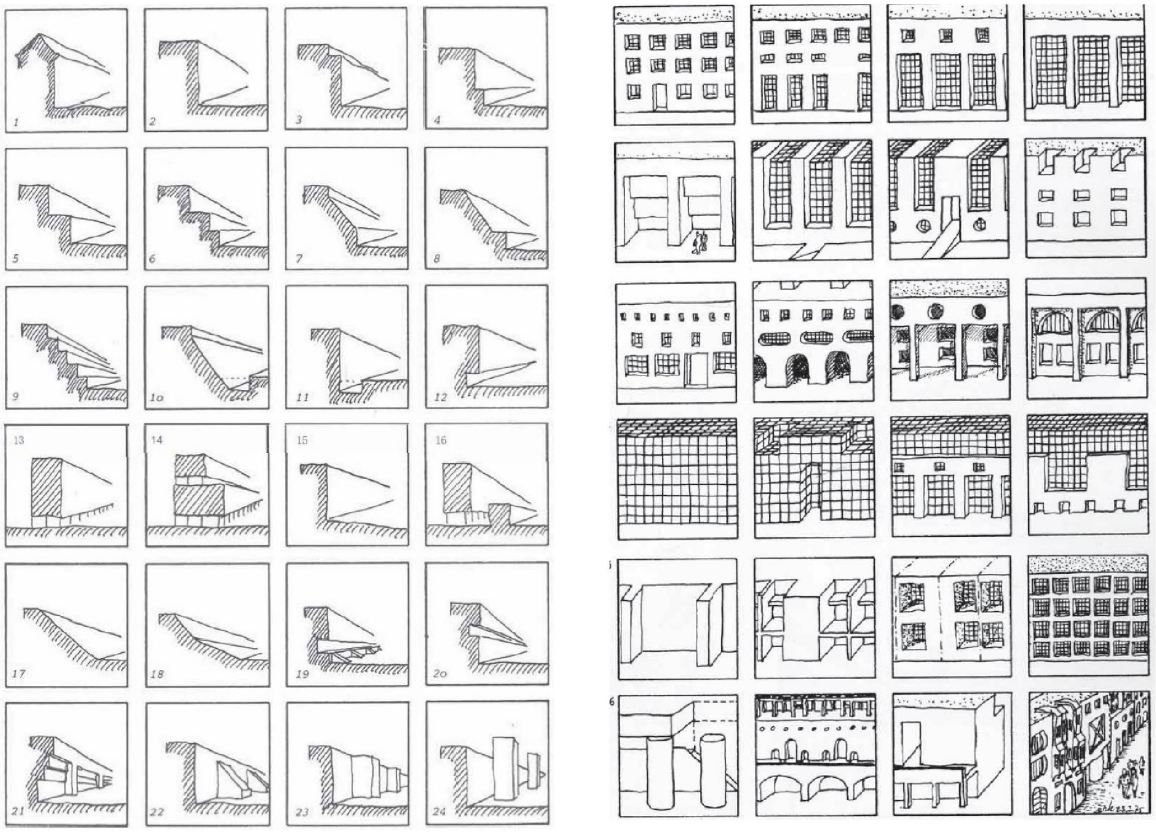


Figure 2-4 Rob Krier 's urban facade and section types analysis

（Source: Reference [48]）

2.5 The Necessity and Feasibility of Using Typology in the Historical Area

（1）Evoking historical memory

A historical building typology, with its specific forms and structures, embodies the rich cultural, artistic and emotional values of a period. The typological approach to the extraction of collective memory and its conversion to form is of great importance to historical areas. Moneo, by extracting intentions from history and reducing them to design practice, makes the abstracted typology to adapt to the needs of place and

[29] Cai Yongjie. From Building Typologies to Space Typologies: Urban Space as the Carrier of History Inheritance [J]. Architectural Heritage, 2020, (3): 1-9.

design practice, while Rossi's analogous design from urban artifacts and geometric images provides a typology that can be interpreted across the original carrier of historical areas.

（2）Regeneration of spatial structure

The street space of a historical district can be recognizing and remodeling through a typological approach. At the cognitive level, Rob Krier's typological approach provides insight into the street and alley system of the historical district, and the Rob Krier's approach of cognizing the block by recognizing the connection of street plazas and the relationship between plan, interface and section is more feasible for recognizing the historical areas. The street corresponds to the street and alley in historical areas, and the plaza corresponds to the traditional courtyard space and other open spaces. The street and alley forms are sorted out. In terms of the regeneration of open spaces, the typological map study can explain how the urban structure and form were formed and developed, the " permanent quantity" (the original typological structure) and the " variable quantity" (the usage and lifestyle accumulated over centuries) of the buildings in the urban development, and determine the historical time. In this way, we can identify the historical attachments that provide a strong basis for design. [30]In the specific restoration of traditional spatial types, the possibility of localization of the original street space is not only the interpretation and return of the traditional street pattern, scale, organization mode and materials; it can also realize the living inclination of the original typological characteristics through open space forming, street interface design and facility configuration. It is also possible to give the ability to accommodating multiple functions to the place-based type features. At the same time, new contents such as cultural display can be given to the historical location within the street space.

In terms of interface research, Rob Krier's type extraction method of classifying street

[30] Xie Shuyi, Giuseppe Bertrando Bonfantini. The Evolvement and Inspiration of Italian Typology-and-morphology-led Planning Techniques [J]. New Architecture, 2020, (1): 143-147.

and alley buildings based on their window openings is also applicable to historical areas. In the process of type interpretation, the virtual-real relationship of these interfaces can be abstracted at the formal level, and the compositional relationship can be preserved, while the interface form can be interpreted according to the actual needs of type function transformation in the process of type interpretation.

（3）The combination of current fabric and traditional fabric

The fabric of historical areas often has realistic use needs and internal reasons, therefore, in the regeneration of historical areas, the type can be integrated with the existing architectural style and modern functions.

（4）Building type localization and combined with modern living

Architectural typology is not only a form, but also has its internal characteristics of use. The operability of the historical areas in relation to the historical and cultural districts provides the possibility of adapting the typology to new forms and new functions. The process of extracting-abstracting-reverting in typology provides the possibility to regenerate the place of the historical areas to adapt to the modern life and practical use.

2.6 Summary

This chapter analyses the typological practice of representative designers at the urban level. The two design stages of typological design, the extraction of typology and the transformation and localization of typology, have been adopted in different ways that have practical implications for historical areas. Based on this, presented the necessity and feasibility of the use of typology in historical areas.

Rossi looks for archetypes in history and collective memory and extracts abstract geometric figures for use in design; Muratori and Caniggia's Typo-morphological approach is important for understanding the actual use and structure of life in historical areas by studying urban morphological changes through ground floor plan and

ephemerality and using it as a design tool. In contrast to Rossi, Moneo extracts types at the level of spatial use and geometrical patterns, and translates the types into locations rather than simply collaging them; the Rob Krier's approach to the structure of urban space makes an important contribution to the study of the urban interface and the urban section, but attempts to establish invariant rules are somewhat limited.

The typological approach to the use of historical sites is not only focused on recognising the deeper characteristics of the site and the process of change, but also on regeneration, a design approach that combines place and history in a relevant manner.

Chapter III Application of Typological Methods in Historical Area Regeneration

3.1 The Use of Typology at the District Scale level

3.1.1 Succession and Restoration-Chengdu Wide Lanes and Narrow Lanes Regeneration

Wide lanes and narrow lanes is located in the centre of Chengdu, and belongs to the Qingyang District. The area extends from Zhiji Shi Street in the north, to Jinhe Street in the south, to Changshun Street in the east and to Tongren Road in the west[31]. In 1646, the whole city was destroyed by war, and the existing traditional buildings were basically built during the Qing Dynasty, preserving the city pattern of "two rivers surrounded by three cities" for a thousand years. Within the district there are three traditional streets: wide lane, narrow lane and Jing lane(Figure3-1). After the liberation of the city, a large number of residents entered the city, and the residential compounds gradually became miscellaneous compounds, with the population increasing and the houses being overwhelmed. [32]The main problems of wide lanes and narrow lanes in Chengdu are：

（1）Narrow streets and alleys with illegal additioned buildings

（2）Outdated infrastructures including lack of necessary fire-fighting facilities

（3）Traditional architectural features destroyed by demolition and erection

[31] Yan Jingyue. Strategies and Methods for the Vitality Regeneration of Historical Streets Take the Shilichangjie Street in Wuhu as an Example [D]. Southeast University, 2018.

[32] Liu Boying, Huang Jing. Conservation strategies for the Wide lanes Historical and Cultural Reserve in Chengdu[J]. Journal of Architecture, 2010, (2): 44-49.

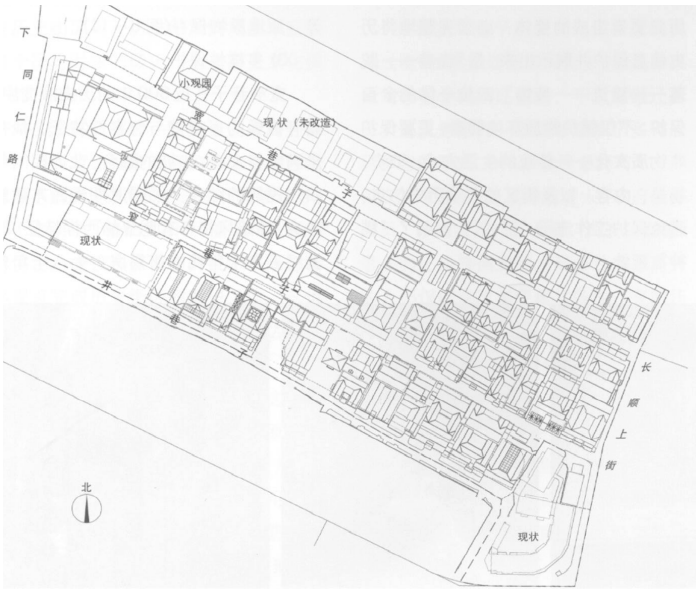


Figure 3-1 Master plan
（Source: Reference [22]）

The Chengdu government has decided on a strategy of restoration as old, adopting the principle of integral conservation. The designers have conserved the district as a whole in four levels: street - courtyard - building - decoration. The three traditional streets of the wide lane, narrow lane and Jing lane are preserved entirely; The traditional courtyards are protected to the greatest possible extent, and the damaged courtyards are rehabilitated and restored so that the whole district maintains the courtyard form of the late Qing and early Ming dynasty. The following regeneration strategies have been undertaken：

(1) Maintaining the scale and pattern of the wide and narrow alleys.

(2) The regeneration and restoration of damaged courtyards, sorting out the original cluttered spaces and creating a complete system of courtyard spaces

(3) Restoration of traditional timber-framed dwellings

(4) Redesigning building types that are no longer of conservation value or for which no historical information can be found. The building is designed to retain its original residential function and to introduce commercial, restaurant, hotel, exhibition and performance functions. The new structure and new materials such as steel, glass and metal panels are used to highlight the characteristics of the era.

（5）Adopting the principles of small-scale progressive regeneration, resident participation and dynamic conservation. Businesses are allowed to deduce the traditional building types based on the needs of their functional businesses, the conditions of each compound, and their own artistic tastes and preferences, while retaining their originality. The traditional types are interpreted so that the traditional and modern features are in harmony with each other. [33]

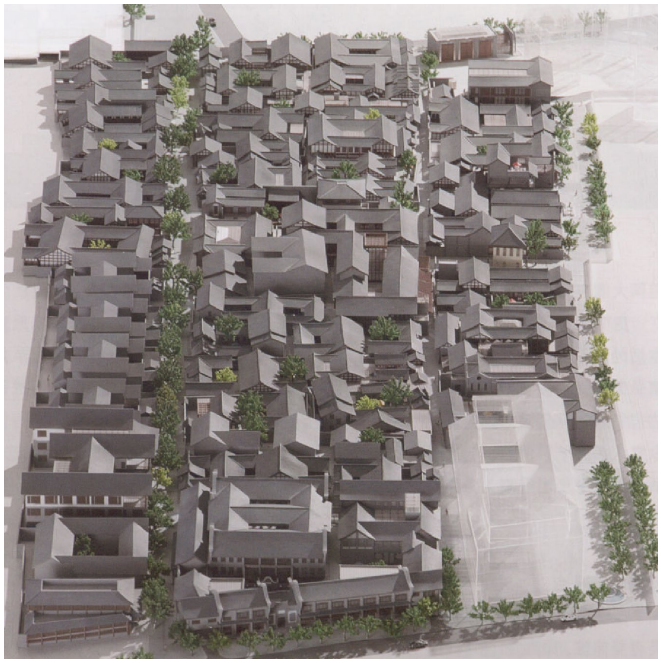


Figure 3-2 Overall model after regeneration

（Source: Reference [23]）

3.1.2 Deduction-Shanghai Xintiandi Historical District Regeneration

The Shanghai Xintiandi regeneration project is located in Taipingqiao, Luwan Dibordered by Huangbre South Road to the east, Zizhong Road to the south and Madang Road to the west. Before the regeneration project in the 1990s, Taipingqiao had a shortage of living space per capita, mixed living conditions, and a serious lack of public services and facilities.[34]The goal of the "Xintiandi" historical district renewal

[33] Huang Yi. The application of architectural typology in the renovation of old cities: an example of the Kuanzhai Alley renovation project in Chengdu[J]. Sichuan Architecture, 2012, 32(6): 41-43.

[34] Luo Xiaowei. Shanghai Xintiandi Plaza: A model for the transformation of old cities[J]. Times Architecture, 2001, (4): 24-29.

is to create an international leisure, cultural and entertainment center with dining, shopping and entertainment functions.

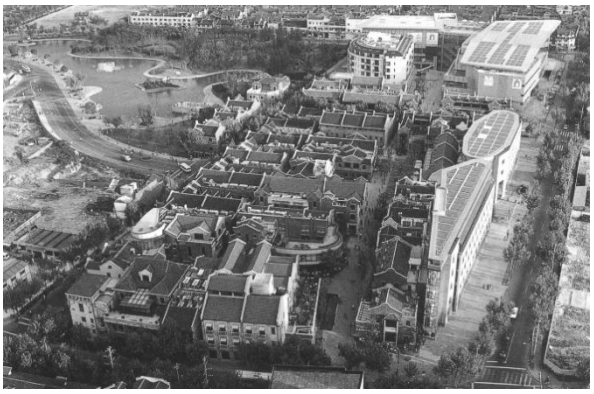


Figure 3-3 Traditional Shanghai Linong
（Source: Reference[23]）

The lane is a traditional neighborhood type in Shanghai, but the street form of lane has more problems for carrying public activities such as dining, entertainment, and office space. The main problems are:

(1) Lack of centrality

(2) Complex district structure with varying accessibility

(3) Poor identification of the area, difficult to find the way

(4) Old building forms and new functions contradict each other

In order to resolve the many contradictions within and outside the site and between the old and the new, the new placement requires a clear organization and coordination in order to seek a balance between the many contradictions.[35] This case study extracts the original spatial typology of the district and reconstructs the original spatial topology of the street in the district(a building lane- a main lane - a street), and transform the original typology in order to satisfy the new function of this area. The main strategies include(Figure 3-4):

[35] Zhou Xiang, Kubota Aya. Mediation, Transposition, Preservation, Reposition and Juxtaposition: The Impact of Rebuilding Shanghai Shikumen Lane Neighborhoods' Public Consumption Space on Community Space [J]. New Architecture, 2018, (1): 109-113.

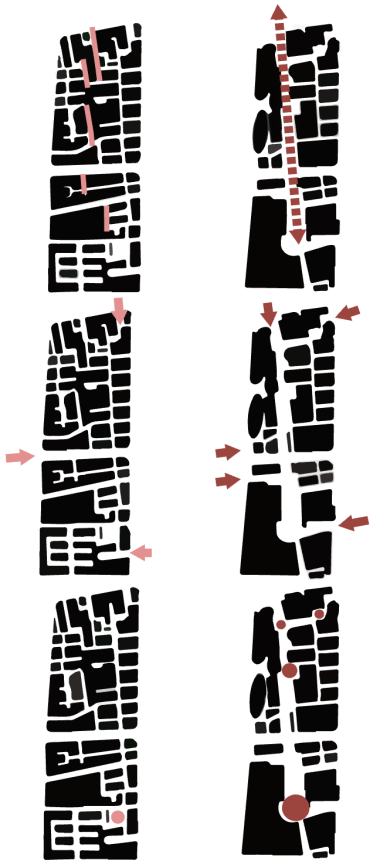


Figure 3-4 Renovated program
（Source: Made by the author）

（1）The main lane is widened as an inner street. The west side of the main alley is widened into an inner street that runs from north to south in 10-20 meters. Unlike the original space of the main alley, the inner street provides a wider scale to

facilitate the activities on both sides. At the same time, the street replaces the chaotic lane structure on the west side, and forms two parallel structures with the main lane on the east side, one dynamic and one static, one wide and one narrow, which also enhances the recognizability.

（2）Introduction of plazas. The plaza is implanted along the larger scale of the inner street to increase the spatial richness and attract the flow of people while reducing the damage to the original lane fabric.(Figure 3-5)

（3）Increase the number of more recognizable entrances and exits. Setting up entrances and exits conducive to the geographic cognition of the block is conducive to identification.

(4) Retain the lane structure on the east side of the base. Maintain continuity of new street and the feather of the historical district

(5) Adjust the internal structure according to the function of the renewed building. Dining and entertainment activities need a more complete form of large space, and the original building's internal space is in conflict with the new function. Therefore, only the external wall of the original building is left and the internal structure is reconstructed. However, in the process of transformation, the spatial relationship and layout of the original building are remained. For example, in some buildings, the rear patio originally

used for ventilation and lighting is still retained, but skylights are designed in the original location according to functional needs. In this way, the light needs of the interior are met, and a new effect is added to the interior space.

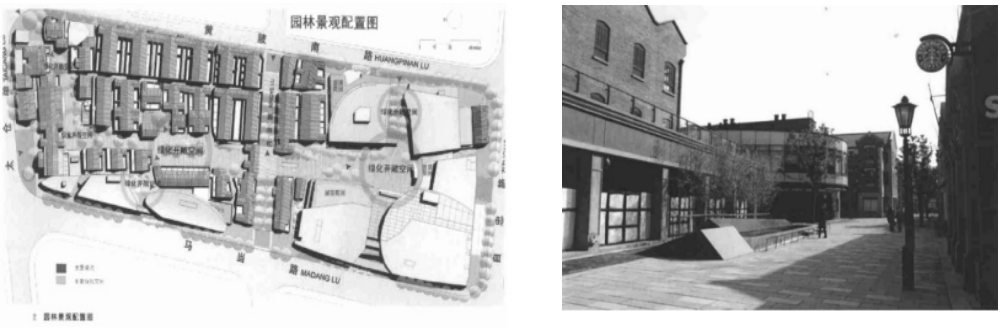


Figure 3-5 Renovated program
（Source: Reference[47]）

3.2 The Application of Typology at the Plot Scale Level

3.2.1 Restoration-Reconstruction of the Inner City of Berlin

Berlin's urban form changed dramatically after the Second World War, when air raids destroyed 25% of the city and 75% of its buildings. The construction of the Berlin Wall after the war further exacerbated the fragmentation of the city. The modernist urban planning concept of freely extending roads overlapping with the historical urban pattern destroyed the traditional street walls and geometric squares, leaving Berlin's inner city in a fragmented state. Berlin has adopted a strategy of regeneration by extracting the historical framework, extracting prototypes from the traditional fabric and building substrate division, integrating new urban spaces and new buildings into the historical framework with new property relations and development needs. The redevelopment of Berlin's plots is based on the following strategy in the central historical area, represented by Paris Square(Figure 3-6)[36]:

[36] Liu Peng, Markus Nipper. Plot Redevision as a Tool in Promoting Spatial Refurbishment of Historical Cities: The Example of Critical Reconstruction in Berlin[J]. International Urban Planning, 2021, 36(4): 108-116., 2021, 36(4): 108-116.

a 建筑基底平面的变迁（1940 年、1989 年、2010 年）

b 地块格局的变迁（1940 年、1989 年、2010 年）

Figure 3-6 Changes in building ground plan and plot layout in Paris Square in 1940-2010

（Source: Reference[25]）

The following regeneration strategy in Paris square has been adopted：

(1) Research on the change of block and building base by typo-morphological method and repair the traditional spatial structure.

(2) Strict protection of the plot widths, plot sequences and corner plot patterns at important interfaces in the plot

(3) Moderate consolidation of some secondary and small-scale plots to meet contemporary building development needs

The designers have extracted the traditional characteristics of the plot pattern and reorganised it to take into account the actual needs of use. For example, a group of small plots on the north side of the square were combined into one large plot for the construction of the new parliamentary office building. This example shows that the restoration of historical districts does not exclude large plots, but that the key question is whether the location and form of large plots can be appropriately handled (such as

by locating them at secondary interfaces or within the district) in order to reduce their impact.(Figure 3-7)

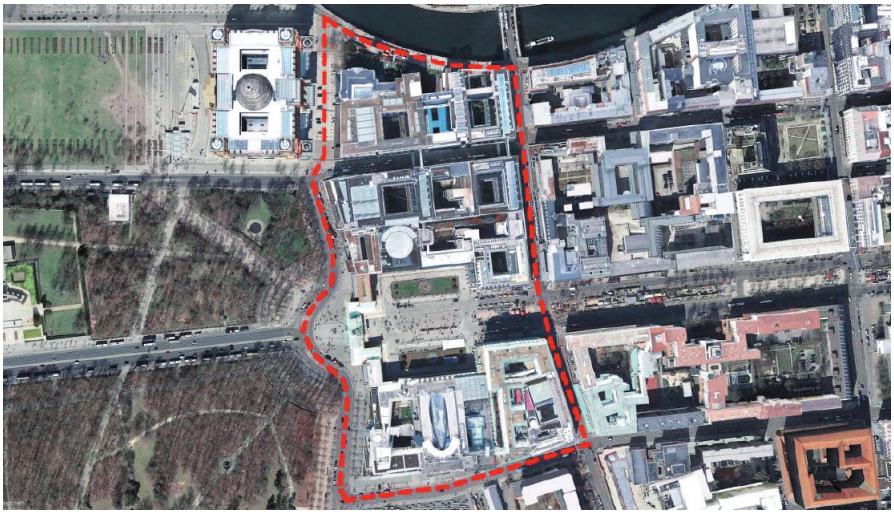


Figure 3-7 Regenerated Paris Square

（Source: Reference[25]）

3.2.2 Overlapping-Nanjing Xiaoxihu Historical Area Regeneration

Located in the south of Nanjings old city, the Xiaoxihu district is a typical mixed residential historical area, with traditional courtyard houses from the Ming and Qing dynasties, modern single-family houses and townhouses, and multi-story houses built after 1949; it contains a variety of residential buildings with different ownership types, such as public houses, private houses and small private houses. Due to the lack of maintenance during the years of living and the iterations of intergenerational and tenancy relationships, the residential buildings in the Xiao Xihu area have gradually fallen into the dilemma of mixed households, disorganized layout, crowded space and low quality(Figure 3-8).

Figure 3-8 Xiaoxihu's condition before the renovation
（Source: Reference [16]）

In the process of privatization of land in China, there is a large increase in the number of property right parcels, a large number of parcels are subdivided, and the shape and combination of parcels are diversified and fragmented. The property rights ownership is unclear, and the mixed living pattern within the same building makes the courtyard dwelling into a residential compound. This phenomenon has brought about a series of problems, including:

（1）Infringement of public spaces (mainly kitchens and toilets)

（2）Dilapidated construction, lack of protection and repair of housing

（3）The original combination of buildings was changed

With regard to the current situation of the Xiaoxihu historical area, the designers proposed a method of using typological map,represented by Caniggia and Muratori. From an epistemological point of view, the typological map connects the urban morphology and the architectural typology and construction characteristic.

Through the study of historical map of the Republic of China period, the relationship between street, plot and structure of Xiaoxihu was obtained. Analyze the changes in living patterns and architectural combination by drawing typological maps of different periods(Figure 3-9). It can also reflect property rights in the land.

