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# Master Thesis 硕士学位论文

RESEARCH ON SPACE RENOVATION DESIGN OF  
"COMMON COURTYARD" IN NANJING  
HEHUATANG HISTORIC AND CULTURAL  
DISTRICT

南京荷花塘历史文化街区中的“共有院落”空间改造  
设计研究

Name/研究生姓名

Feng Qiu/邱丰

Supervisor(s)/导师姓名

Prof. Dongqing Han/韩冬青 教授

Prof. Marco Trisciuglio

Arc. Yun Cai/蔡芸 高级工程师

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# RESEARCH ON SPACE RENOVATION DESIGN OF "COMMON COURTYARD" IN NANJING HEHUATANG HISTORIC AND CULTURAL DISTRICT

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BY

QIU FENG

Supervised by

Prof. Dongqing Han

and

Prof. Marco Trisciuglio

and

Arc. Yun Cai

College of Architecture

Politecnico di Torino

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## Abstract

The spatial pattern formed by the connection of streets and alleys with courtyards is a common spatial phenomenon in China's historical districts, which is closely related to the daily activities of residents and the development history of districts. In recent years, the research and design of the urban old city block morphology mostly focus on the relationship between the space and the form of the block, but the research on the relationship between the residents' daily behavior and the courtyard space is insufficient. Based on the theory of typology, this paper discusses the development and evolution of the common courtyard, a living place spontaneously formed by residents in a high-density historic block, from two dimensions of morphology and behavior. Pointed out that "common courtyard" as one of the residents of the importance of collective living space unit, and the total of compound type, analyzed the economic, social, and the impact on total of compound material space form, help to understand the complexity and diversity in the morphology of historical block, for the further study of collective memory and spatial diversity in the historical block foundation was established.

This article takes Nanjing Hehuatang Historic and Cultural District as the research scope, the analysis of the total of compound type and influence factors, on the basis of this paper further studied the following aspects: first, by using the method of behavioristics, to record the daily behavior of different types of common courtyard, and the bearing behavior of the place were analyzed by the collective memory; Then the intensive utilization and spatial order of the courtyard in Hehuatang Historic and Cultural District are studied. On this basis, through case analysis, this paper studies the common space of subjective consciousness design, comprehensively compares the two kinds of common space, summarizes the design methods, and puts forward the basic guidance for the subsequent design and transformation.

**Keywords:** common courtyard, typology, behavioristics, modernology, collective memory



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# Chapter I: Introduction

## 1.1 Research background

Nanjing Hehutatang Historic and Cultural District is located in the west of Nanjing Old Town, which is the area with the most abundant historical and cultural resources in Nanjing. With a total area of 12.56 hectares, Hehutatang Historic and Cultural District extends to Shuizhai'an, Mopan Street and South Zhongshan Road in the east, the city wall in the south, Mingyang Street in the west and Yingao Lane in the north. It is an area with clear historical pattern, complete traditional features and rich historical relics among the existing traditional residential areas in the Ming and Qing Dynasties in the old city.

Like the situation of many historical sections of traditional residential buildings in cities, the Hehutatang Historic and Cultural District, after several years, presents resistance such as deterioration of material structure, destruction of the texture of traditional streets and alleyways, attenuation of traditional cultural atmosphere and so on. It is in urgent need of regeneration. After years of evolution, Hehutatang Historic and Cultural District has become the only existing residential historical block in the southern part of the old city of Nanjing. Here, there are both aborigines and migrants with different occupations, education levels and ages. Therefore, the integration of different generations must be considered in the renewal measures. In addition, as a historical residential area, Hehutatang historical and cultural block is mixed with a large number of service functions for daily life. Private living and public service functions are mixed, and many space orders in the block need to be sorted out urgently. The research needs to explore the integration of private and public, as well as the differences in daily life caused by different groups and age structures. In recent years, in the research on the preservation and regeneration of historic districts in China, many projects start from the form, using new construction methods to implement the old form on the original site, and relocate the original residents. Although the form is preserved, the inheritance of neighborhood culture is ignored by the residents' daily behavior of living style, resulting in a great number of conservation projects showing a kind of "fake antique" urban phenomenon. The research of this paper is based on the policy of "retaining, transforming and demolition" advocated by the government for the old city blocks, to maintain the spatial structure of the courtyards of the blocks, and to reflect on the residents' daily neighborhood life.

The unique texture structure of Hehutatang Historic and Cultural District not only contains the development and evolution of traditional Chinese courtyards, but also is a kind of low-height high-density block form different from contemporary residential space (Figure 1-1). The courtyards enclosed by the residences are between public and private. These courtyards are connected by lanes, which lead to the main street. The public level is promoted step by step, and the spatial structure is clear. It is of great value to the protection and redevelopment of the block pattern. In addition to the particularity of space and form, the relationship between the daily life, behavior, and space of the residents in the Hehutatang Historic and Cultural District is still worth studying to some extent. The spatial structure of the courtyards in Hehutatang Historic

and Cultural District began in the Ming and Qing Dynasties. In the Ming and Qing Dynasties, the courtyards were mostly used by large families for internal use. In modern times, the courtyards have evolved into a common courtyard shared by several families, and the courtyards have completely become a place shared by neighbors. Different from the living mode in the contemporary society, which takes the community as the carrier of daily life, the courtyard space highlights the sharing state of people in different families. Different generations of people and different ways of use occur simultaneously in the same public space, which affects all aspects of the courtyard. This traditional Chinese collective way of life is gradually disappearing in the contemporary society, but it is missed and called for by lots of urban residents. The public life in the common space contains the daily and commemorative nature of life, and has the significance of historical inheritance. To discuss the integration of the neighborhood public life in the common space and the public and private life in the personal life, and how it affects the spatial form is also a method and idea for the renewal of the old city blocks.

This thesis attempts to record the value of historical relics in the Hehutatang Historic and Cultural District and explore how to make changes while retaining all the existing values. This study includes the private and public issues in the block, the inheritance and development of courtyard space, the value and significance of traditional neighborhood life, and focuses on the micro-unit spontaneously formed in the collective life of residents in the shared courtyard block. This paper discusses the development history of the form and space of the common courtyard, the basic unit of neighborhood living, and the influence of behavioral factors, economic factors, and morphological factors in the small-scale plot of the Hehutatang historical and cultural block, to guide the subsequent reconstruction design.

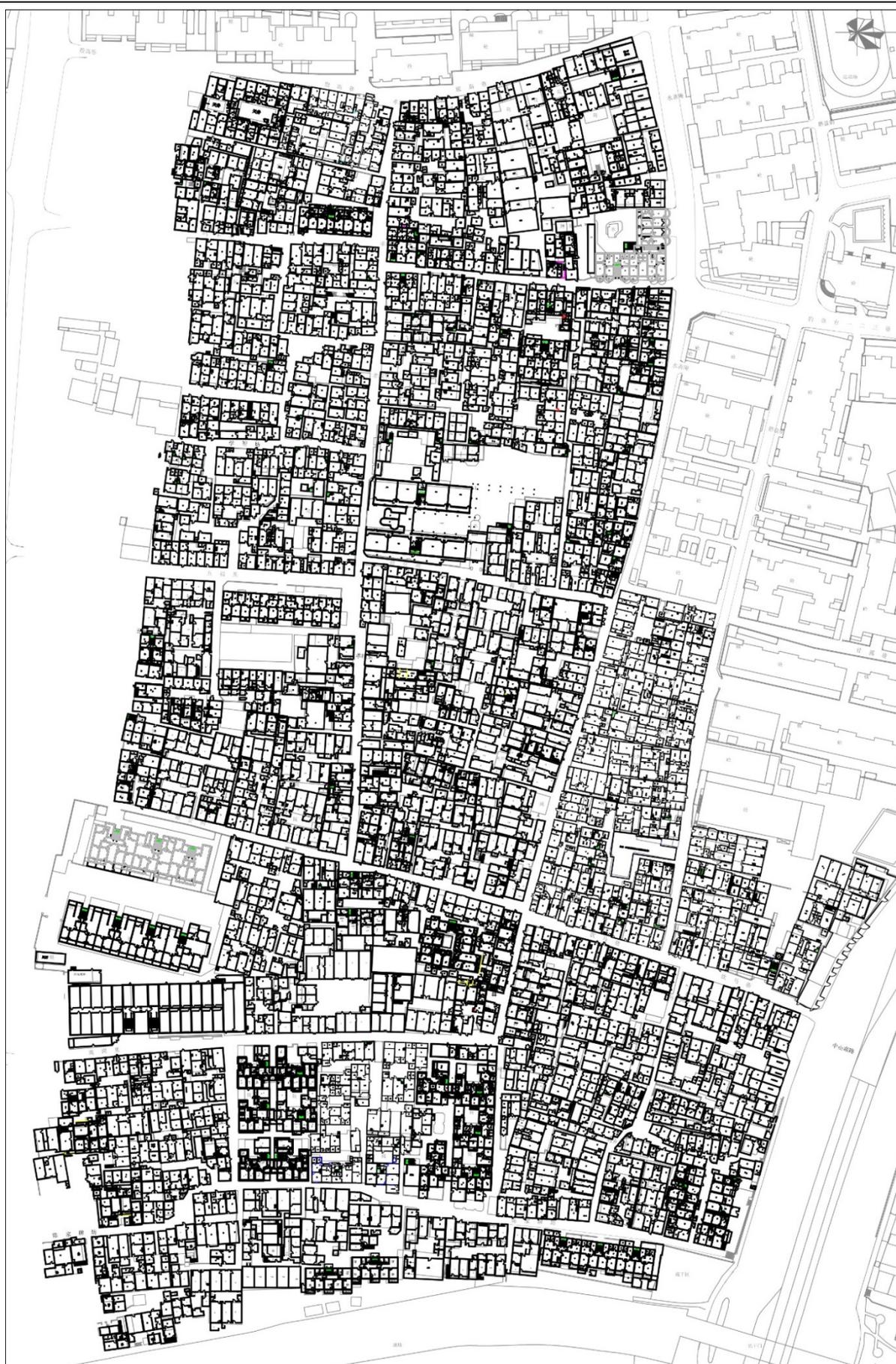


Figure1-1 A typological map of Hehutang Historic and Cultural District

## 1.2 Research objects and research scope

### 1.2.1 Research objects

The common courtyard is a concept of integrated morphology and behavior. Morphologically, it contains the surrounding residences and their enclosed semi-public courtyards. In terms of behavior, the shared courtyard also contains the crowd structure and life pattern, and the public life generated by different families in it. Shared courtyards emphasize the shared nature of group life and are associated with the division of plots in the study block. The courtyard where the neighborhood lives is the micro level of the shared space where the residents live together in a plot series, and it is the basic unit combining the spatial structure of the courtyard with the daily life of the neighborhood. There are several courtyards in Hehuatang Historic and Cultural District, which do not exist in the site alone, but a series of groups together constitute the courtyard group. Different courtyards have different living modes and use modes due to different residents, which have different influences on the morphological structure. It is from these different common courtyards as the basic unit of the development of Hehuatang Historic and Cultural District.

The word "common" comes from the division of space by Kazunari Sakamoto, a Japanese architect. Kazunari Sakamoto divided space into three categories: public, common, and private, which correspond to the English words' public, common and private respectively. A shared space is a semi-public state between public and private. It is open and shared for certain groups, while private for non-such groups. The public means the space created by the rulers, and the common means the space created by the people themselves. From the perspective of topological relationship, common space connects public space and private space. In Italy, this kind of space also has its own definition. The Italian city block presents a checkerboard shape. The four frontages of the plot are all buildings, and the central open space enclosed is such a common space, called *Interno Verde* in Verona. In Hehuatang Historic and Cultural District, such common space happens to be the same element as the core of the spatial structure of traditional streets and alleys: courtyard. The communal courtyards of the block serve a subset of the population: the people who live there.

In addition to focusing on the influence of morphology and typology, the common courtyard studied in this paper also incorporates a new focus: the development and evolution of residents' neighborhood life and the influence of living together. Aldo Rossi mentioned in "Urban Architecture" that urban type is the collective memory of people living in the city, which is composed of people's memory of the space and entity in the city. This memory, in turn, influences the shaping of future city images. Analogical architecture also believes that the collective memory of a city is also the most important part of a city, and the city is different because of the existence of history. Neighborhood life is not only the carrier of history and memory, but also the source of folk culture and humanistic value. The common space integrating courtyard space and residents' public life in the Hehuatang Historic and Cultural District is not only an exploration of form and function, but also a research and development of the historical evolution of people's collective memory in this area.

## **1.2.2 Research scope**

This paper takes Hehuatang Historic and Cultural District as the research scope, reaching Yingaoxiang in the north, Old City Wall in the south, Mingyang Street in the west and South Zhongshan Road in the east. The purpose is to investigate the block culture formed by the daily behavior and life of the residents in the whole block, and to think about the influence of the collective memory formed by such a block atmosphere on the form and space of the basic unit of the block: the common courtyard. And select the demonstration of the common courtyard for in-depth research and transformation design.

## **1.3 Related theory and research**

### **1.3.1 Urban morphology**

The research on Urban Morphology aims to reveal the characteristics and development laws of Urban space formation forms, including many research fields, among which the Italian Process Typological school is one of the most influential. The study of typology begins with architecture and extends to the whole city. Saverio Muratori, one of the representatives of Italian typology and urban morphology, defined the house type as a "transcendental-complex" or "a culture-specific natural idea of life that changes with time and space". For the study of cities, he puts forward the concept of "Operable History" and emphasizes the importance of historical continuity. He believes that history can not only be read, but also be operated and applied to urban and architectural design practice. After the Muratori School's study of Venice, scholars realized the importance of urban fabric: different types of fabric are the joint effects of the city's economy, culture, politics, and history. As for the study of history in typology, Italian scholars believe that there is continuity between tradition and change. In his book *Restoration and Architects*, Paolo Marconi says that before restoring urban Spaces and objects in cities, one can better understand the urban context in which architects and urban planners work. The reading and understanding of places can create a secret key to their history.

Although the British school of historical geography, represented by the geographer M. R. G. Conzen, focuses on the description and explanation of urban form. However, they also found that the progressive urban form analysis method from the elements to the whole and the emphasis on the evolution of urban form over time and the continuity of history have something in common with the Italian type school. The cooperation and interaction between the two schools developed "type morphology", which cognized the morphological types and their evolvement characteristics, and based on the morphological types, cognized the unitary formation phenomenon of urban built-up areas.

### **1.3.2 Behavioristics**

Taking Wajiro Kon's "Introduction to Behavioristics" as a starting point, the Behavioristics make sketches of what they see in front of them and observe the city, paying attention to every detail. The system

that Imao and Jiro try to establish between the two fields of architecture and folklore can be embedded in a phenomenological research paradigm -- to explore the spontaneous consciousness and perception mode of the mutual relationship between human beings and objects by collecting, classifying, analyzing, recording, and comparing. Atelier Bow-Wow, represented by Momoyo Kaijima, Junzo Kuroda and Yoshiharu Tsukamoto, published a book called "Made in Tokyo." The record of urban memory and urban renewal will be combined. Momoyo Kaijima et al. advocated taking the surrounding urban phenomenon as the research resource, thinking about the significance of its existence, and recording it in the form of map. Japanese research studies urban life in the way of record and observation. What is worth paying attention to is not the architecture itself, but the combination of architecture and behavior mode. Buildings in cities are often complex in multiple dimensions, which cannot be explained clearly by mere morphological research techniques. The research focuses on the content rather than the results of the research, which, according to Dog Bark, represents the collective memory of the city that Rossi describes in "The Architecture of the City".

### **1.3.3 Study on Chinese Historical Districts**

In recent years, the urban form of historic districts in China has attracted the attention of a large number of scholars, and the research on urban form and history of the old urban districts in cities has gradually entered the domestic field of vision. With white handler, professor at the university of Birmingham, UK, and New Zealand GuKai professor at the university of the team, not only about type morphology theory and method of research, also to China Beijing, guangzhou and other parts of the city, pingyao has carried on the urban morphology analysis, and applies theory and method in China's urban planning and design practice. Architecture college of southeast university in nanjing in the old city of small west lake to historic district repair protection and regeneration practice, researchers using typology map for the first time in China as the research tool of old city reconstruction and reveals the evolution of the form and the building block type. In a small scale and progressive way, combining historical and cultural protection, residents' willingness, future development needs and capital injection and other multi-dimensional influencing factors; From top to bottom, the overall shape and structure of the historic areas should be sorted out, and various construction activities should be coordinated comprehensively and gradually. With the increase of practical achievements, the domestic architecture academic circles pay more and more attention to typology and morphology research, emphasizing the protection and inheritance of urban history.

### **1.3.4 Summary of relevant theories and research status at home and abroad**

There have been extensive discussion and research on the types and forms of historic districts in the world. In China, with the increasing number of restoration and protection projects of historic districts, this kind of problem has attracted the continuous attention of many scholars in recent years. Historical blocks in China are derived from long-term historical layers, and special attention should be paid to the study of the form of such blocks.

In the field of morphology and typology, the related research in Europe has been relatively rich and

mature, focusing on the exchange of research in different fields. The typology research represented by Muratori School not only studies the internal spatial characteristics of urban space but also emphasizes the importance of historical evolution. Although the typology research in Europe has a long history, it is not appropriate to directly apply theories and results due to the particularity of the development of Chinese street blocks, and the research on the form and historical evolution of Chinese street blocks needs to be combined with its own special background.

The science of Behavioristics, which originated in Japan, emphasizes the significance of recording the operation itself. As a research method, textual research emphasizes the process rather than the result, and its recording method is worth popularizing and implementing in the study of historical districts in China.

## 1.4 Research Methods

The research of this paper follows the method of "fieldwork research -- literature research -- case analysis -- design practice". Field investigation is carried out in the way of study, and the living state and space state of people in the site are studied, and then the renewal design of Hehutatang Historic and Cultural District is promoted.

**Fieldwork research:** Fieldwork research is divided into two stages. In the first stage, we cooperate with a third-party research company to investigate the historical building information, environmental information, property rights, housing construction quality, residents' willingness to repair and other basic information related to block form and economy. In the second stage, drawing on the research method of Japanese Studio BOW-WOW, the daily life style of residents and the usage of the blocks are recorded in the form of pictures. The observation is not limited to the buildings themselves, but also the surrounding environment is observed in a panoramic way. Most of the residential environment is the coordination of form and behavior. In this way, the ecological linkage and interdependent relationship of the common courtyards are investigated, and the lotus pond block is transformed into the form of a map, trying to extract meaningful environmental integration.

**Literature research:** by reading materials in the field of typology research at home and abroad and borrowing the research content of Muratori School in Italy, this paper studies the morphological types of residential blocks. In his article "Architecture and Civilization in Crisis," Muratori notes that architecture has become an autonomous discipline because of the study of civilization. This paper studies the relationship between the historical culture, collective memory, and type of the block.

**Case analysis:** Study the cases of foreign blocks and collective houses, and analyze the relationship between residents' behavior and space, the protection of collective memory and the design of common space in blocks.

**Design Practice:** Based on the residents' renewal intention obtained from field survey and the relationship between the daily life of site residents and the space and place, explore the courtyard design strategies and technical methods of Hehutatang historical and cultural block.

## 1.5 Research value

In the existing urban reconstruction mode of "big demolition and big construction", traditional blocks are demolished and residents are relocated, and the contemporary society gradually loses the public life mode and living place. Do most of the repair work is a kind of decoration repair work, neglect the history of the site, lack of differentiation of urban spatial development as well as the bulk copy commercial economic function, to function in this position, the city is excessively simplified, traditional buildings and streets courtyard space slowly passed, eventually led to the result of the "thousand city side". With the deepening of urban research, the society gradually realized that the city has become a great artifact because of its form, and the city has a kind of creation of human rationality and collective memory. The design of the traditional style block is not to retain the function on the original site, showing a little image of the time. Functionality is a succession, and urban and regional forms are long preserved. The study of form is not limited to the form itself, but to study the life style of people in history and the historical memory of the city through the form. The urban form in each period of historical evolution contains a wealth of morphological value, new buildings should be in the material, structure, and layout of the historical continuity with the urban built environment. Thanks to the Xiaoxihu District Reconstruction Project, the "small-scale and gradual" gradual reconstruction method has been gradually recognized by everyone. In total of compound as a unit of study, in the form of type of dimension and the historical dimension to strengthen the concept of "residents' behavior pattern", fully respect the original neighborhood life and urban collective memory, yard and behavior patterns for research and design, exploratory behavior, the relationship between property rights and form, to different compound protection and renovation of difference.

Its value lies in: the study of common courtyard not only lies in the traditional spatial form and material form itself, but also emphasizes the living behavior between the residents and the residents and these common courtyards. The collective life is a contemporary lifestyle that has gradually disappeared and was once called for regeneration by the society. Retain the most important carrier of collective memory: residents, and protect the folk culture of the block; maintaining the residential property of Hehuatang Historic and Cultural District and ensuring the richness of the living space; The daily life behavior pattern of the residents is fully considered and the residents are given independent choice in the reconstruction action. The government, society and universities participate in the design, and strive to make the research and design objective. It protects the spatial form and urban texture of the historic block

## Chapter II: Common courtyard units and influencing factors

In the historic city of the south of the old city of Nanjing, the common courtyards with courtyard space as the main material form, on the one hand, affect the overall spatial structure and form of the old city, on the other hand, they are also the basic elements to accommodate the daily life in the old city. In order to pave the way for the analysis of the intensive utilization of the shared courtyards and the collective memory of the block, this chapter first introduces the basic unit of the shared courtyards in the Hehuatang Historic and Cultural District, and then summarizes and classifies the shared courtyards in the whole block. Secondly, this chapter analyzes the method of combining the common courtyard units to form the plot group and the structural relationship between the common courtyard units. Finally, this paper studies the influence of economics and sociology on the common courtyard and gives a brief overview of the effect of these two influences on morphology.

### 2.1 Basic unit and division of common courtyards

#### 2.1.1 Basic unit of common courtyards

The basic unit of common courtyard research includes the "void" courtyard and the surrounding houses that constitute the "solid" courtyard. The common courtyard is also the basic unit of common life, which emphasizes the public nature of the courtyard space and the common life between residents. It is a common state between private and public, belonging to a specific group of people, that is, residents. Not every plot in Hehuatang Historic and Cultural District can be divided into the discussion scope of this kind of common courtyard. Only the place with both private and common state can become the basic unit. A single house or courtyard does not constitute such a concept.

