

A Typological Study in Urban Historic Preservation Area in Nanjing

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Abstract: Building typology has played a rather important role in urban morphological research. Since typological process leading to morphological generation, understanding typological process is not only a part of morphological study, but also a part of work in urban design, especially in urban historic area preservation. Over the past 40 years, with the expansion of the city, many historic areas of cities in China have been gradually updated under the idea of protecting the types of historic fabric. It is valuable to evaluate how strongly related between urban fabric and building typology, and whether building types kept unchanging under the idea of urban fabric protection.

Firstly, based on the historic district at the south of Nanjing, this paper represents a morphological development during 1949-2018 to see its generation process, the idea, the policies and the dilemma in updating. Secondly, taking three areas developed in different periods as the cases, this paper has analyzed typological process by focusing on plans, usage pattern, structures, and representations of texture units, elevations and construction details. The results have shown the definition of typological process is important to clarify the urban morphological changing: on one hand for protecting the type of historic urban fabric, designers had to develop new building types to replace the old one, and on the other hand, using old building type has the value to protect historic urban fabric by preservation their representation, however, the structure and use types of houses have been changed afterwards in order to fit the contemporary situation.

1. Introduction

In opinion of urban morphology theory, the formation and evolution of cities were pushed by traditions, social and economic force. Urban Morphology study which is used to describe and analyse city building process can help urban designers to understand the mechanism of city's transformations and thus become a significant part in urban design, especially during urban renewal process nowadays. Building types, as root of urban form and outcomes of socio-economic reality, also plays an important role in the morphological research as well as in city regeneration practice.

China, as a country with a long history, has been facing the problem of city expansion and

regeneration from the day the whole country stepped into modernization in 1949. Contrary to large-scale demolition and reconstruction in the context of historic city in early days, there are growing calls for protecting urban landscape and the type of historic fabric. Reusing and adaptation of traditional building types become the way to preserve and reform historic urban form through building typology. It balances new demands of realistic society and preservation of city historical memory form city form theoretically.

Urban renewal under the type protection criterion leads to the historic fabric appearing again in the modern city successfully. In the meanwhile, it brings the chance to reexamining the relationship between urban morphology and building typology. Since traditional urban form is defined by traditional building type, it's necessary to reproduce old building types for the reappearance of old form. However, traditional type which urban designers reproduced under the idea of protection is controversial. Visual sense is the prime factor to define the traditional type during the regeneration process nowadays to produce historic form, meanwhile the ways those building types function are totally different because the life changed.

Normally, the variant of building typology, including its appearance and function, is a result form changes of human behavior linking with the time expending. Building typology process is tended to be irreversible. An existing type is generally adapted and eventually changed to a new type because of external socio-economic development. Therefore, whether the building type beneath historic fabric today is the same traditional Chinese type, or it's a modification of a new type? Can the traditional type really come back to its origin to form historic fabric? What is the nature of today's rules of historic protection and how can designers respond? The relationship between types occurred during protection and the original Chinese type needs careful comparison.

2. Methodology

Studies firstly need to comb the process of urban renewal in historic area in China and clarify its lifestyle, social and economic force and idea of protection in the evolution of city building process and building typology process.

Urban historic preservation area in Nanjing was chosen because of its typicality in city updating process. The development has lasted since 1980, under the different ideas from giving priority for economic construction to historic memory protection, facing changes of demands form different social conditions. Morphology studies through historical maps can definite different periods during old town development in Nanjing and their predominant building type for city designs used to rebuild the city. Also, Comparison among various kinds of records about socio-economic reality and human behavior issue can lead to impetus factors that are promoting type's adaptation.

To understand the types comprehensively, use function with building plans and space structure, roof as fabric unit and appearance with elevations and construction detail need to be compared. In the morphology study, building constructed, plans, sections and outside images are usually used to describe a type form and for empirical comparisons to distinguish different types under different urban fabric. Material and dimensions, as well as the relationship between nothingness and essence in types are also necessary. However, because it is still not enough to describe the function and space structure clearly with those method, space syntax is introduced in the research. Structure of the type is also needed for the way of construction coming from social condition.