After obtaining typological maps containing superimposed property information, Not only does it clearly show the evolution of street, block boundary, building layout, and changes in housing ownership, household access, functional distribution and so on, It has played an important role in the planning, design and practical work of conservation and regeneration of Xiaoxihu.

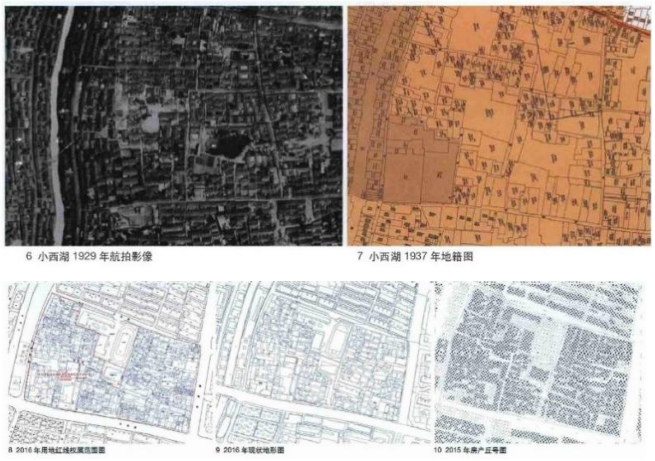


Figure 3-9 Application of typological maps in the case of Xiaoxihu
（Source: Reference[16]）

Afterwards in the regeneration of Xiaoxihu, the following specific strategies are adopted in formal design:

(1) Cleaned up illegal structures and restored the traditional spatial structural features by the research of typology maps, The addition has been reconstructed in a modern way by means of glass boxes. (Figure 3-10)

(2) Translating negative interior space into positive activity venues and driving the vitality of surrounding plots.

(3) On the basis of the research on the addition of buildings, boxes of different forms and materials is placed in the traditional compound to solve the functional needs while creating the infiltration and circulation of indoor and outdoor space

Figure 3-10 Photos of Xiaoxihu's condition after the renovation

（Source:internet）

3.2.3 Deduction- Juer Hutong

Ju’er Hutong is located in the northeast corner of the Nanluoguxiang area of Beijing, China, starting from Jiaodokou South Street in the east and ending at Nanluoguxiang in the west. 438m in length. 8.2 hectares in area. It is a historical area and a neighbourhood with a high concentration of dilapidated houses.[37] Before the regeneration, the living area per capita was insufficient and the phenomenon of mixed living was serious. To improve the living standard of the residents and increase the living capacity was the direct starting point of the design. The designer Professor Wu Liangyong for the city of Beijing from the traditional urban layout - neighbourhood layout - building combination system of the sub-type of research[38], on the basis of this proposed a " Class Siheyuan " layout model. The specific strategy is as follows.

(1) Extracting the basic units from the multi-storey quadrangle, combining the quadrangle type with the unit building form in the design. The floor area ratio is also increased. Designing multiple types of quadrangle.

[37] Wu Liangyong , Beijing Old Town and Ju'er Hutong [M]. Beijing: China Construction Industry Press , 1994

[38] Xu Weipeng. Planning and design of Ju'er Hutong in Dongcheng, Beijing: the use of architectural typology in the organic regeneration of the community[J]. Beijing Planning and Construction, 2021, (2): 119-123.

(2) On the basis of the unit type design, the types are combined as required according to the different requirements of the settlement. The Juer Hutong develops into a topology that can be constantly changed in the process of combination.

(3) At the first floor, the fully enclosed characteristics of the traditional courtyard are interpreted, breaking up the fully enclosed east-west space at the first floor and introducing a path linking the east-west courtyard, with a fully enclosed form above the first floor. It combines the advantages of row houses with convenient services and parking.

By extracting and interpreting the characteristics of the texture, the case of Ju'er Hutong preserves the traditional spatial order of the courtyard, while creating a new system that meets the needs of the users.

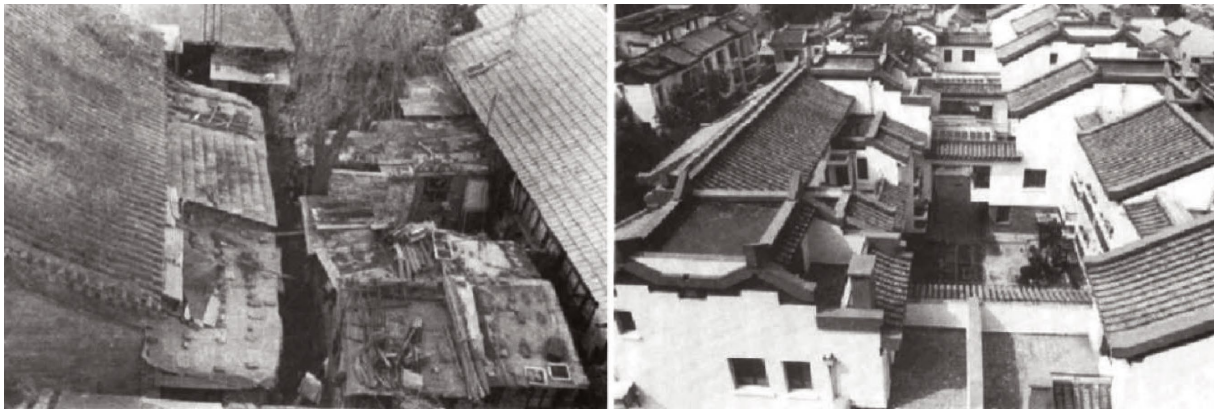


Figure 3-11 Before and after the regeneration of Juer Hutong
（Source: Reference[26]）

3.3 The Use of Typology at the Architectural Level

(1) The Xiadi Paddy Field Bookstore of Librairie Avant-Garde is located in the ancient village of Xadi in Pingnan, Fujian, which has a history of 800 years. The project is located in a field in the northern valley of the village, surrounded by paddy fields on all sides. The building was formerly a residential house and has been abandoned for a long time. Only three old walls of rammed earth and dilapidated courtyard walls remain. The designer Hua Li has preserved the original walls and replaced them with new functions in the interior of the building(Figure 3-12). The new building will be used as

a bookshop. The designers have extracted the centripetal typology of the traditional dwelling and set up a linking space as a centre, connecting the bookshop display area to the north and south, as well as the entrance and staircase to the east and the small theatre to the west, making it a node that connects the four directions.

Figure 3-12 Function substitution of Pioneer Summerlands Waterfield Bookshop
（Source:internet）

The main body of the building is constructed using timber-moulded concrete to harmonise with the rough materials of the rammed earth in terms of scale and texture. At the same time materials such as glass, steel and titanium and zinc sheet metal contrast with the rough material of the walls(Figure 3-13), adapting the traditional type of building to the needs of the new functions and spatial effects.[39]

Figure 3-13 Function substitution of Pioneer Summerlands Waterfield Bookshop
（Source: Reference[27]）

The Pioneer House Land and Waterfield Bookshop extracts the spatial order of

[39] Hua Li. Xiadi Paddy Field Bookstore of Librairie Avant-Garde[J]. Journal of Architecture, 2020, :

the traditional building while preserving its facade, and replaces the internal functions.

（2）The Peach Garden Hotel in Beijing

The Peach Garden Hotel is located in Shihuyu Village, Jiudouhe Town, Huairou District, Beijing, which is at the foot of the Great Water Wall scenic spot. The original building is of brick and timber construction, and the original house consists of a five-room main building and a two-room annexe. The depth of the house is very small, about 4.2 m, and the space is rather restricted. The building was converted into a hotel at the request of the owner. The building was designed by Zhou Chao. In order to make the traditional building meet the folklore requirements for depth of space, the designers have added three landscape boxes to the main body of the house side by side. The interior is made of steel and the exterior is clad in pine panels. The new materials and construction method break the boundaries of the original building, allowing the room boundaries to be extended outwards. The second floor of the timber-framed multi-purpose hall is a tea room and viewing terrace where the view of the Great Wall can be incorporated in the distance（Figure 3-14）.

The regeneration of the househas preserved the character of the original building type in terms of openings, while juxtaposing the old with the new through new materials and construction methods. [40]

Figure 3-14 Addition operation in the peach garden hotel in Beijing

（Source: Reference[28]）

[40] Zhou Chao. The Peach Garden, Beijing, China [J]. Contemporary Architecture, 2020, (4): 92-99.

（3）Shenzhen Nantou Old Town Regeneration

Nantou Ancient City is located in the north of Shennan Avenue and south of Zhongshan Park in the Nanshan District of Shenzhen. However, due to the dichotomy between urban and rural areas, Nantou Old Town suffers from lagging development, spatial chaos, low quality of life and the fragment of literary veins. The designers have researched the number of floors, the current appearance, the structural condition and the location of the neighbourhood to make a comprehensive judgement and propose a suitable strategy for elevation regeneration. At the same time, the original buildings are regenerated with new materials in combination with the replacement of businesses. The original scale and massing of the building type is retained and the facades were regenerated with modern construction methods.

Figure 3-15 Transformation of traditional building types in Nantou old town
（Source: Internet）

（4）Regeneration of Ennin Road, Guangzhou

Enning Road in Guangzhou is the longest and most complete old street in the city, and is also a distinctive street that combines the culture of folk Cantonese opera watching and performance[41]. Before the regeneration, most of the houses in the Yongqingfang area were dilapidated and the overall environment was poor. During the regeneration process, small-scale demolition and repair of traditional buildings were carried out, and the original buildings were replaced with new ones. Most of the buildings have retained

[41] Liu Heng, Huang Jiebin, Ye Yang, et al. renovation of Yongqing neighborhood, enning road, Guangzhou[J]. Urban Environmental Design, 2016, (4): 74-87.

their original façade style. At the same time, some of the buildings have been transformed to accommodate the change in building type from residential to commercial. For example, the building has been deduced to adapt modern exhibition function through the introduction of display windows, façade coverage reconfiguration.

Figure 3-16 Transformation of traditional building types in Enning road
（Source: Internet）

（5）Located in Nanchang, Jiangxi, the Sanyanjing historical area is a site that preserves buildings from the late Qing Dynasty to the Republican period. The design of the exhibition centre extracted the texture of the brick walls in the site and interprets it using a parametric approach. At the same time, a glass box is embedded in the top of the building as a viewing platform facing the commercial centre square and the timber-framed theatre. The addition of the glass volume reflects the authenticity of the building's regeneration, while the inserted sloping roof volume extracted the feature of

Figure 3-17 Transformation of traditional building types in Sanyanjing historical area
（Source: Internet）

the prototype,and the introduction of new structures developed the character of the traditional architectural prototype.

3.4 Summary

This chapter researched the typological approach on the regeneration of historical areas at three different levels: the district, the plot, and the architecture, and also analysed the succession, deduction and analogy method in the cases.

(1) At the district level, wide lane and narrow lane preserved the original spatial structure and transformd the typology of the buildings in the district to meet the actual needs; Shanghai Xintiandi extracted the form of the traditional lane typology, and deduced the deep character, adapting them to the needs of the business

(2) At the plot level, the typo-morphological study in Berlin, Germany, extracts the typology from the traditional urban plot and building base, and repairs the urban fabric by combining it with modern patterns of plot organisation and division required by the business. In the case study of Xiaoxihu, the typo-morphological approach was used to extract the changes in the texture of the site and to combine the specific use and wishes of the inhabitants, while restoring the traditional spatial structure, the building typology was extrapolated to superimpose the traditional and modern texture. The architectural typology is transformed by the use of glass boxes to meet the needs of the residents, and the combination of traditional building compounds was studied in the case of Ju’er Hutong and used in the design of modern housing, which meets the needs of the residents in terms of floor area ratio while retaining the characteristics of the traditional courtyard type.

(3)At the architectural level, the regeneration of buildings in historical areas is not simply a matter of restoration of the existing, but of transformation of the types in relation to the use of the buildings. In the process of transformation, the typological characteristics of the traditional building types in terms of internal spatial organisation, interface concavity, solidity and roof form should be extracted, so that the renovated

building can compatible with the traditional buildings while adapting to the new use functions or the living structures.

Chapter IV The Establishment of Typological Methodology

Through the theoretical study and case study of typology in connecting city and architecture, it is clear that the application of typology to the application of design in historical areas requires, on the one hand, a typological approach to sorting out and studying the current situation, extracting and abstracting the types in the neighborhood, and analyzing their intrinsic characteristics as a basis for design. At the same time, the typologies are compared with the prototypes to analyze the similarities and differences between their actual use and the new lifestyles they will be carrying. After the abstraction of the type, based on the study of the prototype's localization, the type is analogized and interpreted, and the deep characteristics of the type are transformed and interpreted with modern architectural and urban design approaches, and returned to the historical areas, in order to make the type adapt to modern life. On the other hand, the existing morphology of the historical location is inseparable from the business and lifestyle it carries inside, and the regeneration of the historical location should not only be a collage and restoration of history, but also respect the existing conditions to evoke the historical memory. Therefore, it is necessary to understand urban change from the perspective of development and change over time, and to analyze the changing characteristics of districts from the block scale downward from each level. Based on the previous theories, this paper proposes a specific operational methodology for the conversion of historical areas from the extraction of typological features to typological place-making to form.

4.1 Abstraction of Typology

4.1.1 District Level

(1) Street Network

The street network is a constraining component that forms the structure of the urban

fabric, and different types of street networks form different urban spatial structures. Street networks are repetitive elements, and street networks are divided into blocks of land, whose form and scale are controlled by the type of street network. The "street" can also be considered as the public route between groups of "street profiles". The structure of the street pattern is an abstract diagram that focuses on the topological relationships of the streets, examining the links and nodes and their relative relationships and connections.Such as the relationship between the main lane and the branch lane in the Shikumen buildings of Shanghai Xintiandi. The main and branch lanes of the lane form the spatial structure of the historical area in a fishbone pattern.

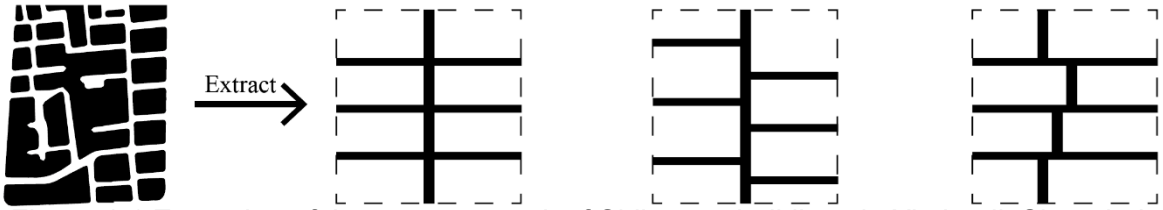


Figure 4-1 Extraction of the street network of Shikumen buildings in Xintiandi, Shanghai.
Source: Made by the author

4.1.2 Plot level

(1) Plot Division

The typo-morphological approach, which research through an ephemeral approach is effective to research the urban fabric and actual use change and guide design. In the case of the Restoration-Reconstruction of the inner city of Berlin, the study of the architectural fabric of the building substrate plan and the division of the plot layout has led to the proposal of a corresponding urban regeneration scheme. The key features of the plot pattern that need to be protected include plot width, plot sequence and corner plot form and so on.

（2）Architectural Composition

The orderly character of architectural composition is also of great value as an application of architectural typology at the plot scale. In recent years, some of China’s historical cities have gradually recognised the significance of the plot pattern for the conservation of the overall urban form, and have taken the courtyard as a unit of

renewal within the historical district, as a boundary to define urban renewal. For instance, Wu Liangyong researched from the traditional urban layout – district layout - building combination system for the type, on the basis of this proposed new types. Therefore, to explore the inner structure of the organisation of building types.

（3）The Relationship Between the Building and the Plot

The study of the typology of historical areas should take into account the specific ways in which people use them. The ground floor plan approach of the typological map reflects how people enter and use the building. As well as the way in which the building is organised in relation to the streets and open spaces.

4.1.3 Building Typology Level

The application of building types consists of three steps: type extraction, type transformation and type localization. The variety of typologies has led to a confusion in the landscape of the historical areas, which often include different building types of different periods with different styles and values. It is therefore necessary to classify the building types within the site, to abstract them and to extract their formal characteristics and spatial use modes. It is also necessary to analyse the existing state of use. In the case of the Little West Lake in Nanjing, for example, the designers not only extracted the building types from the Little West Lake, but also restored the additional volumes in a new way according to the actual use research.

4.2 Type Transformation and Localization

4.2.1 Street Network Restoration

(1) Restoration and Succession

Typo-morphology as a means of understanding urban development is important for understanding urban change. This method can be used to identify historically significant streets and patterns in the regeneration of historical areas. In the case of wide lanes and narrow lanes case study in Chengdu, three main lanes: wide lanes, narrow lane and Jing lane - have been identified and comprehensively preserved. And

their historical elements, such as streets, courtyards and buildings, have been, were improved and regenerated. The regeneration of the archetypal character of the district preserves the originality of the traditional historical area.

(2) Deduction

The original pattern of streets and alleys in the regeneration of historical areas may be in conflict with the new business and use patterns in terms of street width, centrality, and the demands of open space. Therefore, it is possible to extract the characteristics of the street organisation in the district and make deductions from the street structure to meet the new needs of the district. In the case of the regeneration of Xintiandi in Shanghai, in order to solve the problem of the lack of a centre, poor accessibility and the inability to meet the demand for commercial activities in the historical area, the designers retained the herringbone structure of the Shanghai lane and widened the main lane, opened up part of the road and introduced open space to meet the new demands of use.

4.2.2 Restoration of the Architectural Fabric

(1) Restoration and Recovery

In the case study of the restoration-reconstruction of the inner city of Berlin, the restoration of the plot division pattern is key to the regeneration of the urban fabric. The subdivision of the plots does not mean a complete reconstruction of the original pattern of subdivision, but rather the development of different subdivision schemes that are specific to the historical context and development objectives of the different plots. For the regeneration of the historical areas, it is not simply a matter of restoring the traditional fabric, but of interpreting the architectural fabric to meet the needs of modern life in accordance with the existing conditions and the actual needs of use.

(2) Overlapping and Inheritance

The visual characteristics and spatial perceptions embedded in the urban fabric unite the architectural fragments of different historical periods, giving the district a historical

depth and a chronological tension. Therefore, responding to the urban fabric does not mean purely retracing history, but also responding to contemporary needs with contemporary techniques and tools, which means that the relationship between architecture and environment need should be integrated with the urban fabric[42]

Compared with the protection of single buildings, the preservation of the overall fabric resulting from the combination of buildings in the district is particularly important for the continuity of the urban memory of the area. Due to the disorderly addition of buildings in different scales, there are multiple building types of different scales and periods and complex texture organization in the historical area. In the case of the regeneration of Xiaoxihu in Nanjing, the illegally built buildings were demolished, but they were reconstructed in the form of glass boxes and reconnected with the main building, which not only restored the traditional fabric but also combined with the current situation, overlapping the historical and current need, reflecting the continuity of history while showing the authenticity of the regeneration.

a) Overlapped non-traditional volumes b) renewal process

Figure 4-2 Overlapping and Inheritance in Xiaoxihu
（Source: re-drawn by the author based on reference [16]）

[42] Ni Yang, Yao Han. Renewal and Regeneration of the Old City Texture:Study On the Renewal Design of the Duobao Section of Enning Road [J]. Architecture and Culture, 2021, (10): 156-158.

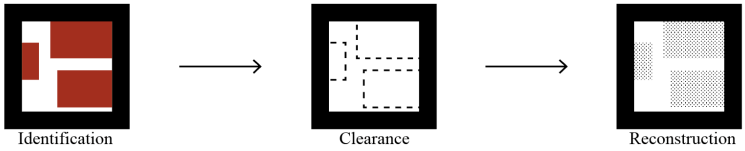


Figure 4-3 Overlapping and Inheritance in Xiaoxihu
（Source: Made by the author）

(3) Deduction and Analogy

In the regeneration of historical areas, when the specific way in which the type is constituted and the needs of the place exist, but when the essence of the genre embodies a certain historical or humanistic concern that is worth following,of transposition. The deduction and analogy has great significance.For example, in order to meet the residential requirements of the building, Ju'er Hutong has deduced the traditional courtyard composition method, maintaining the enclosed layout of the courtyard in terms of the traditional fabric, but retaining the characteristics of row houses on the first floor. But at the same time the new quadrangle-like courtyard has changed in terms of function, scale and materials.

Figure 4-4 Deduction And Analogy
（Source: Made by the author）

4.2.3 Architectural Typology Transformation

(1) Substitution

By using the original space of the archetype building and changing the original use function, dynamically preserving the original building space is possible. This method preserves the original facade of the old building, renews the internal equipment and outdated facilities of the old building, and transforms it into a place with modern facilities, or divides the original space horizontally or vertically to form a new space according to the new use function, and then puts it into practice again. For buildings that are severely damaged, we can extract the type by researching their historical information and archetype, and replace the damaged part with a new volume through

modern technology, or remove part of the volume and replace it with a new one, so as to show the original form and the historical memory in a replacement way. For example, Xiadi Paddy Field Bookstore of Librairie Avant-Garde, replaced the original residential function of the rammed earth wall with a bookstore by inserting a new volume between the remaining rammed earth walls.

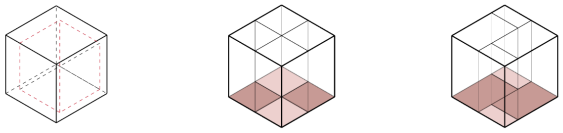


Figure 4-5 Substitution
（Source:Made by the author）

(2) Addition

Partial addition is the most common type of architectural operation. It is an architectural intervention by inserting new building volumes on the exterior or interior of a building through an addition approach, where the new volumes form a co-existence with the old ones. However, this method does not simply add new volumes, but adds parts to the old building to adapt to the new functions through type extraction and summarization based on the historical information of the historical building, so that the new and the old can coexist harmoniously and form a type of parallel relationship. The basis for the addition of volume is the architect's selective placement of a new building volume to meet the shortcomings of the archetype in terms of its ability to support modern functions.

1.Juxtaposition

When the openings or depths of prototypes cannot meet the new functions required for business upgrading, the traditional building typology can be adapted to the new building use requirements, through the juxtaposition of building additions in close proximity to the building. For instance， in the case study of Peach Garden Hotel in Beijing include the addition of a landscaped box and a multi-purpose hall to accommodate folklore requirements for depth and views, and the addition of a glass volume to meet reception and light requirements in Yongqing Square(Figure 4-6). In

the case of the additions, the character of the facade or roof form of the building type is retained, but the specific elements of the building, such as the solidity of the building, the materials and the construction method, are changed.

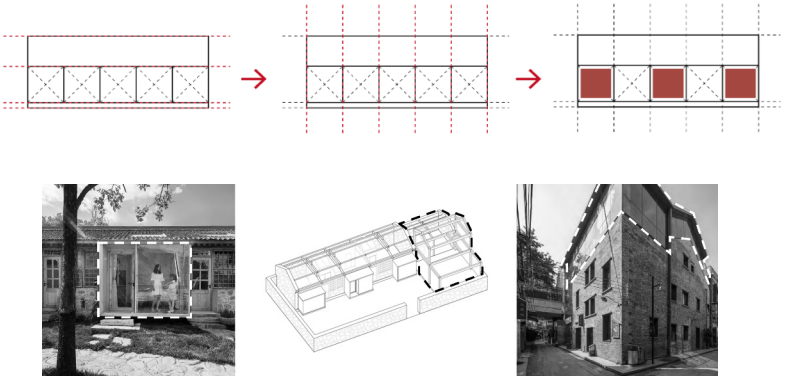


Figure 4-6 Extraction of facade composition features
（Source:Made by the author, base image comes from the internet）

2.Insertion

Insertion is a way of inserting a new designed volume partially or completely into the existing building, because the new and the old exist in a state of integration, people can distinguish the new and the old more clearly and at the same time the enormous force generated by the clash of the two can produce dramatic effects. For example, in the regeneration of Nantou Old Town, glass blocks were inserted outside of the original building. The glass blocks can meet the requirements of modern commerce in attracting customers to the permeability of the interface with the building, while the new and the old form a strong contrast(Figure 4-7).