In the field investigation of Hehuatang Historic and Cultural District, the author found that there were many personal appliances scattered in the courtyard, such as self-built washbasin, self-built hearth, self-built flower stand, etc. The form and use mode of the courtyard were affected by the special behavior pattern of the surrounding residents: Most neighborhood in residential area is lesser, residents to enhance the comfort of living to a total of space use space, yard inside there are many different resident daily life of the appliance, these lifestyle products formed in compound specific sense of place, representing the private taking and use that part of the public space, but this part of the space still belongs to the public, Private activity here is still under scrutiny.

In daily life, the private life of the residents takes place in the private residence, and the common courtyard bears the collective life of the residents, which is a place of conversion between private and public. This kind of shared space has the inheritance of the collective memory of the block: in the history of the courtyard model, residents cooking, washing, rest, children bathing and other behaviors take place in this courtyard, and every family has different memories of such space. The different common life in the block

forms the special atmosphere of the block, and these atmosphere and behavior customs represent the collective memory of the block.

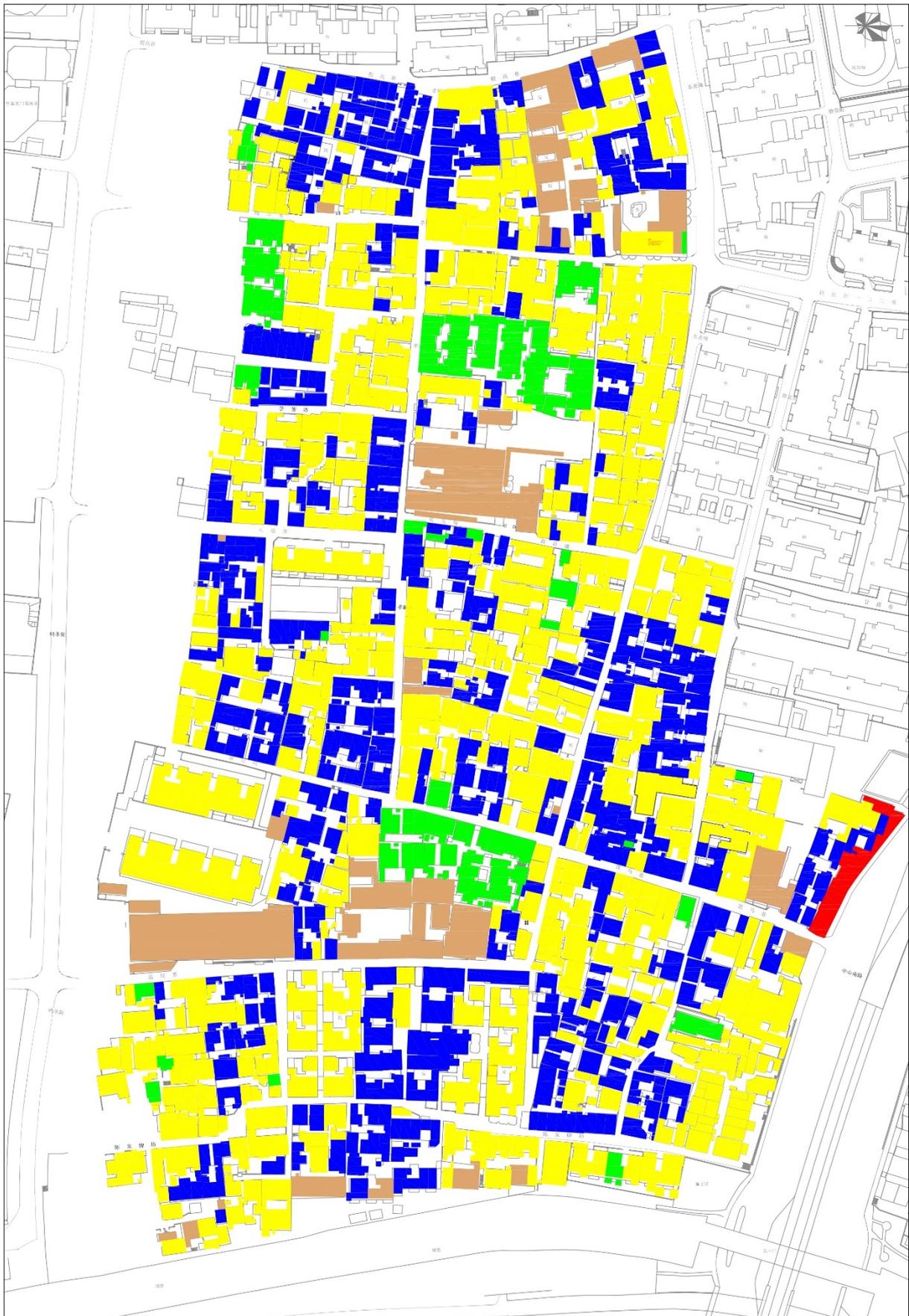


Figure 2-1 Houses property distribution map of Hehuatang Historic and Cultural District

(yellow: Private property green: Public property managed by oneself blue: Government-managed public property brown: Public sector red: Temporary buildings)

The common courtyard is a concept that integrates the form of the courtyard and the neighborhood life. The behavior in daily life is often affected by the land parcel and property right. Therefore, the research unit of the common courtyard should consider the boundary of the form of the courtyard and the boundary of the common life form as well as the boundary of the property right of the land parcel. There are three factors of morphology, sociology, and economics in the courtyard unit, which are respectively represented as spatial form, daily behavior, and land property right. Common courtyards in the block have various forms; House property is complex (Figure 2-1); Different living groups and different behavior patterns lead to different spatial structures. Although the situation in the common courtyard is complex, the common courtyard is a unified block connected by streets and alleys. The structural system of streets and alleys in the whole block is clear and complete. Therefore, the common courtyard is divided into three types according to the relationship between courtyards and streets and alleys in this paper:

1. Island-style common courtyard, which is located inside the plot and does not face the street, requires a path leading to the courtyard. This kind of common courtyard often has the change of land ownership. In addition, due to the separation from streets and alleys, the interior of courtyards generally presents a cohesive spatial feature. For example, Tongxianggongjing No. 1 Courtyard belongs to an island-style common courtyard. Contrast a courtyard number 1936 and 2020 of the cadastral maps, the plot which is a complete cadastral in 1936, is divided into three independent of cadastral, such cadastral change causes the internal courtyard space also is divided, and the form of No. 1 courtyard change the final morphology appears as a Island-style common courtyard.



Figure 2-2 Map of land ownership, 1936

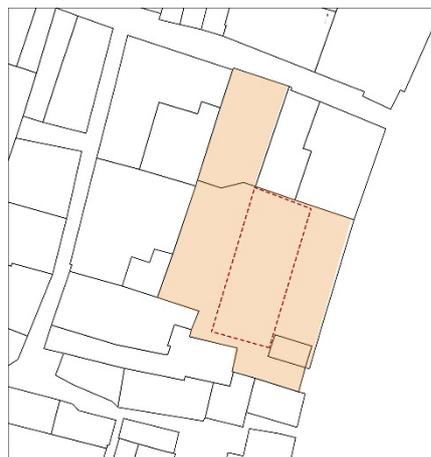


Figure 2-3 Map of land ownership, 2020

(The red line is the outline of No. 1 courtyard)

2. Street-facing common courtyard: with one or more sides adjacent to the streets and alleys. The entrance of such common courtyard is on the street, and the residents sometimes occupy the street space near the entrance to carry out some daily activities. The two sides of the houses facing the street and the courtyard often present two different states. For example, at the intersection between Xiegongci and Shuizhai 'an, residents inside the courtyard regard the upper part of the roadway as a space for washing (Figure 2-4).



Figure 2-4 Residents ready to collect the clothes

3. Passing through common courtyard: public streets and alleys pass through common courtyards. Such common courtyards belong to a special situation. The crossing of public streets and alleys has eliminated the shared attribute of courtyards. However, because such courtyards are still placing for the activities of surrounding residents and their physical forms are interfered by the daily behaviors of residents, so this passage also regards such spaces as a special shared courtyard of traversive style. For example, the open space where Tongxianggongjing No. 7 well is located is an open space centered on the well at the corner of the block. The two sides of the open space have walls, two sideways and residential buildings on the other side of the roadway. The house and the courtyard in the corner are separated by the road and belong to different plots. But during practical research observed the corner place is open corner blocks, but also the surrounding residential common courtyard, residents' laundry, washing, afternoon activities are in the yard, though cut apart by a small tunnel, but look from behavior patterns in the surrounding area is closely linked with compound, daily life of the surrounding residents all influence the development of the common places. Residence, well and open space together constitute a common courtyard space spanning three plots (Figure 2-5, 2-6).

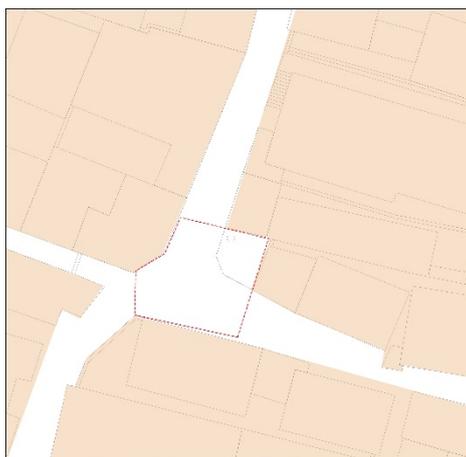


Figure 2-5 Corner space and lots

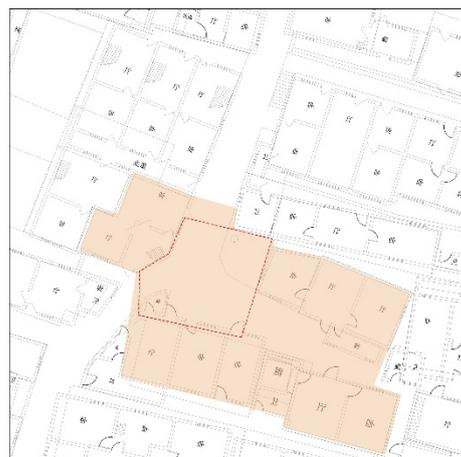


Figure 2-6 Passing through common courtyards

Different from the traditional classification according to the form and structure of courtyards (such as character, U-shaped, quadrangle courtyards, etc.), the common courtyards in HeHuatang historical and cultural district have a lot of space extension and property rights mixing problems. The traditional classification of courtyard layout and form can not fully reflect these influencing factors, while the block is

a spatial structure composed of streets and alleys connected with courtyards. The behavior of residents and the division of property rights in the block are significantly related to the streets and alleys, and the streets and alleys constitute the external environment of the courtyard, which is an element that cannot be ignored. Therefore, this paper adopts the relationship between courtyards and streets to divide the common courtyards.

### **2.1.2 Division of Common Courtyard in District**

Voluntary and gradual expropriation policy will fall into the dilemma of how to divide "courtyard and building" in the implementation process: if the size of courtyard is too large and the number of residents is too large, it is difficult to reach an agreement; if the size is too small, there will be the problem of how to reuse it. This problem can be effectively solved by dividing the basic unit of the common courtyard. In this paper, Hehuatang Historic and Cultural District can be divided into 176 common courtyards (Figure 2-7), among which 134 are Street-facing common courtyard, 37 are Island-style common courtyard and 5 are Passing through common courtyard. On the level of spatial form, each object connects two dimensions: urban form and texture, building type and construction feature. At the level of neighborhood life, it also covers the interaction and influence between different living patterns.

In the past, the division method of planning control unit for old city renewal was mostly implemented in a short period of time, to adopt property right division, block division and so on. The road was used as the form to divide the large block area, and then the mound map was used to further subdivide the operation unit. For example, in the reconstruction of Xiaoxihu District, in order to achieve the effectiveness of the actual reconstruction action, the road was used as the basis for block division, and each unit was defined by the road, and each unit was independently designed for reconstruction. These methods only pay attention to the change of form, but ignore the interaction between the inhabitant population and the daily life pattern and form, as well as the phenomenon of group use between plots. In the field research, the author found that the rich behavior patterns of residents would have a huge impact on the site, and the field of the site would also cross the restrictions of the street. The division unit formed by the common courtyard not only contains the integrity of the spatial form, but also considers the effective boundary of residents' daily life.

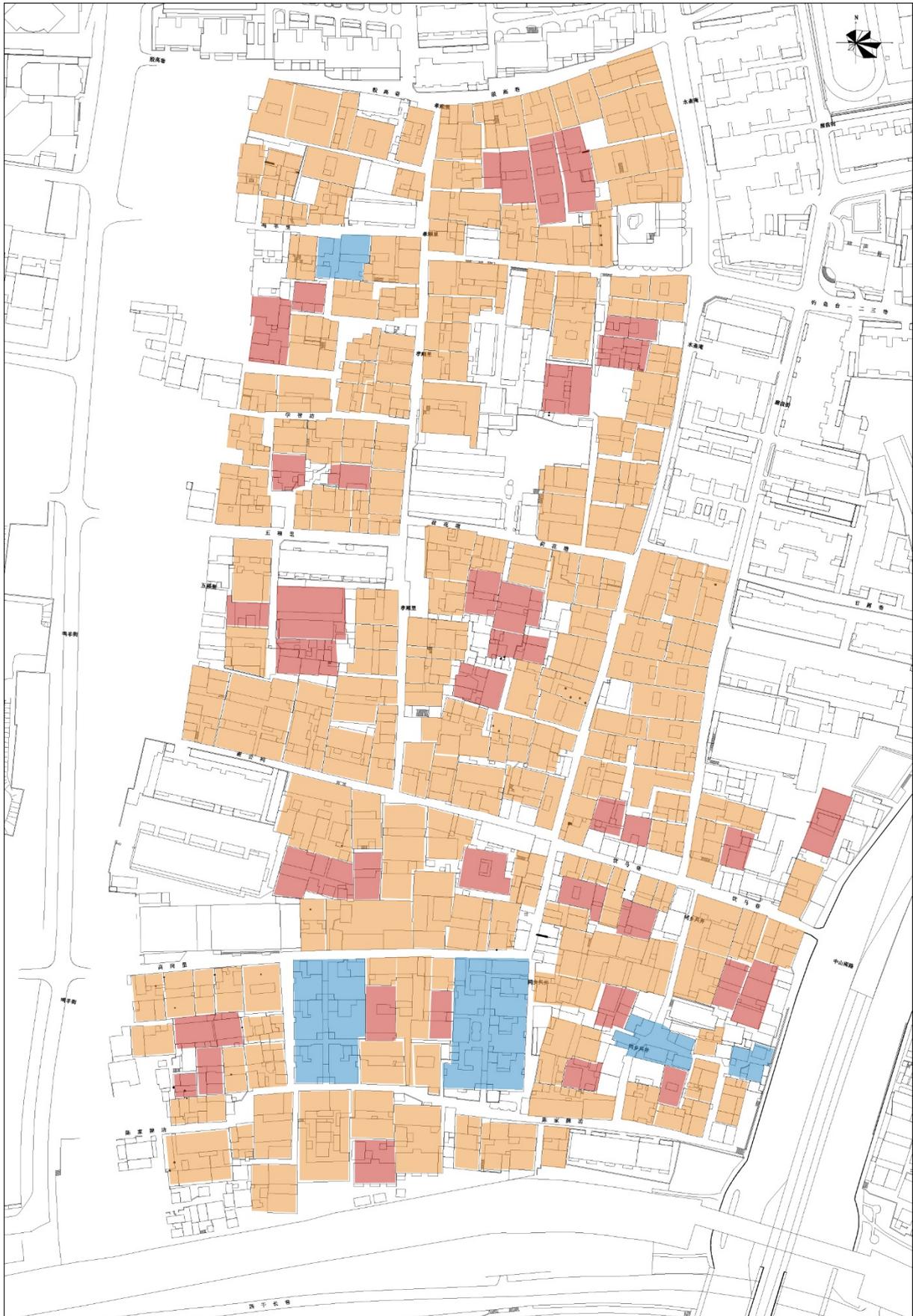


Figure 2-7 The layout of courtyards in Hehuatang Historic and Cultural District

(yellow: Street-facing common courtyard blue: Passing through common courtyard red: Island-style common courtyard)

### 2.1.3 Plot group

Hehuatang Historic and Cultural District can be regarded as a plot group composed of different common courtyards and basic units. Courtyard is a basic place for common life. Different courtyards will inevitably produce different neighborhood life due to different people and different life styles. Some common courtyards are independent of each other and do not interfere with each other. Some are connected in series by the same street and lane to form a group of sequences. Others can sense each other, with the help of each other, and form a space group relationship by extending the space out of the courtyard group. Pedestrians walking in the Hehuatang Historic and Cultural District will often turn around and get into a courtyard. At the end of the courtyard, they will find a gap leading to another courtyard at some point. Through the new courtyard, they will come to another new roadway. There are a lot of such "borrowing space" situations in Hehuatang Historic and Cultural District: courtyards rely on each other in sight and space to extend themselves and form a group of courtyards, which can be perceived and used by more surrounding residents (Figure 2-8). This also makes the division of the research land in Hehuatang Historic and Cultural District not only determine the research boundary by the block, property right and house form in the previous way, but consider the common influence of the use range of each common courtyard, historical background, and other factors. For example, in the block, Tongxianggongjing No. 1 Courtyard and Tongxianggongjing No. 6 Courtyard were originally connected. However, due to the extension of the residences of the residents of No. 1 Courtyard in the later period, the two courtyards were separated by walls, and the two courtyards became two independent courtyards.



Figure 2-8 space extension

## 2.2 Influencing factors of common courtyard units

### 2.2.1 Property rights

Property right relation is a kind of expression form of article ownership namely. The change of property right of the land represents the change of the owner of the land. Individuals have different ways of using

space and different demands, which all affect the form and function of the space. There is a more special property right relationship in Hehuatang Historic and Cultural District, that is, the mixture of public housing (public housing, the property right, the right of use, the right of profit, and the right of disposal belong to the state) and private housing (as opposed to public housing, the property right of the residential is owned by the private within the specified number of years). In the course of history, most plots of land have changed from private houses to public houses, some plots of land have maintained the nature of private houses, and even some plots of land have gone through the special circumstances of private property rights evolving to public property rights and then to partial public property rights and partial private property rights. In this context of different property rights, residents try to define private property rights and public property rights on the site by means of low partition walls, fences, changing pavements or raising the terrain, which also adds a lot of complexity to the spatial pattern of the courtyard. There are many common courtyards in Hehuatang Historic and Cultural District, which are divided in different ways due to different property rights: some residents build a low wall formed by a wash basin to enclose the boundary of their own courtyards; some residents combine the daily necessities (plants, benches...). Confining private courtyards. Property rights bring about different ownership relations, and ultimately reflect a kind of residents on the premise of ensuring the integrity of their own private space, still maintain the "borrowing space" of the common space, with the help of the common space to extend the private space.

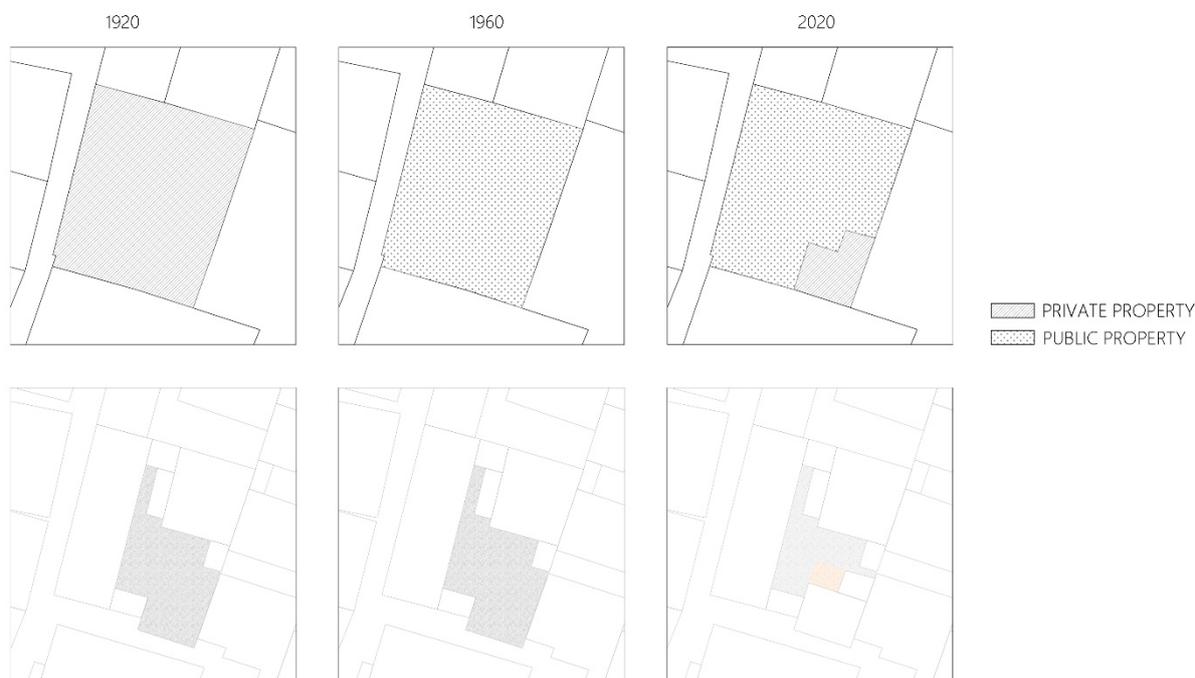


Figure 2-9 Property Rights of No. 6 Courtyard

For example, after field investigation, interviews with residents, and comparison with the map of the property rights provided by the Planning Bureau, we know that: Originally, the whole No. 6 Courtyard was a private house. Because the original owner was sent to other places in the 1960s, the state expropriated the land as public housing and allocated the No. 6 Courtyard to different residents according to the area, so the

courtyard became a shared space for everyone. In the 1980s, the original householder returned to No. 6 Courtyard and had no room to live in. In order to accommodate him, the state divided a piece of land in the courtyard of the original site for compensation and repaid it to him as his private house. After such a historical evolution, and eventually formed the present public private mixed pattern, and the property right relations in the original public courtyard form is divided into two parts: the residents to share the yard with the original household private courtyard coexist, the former head of the household use low floor and fence to distinguish private courtyard from public courtyard.