The research area in Nanjing has experienced 3 periods of regeneration based on the maps from 1949 to 2018. All of changes can be seen in today's map of Nanjing which is rich in tissue and representative (Figure 1). "XiaoXiHu" area which grows naturally from old city without any dramatic or revolutionary changes during the development of Nanjing historic area represents traditional texture. First period in the end of 20th century was under the idea of protection rehabilitation project for Confucius Temple historic tour area along with demolition and rebuilding modern flats in other worn areas. After entering the 21st century, fabric preservation has begun to wide attention and the modification of traditional building type turns in 2 directions. One leads to the Chinese villa in an area called "ChangLeDu" and the other produced an antiquing commercial block called "LaoMenDong". Those three areas of sample are selected and the characteristic of building types in each area is picked up to compare.

3. Urban renewal process in historic district at the south of Nanjing

Nanjing has more than 2,000 years of history. The fabric of this old city has experienced the Liuchao period (third to sixth centuries), and formed into a mature traditional urban fabric after the establishment of the Ming Dynasty Capital in Nanjing. At the time of the years from 1927 to 1937 when Nanjing was capital of the Republic of China, areas around Confucius Temple in Nanjing became major settlement of citizens and the start point of Nanjing's expansion. Before the founding of New China in 1949, those areas still maintained a large area of historic fabric formed by traditional Chinese courtyard buildings with high building density and sparse street network and mixed with residential and commercial functions.

Within the research area, the protection and development of historic area in Nanjing progresses from the Confucius Temple to the south until river bank of Qinhuai. And it skips the areas with less location advantage, as well as more complex property rights, such as "XiaoXiHu" area. The process can be divided mainly into 3 periods: first period started around Confucius Temple area in 1994-2004, second period represented by ChangLeDu project in 2004-2011, and the third is LaoMenDong project in 2011-2018.

From the view of housing adaptation during the morphology process between 1994-2018, types of residence happened between 1994-2004 were tended to form homogeneous texture and replaced original traditional fabric. That fact was changed during 2004-2011, with the updating project of ChangLeDu area – a type raised to bring back the old city form within the context of modern lifestyle. Meanwhile, the function under traditional urban form was changed 3 times after tracing the representation of traditional fabric during the morphology process before 2018. They were commerce during the first renewal process, and changed to villa housing during the second period, finally turned back to an antiquing commercial block during the third period (Figure 2).

In first period, Nanjing's urban construction stepped into early stage of modernization and mainly aimed to promote urban economic development and improve the backward of people's lives after the reform and opening in 1978. Traditional texture was facing the problem of housing shortage along with poor quality and poor function. Recovery of the national economy has caused a large number of rural demobilized soldiers and foreign rural households to flock to cities to find job opportunities. The urban population of Nanjing has grown from 1.08 million in 1949 to 1.77 million, which the existing capacity cannot afford. In "XiaoXiHu" area, extra houses were built out in every empty space between houses or in the courtyards to expand residential area. Also, courtyard houses were divided into small rooms to serve more families based on for-



Figure 1. *Satellite maps of research area in 2018.*

mer space division, and sometime new volumes were rebuilt on the original place. Also, living demands of city dwell also changed. Increasing density in “XiaoXiHu” led to a short of light and ventilation as well as little room for adding infrastructure to adapt modern lifestyle. And, with the size of urban families has shrunk from rural large family to 3 or 4 individuals, residential type with smaller living units and higher FAR during development is urgently needed. Apartment buildings were introduced and demolished parts of nature fabric in the old town, resulting in a homogeneous texture to meet the sunlight standard and vehicle traffic requirement.