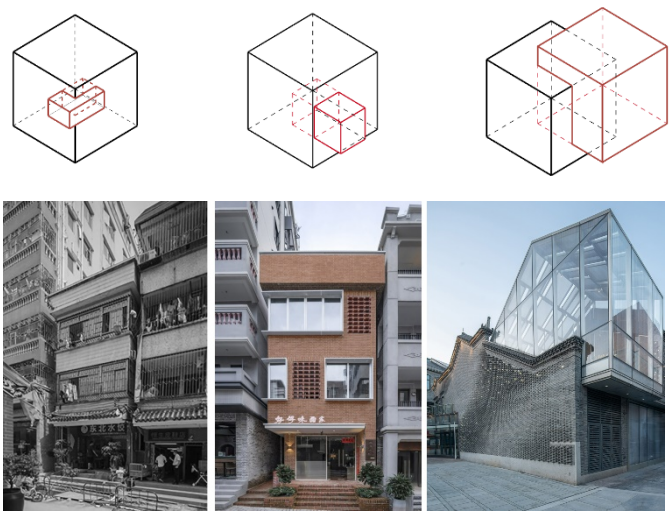


Figure 4-7 Diagram of the insertion operation
（Source:Made by the author,base image come from the internet）

3. Coverage

Covering is a means of preserving the integrity of heritage, as it is often subject to age-related loss of protection, and is a good way to protect heritage from damage. This approach is often applied to landscape heritage, archaeological sites, and so on, where the overlay is needed to protect landscapes of historical value. It can also be used in historical areas as a typological interpretation technique to reconstruct elevation types. Harmonization with the traditional landscape is achieved by changing the transparency

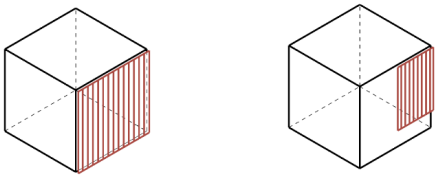


Figure 4-8 Diagram of the coverage operation
（Source:Made by the author）

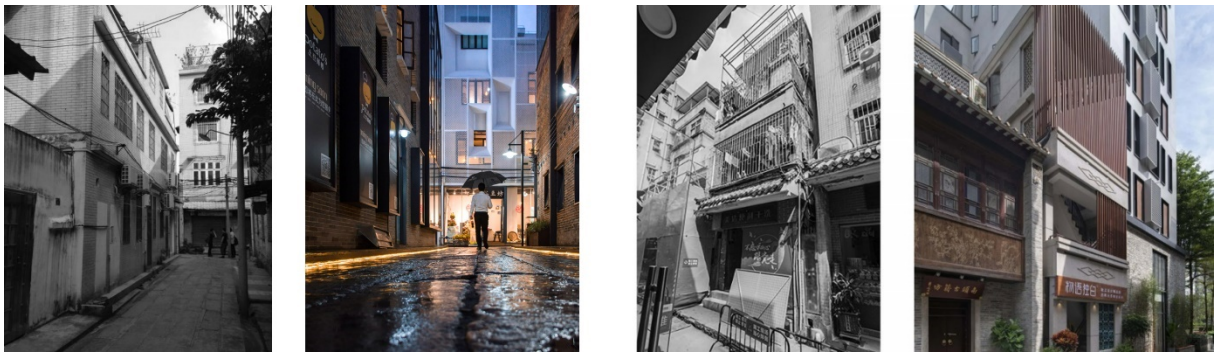


Figure 4-9 Case of coverage
（Source:internet）

(3) Subtraction

The principle of "subtraction" is, as the name indicates, the "demolishing" of a building. When the building type in the historical area cannot carry the space required for the new function, it is necessary to renovate, open up and remove part of the building space(Figure 4-10). [43]For example, we can remodel the patio and open up the upper and lower floors to create a high ceiling space.

Figure 4-10 Diagram of the Subtraction operation
（Source: Made by the author, base image comes from internet）

4.3 Summary

This chapter focuses on the typological approach to extract characters of historical areas. The analysis is conducted at three levels: block, plot and building typology:

(1) District level: analysis of the spatial structure and street network. Analysis of the change of the district from an ephemeral perspective

(2) Plot level: plot divisions in terms of the grouping of building types, the type of combination of buildings, and their corresponding relationship to the street.

(3) Building typology level: for the individual buildings, the characteristic types of their forms, structural systems and details were extracted. Through the above hierarchical classification study, the deep structure of the traditional appearance of the Xudi - Gaodi Street historical area is helped to be perceived

And based on this, this chapter proposed corresponding strategies for the

[43] Xiong Zesong. A study on the idea of renewal of Italian modern "historical reading and writing" architectural heritage [D]. Xi'an University of Architecture and Technology, 2020.

transformation of types at different levels after type extraction, based on case and theoretical study:

(1) Street network level: two different strategies are proposed, Restoration and Succession and Deduction.

(2) Architectural fabric level: restoration and recovery, overlapping and inheritance

, deduction and analogy.

(3) The architectural typology level: based on the case studies, typological transformation strategies are proposed to adapt the building type to the new activity in the historical areas. Three different strategies are proposed: Substitution, Addition and Subtraction.

This chapter provides the theoretical and practical basis for the regeneration of the Xidi-Gaodi Street historical area.

Chapter V Design Exploration Based on Typology in the Xudi-Gaodi Historical Area

5.1 The Background of the Typological Study of the Xudi-Gaodi Historical Area

5.1.1 The Historical Evolution of the Xudi-Gaodi Historical Area

Gaodi Street is located at the intersection of the traditional axis of Guangzhou's old city and the Pearl River, within the core conservation area of the southern section of the traditional central axis of the historical and cultural district. Gaodi Street originated during the Song Dynasty, reached its peak during the Ming and Qing Dynasties, and gradually declined after the Republic of China. The transformation of Gaodi Street area can be divided into two periods: the traditional period and the modern period.

(1) Traditional Period

Gaodi Street was created during the first major expansion of Guangzhou in the Song Dynasty. [44] As the city grew, the waterways around Fanfang in the west gradually silted up and the commercial wharves gradually shifted to the east, the private sector organised itself behind the wharves to support the commercial activities and Gao Di Street was gradually formed. The land along the Gao Di Street was divided up between the merchants and the people. A high-density commercial land use pattern was formed. [45]The Yudai Hao on the north side of Gaodi Street was formed during the Yuan period of the Song Dynasty, and was originally the exterior protective river of the "Song Sancheng", which was an important part of the six drains system of the Song Dynasty,

[44] Zhao Yiyun. Urbanmorphologic evolution of Gaodi Street in Guangzhou from the late Qing Dynasty to the Republic of China [D]. South China University of Technology, 2012.

[45] Zhang Jian. Morphological Plan Analysis of Traditional Street System Formed under the Influence of Natural Topography of Landscape—For Example of an Guangzhou Historical Area Enclosed by Peking St, Zhongshan St, Qiyi St and Gaodi St [C]// Proceedings of the 2013 Annual Conference of the Chinese Society of Landscape Architecture and Gardening (Vol. 1), China Architecture Industry Press, 2013: 211-215.

serving as a defence, water storage and fire-fighting, drainage and flood relief as well as a shelter. The area was used as a distribution centre for foreign trade.[46] It was a place where merchants gathered from more than ten miles（Figure 5-1）.[47]

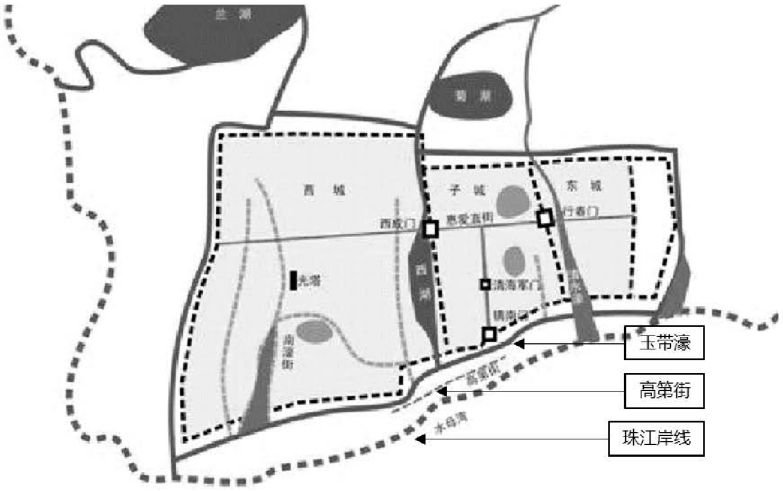


Figure 5-1 Song Sancheng in relation to the water system

（Source: reference [46] ）

During the Ming and Qing dynasties, the Yudaihao was still accessible to boats, so Gaodi Street had the advantage of a good location, with access to the inner city core and to land and water transport areas, and was "known for its prosperity".In the late Qing Dynasty, Gaodi Street became a popular place for salt merchants to settle down, including the famous Xu family of Guangzhou in modern times. It is the largest existing Qing dynasty building compound on Gaodi Street area.[48]

(2) Modern Period

With the establishment of the Guangzhou City Hall in 1918, Guangzhou dismantled its walls of more than 2,000 years. Gradually, it developed from a feudal commercial city to a modern city. Gaodi Street became a commercial centre dealing in shoes, hats and

[46] Jiang Fanying, Chen Jielin, Gao Wei. Evolution of Historical Urban Landscape in the Haopan Street of Guangzhou [J]. Guangdong Garden, 2019, 41(2): 52-58.

[47] Qu Dajun. The New Language of Guangdong (complete in two volumes) [M]. Shanghai: China Book Bureau, 1997: 460-476.

[48] Wu Junda. Research on the Historical District Protection and Industrial Renovation of Gaodijie in Guangzhou [D]. Tsinghua University, 2016.

clothing, literary treasures, medicine and food and inns, and the area around Subo Lane and Shuimuwan within the neighbourhood became a gathering place for modern revolutionary activities. The pattern and texture of the streets in Gaodi Street reflect the traditional urban fabric of Guangzhou[49], and there is a rich variety of architectural types, including traditional buildings, bamboo tube houses, Arcade, residential assemblages, Republican houses.

In the early days of the founding of the country, Yudaihao was converted into a reinforced concrete box culvert, and the water transport function declined completely; Gaodi Street continued its commercial function, with retail businesses becoming a thriving individual market from the early days of the founding of the country to the reform and opening up of the city, and a wholesale market for underwear after 2000; At the same time, along with the urban development of the city, the architectural style and urban fabric of the district were damaged by random additions and alterations. Gaodi street also gradually went into decay.

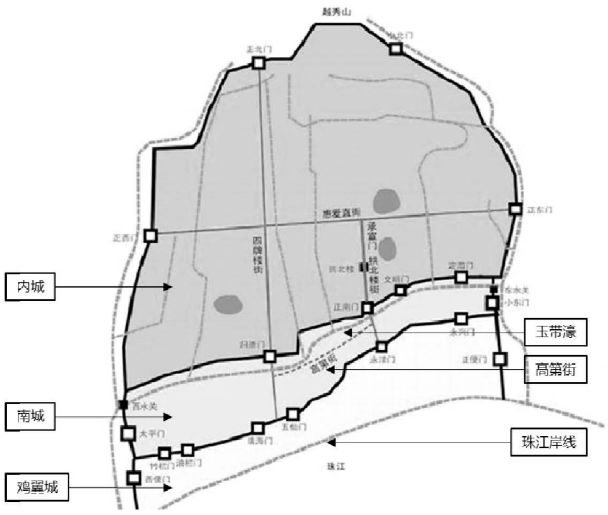


Figure 5-2 Diagram of Guangzhou city in Qing Dynasty

（Source: reference [46] ）

[49] Zhang Jian. Morphologic Analysis of Historical Area of Guangzhou[D]. Guangzhou: South China University of Technology,2012:20, 23-24, 31-37, 71-72.

5.1.2 Macro-environment of the Historical Area

(1) Founctions

The main functions within the district are commercial, storage and residential. Gaodi Street continues the traditional commercial function, with shops on the ground floor and storages on the upper floors, and is a formal wholesale market for underwear. Along the street side of Yudaihao are buildings of the arcade street pattern, mainly commercial buildings and some residential buildings; in the inner streets there are many storage buildings, supplying goods to the shops in the main street. The Xudi compound still retains its residential function.

Figure 5-3 Founction of Xudi-Gaodi street historical area

（Source: re-drawn by the author based on reference [16] ）

(2) Street Transportation

The Gaodi Street district is bordered to the north by Danan Road, to the south by Taikang Road and to the west by Jiefang Road. To the east is Peking Road; Outside the block, access to the base is relatively straightforward and the interior of the base is all pedestrianised. It is mainly divided into main streets and branch lanes. There are three main streets, from north to south, namely Yudaihao, Gaodi Street and Xiheng Street. There are many bicycles and electric vehicles in the interior of the site. There

are many side streets perpendicular to the main street, which are arranged in a network pattern.

Figure 5-4 Street transportation of Xudi-Gaodi street historical area

（Source: Made by the author）

5.1.3 Micro-environment of the Historical Area

(1) Street Scale

In terms of street scale, the total length of Gaudi Street is approximately 700m, that of Xiheng Street is approximately 385m and that of Yudai Hao is approximately 315m. The paths are basically linear and the buildings along the street are rather dilapidated, with a varied but not uniform spatial interface. The width of the main street varies from 6m to 10m, and the width of the road in the main street is appropriate, with the outside stalls of the shops narrowing the walking area. The width of the internal side streets is narrower, at 1.5m-3m, making it difficult to identify the road and making it less walkable.

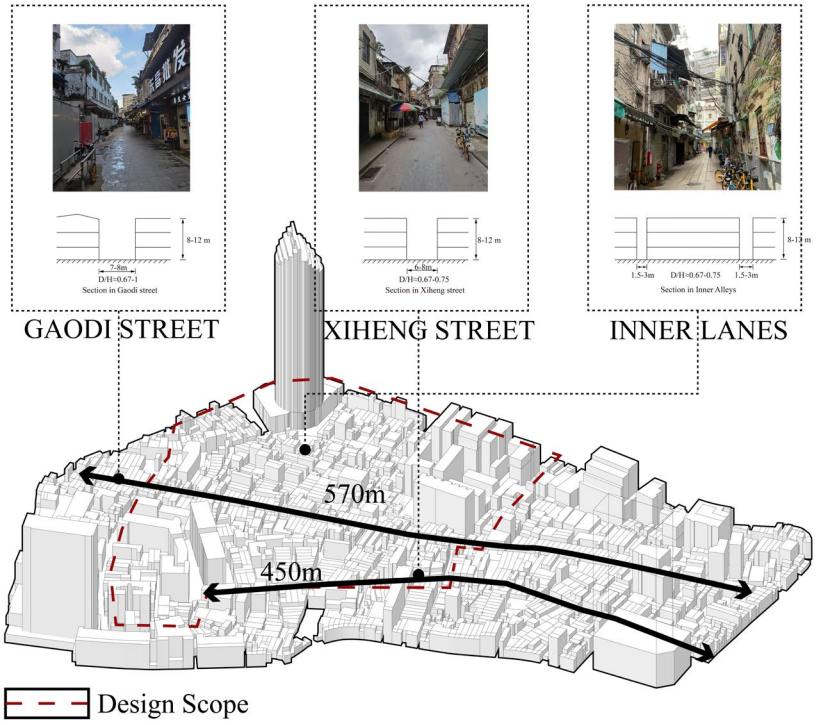


Figure 5-5 Street scale of Xudi-Gaodi street historical area

（Source: Made by the author）

(2) Public Spaces

In the current situation, the public spaces in the district are mainly small courtyards in the alleys, with a small number of open spaces, poor environmental quality and insufficient capacity to carry public activities; in addition, people mix with bicycles and electric bicycles in the district, making the pedestrian environment poor; the parking of bicycles along the road occupies walking space in the streets.

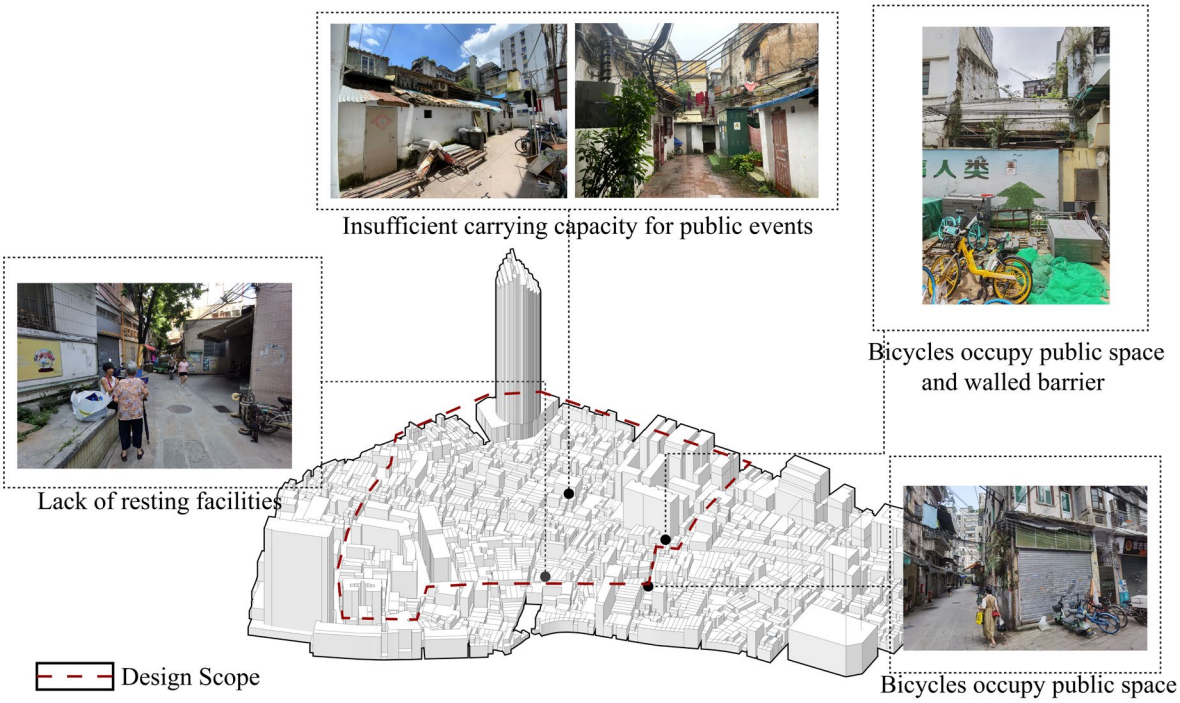


Figure 5-6 Public space of Xudi-Gaodi street historical area

（Source: Made by the author）

(3) Landscape and Street Facilities

The interior of the street is dominated by spot greenery, mainly in the form of trees arranged sporadically in the interior of the site, as well as rooftop greenery, potted plants and planters. At the amenity level, the interior of the Gordie Street block lacks lighting, the boundaries of the buildings are occupied by stalls and the necessary resting facilities are lacking.

Figure 5-7 Current status of the street greenery

（Source: Made by the author）

(4) Building Quality

The buildings within the study area were constructed in three categories: traditional

buildings (brick and timber structures) from the Ming and Qing dynasties to the Republican period in Xu Di, modern buildings from the Republican period, and modern buildings (reinforced concrete structures) from the 1980s and 1990s. This study examines the quality of the buildings within the Xudi-Gaodi historical area.

Figure 5-8 Building quality of Xudi-Gaodi street historical area

（Source: re-drawn by the author based on reference [58]）

(5) Architectural Style

The traditional architectural style of the district consists mainly of the bamboo tube house style buildings on Gaodi Street and Xiheng Street; the traditional Qing Dynasty buildings within Xudi compound; and Arcade street buildings on the north side of the base on Danan road.(Figure 5-6)

The first type of bamboo house is a side-by-side building with a width of 3-4m and a

painted facade. The windows, doors and roof forms reflect the traditional style of the Republic of China. However, the overall appearance of the building has been spoiled by the addition of canopies, security grilles and air-conditioning units to the shops. The overall appearance of the building is relatively old and the facade is not sufficiently maintained.

The second category of Xudi traditional style buildings retain a certain degree of the traditional grey tile roof architectural style of the Qing Dynasty, with white paint on the facade; many buildings have been added to the interior of Xudi, while the building facade lacks maintenance and the current character is dilapidated.

The third type of Arcade street has some traditional characteristics, but the facade material above the first floor, colour and inside division are very non-uniform. The ground floor shops are old in form and less walkable.

Apart from this there were a small number of brightly coloured modern buildings, which are highly incompatible with the overall appearance.

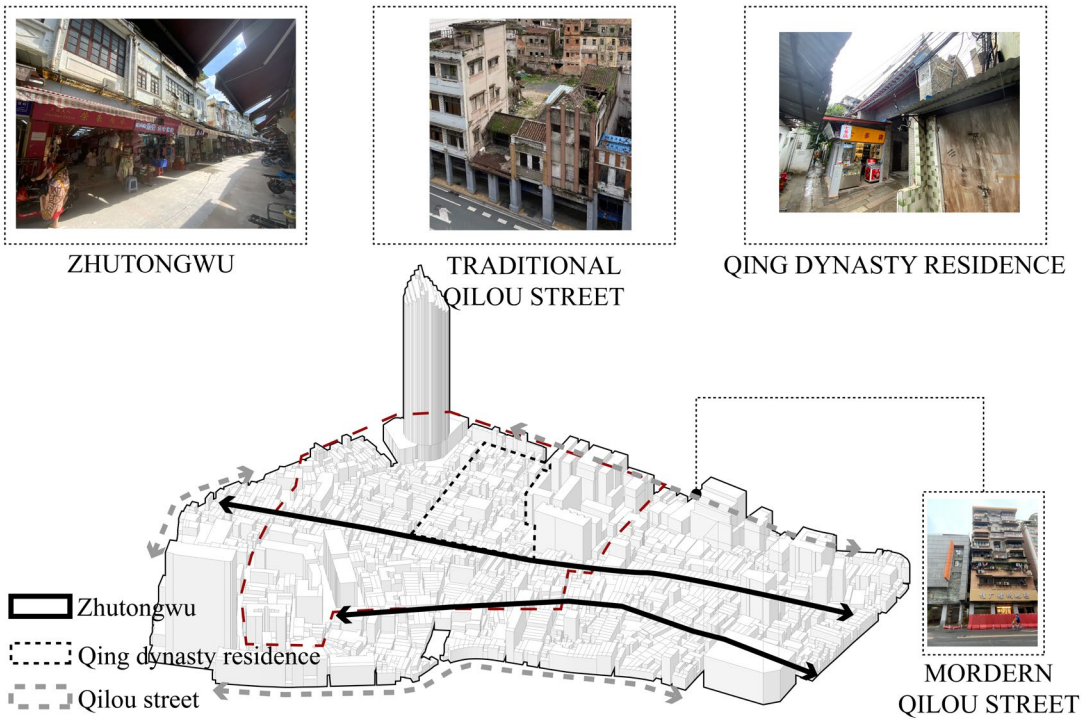


Figure 5-9 Distribution of traditional style buildings

（Source: Made by the author）

Figure 5-10 Architectural style condition of Xudi-Gaodi street historical area

（Source: re-drawn by the author based on reference [58]）

（6）Skyline

The interior of the district has a relatively gentle skyline with traditional buildings mainly 2-3 storeys in height. There is some undulating variation in the buildings along the street. The modern housing within the base disrupts the traditional street skyline and creates a dramatic change.