### 2.2.2 Behavioral patterns

The behavior pattern of residents' daily life is divided into outdoor behavior and indoor behavior. This paper: Jan Gahl in "Life between buildings" for the division of activity, necessity activity could be divided into three categories: outdoor activities (necessity activity under various conditions can occur, including those somewhat involuntary activities, such as school, work, shopping, waiting, waiting, on a business trip, mail delivery, etc.) , spontaneous activity (spontaneous activity only occurs under the condition of suitable for outdoor spontaneous activity is another entirely different activities, only in the will of the people involved, and under the condition of the time, place, may) is produced, social activities (refers to the social activities in the public space depend on others to participate in various activities, including children's game, Greeting each other, talking, all kinds of public activities, and the widest form of social activity -- passive contact, in which people are perceived only by seeing and hearing). Jan Gahl believes that the composite scene of outdoor activities is influenced by many conditions, one of which is the physical environment, which affects these activities in different degrees and in different ways. The higher the quality of outdoor space, the more types of activities can take place, and there is a tendency to extend the time of activities; Outdoor activities mainly occur some low intimacy contact, but its importance can not be ignored, it is the premise of more complex communication. Without such low intimacy, the forms between individual and group activity would disappear. Therefore, outdoor activities are the starting point and foundation of community atmosphere. In the daily comfort zone of the residential area, different activities are linked, and different activities are also related to the level of spatial publicity. In the public space estranged from the residential space, social activities are shallow and mostly passive contact, so the attraction of such activities is limited. In contrast, the public space, which is closely combined with the living space, will have more comprehensive activities, and develop common interests due to the common experience and familiarity of the residents, even if there is no special reason to meet each other.

Children playing in front of the door, old people chatting and resting on stone benches, merchants Shouting, couriers sending mail and other daily life scenes should occur in the street yard space in daily life. But in Hehuatang Historic and Cultural District, in addition to Yinmaxiang, Xiaoshunli, Gaogangli main streets are relatively abundant social activities and voluntary activity, the streets are because of its scale, space, quality problems and residential section transition problems, the daily life are relatively less common (figure 2-10, 2-11). Compared with streets, alleys, and courtyards, according to the hierarchy of public space,

courtyards inside courtyards belong to the most private level of public space, while streets belong to the higher level. Therefore, more public activities of high intimacy should take place in courtyards. However, in block sites, the quality of most courtyards with shared courtyards is low. Backwardness of municipal infrastructure such as drainage and lighting leads to the lack of activities, and the mismatch between spatial level and behavioral activities.



Figure 2-10 Shuizhai alley



Figure 2-11 Tongxianggongjing alley

( Both images were taken at around 3pm on Saturday, January 9, 2021 )

Indoor behavior is the behavior activity that residents carry out in combination with the function and layout of the room. Most of the users will carry out some private activities and spontaneous activities with high intimacy in the room. Due to the relative lack of material space, it is difficult to completely separate the space for private activities and the public communication space in the residential buildings in Hehuatang Historic and Cultural District, which will involve a certain degree of functional mixing: As most homes in the living space is combined with bedroom space, in which period of time to carry on the different attributes of behavior, this room private behavior and public behavior disorder lead to residential interior space order cannot effectively deal with has the common attributes of space, the crowd gathered residents fear public space impact on personal behavior, Most of the residents of street-facing and passing-through common courtyards have the choice of closing their houses to the public interface: a stone wall without any transparent material on the facade or blocking the windows with wooden boards even when they are placed in the wall for lighting. As a result, the house itself is like a "wall" that cuts off the street from the inner courtyard. The transition of street buildings and courtyards should be a very vivid section relationship, because the problems of the internal use of the house cut off all potential spatial order rigorously.

On the other side of the building, courtyard, and the transition of residential stiff, lack of effective gray space to join transformation, residents on the one hand, their existing building shacks to capture yard space create gray space and increase their own residential area, on the other hand also tried to use some personal items to create a feeling of field, build a kind of public and private space transformation. The shape of the communal compound is thus influenced by such private patterns of behaviour. The special lifestyle and

personal belongings of the residents of the communal compound will eventually be reflected in the space and have an impact on it. Most residents have placed their personal items for daily use in the courtyard. These personal items form an atmosphere of private use in the site and then produce a sense of place, and then integrate into the common space, which is imperceptively divided. As in the No.6 Courtyard of Tongxianggongjing: Southwest resident in front of the building of the sink, the northwest corner of resident in front of the building plate placed cooking utensils, these very personal way of life, will occupy the space itself and the surrounding range build the atmosphere that gives a kind of personal use, the longer it will create a private life into the Shared space, make the behavior of a part of life.

### **2.2.3 Interaction**

Property right relation and behavior factor have great influence on the form value, functional business form, cultural custom, and other aspects of the block. Property right, behavior and form restrict each other to form a triangle relationship, and the results are interfered by the other two parties. From the perspective of urban form, the structural hierarchy of streets, alleys, and courtyards in Hehuatang Historic and Cultural District is clear, but the development of the form is not achieved overnight. In the history of Hehuatang Historic and Cultural District, the property rights have been changed for many times, and the form of courtyards also changes with the changes of property rights boundaries. The originally complete courtyards or streets are also divided into public Spaces due to the participation of some private behaviors of residents, resulting in many vague and ambiguous common Spaces that are difficult to define. In terms of property rights, it is found in the survey that although the ownership of each land parcel can be clearly distinguished from the field visit and cadastral map, the ownership of the shared space is still complicated and mixed due to the overlapping relationship of courtyards and the intervention of residents' daily life, giving birth to a series of spaces for common use. After the field investigation found that this is a large number of historical block of everyday life, behavior pattern is the most important intervention of compound factors, because residents life itself is a lot to the public "means" to make their own space to extend the way, this way of site residents demand for living space, need to use, And site although there are many courtyard but because of its poor quality and lack of effective gray space of space transformation, residents can only be used by use of daily life behavior and daily life furniture spontaneously to the inner court, tentatively shared space occupied, and with the development of the time, into the common courtyard, formed a state of symbiosis with shared space.

## **2.3 Summary of this chapter**

Due to the common courtyards are blocks constitute the basic elements and micro place for residents' daily life behaviors, so this article first brief determines the scope of unit of courtyard, and combed the courtyard space structure in the Hehuatang Historic and Cultural District, classified methods, and the plot of the way, for the later and the study of the collective memory and intensive use of the compound foundation.

Among them, it focuses on the common courtyard unit in addition to the spatial structure dimension, adding residents' daily behavior and boundary, using the method of typology map to study the relationship between common courtyard and block composition, and divides the common courtyard into three types: 1. Island-style common courtyard, 2. Street-facing common courtyard, 3. Passing through common courtyard. The spatial characteristics of three types of courtyards are analyzed.

After clear there were compound type and scope, this chapter focuses on a total of courtyard of sociological factors and economic factors on the impact of compound, and further analyzes the economy, the behavior and the interaction of form elements: first, the property factors will result in changes of yard space in the form, the private space in the Shared space will remain on "share" of a public space; Second, the generation of daily behaviors will eventually be reflected in the space, and different types of behaviors will occur in the space with different publicness. Third, the comprehensive observation of property rights and daily behavior shows that private behavior will take place with the help of public space and be restricted by public supervision.

By integrating block map analysis with a larger resolution, this chapter finds that the street pattern, plot organization and behavioral activities of the block affect each other, and produce rich space types in the block, which makes the block extremely complex. Therefore, it will pave the way for the following research on place and collective memory by means of behavioristics.

## Chapter III: Collective memory and space utilization of common courtyard

The special neighborhood atmosphere and collective memory in the historic district are formed with the development of the city. The difference between different blocks is mainly reflected in the physical form of space and the non-material form of daily behavior. The common courtyard as defined in this paper is a basic unit combining the spatial structure of the courtyard with the daily life of the neighborhood. Section for a total of compound type classification based on the last chapter, this chapter first place and daily behavior to study the relationship between discusses different types of courtyard and daily behavior and analyze the relationship between the collective memory, the purpose is not only more deeply analyze the yard space structure form of daily and complexity, is combing the historical block project, Discuss the carrying mode of collective memory. This chapter further studies the spontaneous compound utilization of the surrounding residents in the common courtyard. In the current residential block, there are many problems in the spatial pattern and material form. The types of residential space produced in different periods adapt to the needs of social activities in different periods, and the evolution of the form also obeys a certain spatial order. This chapter further compares and analyzes the living space that the contemporary residents miss and the contemporary living space in the Hehuatang Historic and Cultural District.

### 3.1 Collective memory of common courtyard

Lewis Mumford defined the city as "The City in History" in his book *The History of the City*, and "collective memory" is the key factor that endows the city with the historical connotation of material form and forms the spirit of urban place. In "The City in History" and its development, Mumford repeatedly mentions the word "place". The place he refers to is the field represented by a conventional system, and it is a symbol. Place represents the opposition to the functionalism prevailing in the 20th century. The word place emphasizes domain and locality. Functionalism regards function as nature, and space and site are dominated by function. In his criticism of functionalism, Robert Venturi mentioned in his book "Learning from Las Vegas" that the symbolic role in the field of architecture is becoming superficial, which explains the prominence of "place". Manfredo Tafuri used the term "architecture in purdir". It is pointed out that "place" is not a closed and narrow space, but a prominent place. The descriptions of Tavri and Venturi support people's increasing awareness of the existence of places, which determine the meaning of things.

The places discussed in this section can be divided into two types. One is figurative, which clearly shows itself and the surrounding environment to the audience in a formal way, which can be called "geographical places". The other is the collection of a part of people, with a complex but ingenious local convention. This kind of place contains something beyond form and function: the form of daily life. We call this place "spiritual place".

Hehuatang Historic and Cultural District is in the core area of Nanjing old city. The pattern, texture and form of the district are unique and highly representative of China's old city. The district contains part of the early memories of Nanjing city. The neighborhood life in the block has historical inheritance, representativeness, and strong locality. As the daily living place of residents, the common courtyard units are not so much referred to by the block as the Hehuatang is what kind of block. The living environment of a historic district is very different from that of a thousand sides in a modern city. It has rich changes, and almost every civilian house is a variant transformed from the prototype. The scope of transformation includes topological transformation of structural mode, scale transformation, spatial element transformation and entity element change. Residents show their interests and daily life in familiar places. These places to depict life are the places that carry collective memory discussed in the article. This paper relates the display of the collective memory site mentioned by Mumford to the architectural space in the block and the life happening in the space.

Living space does not depend on a single building can be formed, but also includes the combination of related buildings and various environments can be considered complete. And a type is an abstract system, which is hidden in the concrete environment type, so it can only be perceived in the concrete type. In this paper, the common courtyard is divided into three types, and each type of common courtyard is composed of three parts: the core formed by the courtyard and the house, the interface formed by the door and the window, and the environment formed by the lane and the wall. The daily behavior and activities of residents in different types of common courtyards combine with different components in a special way. This section tries to take the way of behavioristics, the method of research within the Hehuatang Historic and Cultural District of different types of a total of three aspects of compound unit, take an examination of is the total of compound real produce in daily life and the way of living, and the way to the record, the bearing collective memory of the space of daily life, culture, and local block type generalizations

### **3.1.1 Street-facing common courtyard**

#### **(1) Double courtyard**

Two traditional gate heads serve as the entrances of the compound group formed by the combination of two courtyards, Gaogangli No. 19, and Gaogangli No. 17, at Chenjiapaifang alley and Gaogangli alley (Figure 3-1, 3-2). The compound is separated from the surrounding field by a traditional horse-head wall. The "double courtyard" formed by the two common courtyards connected the two parallel streets (Chenjiapaifang and Gaogangli) which were originally not connected. In real life, the residents of the block not only use the yard for sports, rest, cooking, and other daily activities, but also use it as a shortcut to cross the block. Standing at the two entrances of the "double courtyard", the first visitor can only perceive one long courtyard. When he or she goes to the depth of the courtyard, he or she can find that the long courtyard is connected to another courtyard.



Figure 3-1 the entrance of Gaogangli



Figure 3-2 the entrance of Chenjiapaifang

From the perspective of the spatial form of the courtyard, the high wall forms the boundary of the long courtyard, and the residence is located at the end of the courtyard directly opposite the entrance. The high horse-head wall and the residence form a strong perspective of the whole courtyard space, and strengthen the depth of the courtyard. House at the end of a high window open for long, through positive carries on from the road to the deep within the line of sight to create the continuity of street, between courtyard and home, the continuity broke the boundary of inside and outside, a Japanese architect Kazunari Sakamoto in the “Daita Machiya house” described in state space: at home can insight into the court and the things happened in the street. The "double courtyard" on the site is composed of two long courtyards with the above spatial order. The two long courtyards are mirror images of each other. The scattered space at the end extends the space diagonally, forming a larger courtyard together and a courtyard group. Thus, the side of the house is no longer negative and becomes a new facade towards the courtyard, gaining a positive attribute.



Figure 3-3 Ground floor plan

Red solid line: Land property boundary Red dotted line: Common courtyard boundaries

The horse-head wall is not only the partition wall of the house, but also the wall of the whole courtyard. Residents create the nature inside the high wall and establish the order of "home" with the courtyard. The

"Double Courtyard" still retains the traditional forms of components that form the boundary of the "Double Courtyard" and form the historical memory of the material form of the shared courtyard.

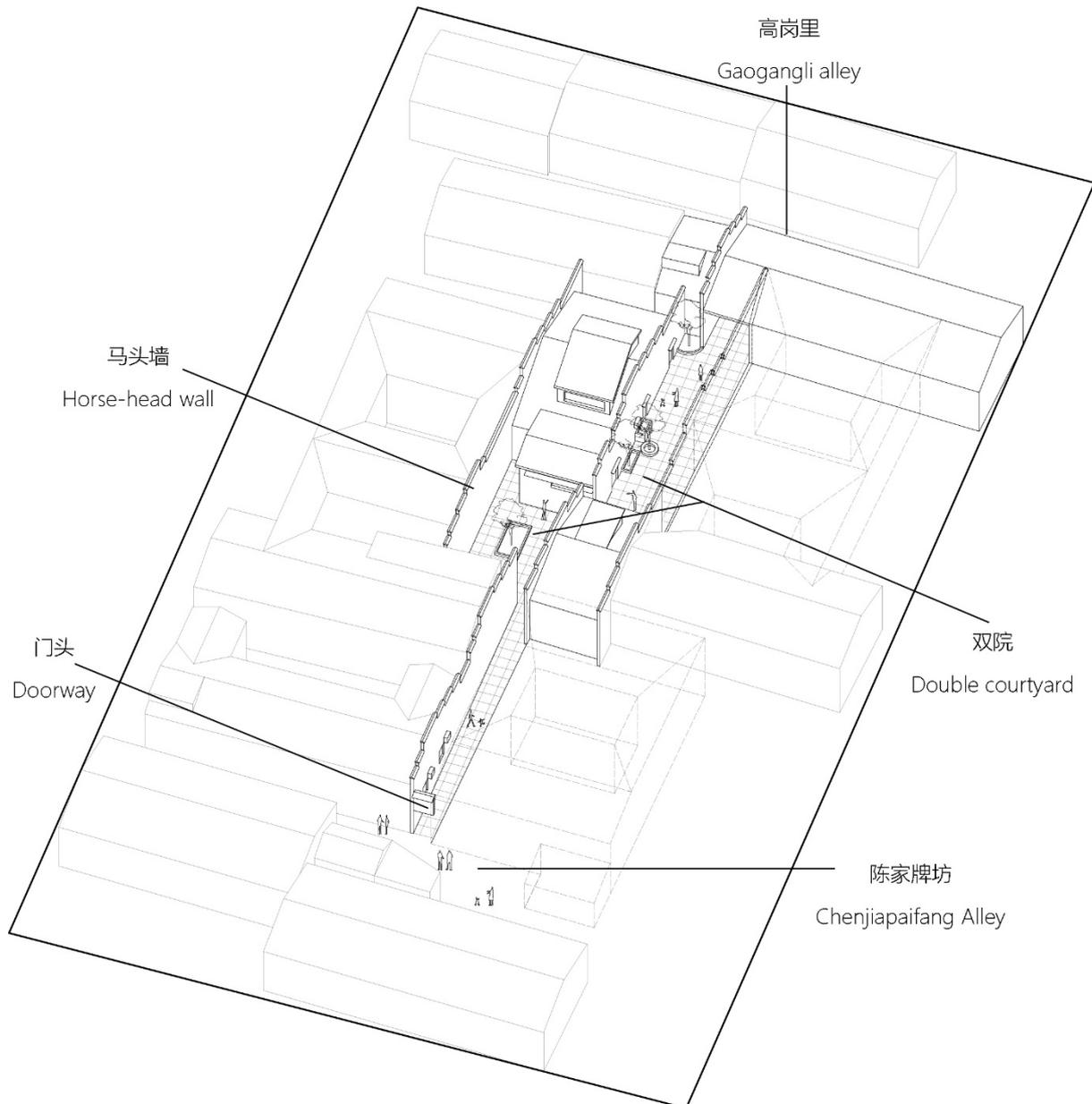


Figure 3-4 Axonometric of double courtyard

## (2) Vase door

The entrance of Tongxianggongjing No. 1 courtyard adopts the traditional form of the vase door (Figure 3-5). The combination of the door and the single-slope buildings on both sides constitutes a group of overall form order, and the traditional elements spontaneously constitute a contemporary form. The traditional construction elements are combined with the space of daily life: the path behind the door divides the building from the east to the west. The path is not only a space for each home, but also a passageway connecting the entrance of the common courtyard with the rear courtyard and the house (Figure 3-6). After access to walk path, then can feel and observed in the streets of symmetric rigorous order completely different atmosphere, pedestrians can be observed from the windows of the left and right sides and eye level to the activities of the residents in the room, the room also can be observed through the window, which, even through the opposite

of the window to see their neighbor's activity (Figure 3-7), neighborhood life is also connected by such a path.



Figure 3-5 Entrance of the vase door

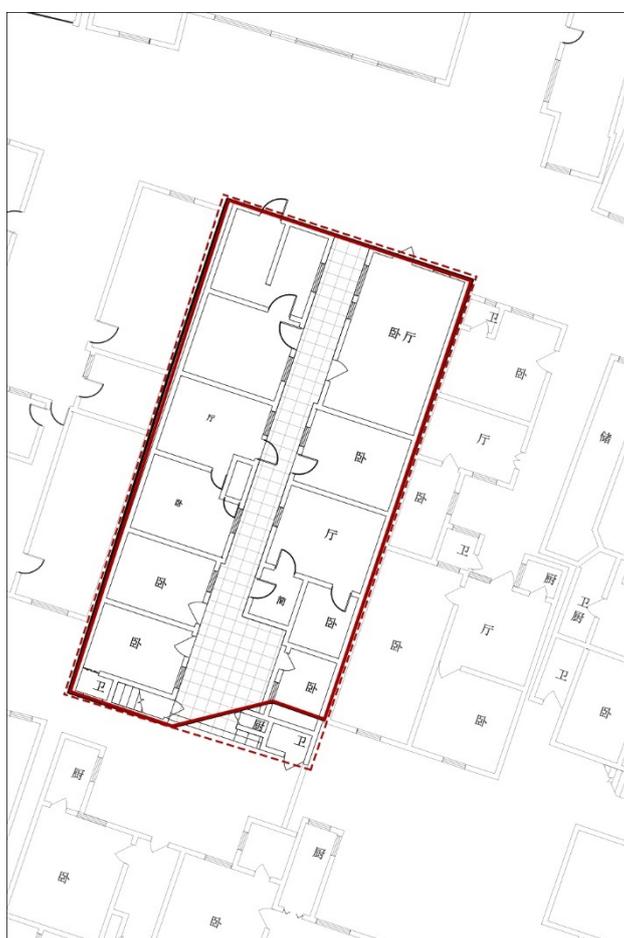


Figure 3-6 Ground floor plan

Solid red line: land property boundary Dotted red line: boundary of common courtyard

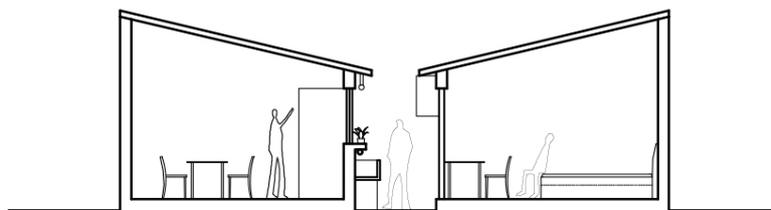


Figure 3-7 Section

Even though the road is narrow, residents in the communal compound still use the lane to build some furniture for daily life, such as washing tables, and choose to park their bikes in the alley rather than at the entrance of the communal compound. According to interviews, residents generally believe that when they enter the compound, they are at home. Because the usable area of the house is too small, residents follow the daily behavior of washing in the courtyard in the collective life style of the courtyard in order to make the space in the house use appropriately. It can be seen from the section that the activities in the alley and the activities in the house are mutually perceptible, and the residents are also supervised and restrained by other residents while using the public space.

John Hejduk proposed the concept of "masquerade stage", which regarded the house as a mask of the corresponding city in life. The entrance of the common courtyard spontaneously formed by the shared courtyard also responded to this idea: The vase door and the doors on both sides form a "mask", which is the "mask" to the outside, undertaking the transition between the block and the courtyard. Entering such an entrance marks returning home, ending the state of work, and opening the state of rest at home. Therefore, the vase door of No. 1 courtyard is not only the entrance between the inside and outside of the common courtyard, but also the entrance for residents to transition between work and rest state. Architectural history is the history of the city, and the form itself is a kind of durability, in such a spontaneous generation courtyard, in the form of traditional (shed roof, vase door) combined with everyday space form constitutes the order of a monument, and this "monument" is also a kind of the embodiment of the residents for the inheritance of collective memory.