In the meanwhile, in order to enhance the popularity of Nanjing’s cities at home and abroad, to promote Nanjing tourism and meet the growing cultural needs of Nanjing citizens, Nanjing Municipal Government has carried out the “Qinhuai scenery belt construction project”, focusing on reactivating the most traditional and popular area in the old city – Confucius Temple area. At that time, the Confucius Temple repaired its “Gongyuan” and the River Hall of the Qinhuai River based on their traditional scales. Also, under the guidance of protecting landscape and putting apart sight corridor in tourism area, height control zone was drawn and

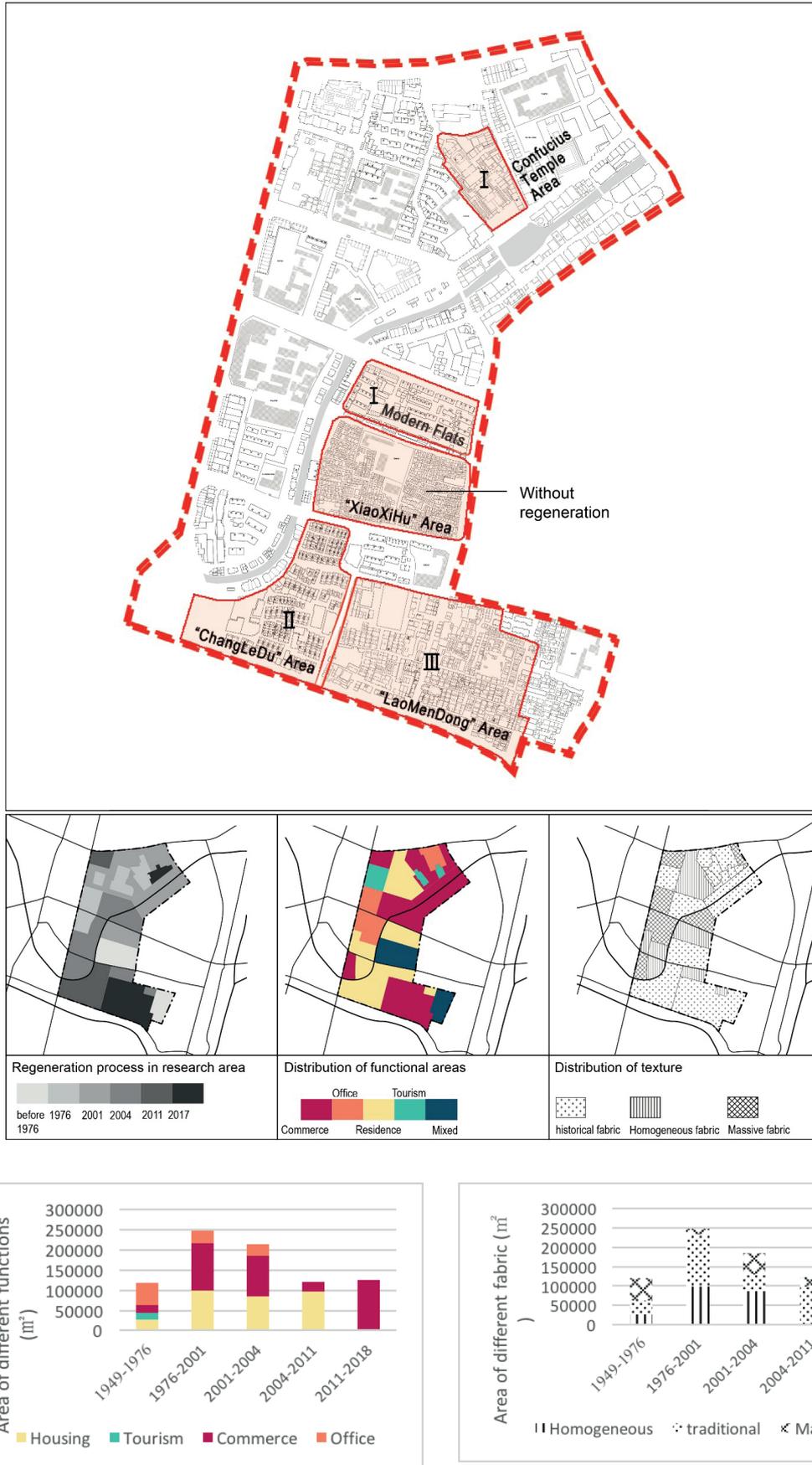


Figure 2. Morphological process during 1949-2018, time sequence for reconstruction was followed by the serial number, while XiaoXiHu area remains unchanged.