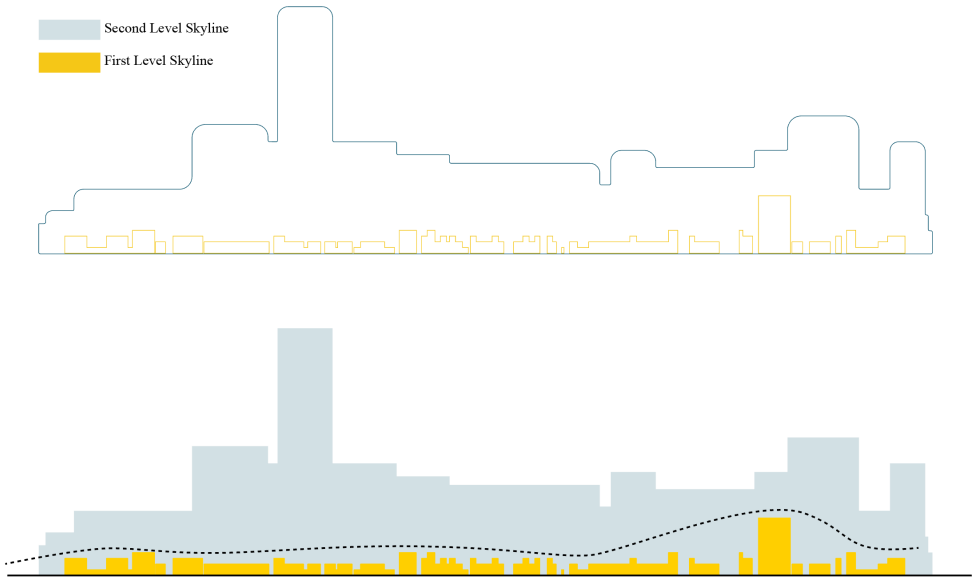


Figure 5-11 Architectural style condition of Xudi-Gaodi street historical area

（Source: Made by the author）

5.2 The Use of Typology in the Xudi-Gaodi Street Historical Area Under the Historical Dimension

5.2.1 History of Guangzhou Urban Renewal Strategy Development

With a history of more than 2,000 years, Guangzhou is one of the first cities to be selected as a national historical and cultural city, as well as a famous "thousand-year business capital", with a deep commercial gene and a long cultural heritage. As a major national city, Guangzhou has always attached great importance to the preservation of history and culture, and has always maintained the concept of "development in preservation and preservation in development", combining cultural preservation and development with city management and economic construction, highlighting local characteristics and improving the living environment. The urban transformation strategy of Guangzhou after the founding of China can be divided into four stages: the period of productive urban transformation (1949-1978), the period of comprehensive urban transformation (1978-2008), the period of transformation of the three old policies (2008-2015), and the period of systematic construction of urban renewal (2015-

present). [50]Among them, the period of productive urban transformation (1949-1978) was mainly for the transformation of industrial buildings. The period of comprehensive urban transformation (1978-2008) was mainly for house, road, and industrial transformation. After 2008, the "Three Olds" Transformation Office, (referred to as the "Three Olds Office") was established in 2010 to transform old villages, factories and towns. At this stage, the document ([Yuefu (2009) No. 78]) and the document ([Suifu (2009) No. 56]) set out the scope of the "Three Olds" transformation, and proposed the method of delineating the Three Olds, identifying three modes of demolition (whole piece redevelopment), change (scattered transformation mode), and stay (historical and cultural preservation improvement mode). However, the two documents only expressed the "three old" transformation of the object characteristics, specific assessment involving the quality of the building, the state of the environment, the state of property rights are not clear, and why transformation, transformation into what, who and when transformation and other key issues also lack basic guidelines. [51]The "Three Olds Office" approved the regeneration plan, and the core indicators such as the capacity ratio and the nature of the site are often incompatible with the tender specifications, resulting in the project being delayed or difficult to implement. At this stage, economic benefits are valued but social equity, cultural heritage, environmental ecology and other important factors are neglected. [52]After 2015, Guangzhou City established the first urban renewal bureau in China in February 2015, covering the entire original "three old" transformation office, and in 2016, the "Guangzhou Urban Renewal Measures" were introduced. In 2016, the "Guangzhou Urban Renewal Measures" were introduced. The way of working was changed from big demolition and

[50] Lan Suwen. A historical study of urban reconstruction in Guangzhou: From 1918 to 2015 [D]. South China University of Technology, 2018.

[51] Wang Shifu, Shen Shuangting. From "Three Old Transformations" to Urban Renewal: Reflections on the Establishment of Urban Renewal Bureau in Guangzhou[J]. Journal of Urban Planning, 2015, (3): 22-27.

[52] Huang Jianwen, Xu Ying. Re-conceptualization of old city renovation: the example of "three old" renovation in Guangzhou[J]. Planner, 2011, 27(1): 116-119.

construction to independent property unit renewal to a combination of comprehensive transformation and micro-regeneration.

Compared to the four stages in China, typology-led urban renewal is an important guide in assessing the quality of buildings, identifying the targets for regeneration, and retrofitting buildings. On the one hand, the typological map is drawn through the typological mapping method, and the information of the first floor plan can clearly reflect the usage of the building. At the same time, it is possible to visually determine the ephemeral additions[53], and the typological study method provides a strong basis for the final planning interventions, especially the reorganization of the urban fabric and buildings - especially concerning which buildings (including elevations, building elements, structural elements) need to be preserved, which can be demolished, which new The aim is to preserve the building typology, the character of the style and to improve the current living conditions.

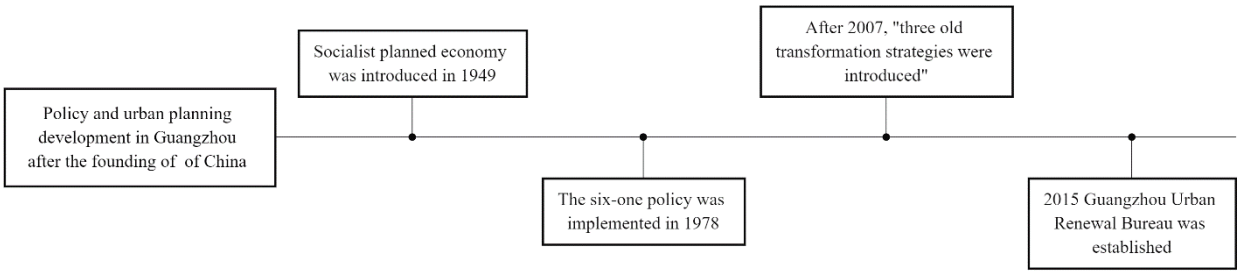


Figure 5-12 History of Guangzhou Urban Renewal Strategy Development
（Source: Made by the author）

5.2.2 The Urban Planning Context of the Typological Study

(1) Planning Goals

Xu Di - Gaodi Street is located in the southern part of Guangzhou”s traditional central axis historical and cultural district, in which most of the area is located in the core protection area of the historical and cultural district. Xudi-Gaodi Street will be developed into a special trade showcase area in the future, introducing business

[53] Xie Shuyi, Giuseppe Bertrando Bovantini. The evolution and inspiration of typological and morphological led urban planning techniques in Italy[J]. New Architecture, 2020, (1): 143-147.

functions as well as public service functions while preserving commerce.

（2）Protection Strategy

In the "Traditional Central Axis (Modern) Historical District Protection Plan", the plan

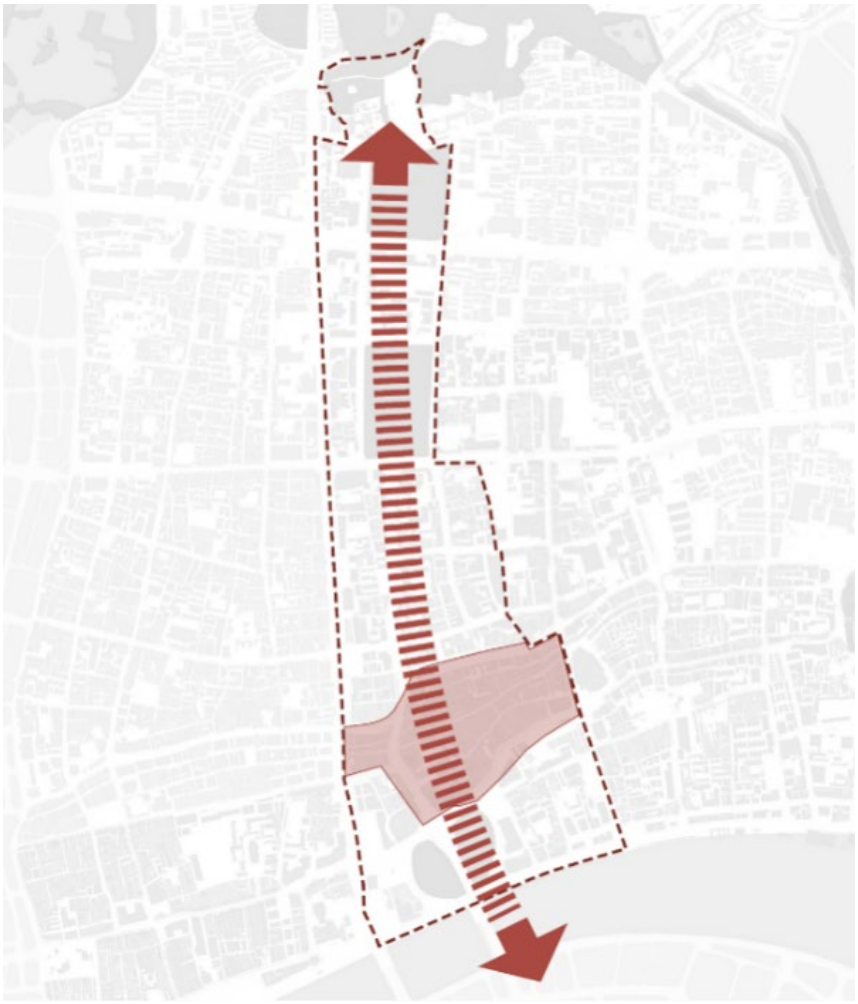


Figure 5-13 Base Positioning
（Source: Made by the author）

provides detailed and clear regulations on street patterns, architectural texture, building renewal methods and municipal facilities and materials, with specific requirements as follows:

1) At the level of street space, it is required to strictly protect the names, directions, section forms, paving materials, street trees and spatial scales of streets and alleys, and to control the heights, massing scales, architectural styles, materials, colors and continuity of street interfaces of buildings on both sides of them. At the open space

level, for streets with poor green environment, under the premise of protecting historical buildings, combined with the renewal and improvement of a small number of buildings with poor style and quality, additional greening and small-scale squares are installed along the streets. Improve the pedestrian environment; demolish the incongruous buildings around the Baiting Xu Dafu Family Temple and improve its surrounding environment.

2) At the level of architectural texture, it is strictly forbidden to demolish the traditional style buildings along the street. On the premise of keeping the main style and architectural features of the street unchanged and maintaining the diversity of street architecture, elevation repair and local regeneration can be carried out for the poor quality style buildings along the street. Four strategies are proposed: protection, repair, improvement (rectification, preservation), and transformation. Among them, for the heritage buildings to be strictly protected, for non-immovable heritage traditional style buildings can be updated and transformed for their internal functions, the external appearance, volume and height to be preserved. For the buildings that are not in harmony with the traditional style can take a variety of measures such as remediation, transformation, and so on, by changing the color of the building, roof form, layer reduction, partial demolition and other measures to coordinate with the traditional style of the historical district; allow the internal renewal and transformation to adapt to the modern lifestyle. The negative impact on the traditional landscape is significant, and it is recommended that, where conditions permit, the buildings should be demolished and rebuilt in harmony with the traditional landscape of the historical district. The illegal buildings should not be expanded and altered, and should be demolished, and the empty land after demolition must be built in accordance with the planning requirements. Specifically with the actual situation of the future renewal and regeneration of the plot shall be determined.

3) At the level of municipal facilities and materials, the street environment should be improved, private buildings along the street should be demolished, canopies and burglar-proof windows should be improved and renovated, and street lights, signs, canopies, air-conditioning units and garbage cans should be harmonized with the traditional appearance; traditional pavements should be protected, traditional stone roads should be restored, and the Qing brick and gray tile architecture of the late Qing Dynasty should be restored.

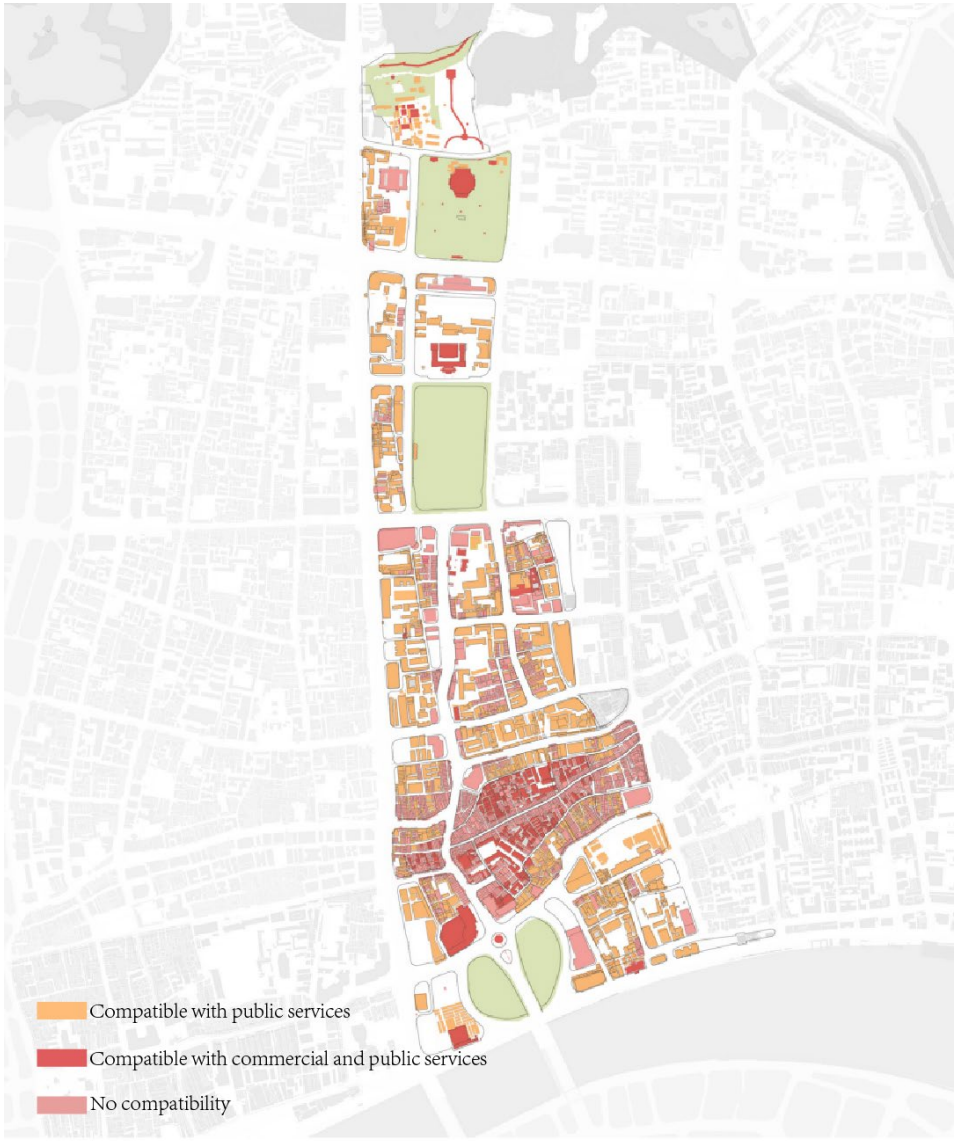


Figure 5-14 Future functions positioning

（Source: re-drawn by the author based on reference [58]）

5.2.3 Integration of Typological Approach in the Xudi - Gaodi Street Historical Area

Through the typological approach, at the block level, research the changes in the street structure within the block by comparing the changes in the building base and the block form in different historical periods; at the plot level, analyse the changes in the architectural fabric within the base to weave in the Xudi building compound. At the same time, extract typological characteristics and regenerate them as guidelines and opinions to control the regeneration of the historical area, offering a variety of alternative possibilities for the regeneration of the district.

5.3 Type Extraction of Xudi - Gaodi Street Historical Area

5.3.1 Street Network

This paper selects four time periods: the Republican period (1935), early years of statehood (1959), the post-reform and opening-up period (1989), and the post-2000 period (2004), and explores the changes in street patterns by studying the changes in street networks over time. The design of the street pattern is guided by the study of the historical changes of the street network.

（1）Republican Period (1935)

According to the 1935 mapping of the city’s meridian map, there are three main streets within the neighborhood, which are connected vertically to the main roads. The buildings in the block have narrow openings, mostly 3-4 meters, facing the roads mainly with narrow sides, seeking more entrances and exits to the streets.

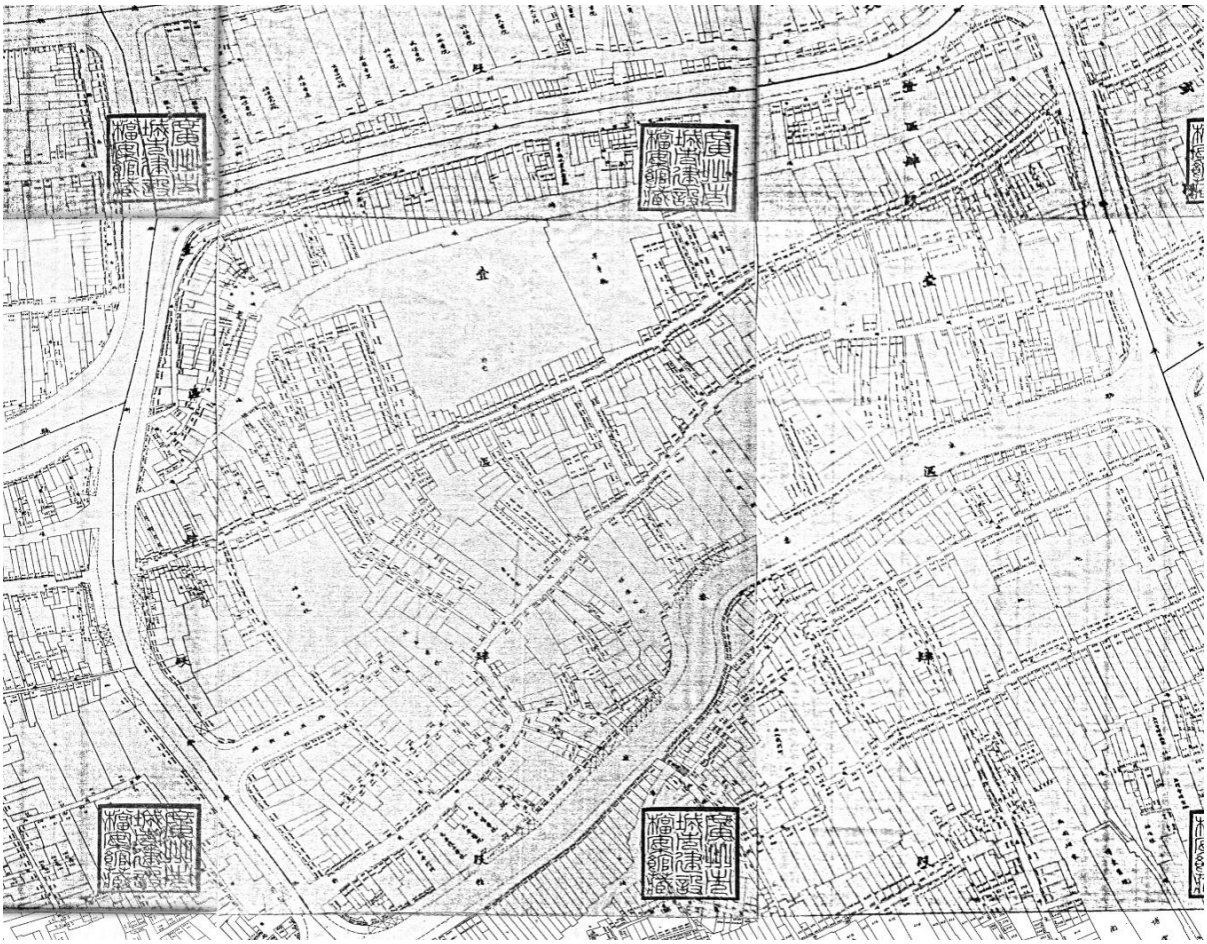


Figure 5-15 1935 Historical Map
（Source: reference [46]）

（2）Early Years of Statehood（1959）

After the founding of the country, Gaodi Street has maintained its function as a commercial street. It operated daily department stores and was popular in the early stage of the founding of the country. The texture of the base in this phase has partially changed, and the overall street pattern has not changed significantly, in which the architectural scale and street pattern of the Xu Di building group no longer reflect the traditional Lingnan building group organization pattern.

Figure 5-16 1959 Plan
(Source:Made by the Author)

（3）The Post-reform and Opening-up Period (1989)

After the reform and opening up, it became a thriving market for individual households as the frontier of reform and opening up. During this phase, the building form on the north side of Yudaihao further changed and the open space area gradually decreased.

The internal street organization of Xudi became more chaotic and disorderly.

Figure 5-17 1989 Plan

（Source:Made by the author）

（4）The Post-2000 Period（2004）

The construction of modern commercial buildings, such as the Hop Run Plaza, has significantly changed the street pattern on the north side of Yudaihao. The overall road

network pattern has not changed significantly, and the open space inside Xu Di has been further reduced.

Figure 5-18 2004 Plan
（Source: Made by the author）

In summary, the extraction of the streets and open spaces within the base and the comparison of the chronology show that the street pattern of the neighborhood has been basically preserved since the founding of the country. The number of blocks within the base has not changed significantly. In the north, many modern residential and high-rise commercial buildings were built. The street pattern of the neighborhood has been changed to a certain extent. The changes in the street pattern are mainly reflected in the interior of Xudi. The area of open space in the streets and alleys inside Xudi has gradually decreased.

Time	1959	1989	2004
Street Network			
Characteristics	Preserves the street pattern of the Republican period with abundant open space	Change in street network and reduction in open space within Xuidi	The open space is further reduced and the commercial buildings on the north side break up the street and open space

Table 5-1 Analysis of changes in the spatial network of streets and alleys over time

（Source:Made by the author）

There is a big difference between the section of the main street and the internal branch lane of Gaodi Street. The D/H ratio of the main street inside the base is about 1 with a strong sense of enclosure, while the D/H ratio of the internal branch lane is about 0.3. The width is about 1.5-3 meters.

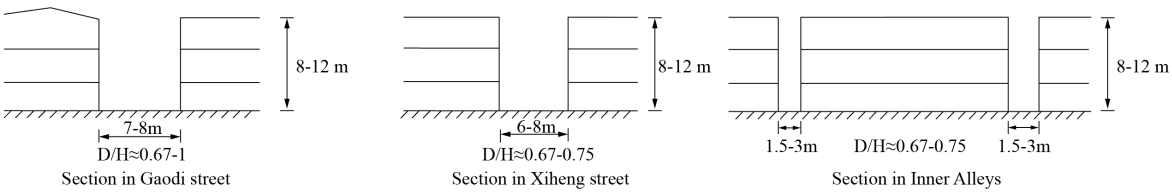


Figure 5-19 section in the streets

（Source: Made by the author）

commercial development of reform and opening up until modern times, the street pattern inside the district has been basically well preserved. However, the architectural patterns and streets in Xu Di have gradually lost their original patterns and traditional organization. Therefore, this paper analyzes the changes of architectural combinations in Xu Di through the ephemeral study, and discovers the characteristics of the changes of the prototype through the study of the archetypes.

5.3.2 Combination of Architectural Types

5.3.2.1 Combination of Traditional Buildings in Xudi

（1）Republican Period

Xudi is a typical group of families living in the city, with a history of more than two hundred years. The construction of Xu Di first began during the Qianlong period of the Qing Dynasty. Originally from Chenghai, Guangdong, the Xu family has lived in the Chaoshan area for thousands of years and is a local famous family. In 1772, Xu Yongming, the 15th generation grandson of the Xu family, moved to Guangzhou (formerly known as Panyu) to settle down and do business. Since the son of Xu Yongming, Xu Baiting, the Xu family has developed in Guangzhou. After several purchases of land, the Xu family developed to the pattern of the Republic of China.

According to the layout of the Xu Di recalled by the Xu family (which should be the early impression of the Republic of China), we can see that the entire Xu Di Li house, through the north-south alleyway, is divided into three parts: east, middle and west, of which the middle is a four-way house facing south. The middle of the house is the widest, and is the ceremonial space of the entire Xu Di family house, consisting of a hall - a hall - a living room - a sacred hall - a third hall - a fourth hall. -The east side of the house is narrower and has a large kitchen; the west side of the house is more spacious and has a flower hall and garden connected to the middle living room, which is the central courtyard of Xu Di. All the houses in the west are organized through north-south lanes, most of which are west to east, with a narrower width, similar to the traditional arrangement of houses in Guangzhou’s branch lanes, while the eastern part

is the latest to be formed, with the Xu family temple as the center of the three-way pattern. In the Xu area, there are three main forms of architectural organization：

(1) The buildings are linked along the axis through patios and a corridor.