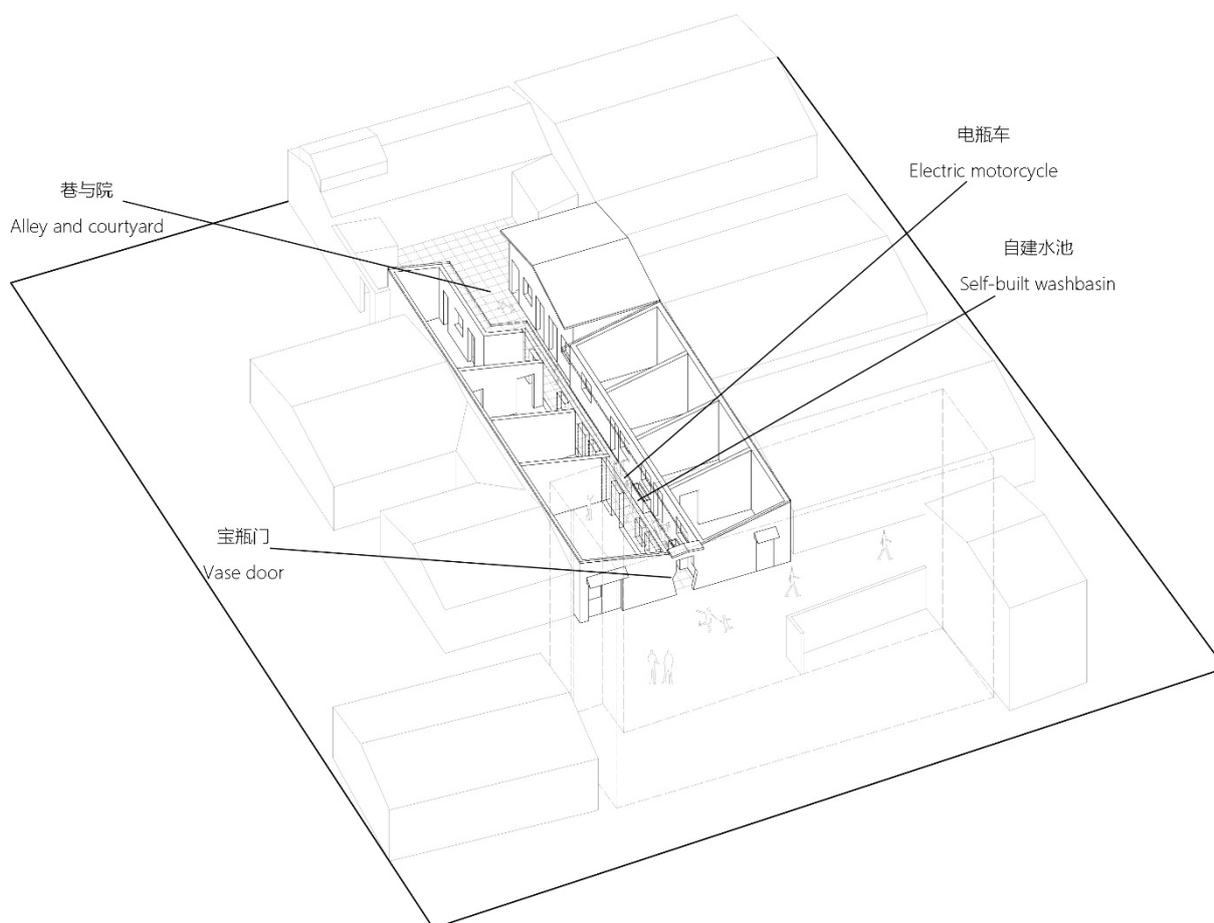


Figure 3-8 Axonometric of vase door common courtyard

### (3) Shop and yard

There are a large number of types that shops are in front of courtyards, and on the ground floor and residential buildings on the upper floor in Hehutatang Historic and Cultural District. In such a residential type, the storefront can gather people and become a stopping point in the street, thus expanding the activity space in the courtyard and becoming a new place for daily activities of residents.



Figure 3-9 Corner shop



Figure 3-10 Current situation

There is a common courtyard at the intersection of Shuizhaian alley and Xiegongci alley. The corner space is a shop with Windows facing both streets (Figure 3-9), which is the place where the surrounding residents buy vegetables. After buying vegetables, residents would also stay here to communicate with

acquaintances, bosses, or people in the courtyard. The old people in the courtyard often choose to sit at the door of the store to chat, bask in the sun and other rest activities. Due to the existence of shops, the street corner on which the courtyard is located is different from other street corners and becomes a place of high vitality and high stopover. The area is the positive space that the common courtyard feeds back to the city, so the residents mostly choose to go to the corner shop entrance for activities, while the interior of the common courtyard becomes some service Spaces such as parking electric cars and laundry.

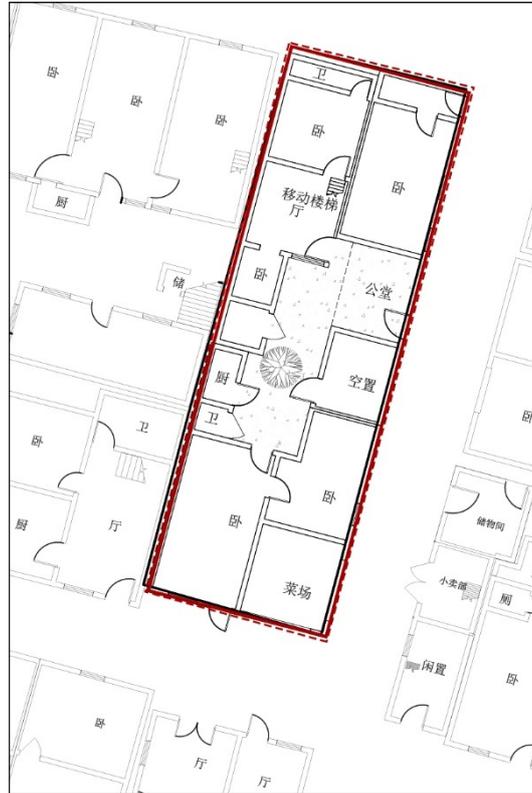


Figure 3-11 Ground floor plan

Solid red line: land property boundary Dotted red line: boundary of common courtyard

Analysis from the space form (Figure 3-11), the corner store for roadway is opened two entrances, and entrance and spacious, is beneficial to the people oriented, indoor courtyard corner store space thus become "gray space" in the streets, on the one hand, to become blocks and transition of common courtyard space, on the other hand also became open space of the street. The entrance of the inner courtyard is located on the Shuizhaian alley, and the entrance of one house in the shared courtyard is on the Xiegongci alley. Both entrances are juxtaposed with the shop facade, and the shop becomes the guardian space of the entrance, increasing the sense of security.

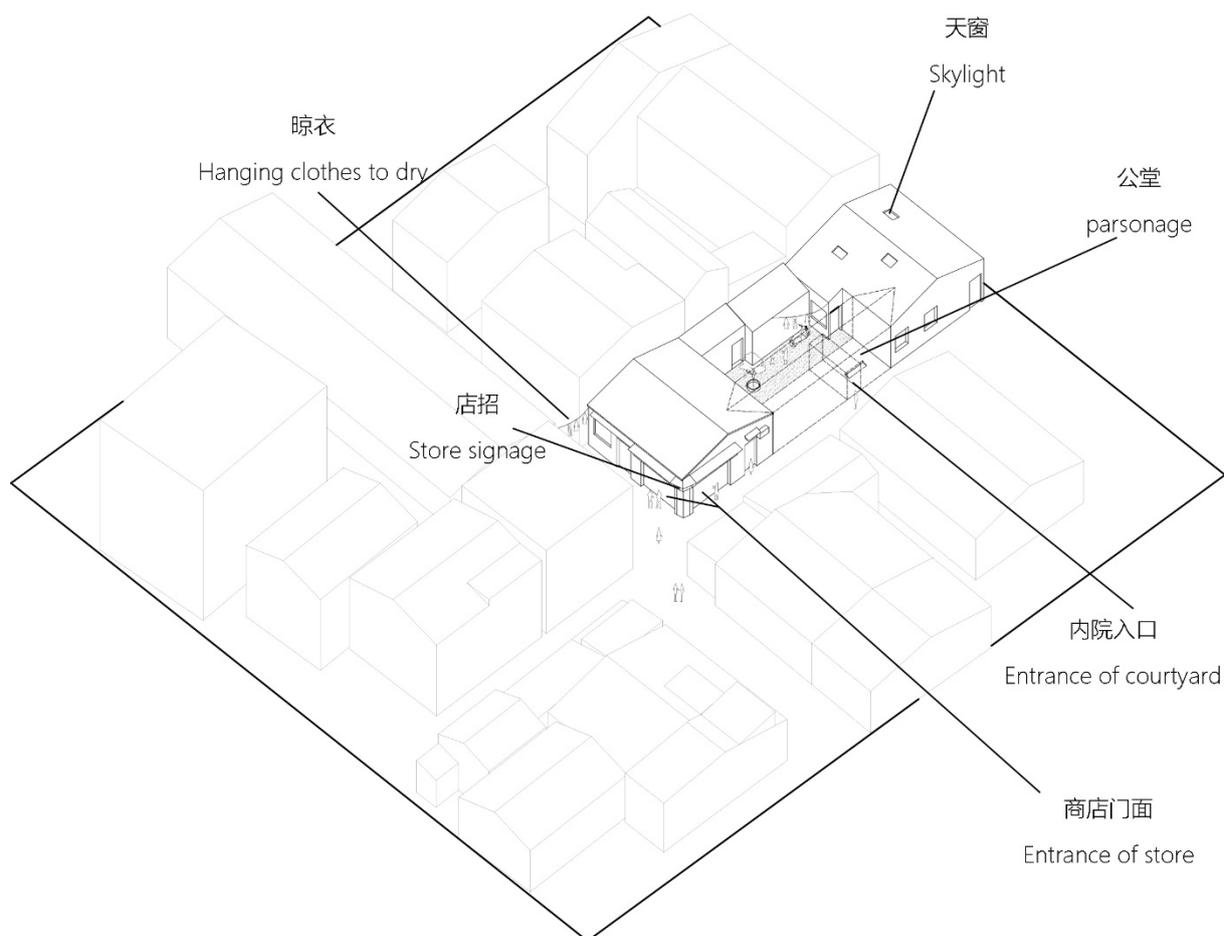


Figure 3-12 Axonometric of the common courtyard

### 3.1.2 Island-style common courtyard

#### (1) Ternary courtyard

Tongxianggongjing No. 1 Courtyard, the original spatial structure is a traditional three-step courtyard structure, and in history it was a family private residence. As the living pattern in the courtyard space changes from the family's private use pattern to the collective use pattern of the courtyard. The courtyard is shared by the group. The spatial structure of No. 1 courtyard still maintains the traditional form of three courtyards, but through the hall form under the eaves (Figure 3-13), the three courtyards are connected to each other to form a ternary courtyard from a bird's eye view, which forms a "王" shaped courtyard (Figure 3-14). The ternary open-air courtyard with two courts of the hall together forms the common courtyard space, so the courtyard space has two attributes: under the compound has close relationship with the residence of the house, it becomes the extension of the house, the furniture such as shoe rack is placed in the courtyard of the hall, and even homes in the second courtyard of the hall built a bathroom space. The open-air courtyard undertakes the residents' daily outdoor leisure activities.



Figure 3-13 the courtyard is connected by the hall



Figure 3-14 Aerial photo

The properties of the houses in the No. 1 courtyard are all private houses, property rights belong to Xiang's family. The landlord only uses the house in the northwest corner and rents the other rooms to tenants. Such a living relationship between the head of the household and the tenant makes it difficult for the tenant to reuse the courtyard according to their own will and needs, and the consent of the landlord is required. In such a tenancy relationship, activities in the common space are monitored not only by the neighbors, but also by the landlord. If the residents in the northeast corner once wanted to add a room on the east side of the front of the courtyard, they did not get the consent of the landlord, and the matter of expansion was not resolved.

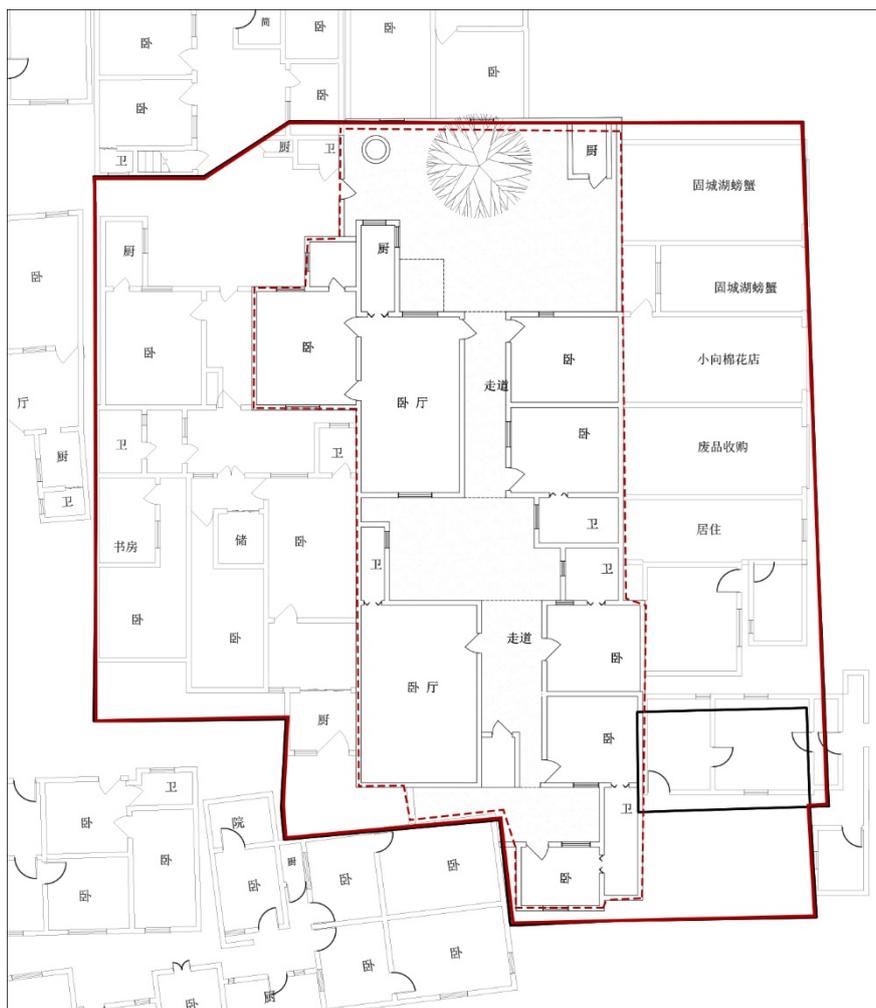


Figure 3-15 Ground floor plan

Solid red line: land property boundary Dotted red line: boundary of common courtyard

As can be seen from the plan (Figure 3-15), the area of the ternary courtyards decreases from the front to the back, and each courtyard is originally an open space. With the increase of residents, the demand for toilet, kitchen, and other service space increases, so residents build their own toilet and kitchen in the space of the courtyard. In Hehuatang Historic and Cultural District, residents expand the above service space to the courtyard space is also familiar. The front courtyard with the largest area has the two symbols of the common courtyard: the ancient well and the walnut tree. Around the two physical centers in the courtyard, the residents carried out their daily life: resting under the tree to play cards, using the tree to connect the cable to dry clothes. These ways of the residents of the No. 1 common courtyard show the integration of the everyday life and the commemorative material form, which constitute the collective memory of the site.

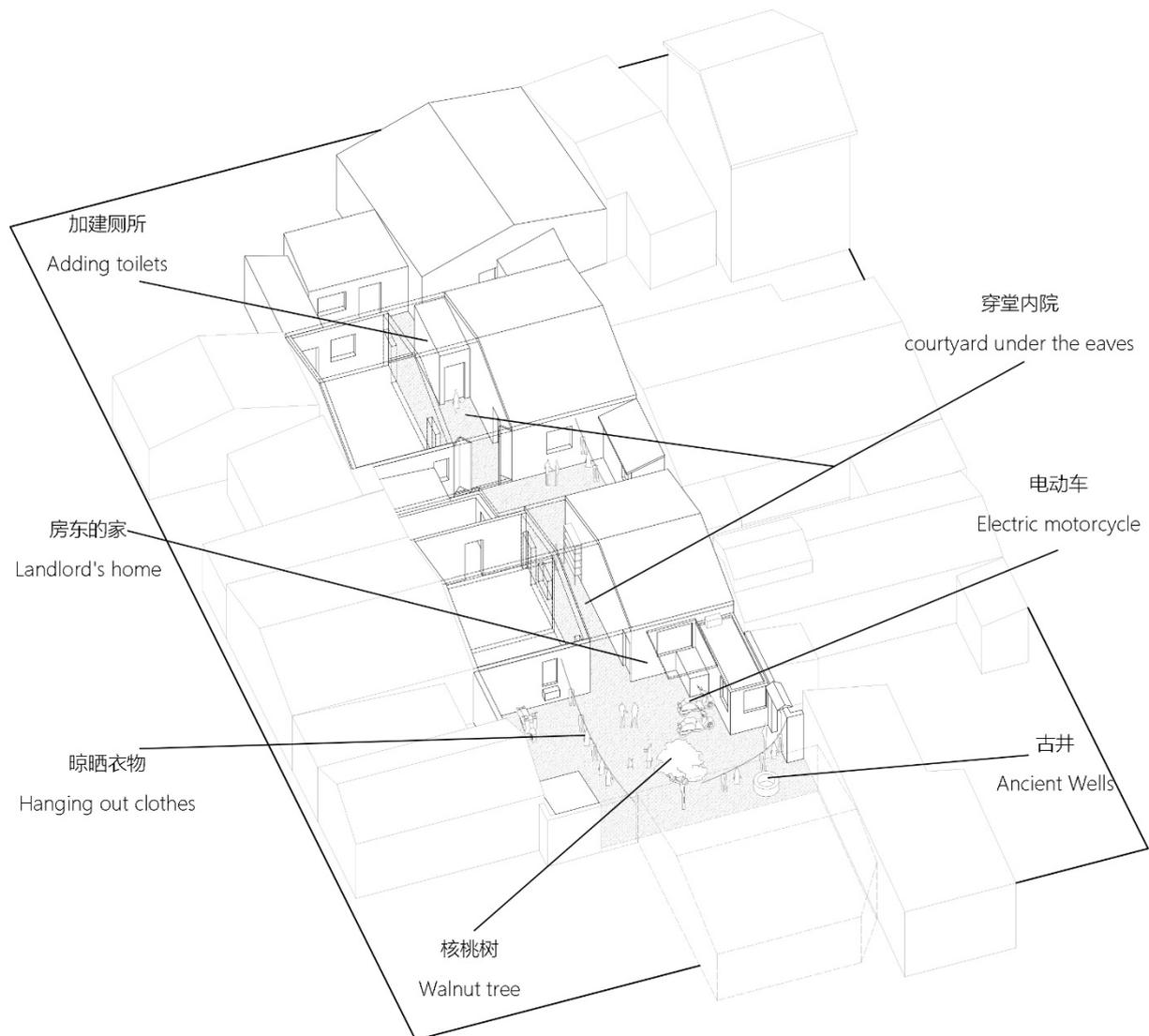


Figure 3-16 Axonometric of the common courtyard

### 3.1.3 Passing through common courtyard

#### (1) The well at corner

As the old well at the corner of the block is designated as a historical protection by the government, a

small opening zone is formed around the old well. The combination of the ancient well and the open space forms a small square that can gather the surrounding residents (Figure 3-17). The ancient well has become the historical focus of the pocket square, with historical memory, and has become a marker in the site. The most vivid part of the site is the daily life of the residents, whose activities are carried out naturally with the help of the site and are not restricted by the historical protection objects. The daily behavior is combined with the site where the ancient well was created (Figure 3-18), and the pocket square has both the daily life and the historical commemorative nature.



Figure 3-17 Aerial photo



Figure 3-18 A clothes-drying place for residents

From the ground floor plan of the site (Figure 3-19), it can be seen that due to the existence of the pocket square formed by the well (referred to as the well yard), the residents would choose to face the well yard with their doors and windows, rather than regarding the street as negative place. The doors and windows are purposely oriented towards a focal point, and the facade creates the site's unique interaction with the courtyard, with both the house and the occupant watching the street corner and supervising the public, making a place that otherwise would have been a passive space come alive. Two main roadways pass through the site and divide the open space consciously by paving the ground. The flow of people brought by the roadways does not interfere with the daily activities in the courtyard, which just limits the space of the courtyard in the way of two streets and two walls. When necessary, the courtyard can also become a larger square with the help of the roadway space. This is the memory of the spatial form of the street corner and belongs to the site.



Figure 3-19 Ground floor plan

Solid red line: land property boundary Dotted red line: boundary of common courtyard

In daily life, the residents around the courtyard hang their clothes in the open space; leisure people will sit around the well to chat, play cards, etc., the people heard or saw their interest in the activities will also stop to join; people who are active in the courtyard can talk with the residents on the second floor when they look up. The doors of the surrounding houses are open and ventilated, and the owner sits in the well courtyard, so that he can observe the situation inside the home at any time... These are the daily activities of the site, which become the unique collective memory of the site. The ancient well only becomes the beginning of the formation of a site, and it is the human behavior and activities that make the site meaningful. The daily integration into the space forms the neighborhood atmosphere belonging to the site. The site formed by the courtyard also affects the surrounding residents in their daily life.