(2) The building is connected to the road in parallel through the alleyway.

(3) Mixed form

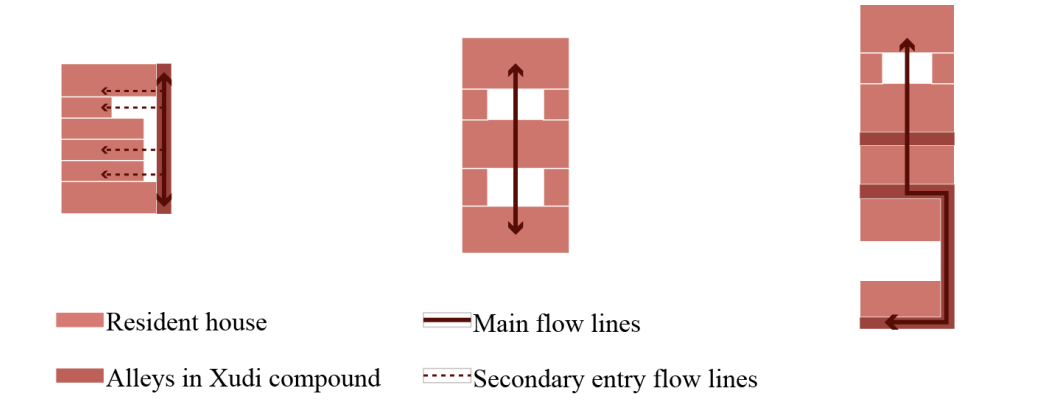


Figure 5-20 Xudi-Gaodi Architectural composition type

（Source: Made by the author）

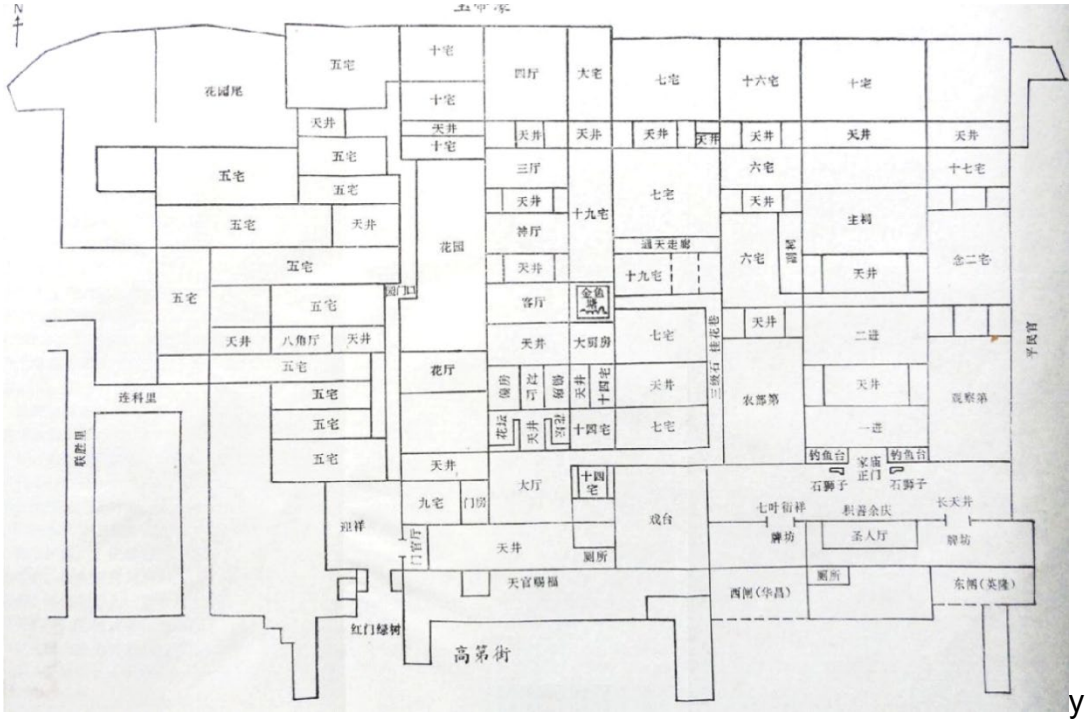


Figure 5-21 Xudi-Gaodi 1935 speculative ground floor plan

（Source:Reference [44]）

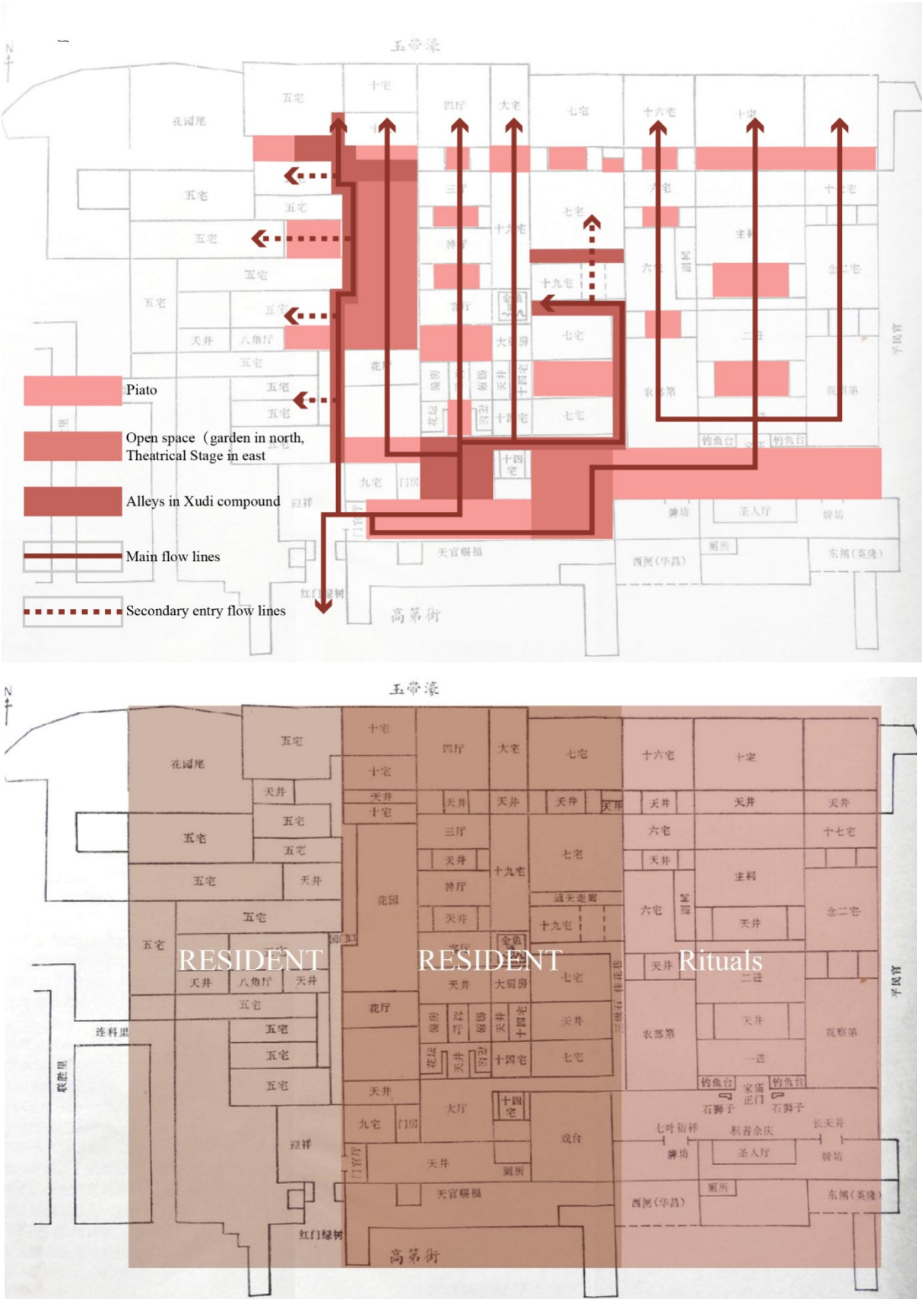


Figure 5-22 Xudi-Gaodi spatial organization mode and route flow line mode in Xudi

（Source: Made by the author）

(2) Early Years of Statehood（1959）

In the early years of the foundation of China, the architectural assemblage of Xudi changed significantly compared to the republican period, and the original building composition type were severely damaged, but the original patio and courtyard spaces still exist, and the spatial extent of the original eastern and central roads defined by the buildings is still recognizable. The remaining part of the research base outside Xudi maintains the traditional Zhutongwu layout.

(3) After Reform and Opening Up (1989)

After the reform and opening up, more additions were made in the base, and multi-story houses appeared in the base, which changed the original architectural texture, and the addition of some buildings destroyed the limited pattern of architectural texture in the longitudinal direction. The number of plots and buildings on the exterior of Xu Di have increased

(4) After 2000

Over the next 30 years, the former residence of Xu Zhuo has become a whole building. Internal road access is inconsistent, and the former residence buildings are enclosed in additions that are weakly connected to each other. The construction of the exterior of Xu Di and Run Square demolished large areas of the original buildings, and the construction of Guangzhou Tenth Middle School and modern residences in Yianli further destroyed the traditional fabric, resulting in a fragmentation of the traditional fabric and a serious lack of unity in the landscape of the site.

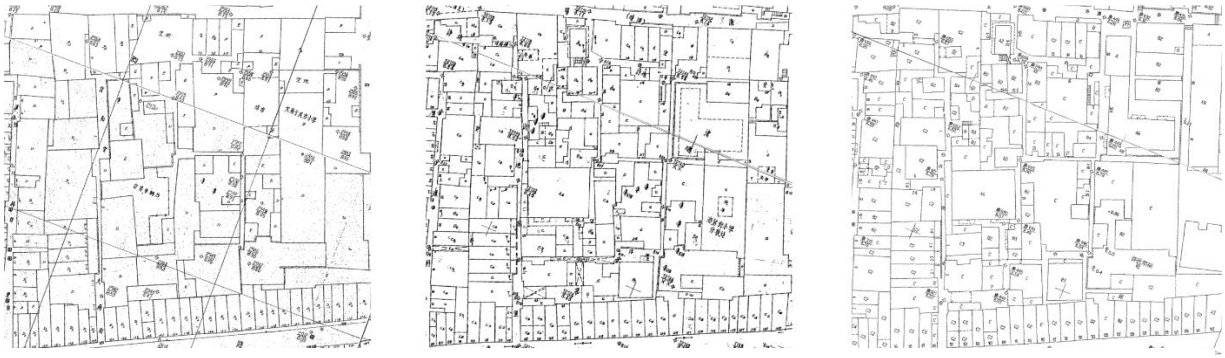


Figure 5-23 Ground floor plan development in1959-1989-2004

（Source: Made by the author）

5.3.2.2 A Combination of Bamboo Tube Houses

Due to their narrow frontage and long depth, the bamboo tube house within the Xudi - Gaodi Street historical area are mainly grouped side by side facing the main street. Some of the buildings are nested together. The balconies and elevations of the bamboo houses in the interior of the block are the main influencing factor in the change of the street section of Gaudi Street.

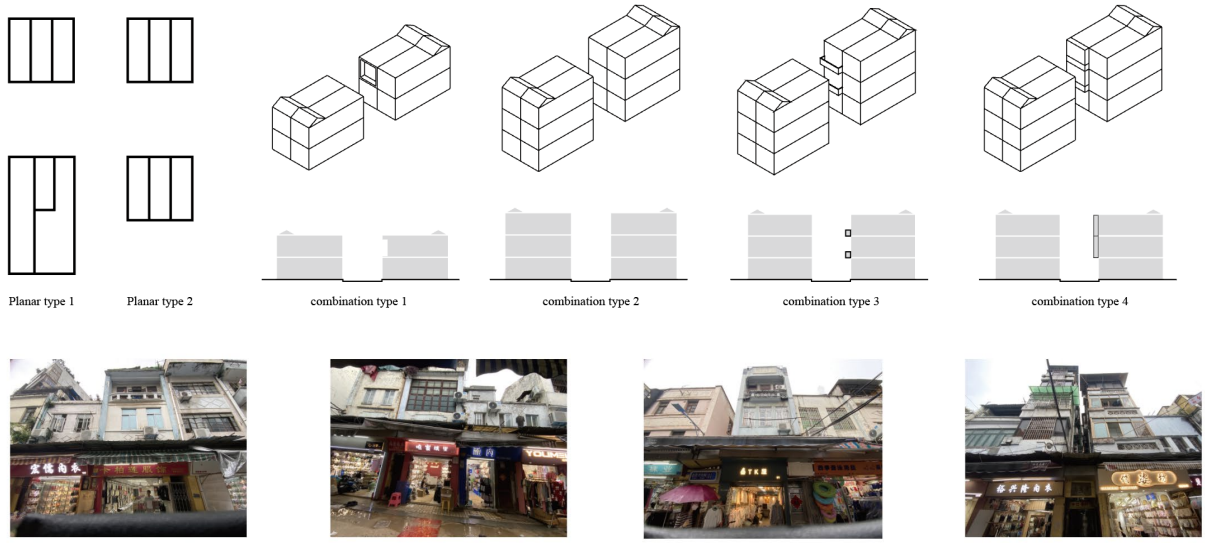


Figure 5-24 Combination Types of Bamboo Tube Houses
（Source: Made by the author）

The arcade street on the north side of Danan Road have two types,the traditional and the modern arcade. The modern arcades have 5-7 floors with elevated ground floor and is laid out in a side-by-side manner; the traditional riding tower is mainly three floors with an elevated ground floor and a pedestrian passage beneath the elevated floor. The outer side of the building profile is directly connected to the carriageway.

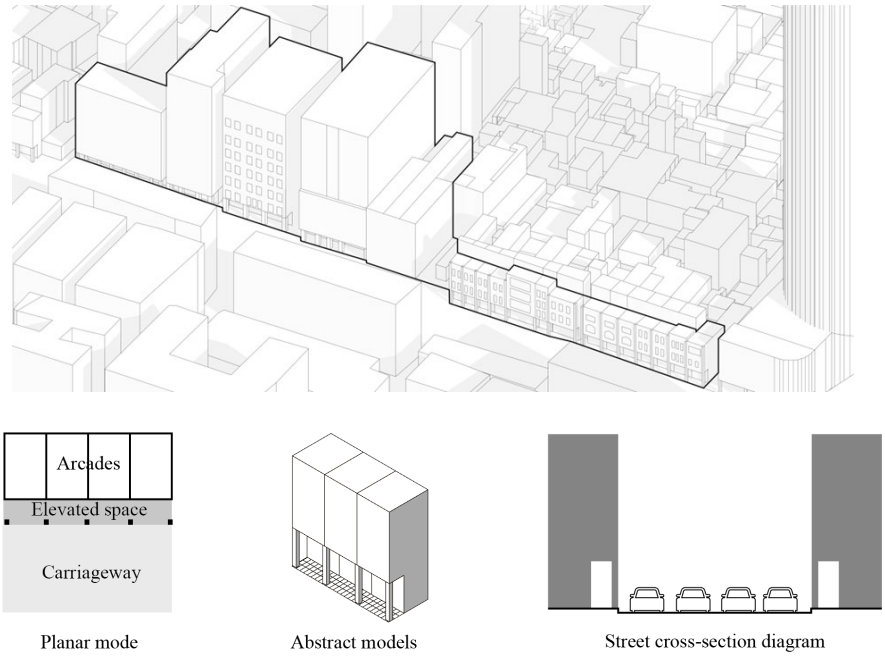


Figure 5-25 Street spatial Combination of arcade street

（Source: Made by the author）

5.3.3 Building Typology

5.3.3.1 Building Type Classification

(1) Qing Dynasty Traditional Architecture

The existing traditional style buildings inside the Xudi are represented by the Xudi Gate and the temple of Dafu Tingxu Bai. The most important group of buildings in the Xudi compound is the Baiting Dafu Tingxu Bai family temple. The temple is located at the back of Xu Di No. 41, and is the ancestral temple of the Chaozhou Xu family in Guangzhou.

(2) Zhutongwu

Zhutongwu(Bamboo tube house) is a traditional architectural typology in Guangzhou and the most numerous type in Gaodi Street, with a narrow facade of around 4 metres and long and slender depth of around 12-27 metres, shaped like a bamboo tube, so it is called Zhutongwu. There is no definite date for the origination of Zhutongwu, and the current view is that Zhutongwu appeared in Guangzhou during the 19th century when the city’s population grew dramatically. In comparison with the characteristics of rural and small-town building types, those of the nineteenth-century building types that have

c in Guangzhou reflect greater pressure on land. [54]The Zhutongwu generally divided into three parts: a foyer in the front, a kitchen in the back, and one or more bedrooms and a ventilated patio in the middle, depending on the length of the depth.

A large number of Zhutongwu are preserved on both sides of the main street of Gaodi Street and Xiheng Street, with long Manchurian windows and Western decorative line footings. Representative examples include 2, 4, 6 and 8 Lianyunli. The exterior walls of this group of buildings are Shanghai batch dang, with western-style columns, arches, western-style mountain lowers and other decorative elements such as bar doors and Manchurian windows. The buildings are simple and decorated with continuous balconies, reflecting the historical style of Gaodi Street.

It is worth mentioning that while the exterior of the bamboo houses within the block retains the traditional architectural appearance, the interior layout has been significantly altered. The first floor has been largely opened up as a shop. Above the first floor are storage areas.

(3) Republican House

Most of the houses in the Republic of China were built in the 1920s and 1930s as single-yard, detached houses, and their floor plans have broken through the narrow proportions of traditional bamboo houses. Due to the high density of buildings in the Gaodi Street area, the houses in the district could not be built in the strict meaning of detached form, but often made use of the bifurcation of Y-shaped streets to increase their independence. A typical example of a small house in the Republic of China is No. 5 Terra Zero Lane, a large 3-story house built in a combination of Chinese and Western styles. The exterior wall is made of red brick with clear water, the top floor has a glazed sloping roof, and the third floor has a curved balcony with fine balustrades.

(4) Traditional Arcade

[54] Tian Yinsheng, Gu Kai and Tao Wei. Urban Morphology, Architectural Typology and Cities in Transition[M]. Beijing: Science Press, 2014

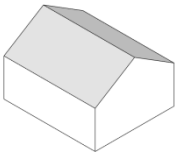
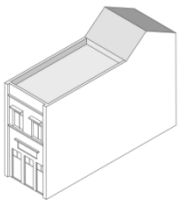
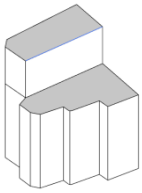
There are a number of traditional arcades along the north-west side of the historical area of Xudi-Gaodi Street, with 2-3 floors, mainly in the Baroque, Gothic and Renaissance styles. The ground floor is elevated and the column span is 4-6 metres. The representative building is No. 44, Danan Road.

Figure 5-26 Street spatial form of arcade street

（Source: Made by the author）

(5) Modern Arcade

In addition to the traditional arcades, there are also arcades with a modern style which elevated ground floor. The functions above the first floor are commercial and residential.This is represented by No. 66, Danan Road. The façade of the building is divided into according to the column span of the ramp, with arched windows and traditional styles such as columns and pediments.

	Qing Dynasty Traditional Architecture	Zhutongwu	Republican House
Volume axonometry			
Structural	bricks timberwork	bricks timberwork	Brick Structure

system			
Representative-architecture	Xudi 5 backseat	Gaodi Street 102	Jilingli 5
Elevation characteristics	Qing Dynasty tile roof exterior wall plastering	Tile/painting, window type is Manchurian or modern windows	Brick wall with wooden windows
Current photos			

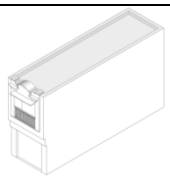
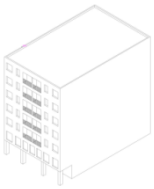
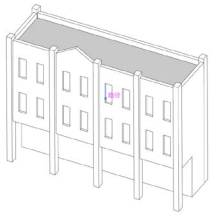
	Western-style building	Modern Arcade	Traditional Arcade
Volume axonometry			
Structural system	bricks timberwork	reinforced concrete frame structure	reinforced concrete frame structure
Representative-architecture	Gaodi Street 72	Danan Road 66	Danan Road 44
Elevation characteristics	pediment，molding，pillar	Elevated ground floor, modern facade	Elevated ground floor, pillar，pediment
Current photos			

Table 5-2 Typology of architectures in the site
（Source：Made by the author）

5.3.3.2 Details

(1) Windows

The traditional style of windows in the Xudi-Gaodi Street district is mainly the Manchurian window style. The window openings are mainly single, double and triple windows. Opposite to the Manchurian Window, modern windows are more free to open and separate, and some of them are combined with balconies for window opening.

Window type classification

Window Types Classification		
	Modern Window (Gaodi Street)	Manchurian Window (Gaodi Street)

Table 5-3 Window types classification
（Source：Made by the author）

The window opening patterns of Zhutongwu buildings in the base have a great influence on the elevational form of the buildings. Through Moneo's abstraction of types, this paper, after on-site investigation, classified the window types of the buildings on Gaudi Street in coordination with the traditional style into six types: single window, double window, triple window, free opening window, left-right connection and combination with balcony.

1. Single Window

The window opening pattern of single window is mainly along the central axis of the building. There are two forms of single window, one is the overall window opening with the window sleeve and window separation taking the form of Manchurian window, such as 62 Gaodi Street, and the other is a narrow window with similar width to other types of window openings on the central axis of the building elevation.

2. Double window

Double windows on the same floor constitute a real-virtual-real relationship, the width of the wall between the window and the window is slightly narrower than the window but the width is basically similar, the width of the exterior walls on both sides of the window is also basically the same as the width of the window, but relatively narrower in comparison to the width of the window. For example, the Mupaitou 28.

3. Three windows

There are two forms of three windows, one is arranged along the horizontal direction, such as 175 Gaodi Street. The other is to arrange three windows on the wall in upper and lower sections. The height and width of the opening of the three windows are more consistent.

4. Free window opening

The free-opening window elevation types are mainly openings of similar width and height in the wall, such as 144 Gaodi Street.

5. Left and right contact

Some of the buildings break the separation between window walls on the façade by placing a separation on the wall between the windows, such as 157 Gaudy Street.

(6) Combined with balcony

Two forms of window openings combined with balconies exist within the base, the first being the Zhutongwu building with a concave balcony form, where the residents reshape the boundaries of the building by adding glass windows to the balcony.

To sum up, the common characteristic of Gaodi Street elevation types is mainly the use of similar width and height of openings, in number of positions, for variation. At the same time, the traditional style of Manchurian windows with glass separation and color dissolves the scale of single windows with large openings and achieves the harmonization of the elevation style

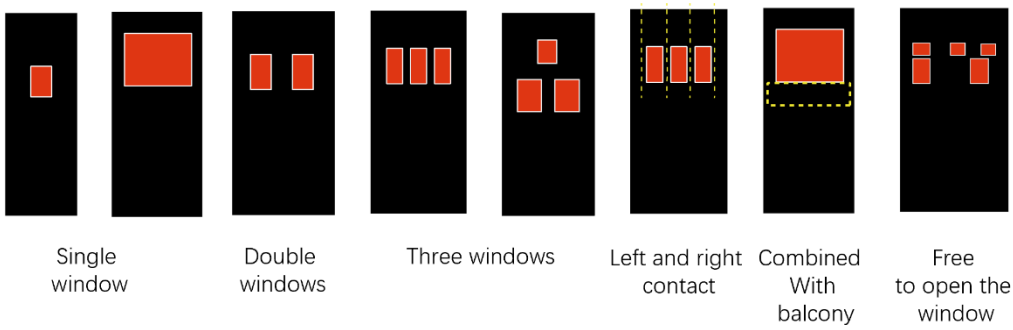
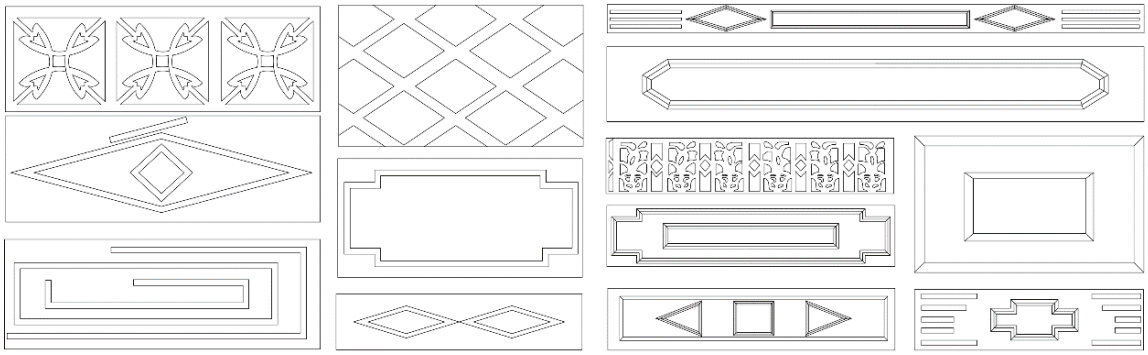


Figure 5-27 Type of the elevation related to the windows opening
（Source:Made by the author）

（2）Patterns

The Zhutongwu has a narrow elevation, and after the first storefront, doors and windows are removed from the elevation, the remaining wall area of the elevation lacks contrast compared to the area of doors and windows. [55]The patterns on the wall are usually set under the windows, the lower part of the eaves, and the pediment. In addition to the relief patterns on the walls, the patterns are usually used on the balconies. The elevation pattern of Xu Di – Gaodi Street block mainly uses geometric pattern with block decoration.



[55] Yi Zhenzong. Research of the Folk Baroque Architectural Art in Nanyue——An Example of Thirteen Hongs Merchant Historical Street in Guangzhou [D]. Guangzhou University, 2018.

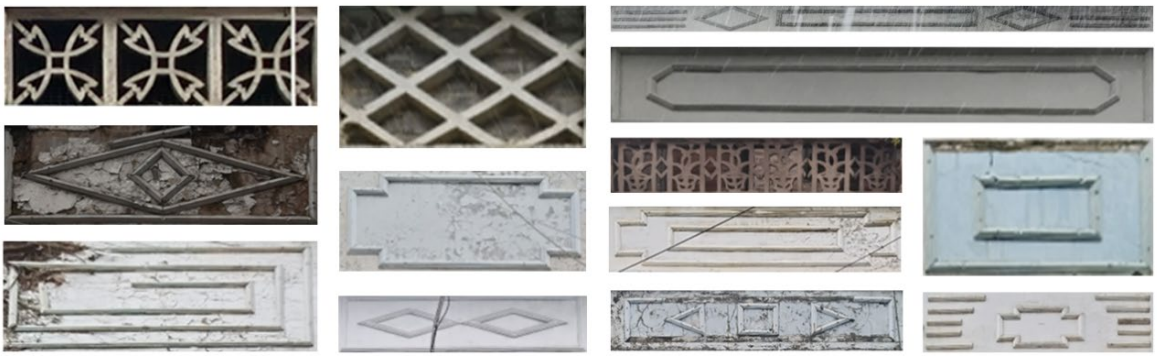


Figure 5-28 Typology of Patterns
(Source：Made by the author)

(3) Balconies

The traditional balcony types in Highland Street can be divided into four types: cast iron balustrade type, solid belly plate type, openwork balustrade type and treasure vase balustrade type according to the material and detailed characteristics. According to the relationship with the main body of the building, it can be divided into three types: pick balcony and concave balcony, closed balcony, half pick and half concave balcony. The modern balconies in Gaodi Street are mainly cast iron balustrade type and solid belly plate type, the color is not uniform and the style is not coordinated with the traditional style.

Figure 5-29 Typology of balconies
(Source：Made by the author)

（4）Pediment

Located at the top of the building, The pediment plays an "eye-catching" role in the details of the building, and its style is also the most abundant. It is the most vivid part of the overall image of the building. It is generally decorative and can be used as a water retaining wall on the roof of the building, but does not carry out structural functions. The pediment is the visual focus of the Zhutongwu, and generally presents

a symmetrical composition to highlight the central part. There are four main types of pediments in Xudi -Gaodi Street as follows:

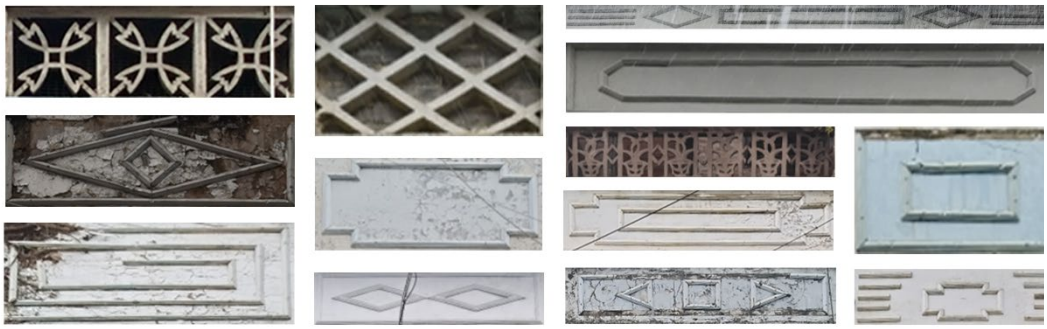
Figure 5-30 Typology of pediment
(Source：Made by the author)

（5）Pillar

Pillar style has an important effect in the architectural composition. In the Xudi-Gaodi Street district pillar forms are mainly used in the pediment, represented by 72 Gaodi Street. As well as the use of short pillars to link balconies, such as 72 Gaodi Street

Figure 5-31 Typology of pillar
(Source：Made by the author)

Classification	Status quo photos

Windows	
Patterns	
Balcony form	
Pediment	

Pillar	

Table 5-4 Typology of details in the site
(Source：Made by the author)

5.3.4 Summary of Type Characteristics and Implications for Type Transformation

(1) At the level of street network, from 1959 after the founding of the China, the original street network of Xudi was destroyed due to the construction of building additions, and the accessibility of streets inside the base gradually weakened, especially inside Xudi, with poor recognizability and insufficient open space. Therefore, in the renewal of historical areas, it is necessary to comb the streets and alleys inside the base in conjunction with the existing building use, compare the changes in street pattern through the ephemeral research method, and identify the streets and alleys with historical significance, which need to be combed and restored.

(2) At the level of architectural texture and combination of buildings, the construction activities within the base have changed the original architectural organization of the base, and the original patios and open spaces of the Xu Di compound have been encroached upon by the private buildings, and the traditional pattern of the heritage buildings has been lost and mixed with the additional storage buildings.

(3) At the level of building types, it can be concluded from the above analysis that the building types in the base are mainlyZhutongwu, but the style is relatively dilapidated, and the elevation type of Gaodi Street is mainly traditional style, and the composition

relationship of the elevation has a certain regularity. However, there is a certain conflict between the function of the prototype and the modern commercial business. Therefore, it is necessary to make adaptive interpretation and transformation of the internal function types of the building during the building renewal. At the same time, according to the different architectural styles, it is necessary to combine the planning requirements for the buildings to carry out targeted classification and renewal.

5.4 Typological Design Exploration of Xudi-Gaodi Street Historical Area

5.4.1 Conservation of the Overall Appearance

5.4.1.1 Overall Strategy

(1) Modest Continuation of the Current Vitality of the Base

The interior of Gaodi Street and Xiheng Street is relatively poor in vitality. The retail and wholesale business of Gaodi Street attracts a single clientele; the interior of Xiheng Street is mainly for living services, with small shops such as vegetable markets and food shops meeting the needs of the residents and having a strong urban atmosphere. The Yu Dai Hao and Xu Di are still inhabited by people from the Xu family, and the daily activities of the residents, full of live-in atmosphere. It can be said that the various parts of Gaodi Street have a distinctive and historically valuable dynamic, which is worth preserving and perpetuating.

However, this high concentration of similar businesses has also lead to a variety of negative problems, such as the confusion of traffic caused by the intersection of the flow of goods and passengers, the dilapidated appearance of the buildings, the inadequacy of the landscape system, the inefficient use of open space and the lack of capacity for public activities. In order to improve the current situation, it is necessary to discuss the characteristics of the existing types within the base, and to give regeneration strategies

Therefore, for the wholesale market of small commodities in Gaodi Street, a partial preservation strategy can be adopted. In the case of Gaodi Street, the two-floor building actually has a mezzanine floor, and the ground-floor shops and upper storages are more convenient for the wholesale function and can be preserved appropriately. For Xudi, it is necessary to restore the traditional texture and at the same time improve the internal spatial quality, and solve the problems of space crowding and environmental decay caused by private additions.

In addition, the pedestrian system and open spaces of the streets need to be improved, with more seating and landscaping, and the problem of bicycle parking needs to be addressed.

(2) In-situ Upgrading Strategy

The single mode of use and operation of the district and the unreasonable distribution of storage and ground floor commercial space have led to a lack of vitality and even a decline in the district. The traditional retail and wholesale model is out of step with the times, and the combination of modern cultural experiences and innovative industries such as the Internet is seriously lacking. Therefore,It is important to upgrade the business in situ and to introduce modern functions in an appropriate manner in order to boost the vitality of the historical area. The introduction of new functions should also be compatible with the traditional historical area in terms of style and environment, as well as the transformation of the original historical area form and building type.

First of all, the choice of the implantation function is a remedy for the missing part of the current situation of the district. As the current culture lacks a material carrier, it is important to give full play to its role as a carrier and to set up cultural display functions. Secondly, Gaodi Street, as the core area of Guangzhou’s historical and cultural district, has the value and potential to develop tourism. The introduction of restaurants and bed and breakfasts will reflect the local characteristics of the district and stimulate its vitality.

[56]The restaurant and accommodation spaces are flexible and have a greater potential for transformation, while improving the unreasonable use of the ground floor store. By introducing creative experiential workshops, high-grade production and retail workshops, attract local young people and promote the local commercial model.

(3) Typological Regeneration Strategies

The growth and development of any city is influenced by both “bottom-up” and “top-down” forces.The regeneration of historical areas also involves a number of factors, including property rights, the wishes of the residents and economic factors. The typological approach to regeneration therefore requires a top-down approach to the overall restoration of the spatial network and texture of the historical area, while at the same time taking into account the possibility of residents’ participation from the bottom

Therefore, a variety of transformed typed could be designed for residents to choose from, at the level of their participation. Based on the study of spatial , building types and human behaviour, the spatial types and building units of the streets can be interpreted and their combinations and use can be investigated in order to guide the space within the whole district through the specific design of the typological fragments. Based on the specific regeneration of the business and use patterns, various types of regeneration and combinations of types can be proposed for residents to choose from, including street facilities, building interface, and so on.

5.4.1.2 Conservation of Street Space

(1) The two main east-west streets, Gao Di Street and Xi Heng Street, should be mainly renewed and shaped to serve as two main axis. At the same time, open space nodes should be introduced to active the district.

(2) Removal of private additions in Xudi，restoration of the traditional fabric of Xu Di

[56] Tian Yinsheng. "The New Bamboo House" and Improvement of the Traditional Urban Landscape of Guangzhou [J]. Southern Architecture, 2020, (5): 78-83.

and placement of nodes to increase the carrying capacity of public activities

(3) Upgrading the pedestrian environment within the street space, regulating bicycle parking, improve the green system in Xudi.

Figure 5-32 Planning structure plan

（Source: Made by the author）

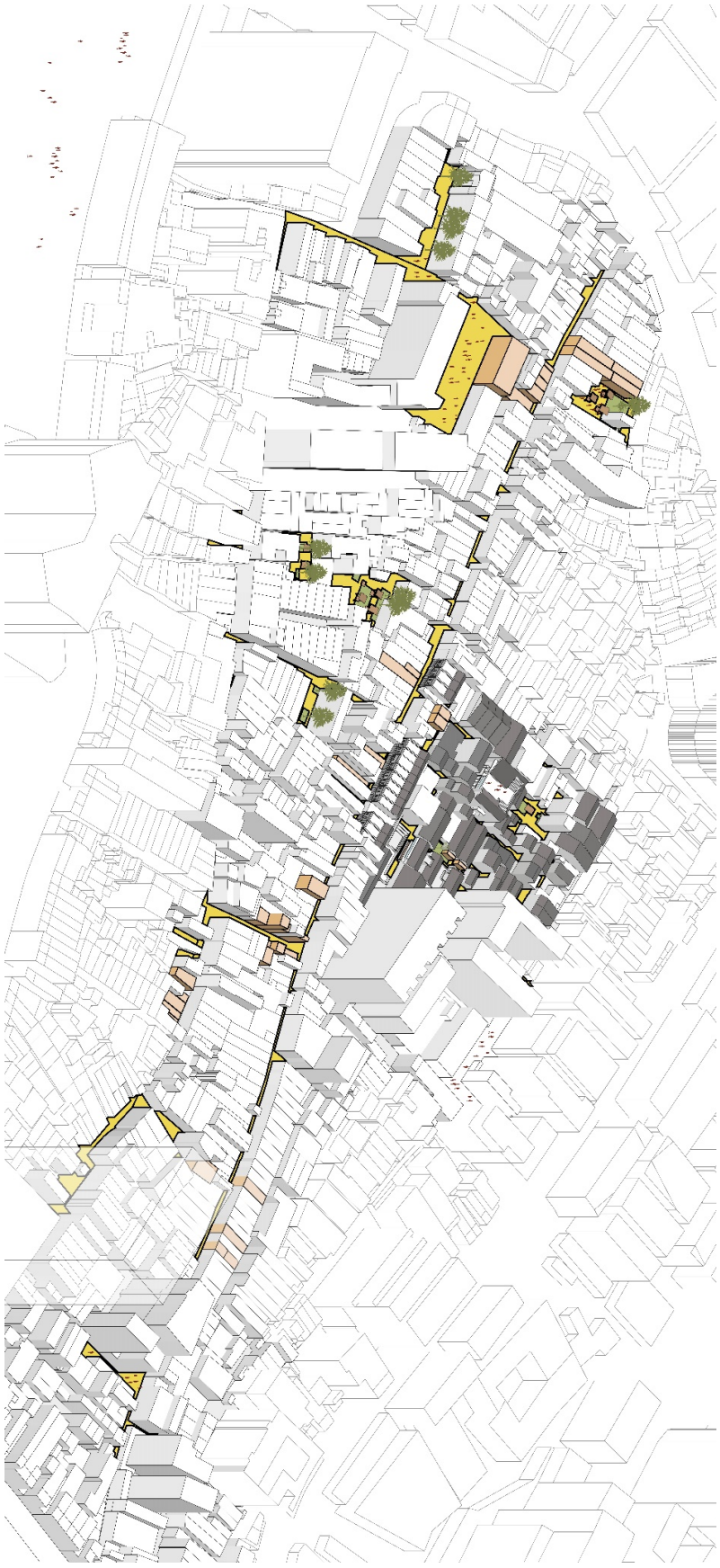


Figure 5-33 Axonometric view

（Source: Made by the author）

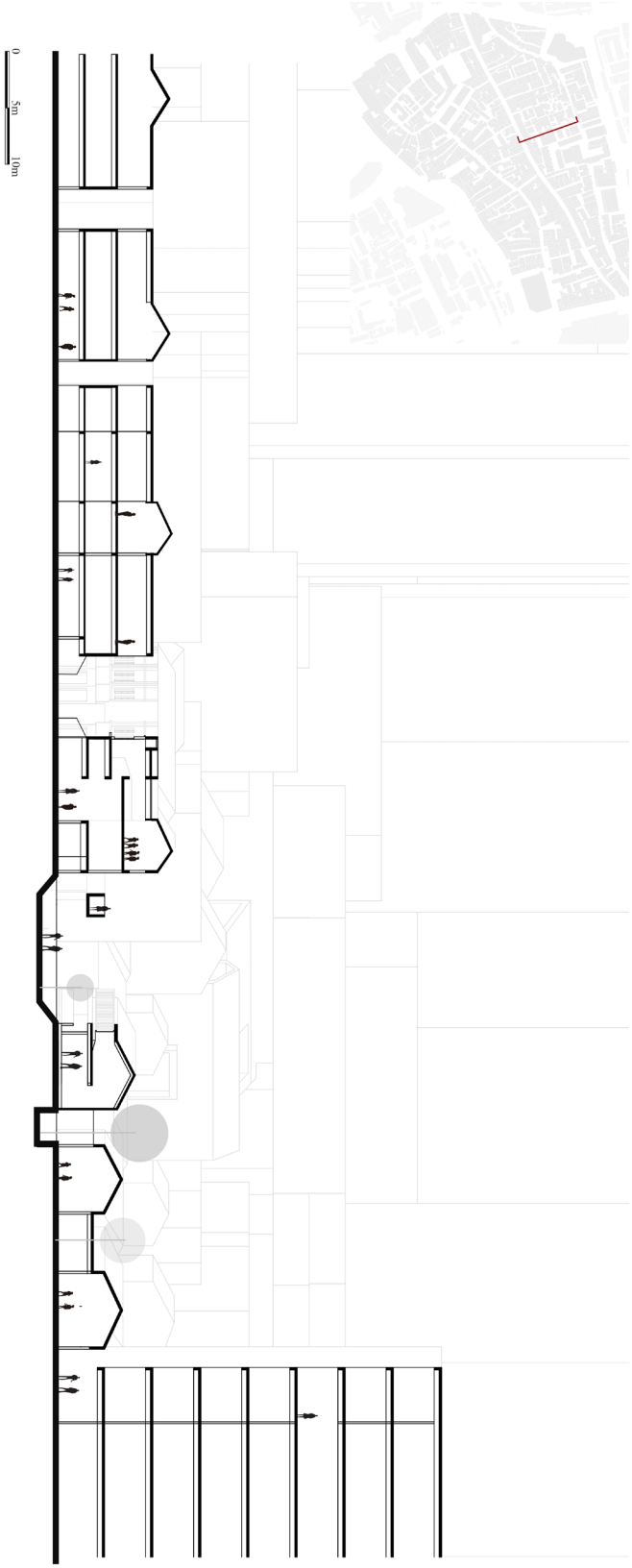


Figure 5-34 Section

（Source: Made by the author）

5.4.1.3 Preservation and Transmission of Cultural Heritage

Gaodi Street is very rich in history, but the cultural value of it is not reflected in the physical space of Gao Di Street. Therefore,cultural galleries, sculptures and other landscape elements can be placed in the interior of the street to highlight the historical features by combining them with the building types.

5.4.2 Architectural Fabric Weaving

At the level of architectural fabric, the architectural fabric of the main street and the inner branch lanes of the district has been well preserved, but the fabric of traditional building compound of Xu Di has been destroyed through illegal additions, so the typological approach can be used to sort out the characteristics of the fabric changes, and to weave the fabric(Table 5-5).

Identity of places is a dynamic process of continuous construction and re-creation, and the dialectical relationship between architectural design conservation-restoration needs to go back to the reasons for construction and restoration[57], so the restoration of traditional building assemblages in historical areas needs to be combined with both historical and actual building use activities.

For the architectural combination of Xudi, the historical additions were identified through a chronological analysis, and the pattern of Xudi East-Central-West Road was repaired in terms of architectural texture, while the private additions to the original open space in Huating were demolished to restore the internal open space. At the same time, some of the buildings were renovated to restore the traditional pattern of organizing buildings through patios and courtyards.(Figure 5-36)

From the diagram, it can be seen that the building between the former residence of Xu Zhuo and the family temple of Xu Dafu was gradually destroyed after the founding of the country, which is not historically significant and is an addition, so the

[57] Laura Anna Pezzetti, Zhang Shunyuan. Covering "urban rewriting" - regenerative structures of historical public spaces and buildings[J]. New Architecture, 2019, (2): 5-14.

building between the two important cultural relics was renovated by seeking the opinions of the residents.

Historical Stages	Republic of China	After the founding of China (1959)	After the reform and opening up (1989)	After 2000 (2004)
Building Composition Status				
Composition characteristics	Organisation through the patio	The traditional pattern is disrupted and the open space pattern is basically preserved	Modern architecture destroys the original layout and further reduces open space	Almost complete loss of street pattern and further reduction of open space

Table 5-5 Transformation of architectural organization of the Xu Zhuo- Baiting Xu Family Temple

（Source：Made by the author）

Within the entire Xudi, the scattered additions that occupied the open space shall be demolished, and then the incongruous flat roof buildings identified in the planning document shall be renovated. By means of flat to slope conversion, the building volumes that are incompatible with the traditional scale of the appearance will be dissolved, and the elevation will be transformed to restoring the traditional texture.

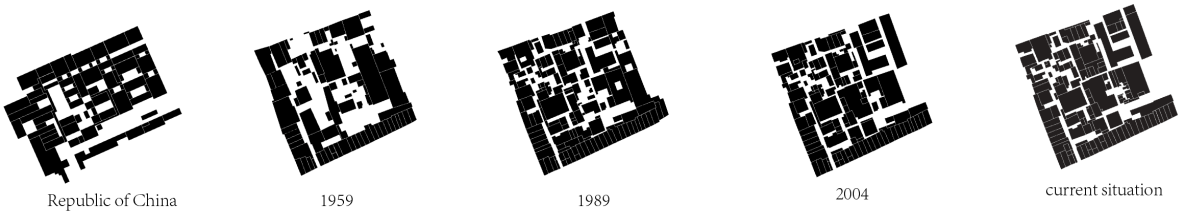


Figure 5-35 Ephemeral changes in the fabric of Xudi

（Source: Made by the author）

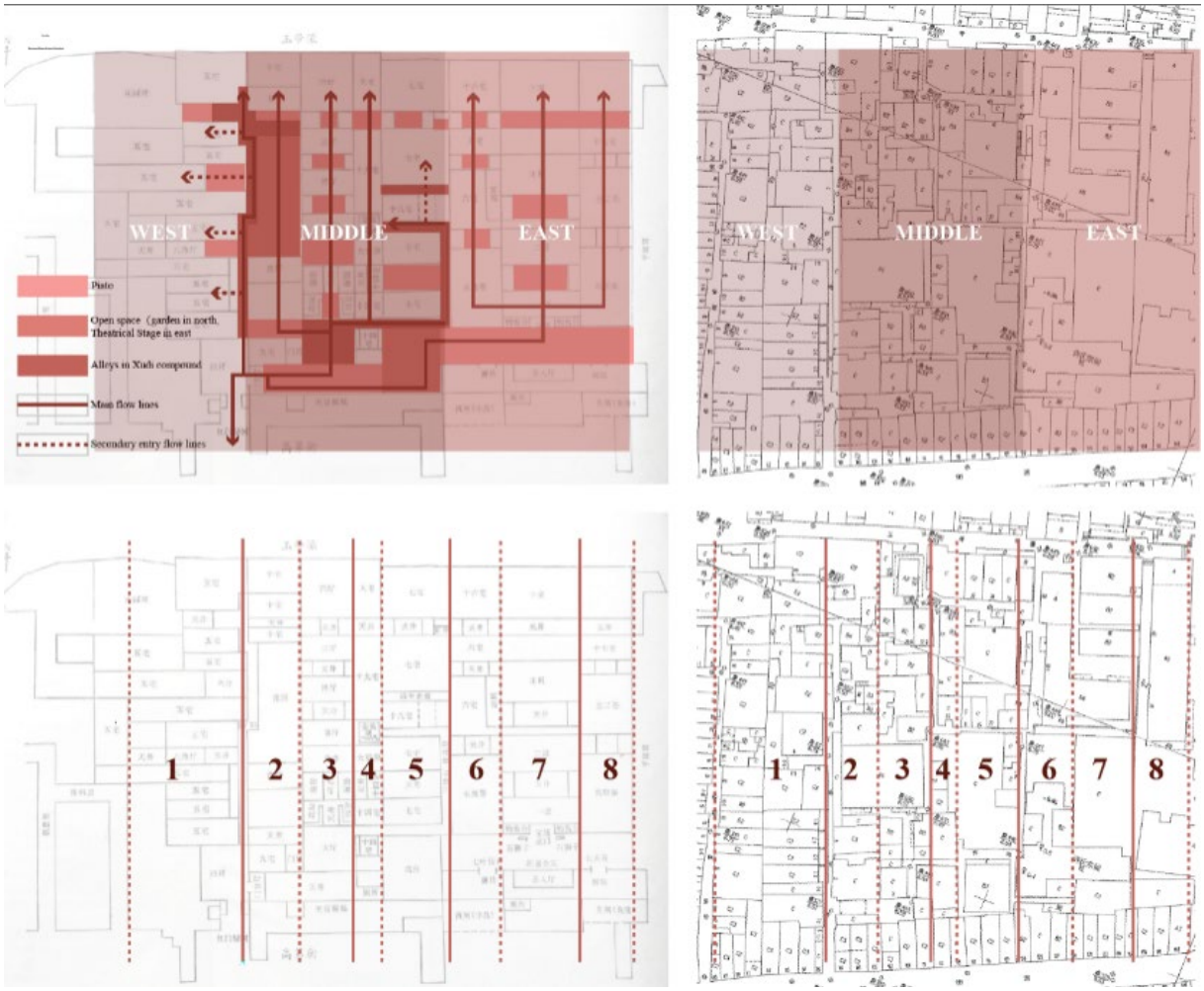


Figure 5-36 Spatial zoning of Xudi

（Source: Made by the author,base image comes from reference [46]）

The original open space system is restored based on study of the changes in the Xudi. In this paper, by extracting the typology from the traditional building composition and plot division, two nodes within the site are regenerated to active the Xudi neibourhood.