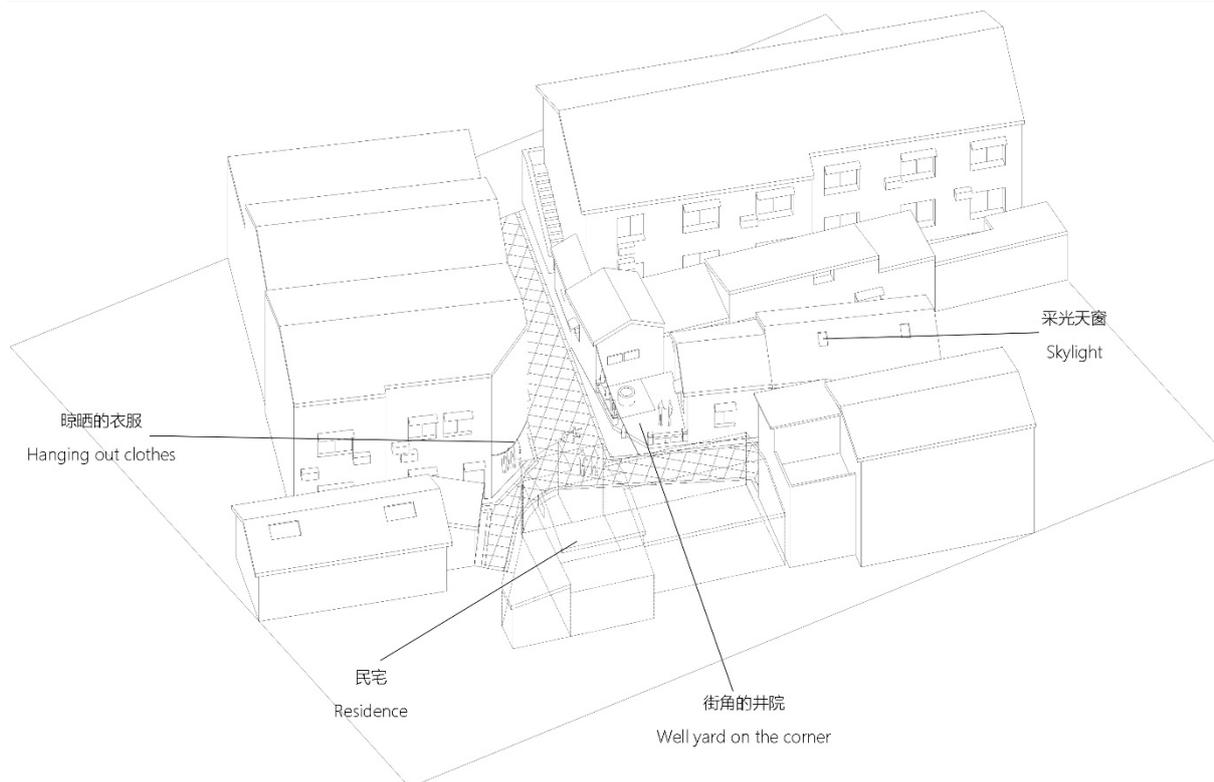


Figure 3-20 Axonometric of the common courtyard

(2) Inner passage

In the district, there is not only the spatial relationship between the plane layout of the roadway around the common courtyard, but also the spatial relationship between the section of the roadway passing through the common courtyard from the first floor. In the plot of the common courtyard group of Gaogangli No. 15, the ground floor of the middle residence is elevated, and a roadway runs through the whole site under the residence (Figure 3-21), becoming a part of the street and lane network of Hehuatang district.



Figure 3-21 Inner alley



Figure 3-22 Aerial photo

From the plan of the first floor (Figure 3-23), this public inner passage runs through the site and connects the courtyards in the common courtyard group together, forming a complete spatial group structure: hierarchical layer by layer, presenting a dendritic form. Residents on the site first walk into the inner lane, then enter the courtyard and finally go upstairs to the room. This spatial sequence is indispensable in the daily life of residents, and the inner lane becomes one of the necessary daily places for these residents. In the

longitudinal section relationship (Fig. 3-24), the courtyard and lane on the first floor are separated living spaces with the courtyard as the core. The ground floor is open to the interior while the upper floor is closed to the outside. Such virtual and real topological relationship is consistent with the spatial pattern of folk dwellings in southern Anhui, and the spatial form has also become a form of collective memory.



Figure 3-23 Ground floor plan

Solid red line: land property boundary Dotted red line: boundary of common courtyard

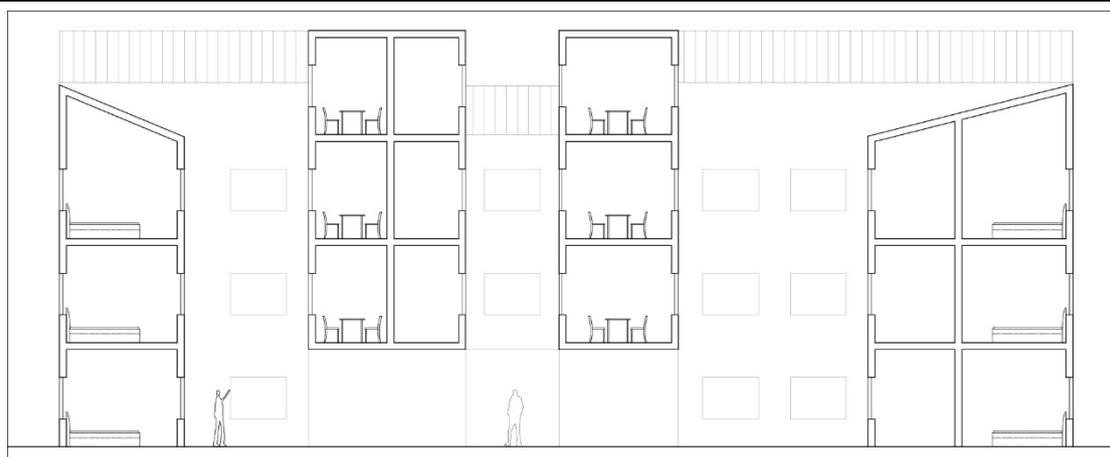


Figure 3-24 Section

In daily behavior, the inner lane is not only a passageway for pedestrians, but also a parking place for residents' electric vehicles. It is also a place for residents in courtyard to walk through the streets and have daily chit-chat. In addition, the patio formed by the inner lane serves as the lighting and ventilation space for the surrounding residents. Residents in the residential buildings above the roadway will carry goods up and down by erection of temporary stairs in the roadway. People walking on the inner lane can observe the activities in the courtyard through the opening of each inner courtyard, forming an interaction between inside and outside the site life.

The common use way and the spatial structure reveals in the development of Hehuatang Historic and Cultural District, the field living demand increases, the capacity of the traditional block texture and painting how living pattern in the vertical direction of integration, for the study of yard space form and the evolution of living pattern development is of great significance.



Figure 3-25 Axonometric of the common courtyard

The rich evolution and change of environmental forms become types through the accumulation of time. In turn, type can become the source of diversified forms, and there is a two-way interactive relationship between type and form.

## 3.2 Intensification of the common courtyard

The concept of intensification originates from the study of agricultural business methods, which refers to the use of advanced technology and management methods by investing more non-land elements per unit area of land in order to obtain high production and income per unit area. In this paper, we focus on the intensification of the common courtyard in the historic district in the context of the residents' daily life pattern, where the mixed population structure generates different demands for public space at different times and under different conditions, and the spatial and functional diversification of the use of the common courtyard spontaneously enhances the land use efficiency.

### 3.2.1 Spatial Diversity of Courtyard

Due to the limits of the scale of the neighborhood, the volume and height of the buildings, the common courtyards in Hehuatang Historic and Cultural District are often spatially diversified in the horizontal direction (in the functional diversity in the plan rather than in the section). The courtyards are divided in plan by different users, and a series of places are created by combining the boundaries faced by different division areas. This horizontally diverse structure is reflected in the spatial composition of solids and voids (buildings and courtyards), the arrangement of plots, and the street configuration, in line with the bottom-up development of the old town neighborhood.

During the research, it was found that courtyards are used by residents as light and ventilation spaces in shared courtyard units. The special street structure of Hehuatang Historic and Cultural District causes a large number of residences to face the street directly, but since residents choose to cover the windows along the street with partitions to avoid the interference of pedestrians with their living space (Figure 3-26), the residences lose the opportunity to open to the street and let in light, and the residents open skylights inside the buildings to increase the natural light and ventilation inside the rooms. The residents will open skylights inside the building to increase the natural light and ventilation in the rooms to compensate for the "loss" of the street. When comparing the number of skylights in the buildings in the condominium with those in the non-condominium, it is clear that the former has fewer skylights: there is a large courtyard inside the unit that can be borrowed, and the occupants of the condominium can keep the street closed and use the side facing the courtyard for light and ventilation.



Figure 3-26 Obscured windows

The common courtyard unit residents also use the courtyard as an entry space, representing a transition between inside and outside, and this shared space becomes a "gray space" between the "home" and the neighborhood. In such a "gray space", everyone will monitor the situation in the courtyard. In the survey, the residents of No. 6 courtyard also said, "No. 6 courtyard is very safe, as soon as you enter the courtyard, it is just like home. Once the gate is closed to control the yard, the house is fine. And everyone in the courtyard is familiar with each other, even if we are out and not at home, other people in the courtyard are active in the compound, but also equivalent to helping me look after the situation at home, theft rarely happens at home."

Some residents even use the courtyard as a service space for living (washing for children, dumping of sewage, etc.). Compared to buildings without courtyards, buildings in common courtyard units can use the internal interface of the courtyard to set up air conditioning units, fresh air ventilation equipment, and fire fighting facilities, thus keeping the street facade clean and intact. The courtyard is the core of the common courtyard unit, and as a flexible space to serve the residents, it not only provides a bright and shiny place for activities in the common courtyard unit, but also serves as a service space to solve the problem of "aesthetic impact" in the residents' lives in architecture.

Therefore, in this spatial structure of solid and void in Hehutatang Historic and Cultural District, "void" is also used as a transparent entity, and "void" is seen as a kind of greenhouse-like space intervening in the composition of the solid, becoming a transitional buffer in the composition of the solid space. Transition buffer. The "solid" can use this "greenhouse space" to extend its space when needed, and this "greenhouse space" is always in a dynamic state, following the activities happening in the solid space and bringing about different ways of using the space as activities occur in it.

### 3.2.2 Compound use of courtyard

In the common courtyard unit, the courtyard as a necessary place for daily life, is used by different people at different times. People of different ages have their own special ways of using the common courtyard space because of their different work and rest patterns and lifestyles, and eventually different people and different activities occurring at different times achieve harmony and coexistence in the same courtyard space. Most of the families in Hehutatang Historic and Cultural District are three families or two elderly couples (or

elderly people who live alone), and the influence of the common courtyard on the family is seen from the family structure. In the case of a two-member family consisting of two elderly people, the elderly needs more resting space in the courtyard because of the small scope of life and the relative weakness of the social circle. For a family of three, the children are often in elementary school, an age when they like to invite their friends to play or enjoy themselves in the courtyard, and the parents also need a certain amount of socialization. In a common courtyard with such a family structure, the children often visit each other in the afternoon and run through the streets of the courtyard, and most of the furniture in the courtyard for resting is movable and can be used frequently inside and outside.

However, in the actual situation of the neighborhood, both types of family structures exist in each common courtyard, and the common courtyard meets the use of these different family structures in daily life, and the courtyard gradually develops itself into a common courtyard with a large number of compounds uses in time. The differences in family structures are eventually presented by different occupations and ages: retired elderly people, working parents, school students, etc. These people use the courtyard differently in the time dimension: in the morning, young people and students who go out use the courtyard as a transition place from home to work, while the elderly use the courtyard as a resting place, and they can enjoy the courtyard alone until the end of the school day; in the evening, the courtyard becomes a kitchen for some families. In the evening, the courtyard becomes a kitchen for some families and a place for children to study; in the evening, students see the courtyard as a place to play and wash (some families wash their children in the courtyard). These are the spontaneous and diverse uses of the courtyard by different generations of users to meet the demand for public space at different times.

As a result of the relocation of the residents and the departure of the children from the compound, there are five households living in the compound, which are divided into six elderly people over 60 years old, eight workers and one child in school (Table 3-1). In terms of activity range, the daily activities of the elderly were limited to the neighborhood from home to the vegetable market, and occasionally to the hospital; in terms of activity time, most of the elderly went out to buy vegetables in the morning before preparing lunch, and would prepare lunch in the courtyard or at home, and return home to sleep after the meal, while the elderly rested in the afternoon before dinner. time, and they will go to bed at around nine o'clock in the evening. Due to the age of No. 6 Courtyard, the ground and drainage problems of the city need to be solved, so at this stage the elderly prefer to stay at home or go for a walk in the neighborhood. A child lives in No. 6 Courtyard for a long time, and a granddaughter occasionally comes to stay with Residence Four for a short time. For the parents who work, they wake up in the morning, wash up in the courtyard, prepare breakfast, and return home in the evening to cook dinner, and then relax after dinner when the elderly and children are resting. Through interviews with them and research on their daily life behaviors, the author drew a distribution of activities and ages in this shared compound (Figure 3-27).

Table 3-1: Households Information Sheet of Tongxiangongjing No. 6 Courtyard

Residence	Property Rights	Relation	Age	Status
Residence One	Public Property	Householder	55	Work
		Son	28	Work
		Wife	56	Work
Residence Two	Public Property	Householder	74	Dropouts
		Wife	72	Dropouts
Residence Three	Public Property	Householder	73	Dropouts
		Wife	69	Dropouts
Residence Four	Public Property	Householder	75	Dropouts
		Wife	72	Dropouts
Residence Five	Public Property	Householder	53	Work
		Brother	58	Work
		Sister	59	Work
Residence Six	Private Property	Householder	35	Work
		Wife	34	Work
		Daughter	5	School

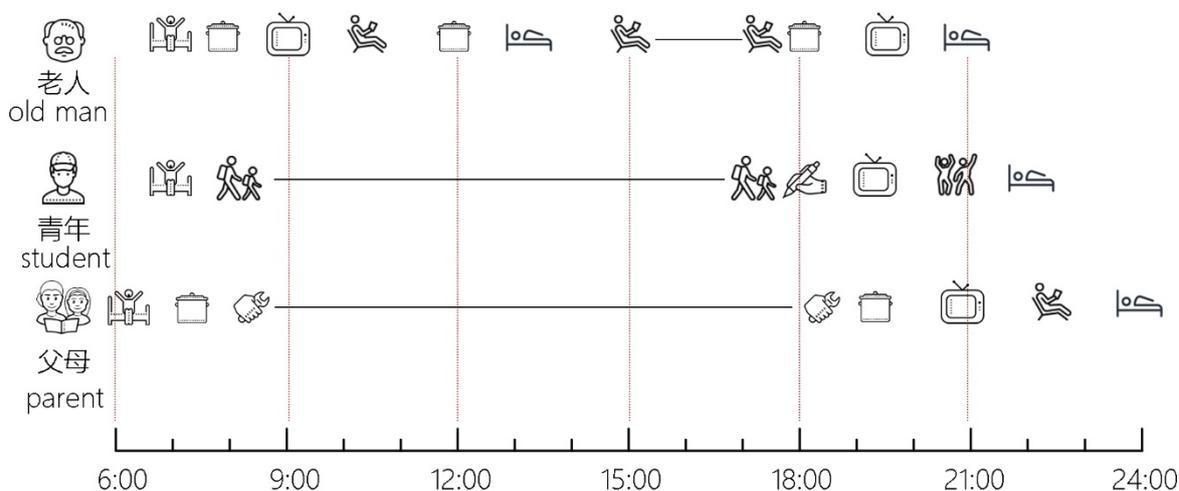


Figure 3-27 Daily activities for residents of the No. 6 Courtyard

The property rights in the No. 6 Courtyard are mixing public and private property rights. The Residence Six is in private ownership, and within the scope of their private property rights, they repair the ground of the courtyard, raise flowers and other private activities in the courtyard, and use fences and plants to distinguish their private land from the public courtyard. From the distribution of the courtyard, the tree is the center of the courtyard, and near each household's space, the household will build some daily utensils to occupy the space and widen their own space, often these utensils are closely related to their daily lives, such as the plant wall planted by the owner of Residence Six, the kitchen extended into the courtyard by the occupant of the Residence Four, etc. The space of the courtyard in the common courtyard is both public and private, and the internal residents use it together. The space of the courtyard in the common courtyard is both public and private, and the residents share the use and supervision of the common. This kind of use is common in the Hehutatang Historic and Cultural District.

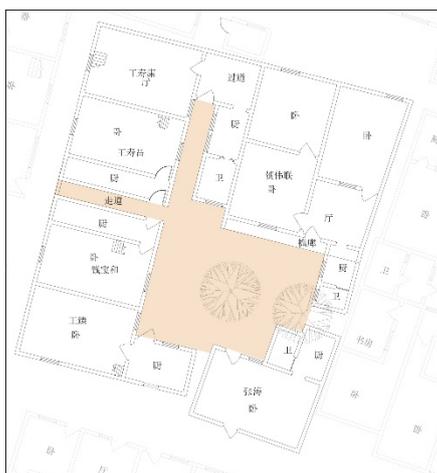


Figure 3-28 Courtyard space



Figure3-29 Division of daily furniture

### 3.3 Spatial order of the common courtyard

The courtyard living pattern that is still preserved in the Hehuatang Historic and Cultural District, the common life in the compound represents the collective memory of the residents. China's modern residential pattern has changed from the compound model to the worker's dormitory model to the contemporary neighborhood model, with changes in institutions and work patterns bringing about changes in living space. The industrial era brought about a recent change in housing, with the Taylor system as a prototype, and the construction of collective living buildings around factories began everywhere. The traditional courtyard pattern disappeared, but the living style of group living remained, and the carrier of public space evolved from courtyards to corridors in collective housing and to larger levels of squares between buildings. With the rapid growth of China's economy and the spread of automobiles, people are gradually moving away from their work areas and scattering to different parts of the city, and occupants are demanding more and more privacy for their homes, while the need for public space is gradually becoming weaker. With the massive construction of small communities, collective housing is gradually eliminated, and the living space and the activity space supporting living become single, which also leads to the unity and monotony of urban space in China.

Taking the residential pattern of the Hehuatang Historic and Cultural District as an example, as a residential plot group, the streets and lanes and courtyards within the neighborhood together constitute a series of public spaces outside of the residences, forming a spatial order relationship of decreasing publicness hierarchy. When residents return to their rooms from the city, they must pass through the above places in turn, and the scale of the places increases from large to small, which inevitably increases the opportunities for communication with neighbors. In contrast, in the contemporary neighborhood of residence, the public space is composed mostly of the neighborhood gate square and green plots. Residents enter the building through the community square and go to their rooms through stairwells or elevators; compared to the spatial order of the miscellaneous courtyard, there is less of a courtyard hierarchy; or the public space in front of the traditional community building is not enough to provide reciprocal vitality and living attributes. The

residential superblocks are surrounded by fast motorways, forming islands that are difficult to reach and traverse on foot, and the spatial isolation of the physical space greatly reduces behavioral interaction and social connections.

The Hehuatang Historic and Cultural District has a low number of building stories, a high density and a dense street network, which is suitable for pedestrian traffic and provides a space for pedestrian interaction around the buildings. Because the outdoor space is comfortable in scale, the residents are willing to stay and use it. In addition, modern residential planning is dominated by automobile traffic on the roads, and residential buildings are built on the same plot, so there is little pedestrian traffic between plots and the public space near buildings is poor for outdoor stay. The outdoor space is too large to be suitable, and the human scale is lost. Due to the large spacing in the urban plan, outdoor experiences are boring compared to traditional neighborhoods. Even when there is a small amount of activity, it is separated in space and time.

The common space of courtyard pattern represents the urban material form of an era, and although it is gradually replaced with the development of economic situation, the unique form and usage has important historical value and is a type that can be inherited. These spontaneously organized and developed historical residential areas, despite poorly built quality and poorly maintained style, have been shaped by the pleasant scale, the collective memory of the masses, and the unique neighborhood atmosphere with special interception characteristics, and the small-scale neighborhood texture has been absorbed and incorporated into the city, and the block group group of plots has become a real organism. Preserving the Hehuatang Historic and Cultural District is not about creating a brand-new neighborhood with modernist architecture, but about creating architecture that is adapted to the neighborhood and integrated into it. History is continuous, and so should be spatial development. China's rapid contemporary urban development has also been criticized for its abandonment of a mass of historical forms, and a unique spatial layout and abundant urban memories may be a solution to the problem of a thousand cities in China today. With the development of society, contemporary people also continue to miss the shared living pattern of the past, believing that the state of living in a compound has more interaction activities and the home and street are more dynamic. More and more people want to experience daily life in such a shared space. Of course, there are advantages and disadvantages to this kind of shared space, but preserving the few courtyard spaces of daily life is a way to preserve the history and culture and people's collective memory on the one hand, and on the other hand, it may enable subsequent researchers to trace such prototypical spaces.

### 3.4 Summary of this chapter

This chapter selects representative shared courtyards in Hehuatang Historic and Cultural District and examines the collective memory, intensive use, and urban order in the common courtyards in terms of their spatial forms, daily life and places using a behavioristics approach.

Based on the typological classification of the common courtyard in Chapter II, this chapter further summarizes the forms and places of the common courtyard, which can be broken down into three components

from the perspective of spatial composition: (1) alleys and walls that constitute the surroundings of the common courtyard, (2) doors and windows that constitute the interface of the common courtyard, and (3) courtyards and houses that are the core of the internal space of the common courtyard. The behavioral activities and spaces in the three places are further recorded and analyzed to summarize the behavioral patterns and living habits of the local residents belonging to the Hehuatang Historic and Cultural District, which together form the collective memory of the area. On this basis, this chapter analyzes the diverse use of the courtyard in time and space by different generations of people in the shared courtyard, and selects a typical sample to record the real state of use in the courtyard by means of a chart. Finally, a comparison is made between the traditional shared spaces in the neighborhoods and the activity spaces in contemporary residential areas, and the value and significance of the spatial order of the common spaces in the traditional neighborhoods are summarized.



## Chapter IV: Relevant Case Analysis

In order to illustrate more clearly the relationship between the creation of shared space, community spatial atmosphere and residents' daily life, this chapter selects three foreign cases that the author has personally visited for analysis. Through the interpretation of the classic cases, we try to learn from the research and design of the actual construction projects, and gain some inspirations on the design methods of the common use space in collective life. This chapter selects three types of real cases from a wide range of cases: common space and community creation, common space and collective memory, and common space and urban space, all of which come from the specific problems to be faced by the shared spaces generated in residential neighborhoods. All of these issues can work in space and life at the same time, so that the behavior of residents and the living space participate together in the composition of the neighborhood.