At the same time, additions that destroy the traditional fabric are demolished and rebuilt through boxes(Figure 5-37).

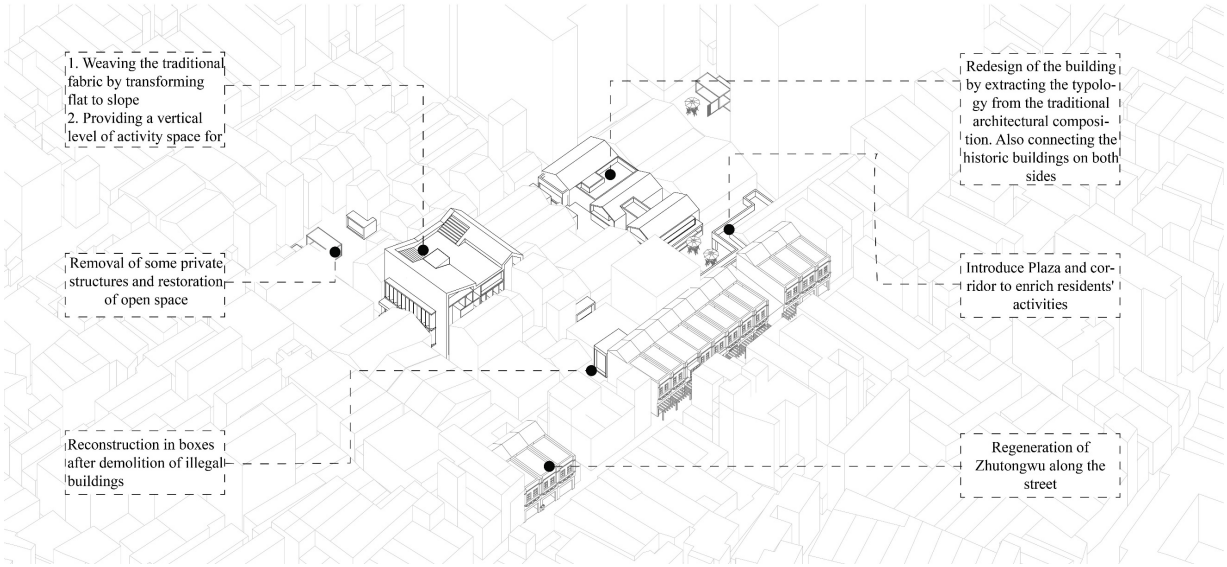


Figure 5-37 Regeneration strategy of Xudi

（Source：Made by the author）

Figure 5-38 Regenerated masterplan of Xudi

（Source：Made by the author）

Node 1 is located between the residence of Dafu Tingxu Bai and Zhuo Xu(Figure 5-39). From the previous analysis, it is known that the building between the two important

heritage buildings is a post-construction addition. Therefore, the building is chosen to be renovated. The new building should be used as a bridge to connect the historical buildings and revitalize the surrounding open space. At the same time, restoration of the traditional pattern is trying to be conducted. Therefore, this paper extracts the organization pattern of building-patio-buildings in the traditional typology, and afterwards transforms this traditional organization pattern into localization, changes the layout of the patio in the central axis to fit the building, and changes the position of the patio, so that the characteristics of the typology after localization can be adapted to different new functions(Figure 5-40).

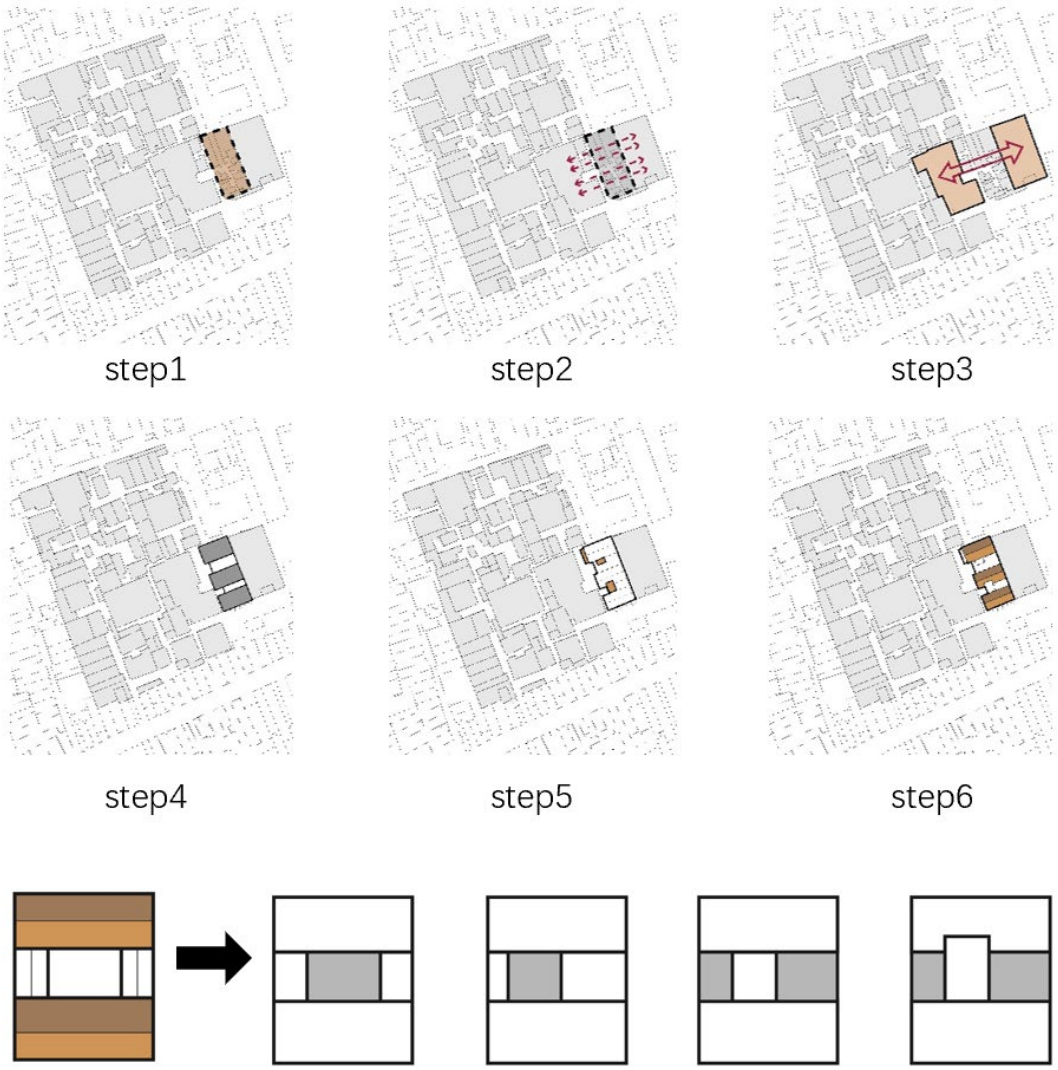


Figure 5-39 Type transformation process
（Source:Made by the author）

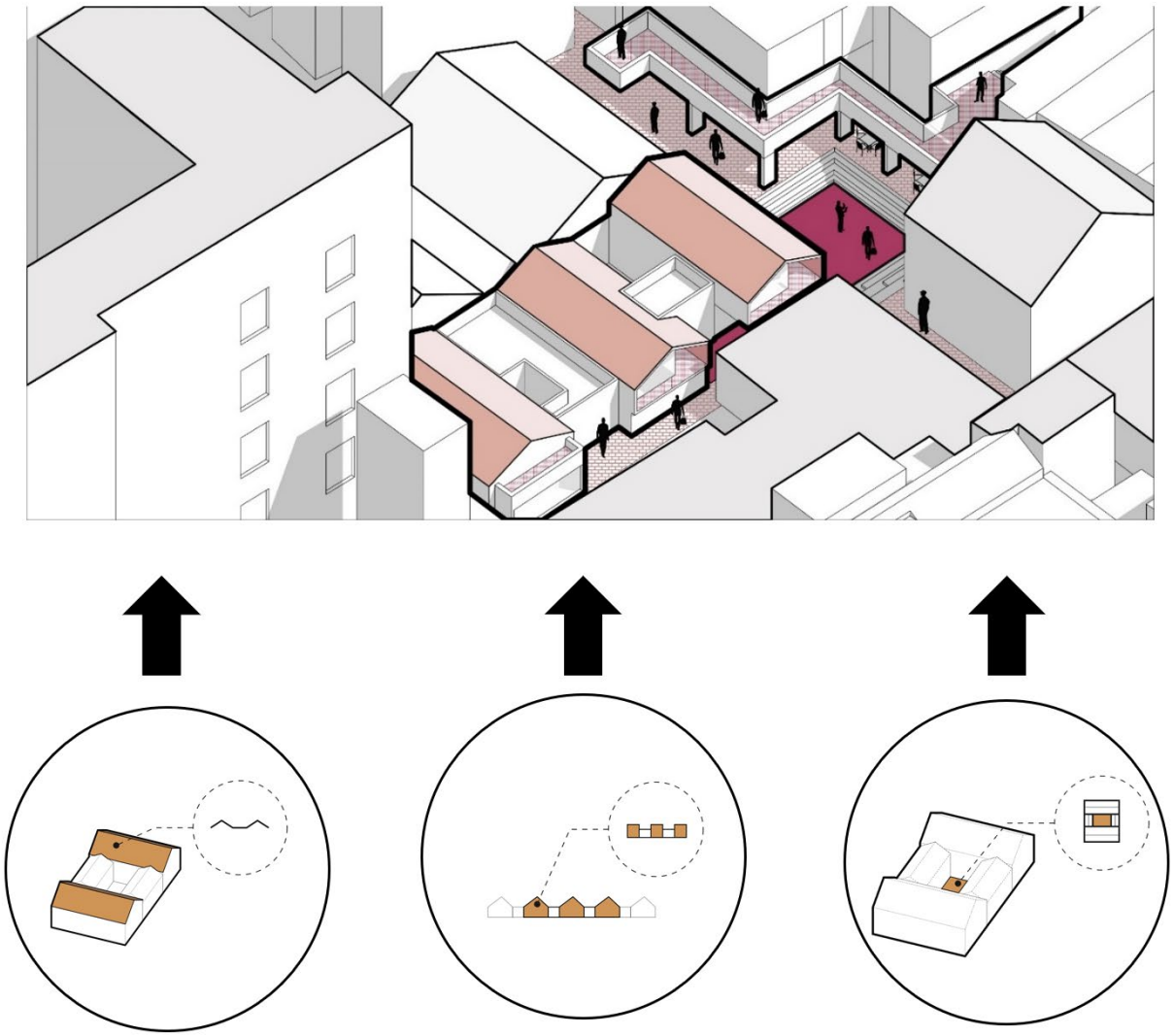


Figure 5-40 Type transformation process
（Source:Made by the author）

Node 2 is located in the interior of Xudi, a six-story flat-roofed building, which is defined in the upper planning document as a renovatable building and can be renovated by means of flat to slope and floor reduction(Figure 5-42). Therefore, in this paper, the flat-to-slope operation is carried out through typological methods. Firstly, in the location and form of the roof, the type is extracted from the traditional street pattern division and applied to the roof design to dissolve the original building volume and make it harmonize with the traditional neighborhood. After that, the courtyard is set on the roof, and the courtyard type on the ground level is interpreted and converted into a roof garden. At the same time, the new building is given the function of an observation

platform, which corresponds to the surrounding buildings(Figure 5-41).

After that, in the building interface forming, due to the high height of the building, the traditional Zhutongwu elevation scale and roof form are extracted, and the elevation scale is dissolved to make it in harmony with the Zhutongwu form of the main street.(Figure 5-43)

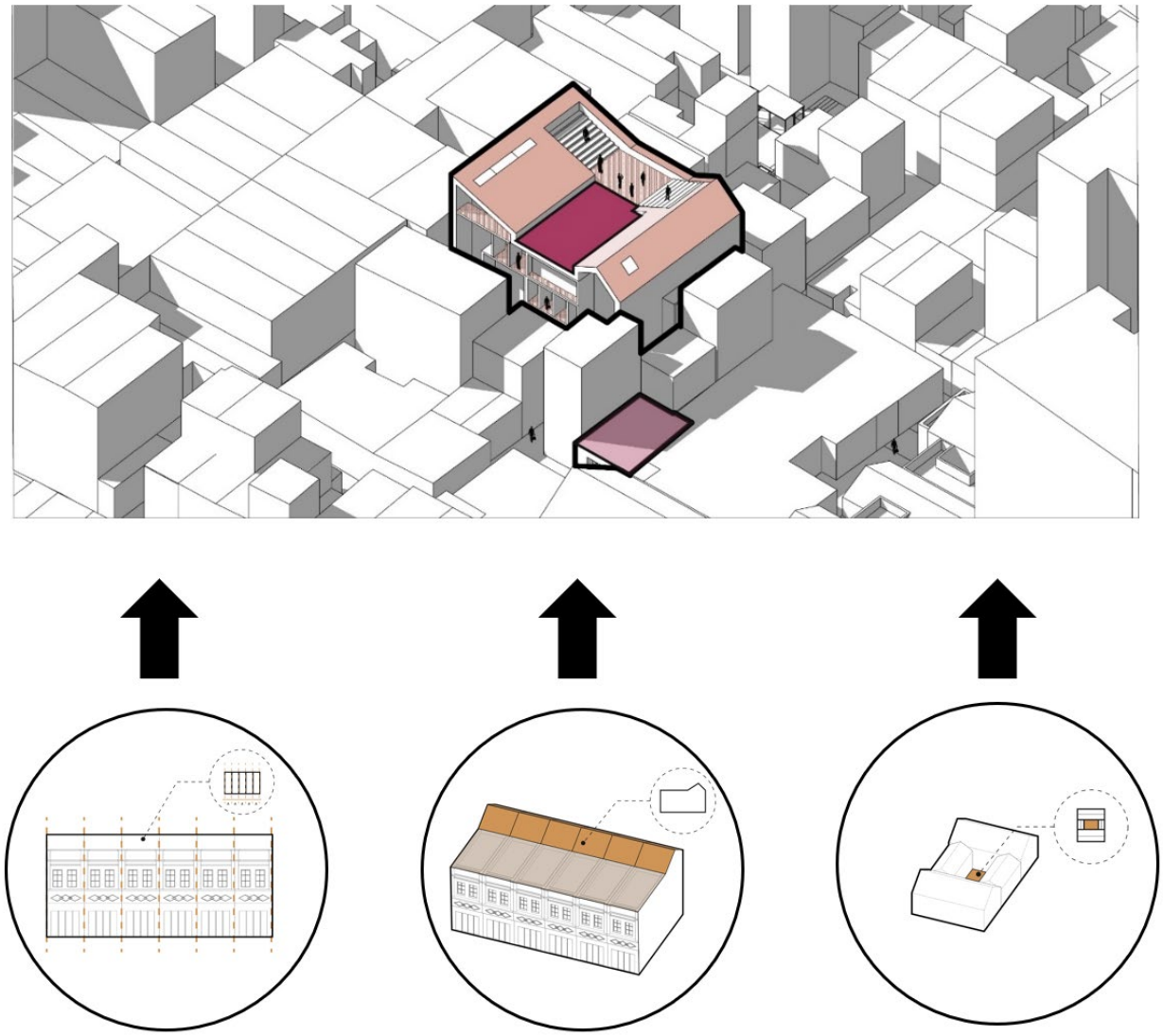


Figure 5-41 Type transformation diagram
（Source:Made by the author）

Figure 5-42 Fabric weaving diagram
（Source:Made by the author）

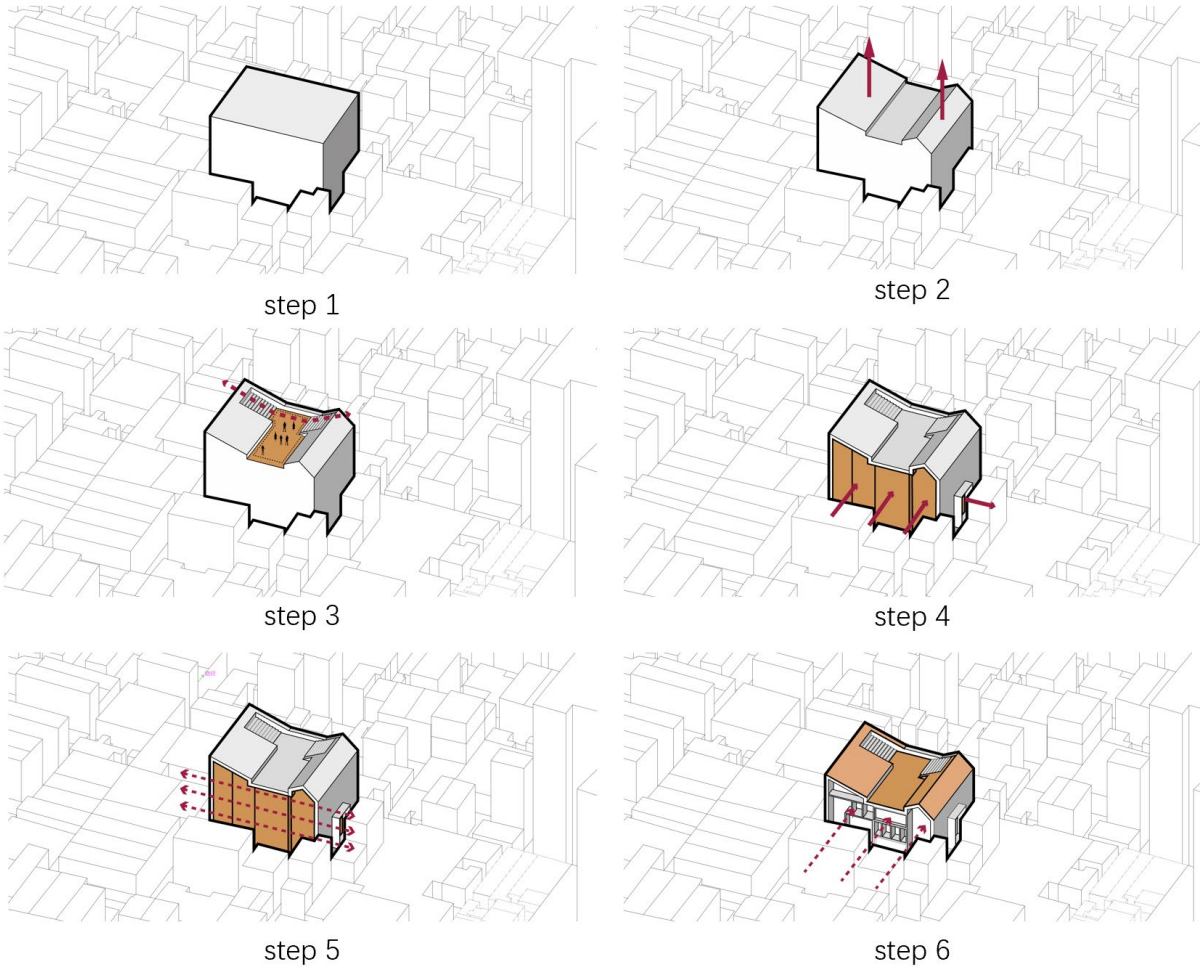


Figure 5-43 Type transformation diagram
（Source:Made by the author）

At the same time, the architectural texture of the interior of the base is restored to improve the quality of the street space(Figure 5-44)

Figure 5-44 Scences after renewal

（Source:Made by the author）

5.4.3 Architectural Regeneration

5.4.3.1 Strategies for Controlling the Architectural Appearance of Streets

Figure 5-45　Appearance control of the street

（Source:Made by the author）

(1) Canopy Modification

The temporary addition of canopy inside Gaodi Street are of varying heights and are made of dirty canvas canopies. These additions have a strong impact on the built environment within the street. Therefore, the existing canopies should be improved. The temporary canopies can be replaced by suspended or porch canopies. The form of the canopies along the street also should be controlled in conjunction with the form of the building type(Figure 5-46).

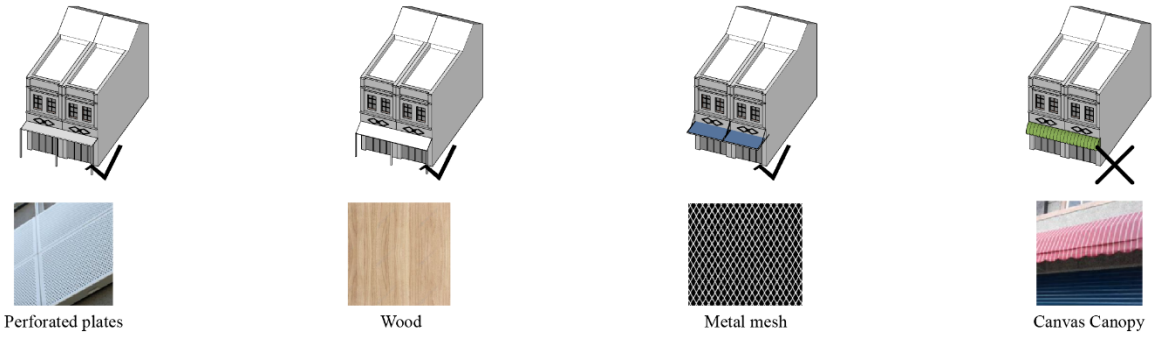


Figure 5-46 Appearance control of the canopy

（Source:Made by the author）

(2) Facilities and Landscape

The pedestrian environment should be improved through the addition of small planters, flower pots, green roofs and other landscaping devices, as well as seating and bicycle racks, enhancing the appearance of the street interface(Figure 5-47).

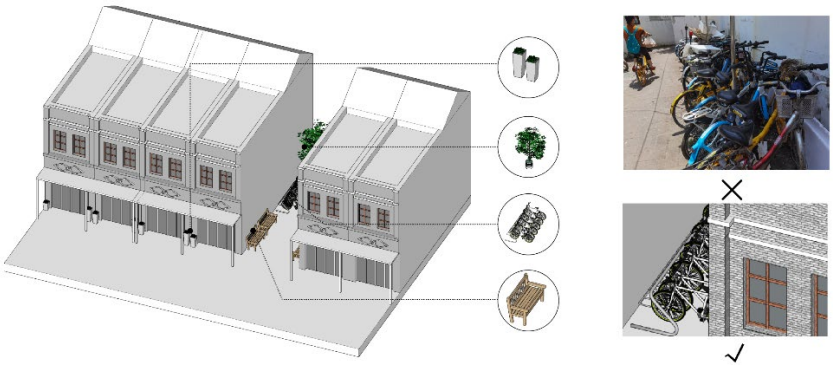


Figure 5-47 Diagram of facilities and landscape

（Source:Made by the author）

(3) Interface Improvement

The buildings could be unified according to the quality and historical value of the existing buildings. The function and plan could be redefined to meet the actual need, and combining with changes to the interface in conjunction with functional changes. Creating more visual communication between the building and the street. In addition, the form of air conditioning needs to be regulated.