### 4.1 Mehr als Wohnen, Zurich

The "Mehr als Wohnen" residential community in the Oerlikon district of northeastern Zurich, a former cement production plant, is located 20 minutes from the city center by public transport. With the urbanization of Zurich, the formerly marginal urban space is being re-internalized into the city. At the beginning of the project, the three main actors in the urban development were identified: government, society, and developers (social housing developers in Zurich are generally cooperatives). Each of them has its own role to play and influence the other, and the will of the residents can be involved in the urban development process. Most of the residents, from their own life experience and space, put forward their needs for daily living space in the progress of urbanization, which played a huge role from the strategic planning stage of the project, for example, at the beginning of the project, a separate apartment building was planned for the elderly, but after the citizen's intention survey, it was found that the elderly preferred to live with everyone rather than to close themselves to a certain group of people, which was finally used. The plan was to have a variety of apartment types in each building, including small apartment types for the elderly. This phase is the most missing link in China's urbanization process, as David Harvey describes in "THE RIGHT TO THE CITY": "The freedom to create and reinvent cities and individuals themselves is the most precious but most neglected of our human rights."



Figure 4-1 Mehr als Wohnen

The "Mehr als Wohnen" residential community is a neighborhood composed of 13 independent buildings, which not only provides a large amount of living space (41,000 square meters of residential space), but also provides 6,000 square meters of office and dining space. The neighborhood carries out the concept of collective living, and the 13 buildings create a good community space at the edge of the city by starting from the common space within the monoliths and continuously stimulating the quality of the urban public space. The daily life generated in such community space forms a unique community culture and has a great impact. This project has many merits from development, design and operation, and this section will only discuss the common space and community life in the project.

The neighborhoods are grouped in individual building cubes (Figure 4-2), and the individual buildings form a kind of matrix in form: a matrix derived from the block division of Zurich's neighborhoods. Each building appears to be an independent "asteroid", but in fact it uses its own internal common space to connect with the public space of the city, forming an orderly group of public spaces. The external space is defined as a shared space with several levels of urban roads, squares, alleyways, green spaces, and atriums, and residents will pass through several levels of public space when they return home from the city. Through the transition of layers, the private residential space is connected to the city. The web-like spatial structure between the blocks introduces urban streets that combine the bottom of the residential buildings with the urban space, and such a layout emphasizes the shared space beyond the residential space of the residents. In addition, each residential block takes into account the intergenerational differences of the residents inside, and the specially designed common space for different groups of people makes the group space a very characteristic neighborhood in the city.



Figure 4-2 Ground floor plan: Grouping of independent cubes

In Haus A which is in the west of block, the relationship between residential and shared spaces within the building follows the structure of the block space. The inner dwellings of the building are like individual boxes (Figure 4-3), and the common space connects the boxes within the group. The common space in Haus A is divided into two levels: 1: the atrium space with the central staircase as the core, which serves as an



Figure 4-3 Haus A

internal and external transition space between the block and the building, a light space and a lobby space for the whole building, serving all residents of the building and some visitors; 2. The common space within the group houses, which serves the residents of the group by taking up the necessary spaces for communication in their daily lives: kitchen, living and dining spaces. The staircase occupies the center of the atrium like a sculpture, breaking the separation between top and bottom, linking the interior of the first floor with the corridor space of each floor, and further becoming a place of interaction. Residents put furniture inside the shared atrium to decorate the interior space according to their own preferences (Figure 4-4) and add a personalized atmosphere to the shared interior properties. The atrium space becomes special because of the residents' different ways of

using it, and becomes a unique space that complements the residents inside the building. The common spaces within the clusters are closer to the private lives of the residents, and the arrangement of the common spaces varies from cluster to cluster. All the common spaces within the clusters are kept in line of sight with the atrium through large windows (Figure 4-5), which not only ensures that privacy is not interfered with, but also makes all the common spaces get an integration and become a whole space in terms of perception.



Figure 4-4 Private furniture in the atrium



Figure 4-5 Windows between the residence and the atrium

The residences in Haus M are arranged around a light-filled atrium, with a circle of interior corridors and staircases that connect the common spaces on each level of the building's interior. The sunlit skylight at the top and the white paint inside create a "greenhouse space", which becomes a comfortable space for residents to interact internally (Figures 4-6). The corridor is not only a transportation space, but also an activity space for the residents inside: residents plant plants inside, children run and play in the corridor (Figure 4-7). ..... Due to the special atmosphere of the neighborhood, all these activities are possible. atmosphere, these activities are able to extend outward, making the building and the neighborhood have a behavioral activity connection.



Figure 4-6 Greenhouse



Figure 4-7 Corridor as a living space

## 4.2 Gallarate, Milan

Designed by Aldo Rossi in collaboration with Carlo Aymonino, the Gallarate was born at the end of the Second World War. In the wake of the massive housing crisis in post-war Europe, the Italian government planned a satellite community of 50,000 to 130,000 residents in the western part of Milan, and the community was divided into two parts. In the early 1950s, the post-war Italian economy was growing rapidly,

functionalism was expanding, and Italy was in an "urban crisis": industrialization and urbanization were rapidly dismantling the distinctive physical spatial structure and urban memory that had taken thousands of years to develop in Italy. In order to counter the purely functionalist fervor, Italian rationalist architects tried to return to rational and timeless architectural forms. West argued that in the functionalist stance, the city was over-simplified and that the city, because of its form, was a great man-made thing, possessing a creation of human reason and collective memory. The Gallarate Residence also reflects, to some extent, the discussion of architecture and collective memory by the architects represented by Rossi.



Figure 4-8 Gallarate

The Gallarate residences consist of a group of five residences that are elevated on the ground floor for pedestrian access, vehicular access, and service rooms. A second-floor terrace and a third floor gallery connect the buildings within the community. The elevated portion of the first floor, the second floor terrace and the third floor gallery all provide opportunities for residents to traverse the entire site. Due to the ease of access at different elevations, the three spaces throughout the site take on different qualities: the second floor traversal space becomes a transition space for people and cars from the city to the community and a touring path for visitors; the second floor platform becomes a collective space for the entire community: an amphitheater, a community square at different elevations, etc.; the third floor corridor is interspersed with the building in the form of elements, surrounding the second floor plaza. The small scale of the corridor presents the temporary nature of the act of crossing, which contrasts with the stayable entry spaces (the residential complex combines the terraces of activities on each floor with the entry spaces on the third floor and above).

Rossi and Aymonino demonstrate an exploration of common space and collective memory in the form of the Gallarate apartment and the lifestyle of collective living. They use the "Mercati di Traiano" as a spatial

prototype for their residences (Figures 4-9 and 4-10), which face together toward the enclosed square. At the intersection of the piazza, an amphitheater is arranged, and the form of the amphitheater courtyard with step seating can be compared to the open-air theater transformed from the “Arena di Verona” (Figures 4-11, 4-12). Every summer, the entire Italy gathered at the Colosseum for the opera festival, and in Gallarate, the inhabitants would perform in the amphitheater as well as in the events. The outdoor terraces in the “Mercati di Traiano”-like houses were arranged in a stepped pattern, and the inhabitants of the second floor and above could watch the events in the amphitheater from the terraces in front of the houses. This type of activity and viewing is reminiscent of watching opera in the Colosseum and the experience of living in ancient Rome.



Figure 4-9 Façade of the residence



Figure 4-10 Mercati di Traiano



Figure 4-11 Theatre



Figure 4-12 Arena di Verona

In the same period, Alison and Peter Smithson built a neo-brutalist collection of houses in London, England: Robin Hood Garden. Similar in form to the Gallarate common space, Robin Hood Garden was conceived as an aerial walkway, creating a wide living terrace that connects the residents. However, due to age and disconnection of the shared space from the residential space, the space became negative and most of the activity space became a breeding ground for crime, and eventually Robin Hood Garden was demolished by the British government. In contrast, the Gallarate, located on the outskirts of the city, remain vibrant and active in the midst of the city, partly due to the great commitment of the community management, and partly due to the fact that Rossi and Aymonino's work in the residential and communal spaces is based on the collective memory and traditional behavior of the city's residents, who use the residential and communal spaces in a way that creates a sense of The use of housing and shared spaces by the inhabitants simultaneously

generates a bond to history, so that the space continues to have an active and positive effect, not only by giving the architectural entities a recognizable form, but also by giving the spaces between them a certain typological meaning of "enduring form", so that the buildings inside and outside the complex have a spatial character related to the collective memory.

### 4.3 Hillside Terrace, Tokyo

The construction of Hillside Terrace, which took thirty years and seven phases, is an exploration of the concept of architectural clusters in the urban scale by Fumihiko Maki. He started from the traditional Japanese spatial forms and tried to find a suitable spatial language to implement in the city. In his "Notes on collective form", completed in 1994, he mentions that "each building provides a perspective on the other buildings, and the collective form exists through the exchange of views. The collective form exists through the mutual exchange of views. "The importance of individual experience in the collective form is emphasized.

In the contemporary urban environment, spaces are filled with different layers of publicness, from indoor public spaces and open spaces within neighborhoods to urban public spaces, and order is established in the spaces of different publicness, making spaces interconnected and permeable to each other. The solid is no longer a single focus, and the white space between solids becomes a window of connection between the neighborhood and the city. In order to integrate the space of the community with the urban space, Fumihiko Maki has developed a concept called "Niwa" (Figure 4-13) from the traditional Japanese garden space, which is a public space with a certain degree of privacy, like the common space mentioned in this paper. In this type of common space, the closure and isolation of the building skin is dissolved and becomes a kind of visual transparency, and the outer wall of the building becomes the inner wall of the common space, a kind of stage background for activities in the common space.



Figure 4-13 Niwa

The public space is the medium of the collective form, in which the solid and the space form a resilient whole, rather than a fragmented figure-bottom relationship. The relationship between entity and void (the "Niwa" space above) has a connection beyond space because of the presence of users. Through the perceptual

penetration of the complex (Figure 4-14), the totality of the public space is reinforced, and the instantaneous movement of the user in the collective block and the instantaneous sight becomes the way of perception in the present. Therefore, the group form created by Fumihiko Maki is not only the spatial form in material form, but also encompasses the behavioral activity patterns of the users in the temporal dimension. These activities, together with the spatial forms of the buildings, create a unique spatial atmosphere in the neighborhood.



Figure 4-14 Perceptual penetration

Due to the presence of these "Niwa" spaces, the public spaces within the neighborhood are of high quality and the courtyards interpenetrate to form groups that are integrated into the city. High-quality commercial functions are organized around these "Niwa" spaces, creating numerous places where people can stay, which in turn makes the building complex more harmonious in the city and adds to the vitality of the neighborhood. The shared spaces also serve as a buffer between residents and visitors, and the Hillside Terrace area ultimately becomes a place of active activity in the city and a neighborhood where residents and visitors can live together in harmony.



Figure 4-15 Place to stay

#### 4.4 Summary of this chapter

This chapter aims to discover the relationship between collective living and common space among the occupants of three foreign collective neighborhoods, and to investigate the morphological relationship between the shared space required for living and the city and the community by examining the relationship between them. It also further investigates the interaction between morphology, lifestyle, and common space in collective housing, in an attempt to shed some light on the experimental design of the common courtyard of Tongxianggongjing No. 6 courtyard to be carried out below.



## Chapter V: Design experiments for common courtyards

This paper investigates the experimental application of analytical and design methods corresponding to shared courtyards, testing the validity of the research in practice, while developing the research through feedback from specific practical problems, and testing and reflecting on the research itself once again. This section emphasizes the universality of koanology and analogical analysis methods in the renovation design of historic districts and the specificity of renovation design for specific courtyards facing different problems. This chapter takes the Tongxianggongjing No. 6 courtyard as the design object, and the specific practice focuses on the following aspects.

1. In-depth interviews were conducted with the residents living in No. 6 Courtyard, and the residents' needs for internal space and their views on the external environment were recorded, and the residents' different visions of space were organized and recorded according to family and generation (see Appendix). This was used as a starting point to develop a design that would lead to a common living model that would fit the characteristics of No. 6 Courtyard according to the current living conditions of the residents.

2. Based on the research of residents' wishes in the neighborhood (Figure 5-1), the dwellings of households who wish to relocate are expropriated and transformed. Based on the demand for space from the residents of the common courtyard obtained from the survey, the homes will be expropriated and the space will be transformed according to the specific needs of the residents in the courtyard, making it a common courtyard activity space that can meet the needs of different generations of people.

3. The conservation and renovation of the original spatial structure of the compound is based on the spatial pattern of the residents' spontaneous use of the compound as learned from the field research, and how to preserve the spatial structure that is part of the residents' behavior while making the renovated compound space meet the new needs of the residents.

4. The wall of the residence is both the boundary of private space and the stage backdrop for activities in the shared space. Using the wall as a starting point, we explore the open boundary between the residence and the shared space in collective living, and select spaces that can open up to the courtyard for design, so that residents can maximize the use of the courtyard space.

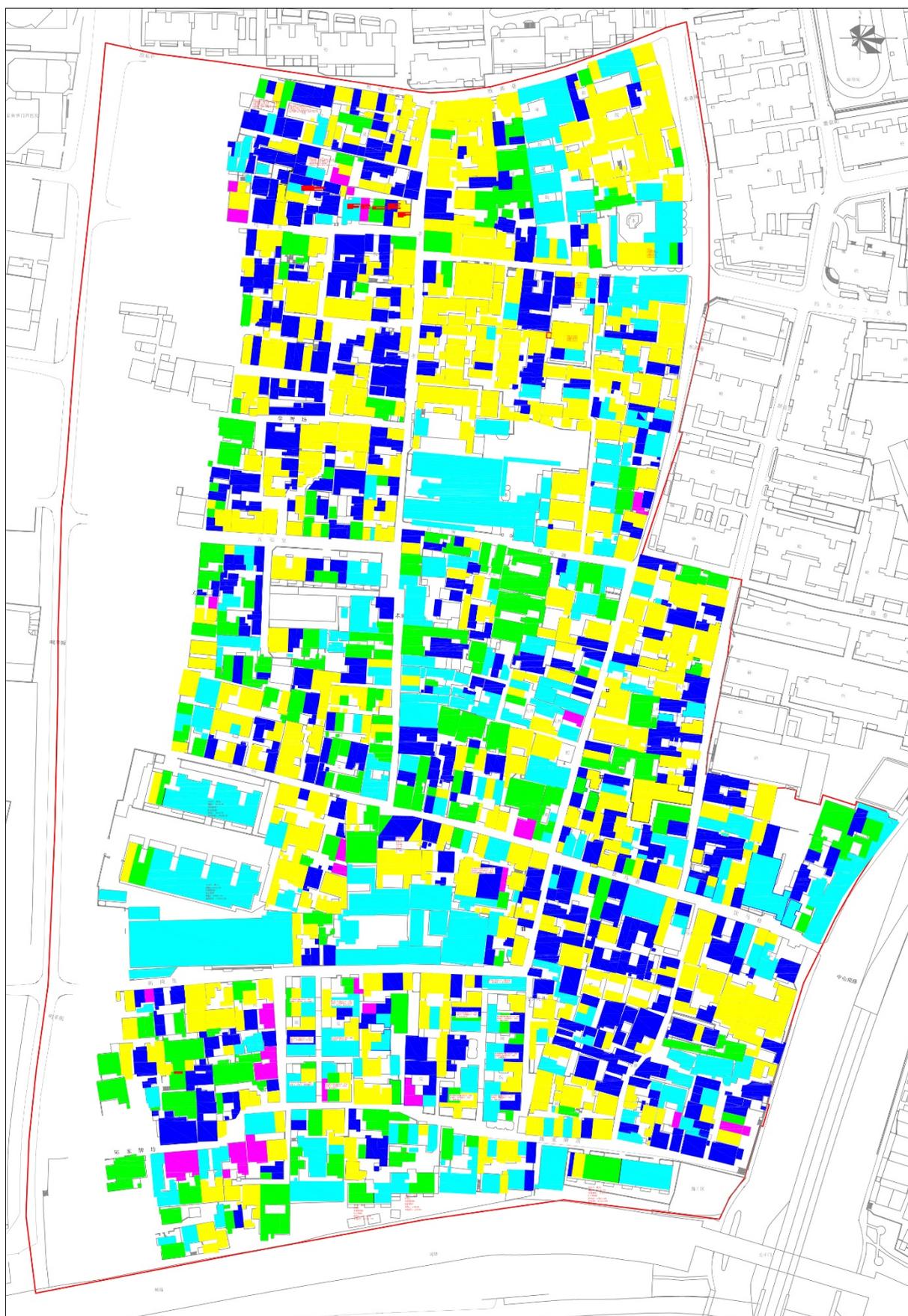


Figure 5-1 Residents' willingness

(Yellow: insurance elimination, repair Blue: negotiation replacement Purple: independent renewal Green: other Cyan: no choice at this time)

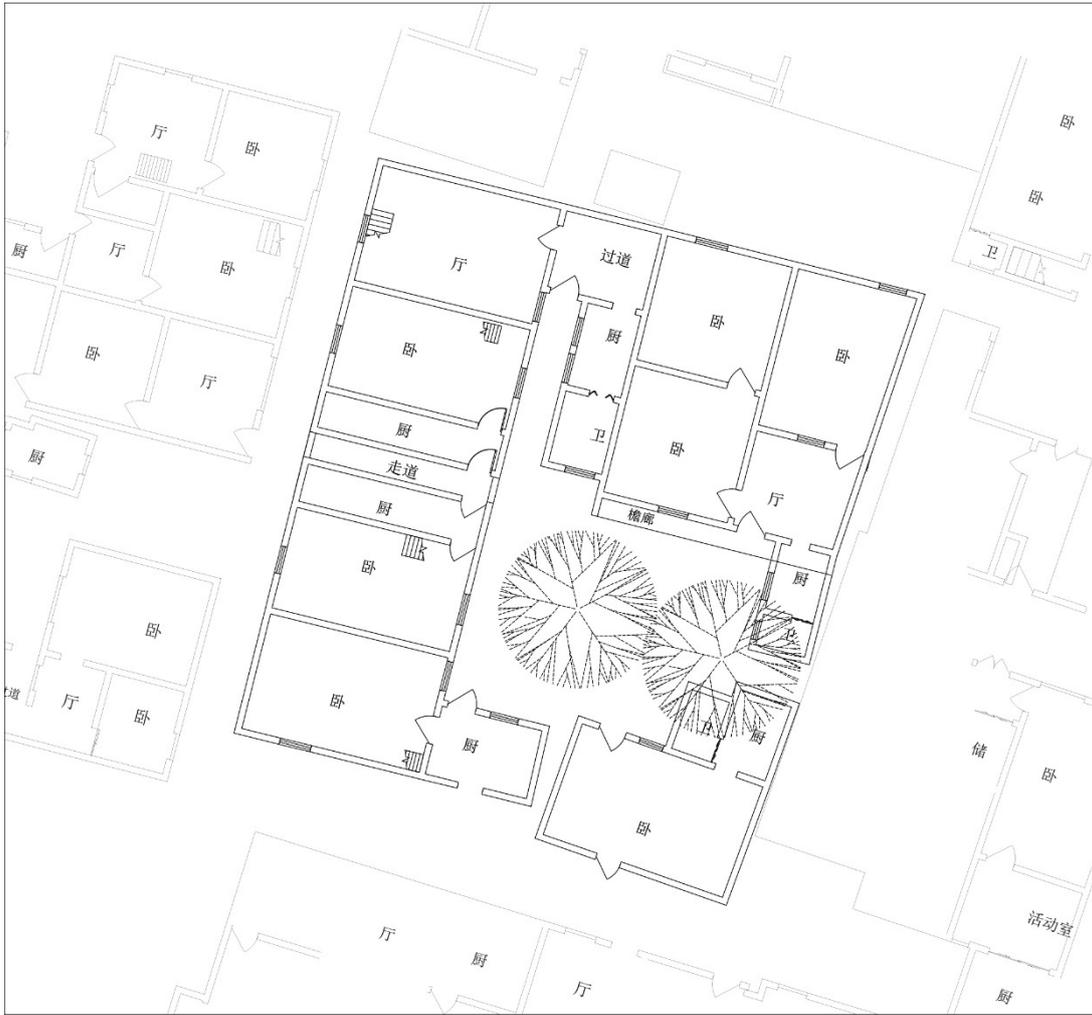


Figure 5-2 Plan before remoulding

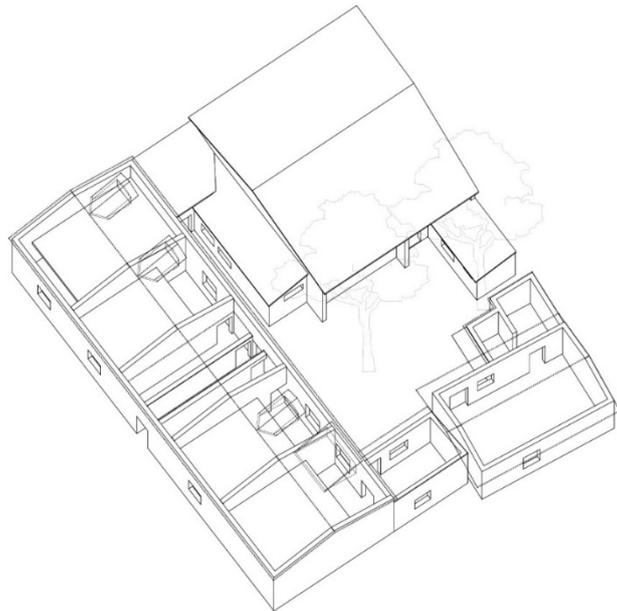


Figure 5-3 Axonometric before remoulding



Figure 5-4 Plan after remoulding

(Red line: New addition in remoulding Yellow line: Demolished wall in remoulding)

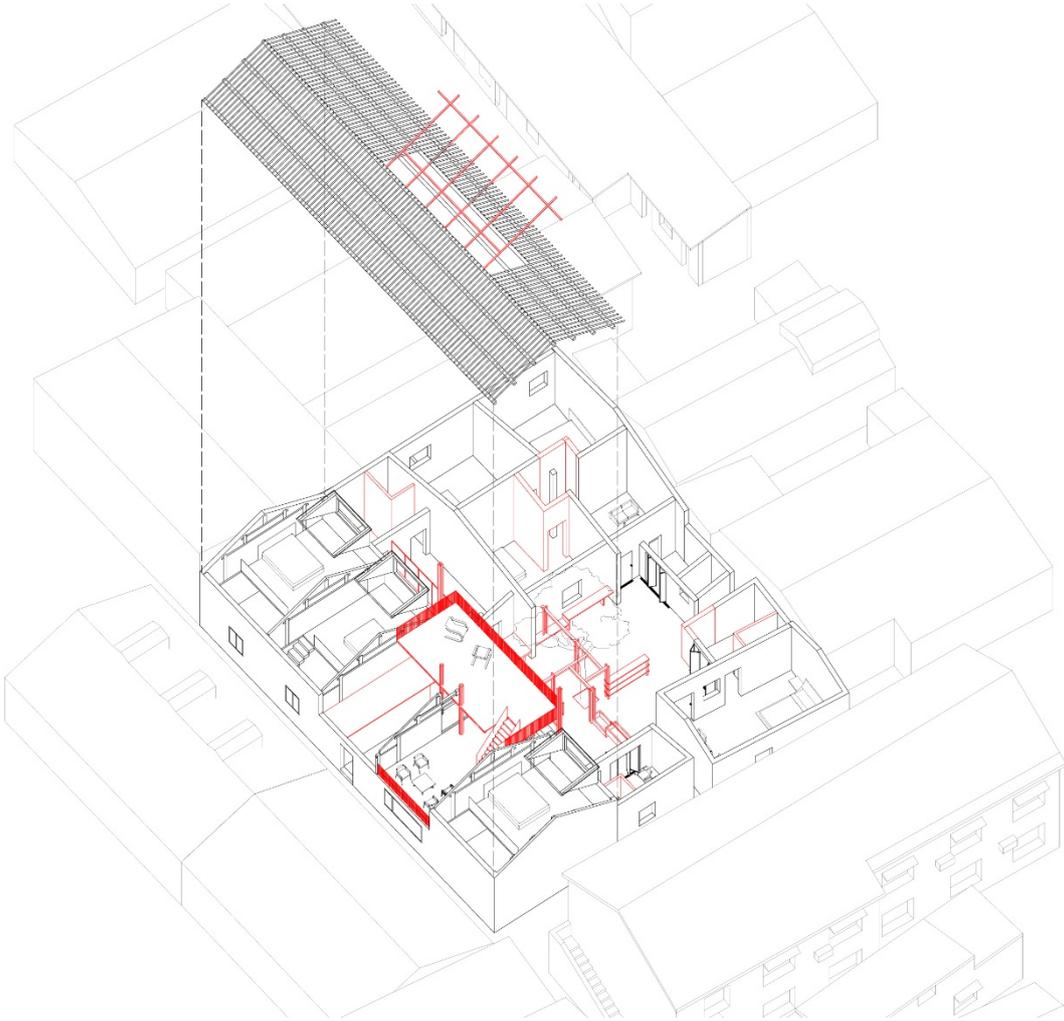


Figure 5-5 Axonometric after remodeling



Figure 5-6 Axonometric after remodeling

## 5.1 Study of co-living patterns in No. 6 courtyard

This section records the residents' real-life situation and their needs for the renovated space through research and interviews. The author explores the possibility of collective living and potential common living patterns of the residents in No. 6 courtyard based on the existing living patterns and the impact of the unique neighborhood environment on their lives.

### 5.1.1 The current living conditions of the residents in No. 6 courtyard

Through the household survey, the writer learned that there are fifteen residents living in No. 6 courtyard, eight of whom are males and seven females. The reasons for the current living conditions of the residents in No. 6 courtyard fall into two categories: one living pattern is influenced by the infrastructure, which is closely related to the unique conditions in the different shared compounds; the other living pattern is caused by the living needs and interests of the different generations of residents.

First, this subsection analyzes the living pattern in terms of infrastructure impact. There are two paulownia trees in the courtyard, and because they grow freely all year round, the roots of the paulownia trees have invaded into the rooms of the residents, and the roots have damaged the ground of the courtyard dam as well as the interior ground of the dwelling (Figure 5-7). A bubinga tree on the west side even tipped toward the residence, damaging the roof as well as the wall of Residence Six in the courtyard. Moreover, the root systems of the two trees occupied the subgrade of the entire courtyard space of No. 6 courtyard, making it impossible for municipal pipelines to be laid into the courtyard. The presence of the trees affected the infrastructure of the plot and thus changed the lifestyle of the residents inside: since the internal pipes of the residence could not be connected to the municipal sewerage pipes, the residents' sanitary facilities at home were spittoons, which they then carried regularly to the public toilet five hundred meters away to clean up (Figure 5-8); the tap water for all households in the courtyard was billed through a water meter, and each household shared the water bill equally; since the underground of the courtyard could not be The residents of No. 6 courtyard are unable to dump their sewage, and generally dump it directly in the courtyard's open space to dry by natural air; natural gas pipeline is also unable to enter the courtyard, and the residents still use gas cans to solve the cooking problem. The residents believe that the impact of these infrastructures is the fundamental problem in their daily lives, and that these conditions are common to all people in the compound, and that changing these conditions is the most important and primary concern.

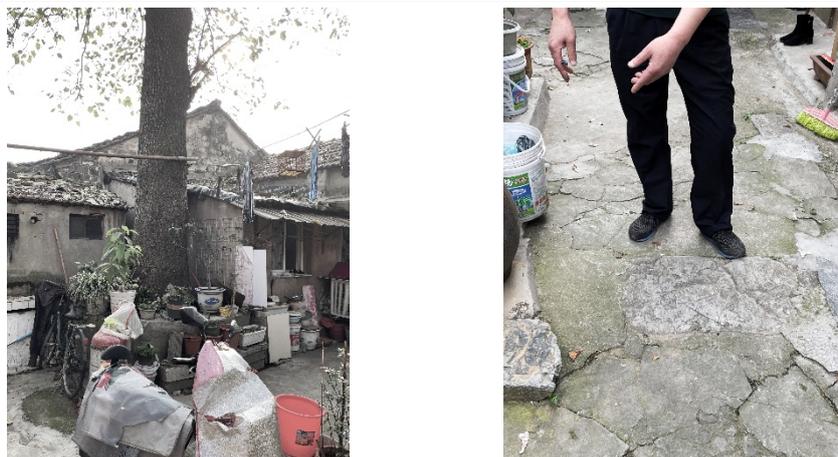


Figure 5-7 Walls and floors damaged by trees



Figure 5-8 Open-air kitchen Residents with dumped spitton

Secondly, this passage will analyze the residents' own needs. Due to the limited area inside the residence, there was no kitchen and bathroom space inside the house in the early years, so the owner of Residence One privately occupied the unused alley behind the residence and temporarily built a kitchen and toilet space and has been using them since then. The owners of Residence Three and Residence Four also built their own kitchens and sanitary showers in the courtyard in the early years because they were unable to provide the necessary living space due to the narrow size of their residences. The owners of Residence One, Three, and Four all wanted to convert the attic space into a better living space because of the long-term visits of their immediate family. Residence Five is registered for three siblings who want their bedroom spaces to be separate and uninterrupted from each other. The head of Residence Six would like to have an additional bedroom for his daughter who is studying. In addition, Residence Four often has friends coming to the house for chess and card activities, but now they can only do this activity in the narrow aisle, and would like to improve it; Residence One would like to have a more decent meeting space for themselves; residents with children have raised the need for a study space for their children.

### 5.1.2 Scenario of co-living model in No. 6 courtyard

The author further investigated the preliminary plan of piping planning for the renovation project of the

Hehuatang Historic and Cultural District, where the sewage pipes and micro-piping corridors in the municipal system are buried only under the alleyways of Tongxianggongjing (Figure 5-9). Due to the interference of tree roots, the newly planned pipeline system can only effectively radiate to some rooms in the courtyard (Residences One, Two, Three and Four), and it is still difficult to connect the pipeline inside each residence in the courtyard to the municipal pipeline. Taking into account the current situation of No. 6 courtyard: the residents' urgent need for a well-established and convenient kitchen and toilet space and the fact that the residents have been living together for many years, there is already a certain degree of sharing due to the current situation, such as: all residents in the courtyard share a water meter; sharing the inner courtyard space, etc. The premise of this common courtyard is that residents can share one type of space, so this design uses the Residence Two (public housing), which has been determined to be demolished and left, to transform it into a shared kitchen and toilet space for the residents in the courtyard.

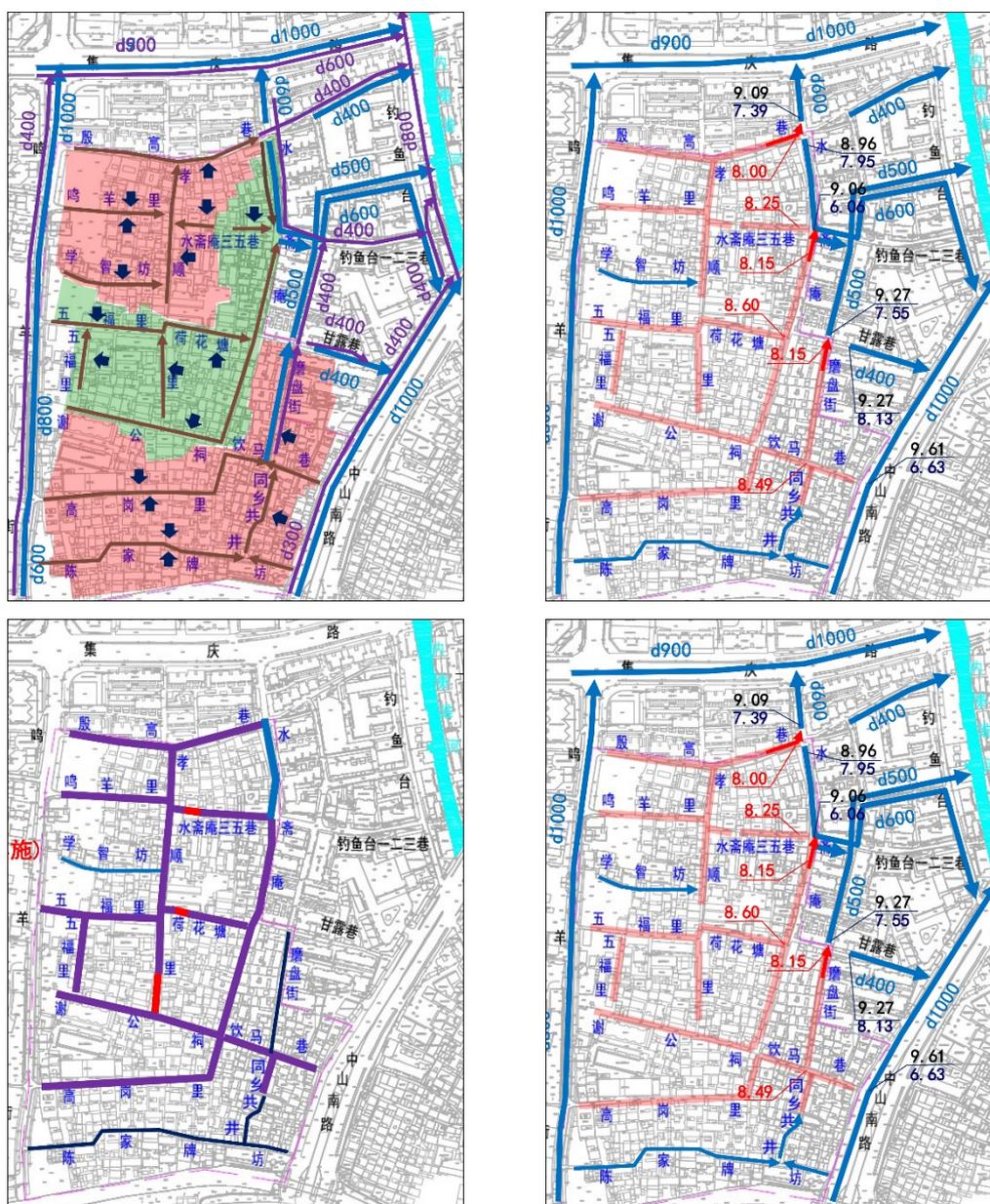


Figure 5-9 Planning municipal pipeline map

( Top left: Drainage status Top right: Stormwater design Bottom left: Micro-pipe corridor distribution  
Bottom right: Sewer pipe distribution )

This proposal proposes to integrate the entrance space and courtyard space of the Residence Two and No. 6 courtyard into a series of spaces that can be used by the internal residents. The ground floor is the most frequently used space by residents and can be transformed into a kitchen space and bathroom that residents must use on a daily basis: residents use the kitchen space together, each household has an exclusive cooking area, and the dining table can be assembled according to different sizes of meals; fifteen residents in the courtyard share the three bathrooms at the entrance. The space under the roof frame on the second floor can be used as a resting space for all residents. According to the daily behavioral activity time diagram of the residents in this home (Figure 3-27), the use of this space can be predetermined at different times: in the morning and before 5:00 p.m., it can be used as a daily resting and chatting space for the elderly in the home; from 6:00 to 7:00 p.m. when the working people and students go home, the students can do their homework and study on the second floor, and the parents prepare dinner on the first floor. After the meal, the second floor can be used as a resting and cooling place for the whole courtyard. Such a shared space involves the mixed use of different people, but because it occurs within a common compound, all activities during this period are supervised by everyone, and everyone is responsible for the maintenance and management of this shared space.

The service space inside each house is unified into one area, and only shower space is added inside the house (the size of the water supply and drain for shower is small, and the shower is a private and necessary space). The original service space of the house can then be transformed into a space for the special needs of each household, and this space can also be opened to the courtyard, further expanding the space inside the house with the public space of the courtyard.

## 5.2 Three types of common living space

The Residence Two in No. 6 courtyard is a single open room with a face width of only three meters and four. In order to make the space meet the common living pattern envisioned above, the design is composed on the profile so that the different functions are better integrated into the space of the corresponding features and so that the newly renovated building is harmoniously integrated into the site. Through the combination of functions on the profile, the design copes with the transition between the alleyway and the courtyard on the one hand, and better completes the transformation between the courtyard and the alleyway; on the other hand, it also integrates three shared spaces of different nature (Figure 5-10).

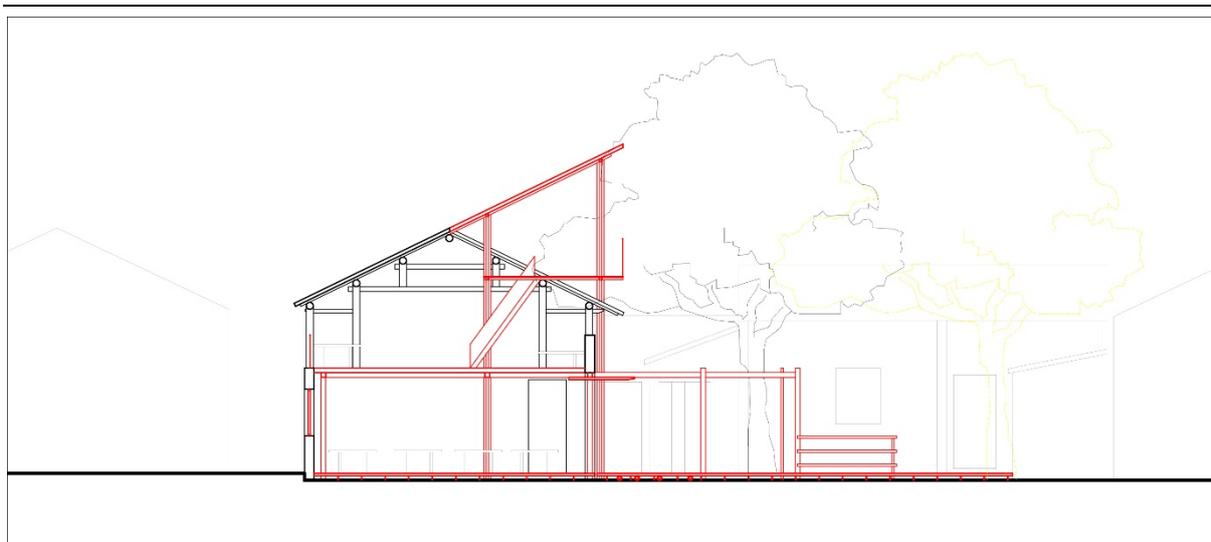


Figure 5-10 Three common spatial profile relationships

(Red line: New addition in remoulding Yellow line: Demolished wall in remoulding)

### 5.2.1 Shared service space

The design integrates the Residence Two with the entrance space on the north side into a living space on both sides of the entrance, which makes it easier to connect all the infrastructure of this type of living space to the municipal pipeline on the one hand, and on the other hand, it is a place where everyone of the residents can easily reach and use, making such a shared space the most efficient. The common kitchen is only one room in width, and the design is carefully designed in this space after an in-depth survey of the actual usage of the residents. According to the research, only three families in the courtyard would cook in the courtyard at noon on weekdays, and everyone would use the kitchen at night and on weekends. So, the public kitchen is equipped with a stove, operating tables, and storage space for each household to cook separately, but through the flexible arrangement of tables and chairs, the common kitchen becomes a variable and flexible shared space to meet the needs of different time periods and different sizes of meals (Figure 5-11). The kitchen space on the ground floor is located between the courtyard and the alley, which can extend the public kitchen space with the courtyard space when necessary, and also become a kind of display place to the outside world.

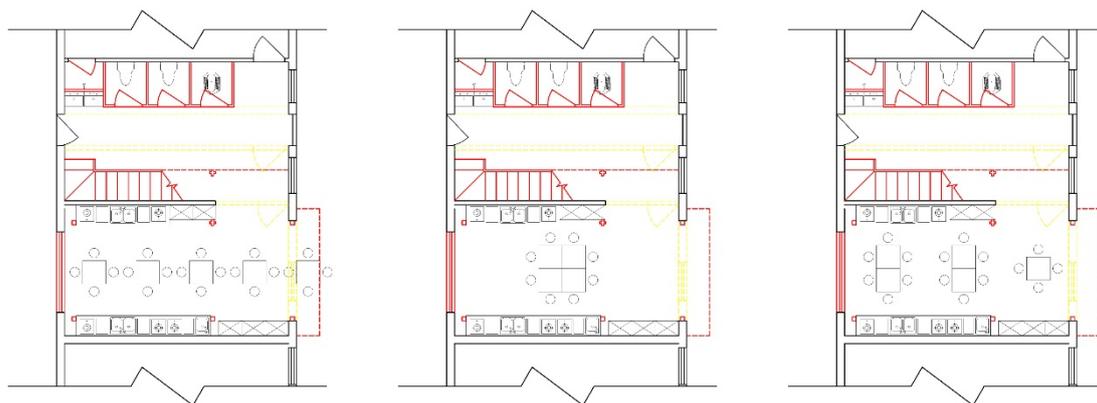


Figure 5-11 Different models of common kitchen

(Red line: New addition in remoulding Yellow line: Demolished wall in remoulding)

By counting the number of residents in the courtyard, three shared bathrooms were set up in the courtyard, with the bathrooms located on the north side of the entrance, which was the site of the private structure of the Residence Three before the renovation. Because such service space is used by every resident, residents have to agree with each other to form a kind of usage code and take turns to clean such space.



Figure 5-12 Common kitchen

### 5.2.2 Activity room under the roof frame

The attic space on the second floor is a special spatial form in the Hehuatang Historic and Cultural District, and residents also told the author in interviews that they wished to use the attic space under the sloping roof (Figure 5-13). The author observed that almost every residence in No. 6 courtyard would have such an attic space, which is wrapped by an old wooden structure roof frame. Such a roof frame is both a kind of space limitation and a symbol of the courtyard. The combination of such a roof frame and the second-

floor attic space creates a public space for daily use by the residents, and also shows the well-preserved wooden roof frame to the pedestrians, so that the pedestrians on the road, the users in the attic and the roof frame form an echoing profile relationship.

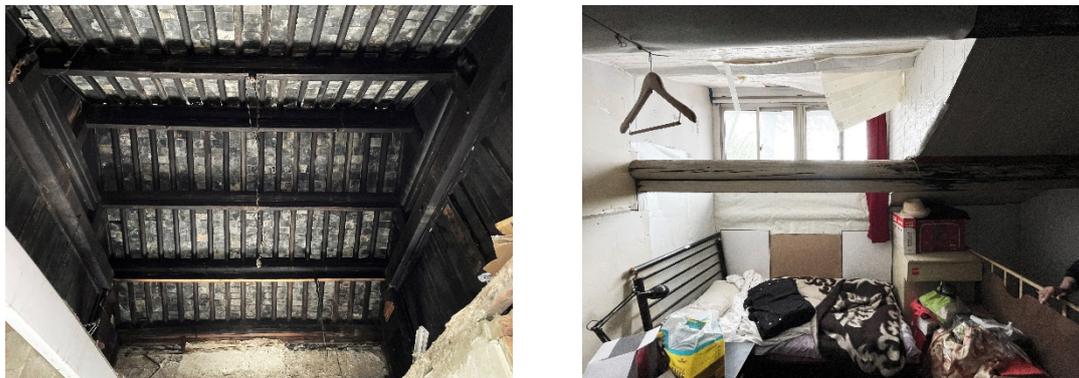


Figure 5-13 Wooden roof frame and attic space

The design opens the entrance to the upper part of the wall of the open space where the Residence Two is located, allowing the roof frame to be revealed. At the same time the attic space on the second floor is transformed from an originally closed and dark storage space to an open, bright and well-ventilated positive space. The second floor loft becomes a place for leisure activities in the interior courtyard (Figure 5-14), in which the user is surrounded by the wooden roof frame and can also observe the neighborhood and the movement in the courtyard from the space above.

The activity room under the roof is mainly a place for the residents to use everyday for public activities, such as morning reading for students, a place for the elderly to chat and drink tea after getting up in the morning, and a place for the elderly to rest after lunch break, where they can observe the things in the lane, chat with the people coming and going, and observe the scenes in the courtyard at the same time; after the children finish school, the adults cook on the first floor, and the students can do their homework and study here; after meals, the whole courtyard can cool off and play here, making it a public space for everyone in the courtyard.



Figure 5-14 Activity room under the roof frame

### 5.2.3 Terrace beside the tree canopy

The spatial prototype of the terrace on the third floor (Figure 5-15) is derived from the tiger windows of the dwellings in No. 6 courtyard and the single-pitched roof form of the building immediately to the north of the sixth courtyard. The design attempts to relate to another important element in the courtyard through such a space: the bubblegum trees in the courtyard. Functionally, the terrace raised on the third floor serves not only as a resting place in life, but also as a place for residents to dry their cereal food; spatially, the building creates a visual relationship between the trees and the pedestrians in the alleyway by forming a long single slope, and the pedestrians follow the line of sight of the eaves on the side to observe the trees in the courtyard more easily, allowing people outside the courtyard to have a diverse relationship with the courtyard as well.