At the same time, it is possible to extract elements from existing buildings, evolve them and apply them to the regeneration of the architectural style, maintaining the originality while promoting the unity of the old and the new(Figure 5-48).

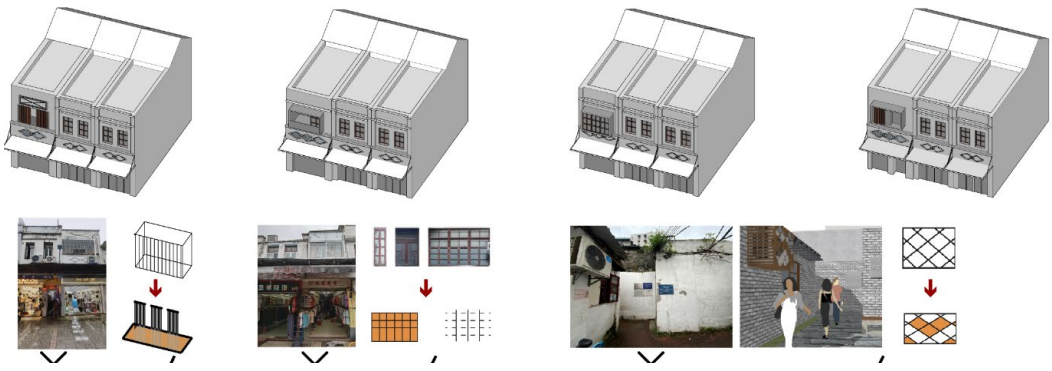


Figure 5-48 Appearance control of the interface

（Source:Made by the author）

5.4.3.2 Building Type Transformation Strategy

The main historical buildings within the Xudi-Gaodi Street Historical area are Zhutongwu, which are also relatively dilapidated and need to be upgraded in terms of architectural quality. Besides, due to the functional replacement of the traditional buildings in the district, the internal space is already very different from the prototype, and the spatial characteristics of the prototype may be contradictory to the human activity and the existing business use. Therefore, the regeneration of the building types should based on inner spatial type as a basis for the transformation of the existing building types, taking into account the activities of the people. In this manner to allow the retailers to choose according to their actual needs.

(1) Substitution

Substitution operations are a common conversion strategy within the base(Figure 5-49). The ground floor is primarily commercial, with service rooms such as a kitchen and a toilet next to the stairs on the first floor of the building. The mezzanine and third floors are used for storage. The advantage of this mode of regeneration is that it retains the relationship between the original building structure and the external interface, but actually only the ground floors are opened to the public. The regeneration of the historical area can enhance the use of the building above the first floor by maintaining the commercial function on the first floor and other functions such as offices、cultural and creative spaces above the first floor, freeing up the upper space（Figure 5-49.

Figure 5-48 Gaodi street 100

（Source:Made by the author）

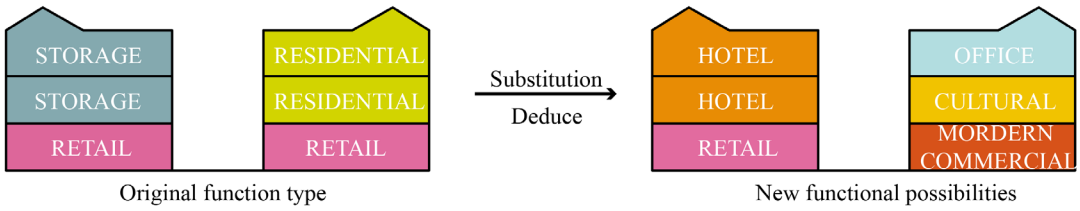


Figure 5-49 Diagram of substitution
（Source：Made by the author）

(2) Addition

The facades of traditional buildings are relatively enclosed above the first floor, with poor light capacity, and not conducive to ventilation; On the other hand, the original buildings may not be capable of meeting the needs of spatial use in terms of functional substitution and the landscape view requirements. The problem can be solved by building an addition volume such as adding landscape boxes. The street interfaces and sections can also be enriched while meeting the functional needs（Figure 5-50）.

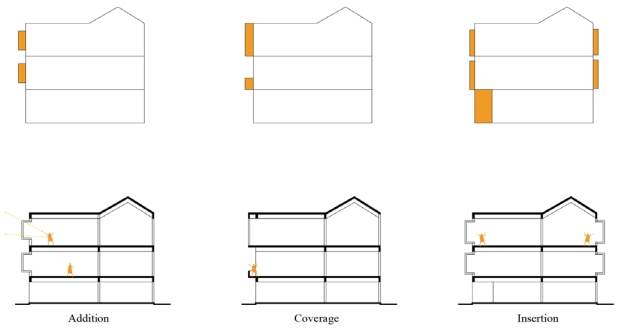


Figure 5-50 Diagram of addition
（Source：Made by the author）

(3) Subtraction

The current entrance to the building on Gaudy Street is directly facing the street and lacks a buffer space. The quality of the shops can therefore be improved by creating an entrance space by means of a setback on the first floor of the building or a partial setback above the first floor. At the same time, the additions such as glass windows in the original balcony position within the historical area impacting on the original appearance, so the subtraction method is to be used to remove some of the structures

through consultation with the residents. After this, reconstruction with new materials and forms（Figure 5-51）。

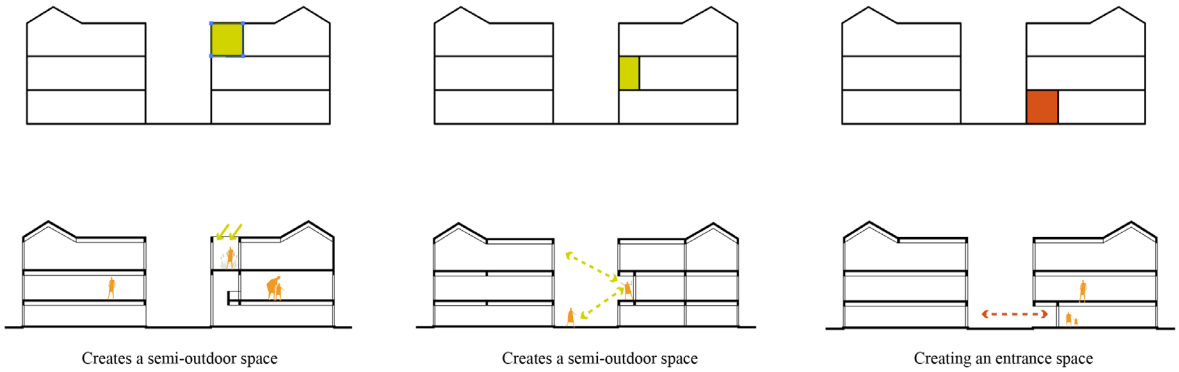


Figure 5-51 Diagram of substraction
（Source：Made by the author）

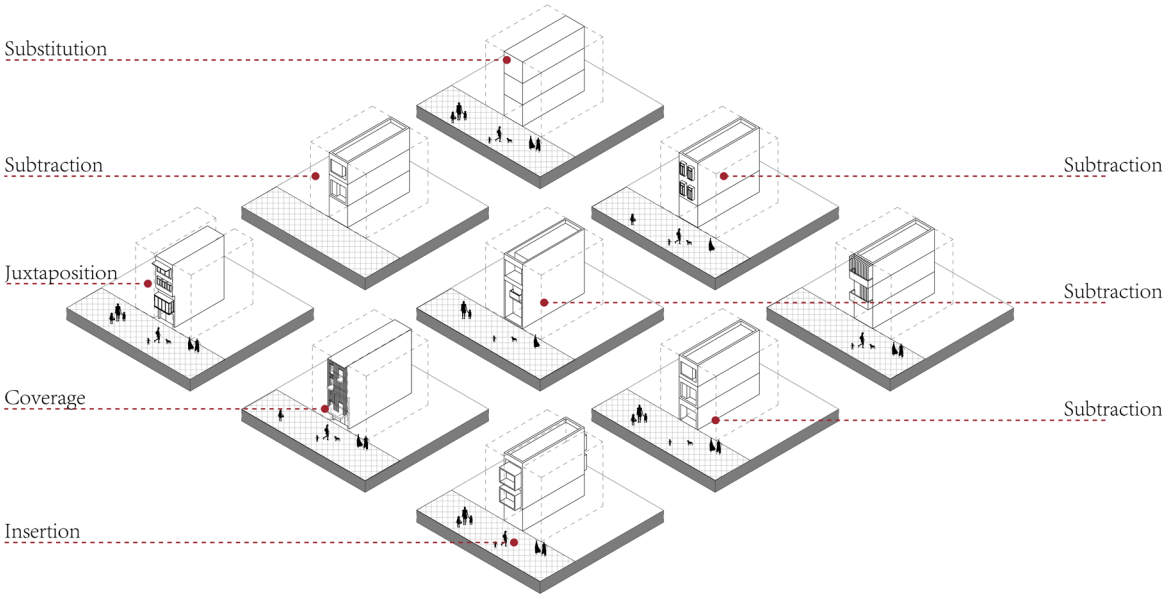


Figure 5-52 Transformation diagram of the Typologies
（Source：Made by the author）

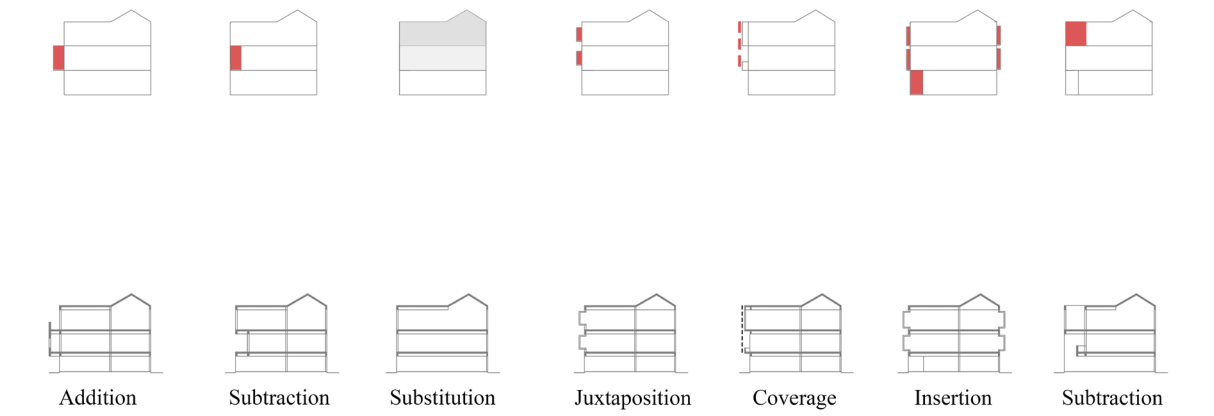


Figure 5-53 Transformation diagram of the Typologies
（Source：Made by the author）

5.4.3.3 Building Nodes Regeneration

The historical area of Xudi-Gaodi Street has a number of buildings that are incompatible with the traditional style, so the typological approach to architectural regeneration can be applied in practice, taking into account the actual situation. The regenerated buildings will be the transferred typological fragments of the historical area, activating the internal dynamics of the district.

(1) Node 1

Node 1 is located in 29 Mupaitou in Xiheng street, where the existing building is a new modern building, and the elevation features, materials and details are not in compatible with the traditional style. The regeneration is based on the completion of the shape of the building, restoring the building to its integrity, and at the same time, introducing a modern transformation of the sloping roof and patterns, while improving the publicity of the building by adding landscape boxes (Figure 5-54).

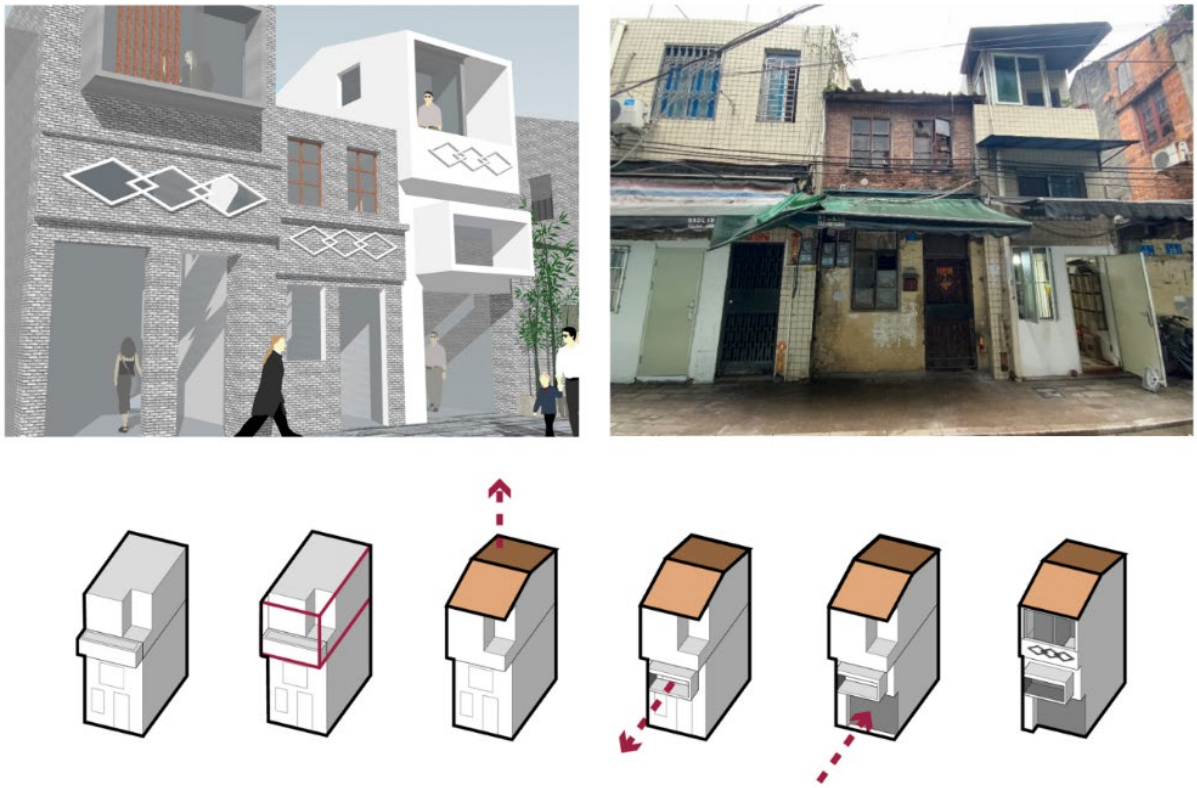


Figure 5-54 Building renovation node 1

（Source:Made by the author）

(2) Node 2

Node 2 is located on 82 Gaodi Street , where the elevation material of Wenguang building and the anti-theft net outside the window are rather incongruous with the traditional style, so the material is replaced, and at the same time, the original building is renovated on the basis of retaining the feature of window opening on the elevation. Through the operation of addition landscape box to the building, the connection between the interior and exterior of the building is strengthened to meet the needs of light and publicity of modern business(Figure 5-55).

Figure 5-55 Building renovation node 2

（Source:Made by the author）

(3) Node 3

Node 3 is located at 29 Mupaitou. The private addition of a small volume has a dilapidated appearance and impacts on the appearence of the district. The original building was demolished and replaced with a simple, modern box (Figure 5-56).

By substitution the addition volume from the original building, restored the building while preserving the existing use of the building.

Figure 5-56 Building renovation node 3

（Source: Made by the author）

(4) Node 4

Node 4 is located at 22 Gaodi street. The materials and colours of the private addition

are in greater conflict with the traditional architecture. Therefore, extract the division and colour of the Manchurian windows and apply them to the inserted box. The renovated building is made to compatible the traditional style(Figure 5-57).

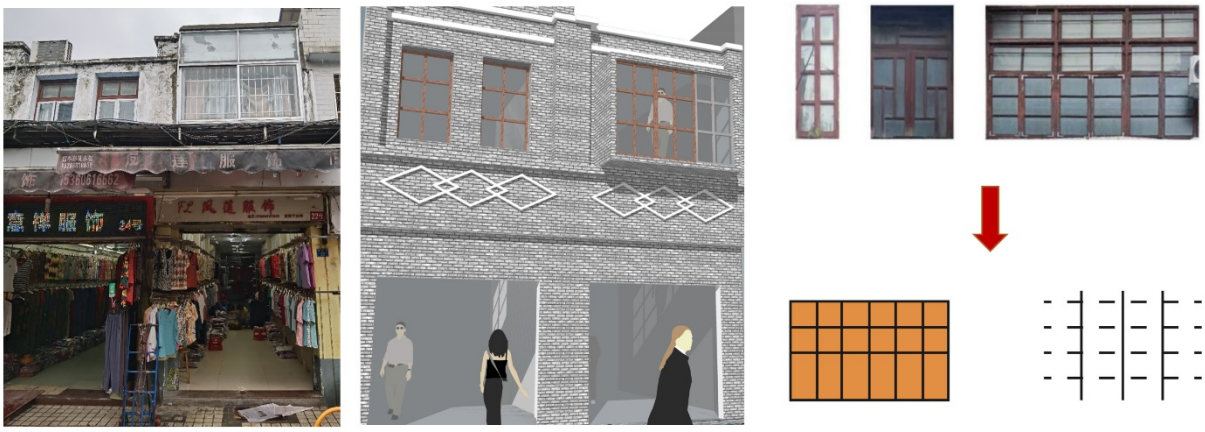


Figure 5-57 Building renovation node 4

（Source: Made by the author）

（5）Node 5

Node 5 is located at 113 Gaodi street. The addition of anti-theft net to the building spoils the appearance of the street. Therefore, extract the colour of the Manchurian windows and apply it to the external grille panels using rust steel plate. The security function is retained while responding to the character of the traditional building type(Figure 5-58).

Figure 5-58 Building renovation node 5

（Source: Made by the author）

5.5 Summary

This chapter analysed the problems within the district, and analysed and extracted the street pattern, architectural texture and building typology features within the district. It also applied the specific transformation methods of typology for renovation and renewal. The design attempts to solve the problems of spatial decay of the streets and alleys, the destruction of the architectural fabric of the Xudi and the adaptation of the individual building types to modern life and the upgrading of the businesses. The design is based on the continuation of the street pattern, the restoration of the architectural fabric and the transformation of the building typology, in order to transform and regenerate the historical area of Xudi-Gaodi Street.

(1) At the level of the street pattern, the traditional streets and alleys are continued and control strategies are proposed for the overall appearance of the streets and alleys within the historical area.

(2) At the level of architectural fabric, a chronological study of the architectural integrity within Xudi is conducted to explore its historical changes, and while restoring the fabric, existing buildings that are incongruous with the traditional style are interpreted and used as nodes to revitalise the surrounding environment. At the same time, the open spaces are restored to meet the activity needs of the residents.

(3) At the level of building typology, by extracting the abstract iconography of the buildings and preserving the interface typological characteristics of the traditional buildings, different strategies are proposed for the transformation of the building typology. It is also combined with guidelines in the form of specific node transformations to guide the renewal and regeneration of the main building type within the historical area- the Zhutongwu. At the same time, the nodes, as typological fragments within the block, form a contrasting relationship between the new and the old with the traditional buildings, revitalising the main street. In terms of materials, the typology of manchurian is extracted from the traditional architecture and interpreted

using modern materials such as rusty steel plates. The private additions are upgraded to enhance the style of the neighbourhood while retaining the original use.

The above regeneration strategy is based on an isomorphic relationship between the past and the present, and the typological approach to regeneration perpetuates the collective memory of the inhabitants, which is integrated with the historical tradition.

Conclusions

Main Conclusions of this Article

Through the typological approach, this study establishes a complete operational methodology system from type extraction, abstraction and translation at the district level for the historical areas in the old city of Guangzhou. Based on the theoretical study, the typological analysis of Xu Di - Highland Street and the specific questions raised will lead to the exploration and innovation of the design and practice of the historical location that needs to balance the needs of the preservation of the traditional style and the use of new business and community life, while testing the practical applicability.

Contemporary typological theory focuses on the continuity of urban space and architectural space, not only at the level of architectural research and recognition and restorative conservation, but also in how typological restoration connects architecture to the city. How to combine with traditional architectural elements, culture or urban memory to regenerate urban space, restoring streets and plots, and achieving a mixture of residential and other functions. From building type to space type, it is important to pay attention to the contribution of the transformation of the type to the city, and the type of place should serve as a bridge between architecture and the city. Typological approach to the renewal of historical areas provides effective analytical and practical tools for the continuation of urban space and architectural space manipulation, while providing guidance for the proposal of existing renewal strategies

Historical areas need to solve the problems of traditional style preservation, such as street combing, restoration of traditional building combination, architectural texture protection, regeneration and renewal, but also need to consider its adaptation to modern life and community life for the community space, building function, street style requirements of the contemporary. Therefore, it is necessary to balance the demands

of both aspects in the renewal process, and to find a balance between the maintenance and coordination of the traditional appearance and the adaptation to modern life. Therefore, it is necessary to extract the deep characteristics of the historical building archetypes and the deep characteristics of the street space, building combinations, building units, and material details in terms of function and form that are required for modern life. The extraction of the archetypal features and the comparison with the typological features after deduction are the key aspects of the typological approach to the conservation and renewal of historical areas.

Type restoration needs to be combined with localization needs and considered in integration with the existing street pattern and the existing conditions and needs of the community. Behind the typology is the reality of life. A certain level of spatial activity and technology has given rise to various prototypes and types that are adapted to actual needs. Therefore, in the renewal of historical areas, we should use modern language to express the deep historical and cultural content of traditional neighborhoods instead of simply restoring and rigidly applying traditional forms, considering the extraction of deep features of historical building prototypes, analyzing and comparing the connections and differences between the archetypes in terms of spatial organization, physical environment, architectural style and the required new common functions in actual use. When the archetype is transformed into a new type of building with other functions, some of its features have evolved to the new type. Therefore, it is necessary to clarify the use requirements and typological characteristics of the new type, and to search for the development of possibilities, solutions, and creative use of the space and lifestyle.

In the process of type reduction to form, the subject of the archetypal features and the carrier of the object features reduced to form can be changed, and the archetypal architectural features and elements can be transformed into different areas or components across different levels after extraction and abstraction. The rendition is carried out across levels between streets, texture, buildings and details. The different

carriers of type reduction provide a variety of possibilities for type transformation to form.

The Contributions of this Article

The main theoretical contributions of this paper are:

(1) This paper integrates and tests previous theories through case studies and theoretical research on the theoretical aspects of the application of typology in historical areas, and proposes a relatively complete specific methodological system for the extraction and restoration of typology in historical areas. The specific methods of typology extraction and transformation of typological localization from the perspective of adapting historical areas to modern life are proposed for street network, building composition, building units and building details, and tested through design exploration.

(2) Analyzing the urban renewal strategy of Guangzhou and exploring the integration of the typological approach with the conservation of Guangzhou's historical areas with specific cases

(3) Focusing on the Lingnan area, a typological extraction and deductive restoration of the Lingnan traditional group of buildings on Gaodi Street in Guangzhou is explored, and a methodological system of typological renewal for the adaptation of Guangzhou's historical areas to modern life is developed.

(4) The typological characteristics of Zhutongwu in Gaudi Street were extracted and categorized, the abstract features of which were summarized, and an attempt was made to revert the type, extending and supplementing the typological regeneration method for the adaptation of Zhutongwu houses to modern life.

(5) Exploration of the typological approach to the regeneration and renewal of traditional buildings and multi-storey modern buildings in incongruous traditional style of Guangzhou's historical areas.

Shortcomings and Later Development of this Article

(1) Insufficient research on the actual property rights of the site and idealistic design exploration.

(2) Due to personal level and research equipment conditions, there are inevitably biases and omissions in type categorization

(3) The conservation of historical areas is a complex and wide-ranging process, which involves socio-economic, governmental policies and people's ideology, and so on. The focus of this paper is on the physical and spatial elements of historical areas, while other elements such as economic development are not covered extensively.

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