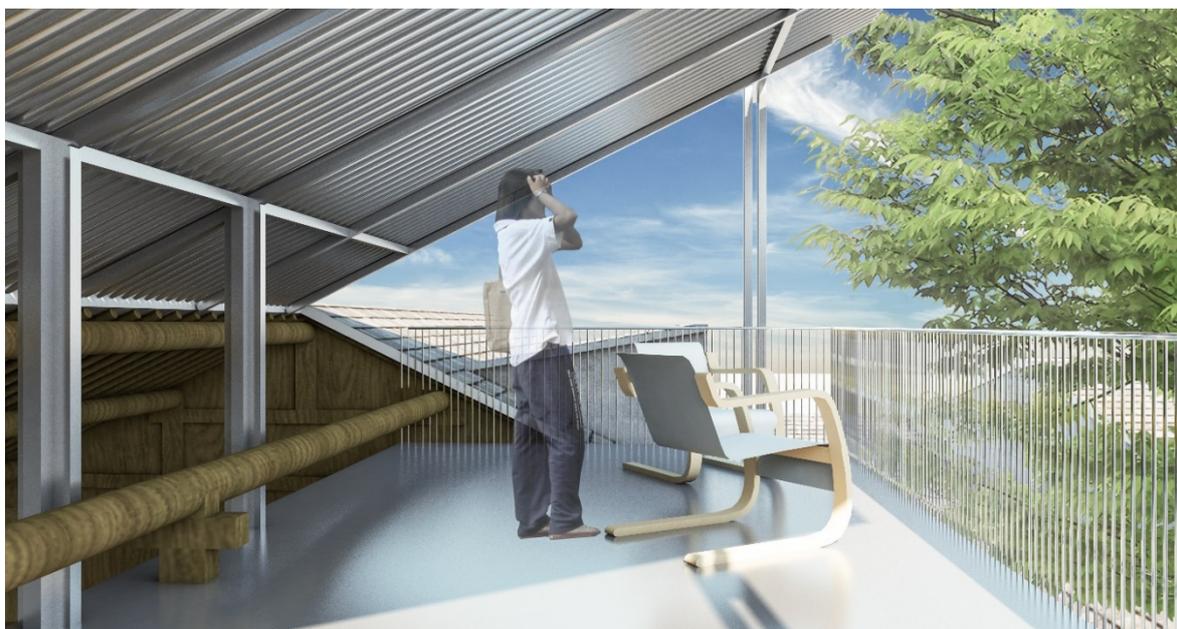


Figure 5-15 Terrace beside the tree canopy

The three common spaces are combined in the section to form a set of spatial order and become a whole spatial relationship. The original dark entrance space (Figure 5-16) is made more active and bright, constituting a "bright space" full of light; such a space is between the courtyard and the alleyway, filled with everyday actions, better organizing the relationship between the courtyard and the external environment, allowing the external neighborhood to perceive the courtyard, and such a half-room, half-pavilion. Such a space of half-room and half-pavilion also constitutes a "la chambre claire", a space of translation and perception, through which real objects can be read and perceived by the public.



Figure 5-16 Entrance of No. 6 courtyard



Figure 5-17 Entrance after remoulding



Figure 5-18 Entrance and alleyway after remoulding

### 5.3 Courtyard and Residence

#### 5.3.1 Quadrant of the courtyard

The two paulownia trees in the courtyard became the focus of design attention, on the one hand, the

roots of these two trees have damaged the infrastructure of No. 6 courtyard and the ground level of the courtyard, causing a great impact on the daily life of the residents; on the other hand, the trees have become the center of gravity and place in the spatial structure of the courtyard. Considering that the two trees are not valuable species or historical preservation, and that the paulownia tree on the west side has tilted towards the Residence Six and dissected the roof, wall and indoor floor of the residence, the design decided to remove the large tree on the west side, and to remove the roots of the large tree in the center of the compound with a radius of four meters, and to reinforce the tree in the center.

In the courtyard of No. 6 courtyard, the public courtyard was divided into four parts of the spatial status quo due to the property rights relationship (subsection 2.2.1) and the residents' usage patterns (subsection 3.2.2): the southeast plot was used as the private plot of the resident surnamed Wang and repaired the ground of the courtyard by himself; the northwest plot became the entrance space of the courtyard; the northeast and southwest corners were each occupied by the residents using laundry and storage. Residents' private behaviors such as: drying clothes, planting, washing, etc. became the behavioral way to divide the space (Figure 5-19). These markers and daily necessities in No. 6 courtyard become the components of the spatial structure, forming a kind of four-quadrant frame order, which makes the current situation of the courtyard plan present a four-quadrant pattern relationship (Figure 5-20).



Figure 5-19 Daily components and quadrant

This pattern of relationship is formed spontaneously in the daily life of the residents. The four courtyards are then integrated by the symbols of the site (a tree or a well) to become a complete courtyard.

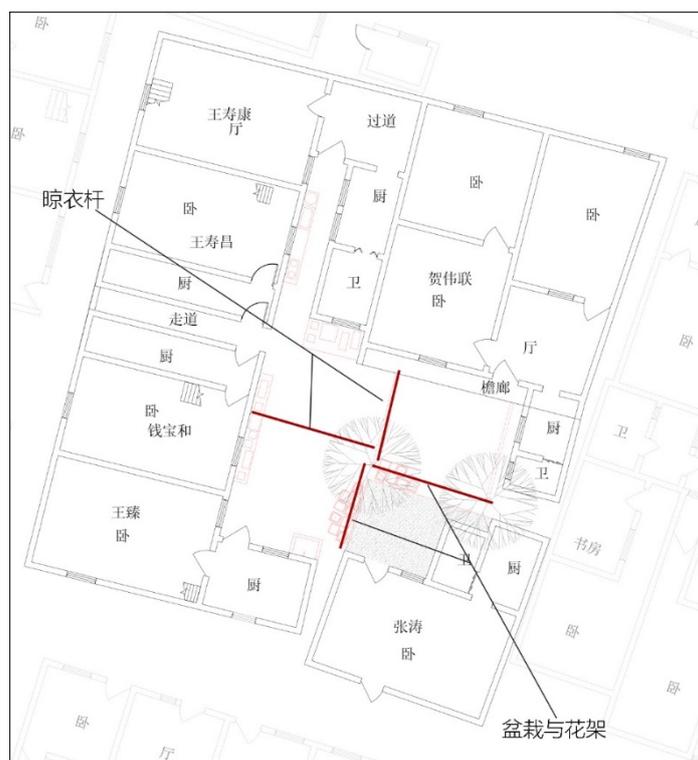


Figure 5-20 Courtyard quadrant plan

The current design pays attention to the specificity of this spatial pattern and the logic of its formation, and tries to continue this spatial structure: such a spatial structure is not created out of thin air, but is born under the influence of the life of local residents and the special objects of the site, and has a good inheritance. The behavioral patterns recorded in the field survey that divided the internal space of No.6 courtyard are continued to be used in the new scheme, so that these behaviors can participate in the spatial composition of the new courtyard, and the behavioral activities are summarized and integrated into the courtyard space in an organized way, so that the behavioral activities form an order, and the design tries to form an organic unity between the order of behavior and the order of space.

The washstand was a very important living component in No.6 courtyard, and because of the limited indoor living space, more than half of the families in No.6 courtyard had built washstands in the courtyard. This washing-up behavior in the courtyard can also be traced back to the collective living pattern in the large compound in the last century. In this design, all the old washstands in the compound were removed and integrated into a new long washbasin. Through interviews, the author further learned that residents needed a space to dump their sewage, and at this stage, due to the lack of a sewage sink, residents often dumped their sewage in the compound, causing the space to be dirty and wet. In this proposal, a short sewage sink is arranged on the north side of the long washbasin, and the washbasin and the sink form a long platform, which also becomes an element of the redistribution of the compound, formed by the alienation of the column of the reinforced tree (Figure 5-21).



Figure 5-21 Living components and structural components

In addition to the washbasin, the potted plants planted by the inhabitants and the laundry hung to dry serve to divide the courtyard. The design combines these activities into a structure: the beams and columns are alienated into a clothesline for living and a shelf for planting, respectively. The system of alienated beams and columns with practical functions is not only involved in the spatial composition of the renovation of Residence Two mentioned above, but also in the spatial composition of the four quadrants of the courtyard for the daily use of the residents.



Figure 5-22 Inner courtyard

### 5.3.2 Interior walls as a medium

In describing Fumihiko Maki 's design approach in Hillside Terrace, Professor Lu Andong mentions that

in the play on different publics, the building entity becomes the stage backdrop for human activities, and the building facade becomes the inner wall of the outdoor space at the same time. Between the indoor and outdoor public spaces, the inherent closedness and defensiveness of the building skin dissolves into transparency and vision. Similar to the analysis of the Hillside Terrace in Chapter IV: the wall of the building serves as a stage for the daily life of the users. The wall here is a medium through which the private space participates in the public space, a method of overlapping derivation between space and space. Therefore, the residential renovation plan of No. 6 courtyard also starts from the wall associated with the courtyard and tries to allow each family to use the space of the courtyard to achieve spatial borrowing and extend their own internal residential space outward.

Since the service spaces inside the residence are integrated into the entrance to become a courtyard common space, such negative spaces of the original residence can be transformed into specific spaces that meet the specific needs of different residents. The head of Residence One proposes a decent private meeting space inside the house; the head of Residence Four needs a chess space; Residence Five needs a space for three siblings to live together. Such a specific space can also be further opened toward the courtyard, borrowing space from the courtyard, and becoming a gray space between the residence and the courtyard (Figure 5-23).



Figure 5-23 Inner wall

In No. 6 courtyard, the interior walls serve as the building blocks that define the field and carry out the division of the field. The easiest way to break through the original space is to break the boundary of the wall.

After researching the residents' willingness to open their kitchens to the courtyard space, the proposal first adjusted the internal layout of each house in No. 6 courtyard so that the kitchen space could be located against the public courtyard, and broke the non-load-bearing part of the wall as a passage to the outside of the room while satisfying the premise of the wall as a weighing structure. The passage part is equipped with sliding doors that can be opened, so that when the climate is comfortable, residents can open the sliding doors and extend the open space of their homes into the courtyard.

In the original layout of the residences in No. 6 courtyard, the kitchen space is usually located at the entrance or at the end of the flow line of the residence. By reorienting the kitchen space to open towards the courtyard, the interior of the house is connected to the courtyard to form a circular motion line (Figure 5-24), creating a circular order in the small area of the house, and the house is expanded on a perceptual level. The presence of the circular motion line also enhances the flexibility of the residence.

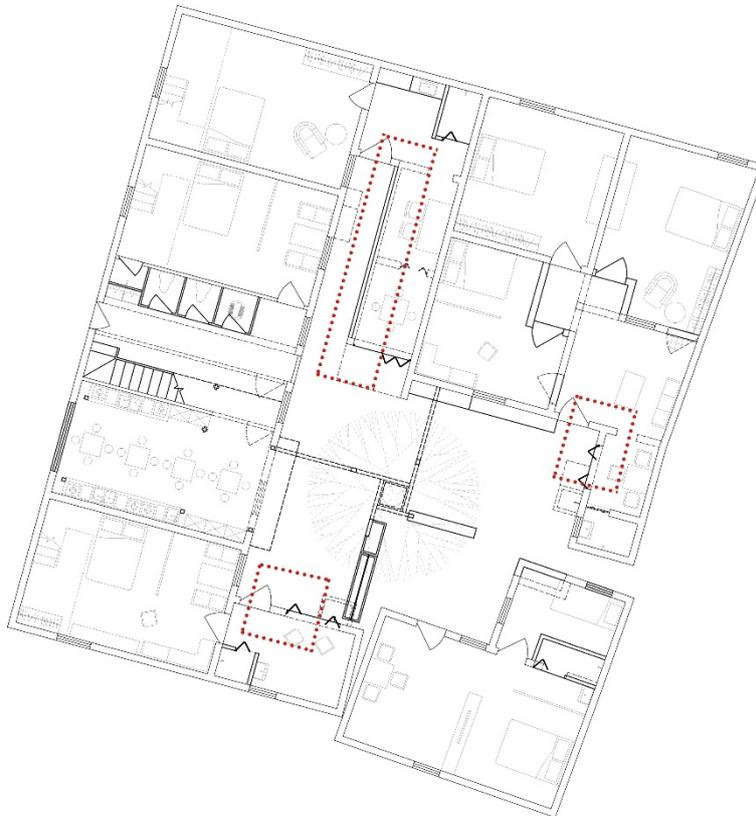


Figure 5-24 Loop in the residence



## ChapterVI: Conclusion

### 6.1 Research conclusions

This paper emphasizes the importance of the common courtyard as a spatial and behavioral unit in a historical and cultural district, establishes a morphological classification of common courtyards, and explains in detail the characteristics of different types of communal courtyards in three different aspects: morphology, sociology, and economics. This paper attempts to reproduce the meaningful daily life places of the residents by means of diagrams, and to find the relationship between daily behavior patterns and spatial composition. The research results and implications of this paper are mainly reflected in the following four aspects.

First, the spatial structure of the street-lane cascade courtyard in the historical and cultural district is gradually formed and solidified with urban development. As a material space carrying collective life, courtyard is a kind of spontaneous formation based on the daily life of residents in the low-rise high-density neighborhood, and is a common space belonging to the residents. The common courtyard is a multi-dimensional concept that integrates this shared space with the collective life inside. The relationship between the common courtyard and the street largely influences the basic characteristics of the shared courtyard, so it can be used as a criterion for the classification of the shared courtyard. By summarizing and analyzing the morphology of various types of shared courtyards in Hehuatang Historic and Cultural District, this paper concludes that the common courtyard in this district can be categorized into three main groups.

(1) Island-style common courtyard: Such a common courtyard is located inside the parcel not adjacent to the street and requires a path to be introduced into the courtyard. This type of compound is often subject to change of ownership. The courtyard is detached from the street, and the interior of the courtyard generally shows a cohesive spatial characteristic.

(2) Street-facing common courtyard: This common courtyard has one or more sides adjacent to the street. The entrance of the street-facing compound is on the street, and the residents inside sometimes occupy the street space near the entrance for some daily activities. The two sides of the street façade of the dwelling face the street and the courtyard, often showing two different states.

(3) Passing through common courtyard: This kind of common courtyard is a special case where the crossing of public streets and alleys has eliminated the common property of the courtyard, but because such a courtyard is still a place for the activities of the surrounding residents and its physical form is interfered with by the daily behavior of the residents, this paper also regards such a space as a special kind of passing through common courtyard.

Second, the morphological status of historical and cultural districts is the result of historical morphological cascades, which are influenced by a variety of factors in the development process. This paper further investigates the factors influencing the morphology of shared courtyards. This paper finds that the morphology of the common courtyard is not only influenced by the daily behavior of the residents, but also

by the ownership relationship of the plot of land. The morphology of a common courtyard is only a material state of presentation, and the triangular relationship between morphology, behavior, and property rights is formed, with each part being constrained by the other two parts, and the three parts acting together to form the current state of the common courtyard.

Third, in order to find commonalities among the three different types of common courtyards, this paper examines the spatial composition of common courtyards and divides them into three components: the core: yard and house, the skin: door and window, and the environment: alley and wall. Any type of common courtyard can be broken down into these three components. The three components become the places where places occur in daily life. By means of the behavioristics, this paper records and reproduces the behavioral patterns of residents in Hehuatang Historic and Cultural District in different places, and by abstracting such behavioral patterns, it summarizes them into the unique cultural atmosphere of the district, which is called collective memory.

Fourth, the article further investigates the spatial order and intensive use in the common courtyard. The intensive use of the common courtyard by the residents mainly presents the diversified spatial use and the multiple uses of the courtyard by different generations of people at different time periods. The advantages and disadvantages of such spatial order are also analyzed through comparison.

## 6.2 Problems and Prospects

The topic of "preservation and renewal of historical and cultural districts" covers a very broad area. This paper proposes a research method based on the common courtyard as a unit, which only attempts to establish a bridge between form, behavior, and property rights, and use it as a clue to explore how to protect the daily life of the original residents while preserving the historical and cultural. This paper focuses on the preservation and renewal of historical and cultural neighborhoods while safeguarding the daily lives of the original residents. This paper focuses on the investigation and reproduction of existing living places in the site and the analysis of existing architectural cases, and the application of related methods through actual design practice. Through the research of this paper, we can find that the spatial structure of the historical and cultural district is not only related to the morphological structure of the courtyard, but also closely related to the daily life of the residents and housing ownership.

Taking Nanjing's Hehuatang Historic and Cultural District as an example, this paper presents a systematic study of the collective life bearing space in the historical and cultural district: the common courtyard. It should be pointed out that there are still some problems in this paper's research. First, the neighborhood has been in a dynamic state of change, and the dimensions of the morphological units collected in this paper are difficult to be absolutely accurate. Secondly, although this paper takes into account the changes in the relationship between parcels and property rights in history, it does not study the reasons for such changes in depth. Third, the design of renewal in such a historic district needs to respect the wishes of local residents. The study of collective memory and place needs to consider the residents' evaluation and

feelings about such a lifestyle, in addition to reproducing their daily behavior patterns. These issues have an impact on the accuracy of the study, but they do not hinder the accuracy of the paper's conclusions.



## Appendix

Resident interview records (the real names of the residents have been concealed)

First interview:

No. 6 courtyard Residence Four: We live in this neighborhood we couple is born and raised old Nanjing people. We don't want to move away, but we hope the government will help us repair our house. We are already more than 70 years old and are very familiar with the surrounding area, the food market and the hospital are very close, these two things are the most necessary for our elderly residents. A few years ago, the government said it would repair this area, and many people came to measure, install fire-fighting facilities, add electric wires, and survey; but we really want to get the drainage in this area first.

No. 6 courtyard Residence One: This No. 6 courtyard used to be a private house for our family. The area where I live now used to be part of the yard without a house. But during the Cultural Revolution, they were deported and the whole land was reclaimed by the government. When we returned to Nanjing, the government allocated this small piece of land for me to live on.

No. 1 courtyard Householder: We have a total of more than 400 square feet in this courtyard, all of which is owned by our family, and these are my tenants. A total of four old ancestors are involved, and we all own this land together, but now we are all scattered in various places. I would like to get the compensation money to move out of this land, I just spent more than 300,000 yuan to improve the place, if the government is going to repair it again I am still quite distressed; I hope to live in the building, the environment here is still too poor after all, when I want to rest at noon, if there are people chatting in the yard, the room can be heard, affecting the quality of rest. And my son is getting married in a few years, I also hope to get the money to prepare a wedding house for him first, the rest of the money I move to a small building inside. But it also depends on how the government arranges, the details we also have to discuss with the descendants of the four old ancestors, they do not live in Nanjing, more hope to get the money, if the repair, our family to discuss the first from their hands to buy the land.

Second interview:

No. 6 courtyard Residence Four: This yard, in the summer there are these two trees, a little bit of the sun can not be, but also because now the trees have grown up, the underground roots have arched the ground, it is not flat at all. We usually do not have activities in the courtyard, the ground is not flat, we are also drying clothes, washing clothes. We have reported many times to the city department to trim the branches of these two trees, there are too many leaves, and it is troublesome to clean them every autumn. (Ask about daily activities) Although we have lived together for many years in our yard, we do not play together, we just buy vegetables around, take a walk and there is no specific place to stay, occasionally friends come and do not sit in the yard, but play cards at home. The yard is used by everyone, but I will not go there to use (pointing to

the new concrete floor in front of Zhang Tao's house), and can not be used there, on their own door this narrow piece of land on the line. The street to the west is usually not very noisy and will not affect my life, I just hope that the ground inside the yard can be leveled and the drainage must be redone well. I lived here sixty years ago, before these are not masonry, they are wood, this wall is below the wooden board above the wooden grid, a grid, you can still see people's homes.

The third interview:

No. 6 courtyard Residence One: The most important problem inside our courtyard is that these grounds inside the courtyard are arched up by Uncle, the ground is all uneven, and the roots of the trees are growing into the house. These tree roots make the drainage pipes below have no way to go underground, we now have no drainage in this courtyard, and the ground inside the courtyard is also lower than the road outside the alley, every rainy day will pour rainwater in, this is the most important. Now the tap water flow is also very small, a courtyard inside are in a common tap water meter, we must hurry to install a tap water meter for each family themselves. These two trees are the most headache, it is best to remove them, every time the wind and rain branches will fall, very dangerous, and the trees are crooked, the roots of the trees grow to each family home, very headache. For the interior of my house, I need toilets, and now it's all about me occupying the back alley directly to make a private toilet. Our current partition wall needs to be repaired properly, now it is a bucket wall (both sides are green bricks, hollow in the middle) very easy to damp and moldy. We have now wrapped the walls with wallpaper ourselves. The attic also needs to be properly used up, our attic on the wooden roof frame is very good-looking, is certainly the characteristics of the courtyard, we are very well protected, the small attic has windows for light, the top needs to do a room, the family will come to sleep relatives, skylights we are now inside the courtyard are their own additions, very ugly, I hope to unify the repair. I hope to have a place to sit and entertain my friends when they come. (When asked whether I would like to demolish and move away) I don't want to demolish and move away, I have lived here for decades, I am used to everything, I will not be used to other places, I am familiar with everything here, it is very intimate.

No. 6 courtyard Residence Six: The two trees in the courtyard I really hope to tear down, although the sun does not shine in the summer, but in other seasons, these two trees are really a problem, keep dropping leaves we have to clean for a long time, the courtyard is full of old people, can not sweep. The trees have rotted the ground in the yard, and now the trees are growing towards my house, and the more they grow, the more slanted they are, which is dangerous to look at. I don't have a toilet in my house, I use a spittoon, I would love to have a toilet in my house. There is no place to pour the water inside the yard, there is no way to set up a sewer pipe, it will be rotted by the tree.

No. 6 courtyard Residence Four: Will the kitchen in my house be demolished if it is repaired? I think this kitchen is very important, and if it is to be torn down, then there needs to be a place where I can cook. I spent money on finishing our attic, and this room above is very comfortable. I also asked the master to deliberately avoid the wooden beams, which are old and should be protected.