Figure 3. Map of height control zone in research area.

limited the surrounding new blocks of flats to the type of multi-storey or small high-rise dwelling (Figure 3).

With the rapid urban expansion since 21st century, a large number of residential were built inside and outside the old city. The problem of old city turned from lack of housing to crowded.

The development of the real estate industry and the diversification of the main urban construction led to high land prices. Implement of housing monetization in 1998 and urban construction project opening to market in 2003 bring a gradual boom in the real estate industry. And the urban construction enterprises are required to be responsible for their own profits and losses. Increasing cost of land makes the original low-density urban texture no longer able to resist the high-density development trend of the city. Commercial office building and modern flats have been replacing courtyard type since the beginning of 21st century. Before 2005, the traditional texture of north of the research area had been destroyed by the construction of high-intensity and high-volume rate. And with the demands of improving local living condition and economic development, two of the three historic areas left within the research area – ChangLeDu and LaoMenDong, which were listed as a protected traditional residential protection area in 1992, re-launched the renovation plan in 2004. After bidding, ChangLeDu area was sold as a residential land with commercial and entertainment function at 11000 yuan/m² in 2007 to an estate agent, compared with the land sold at 1000 yuan/m² in 2006 inside old town of Nanjing intending as an apartment area with 2.1 FAR. All the original constructions were razed to ground after the area was sold out.

Meanwhile, as the idea of protecting cultural features has turn into public view increasingly since 2001., contradiction between protection and development is increasingly acute. Nanjing City Master Plan in 2001 required the protection of traditional dwellings to reproduce its characteristics and features under the current development system and get a certain economic return. With conservation Planning of Nanjing Historic and Cultural City in 2010 and regulatory detailed planning of the area, new constructions in ChangLeDu were asked



Figure 4. Way to build ChangLeDu, (a) FAR in “ChangLeDu”, Area was asked to be much more lower than general trend of normal housing project, (b) private street for resident only.

to built under 9m, and using the same volumn and style of traditional courtyard type to preserve historic image of south old town. Finally, the courtyard-style type of modern luxury Chinese villa was introduced and formed a tradition alike texture of ChangLeDu’s structure. It used high price to deal with high land cost and low FAR need.

Building in ChangLeDu restructured the structure of roofs and courtyards in traditional types to enrich the layout of villa and maintain characteristic of traditional style. Original streets were also rebuilt with narrow lanes adding to regain the rich perception of traditional public space. However, renewal practice of ChangLeDu has been criticized for the lack of social justice. Demolition forced the local to leave their home with low compensation standard, and asked for high price (average 45,000yuan/m²) from the wealth. Living standard in the old town was improved but not for the general public. Moreover, although the villa retains the traditional texture, ChangLeDu remains a chinese closed housing estate which cannot provide services to the public and bring the city memory back (Figure 5).

LaoMenDong historic commercial district was the third attempt at few remaining historic areas in south old town under the idea of fabric protection. As residential area with low rate of capacity no longer meet the demand of protecting traditional culture buried in historic fabric and more stringent idea of overall protection after 2010 “Nanjing Historical and Cultural City Protection Plan” has come up, Nanjing government has moved towards the development a of commercial district in the real issue of protecting tradition and self-financing.

Commercial district of LaoMenDong has become a public space for either tourism or local citizen. Traditional street and lanes space are reserved and linked to public courtyards within commercial areas. Small landscapes, such as waterscape of stream and slate bridges and old trees, of old city life were created deliberately in order to make up city memory. Buildings in LanMenDong were required renovation of the traditional courtyard house to meet the needs of modern functions and preserve the characteristics of the traditional style (Figure 5).

4. Connotation of traditional Chinese courtyard type

Traditional type of Chinese courtyard generates from lifestyle and construction structure buried in the building. The plan starts with space which tended to be relatively public like courtyard or livingroom specially for treating guests. A screen is set up to separate a small

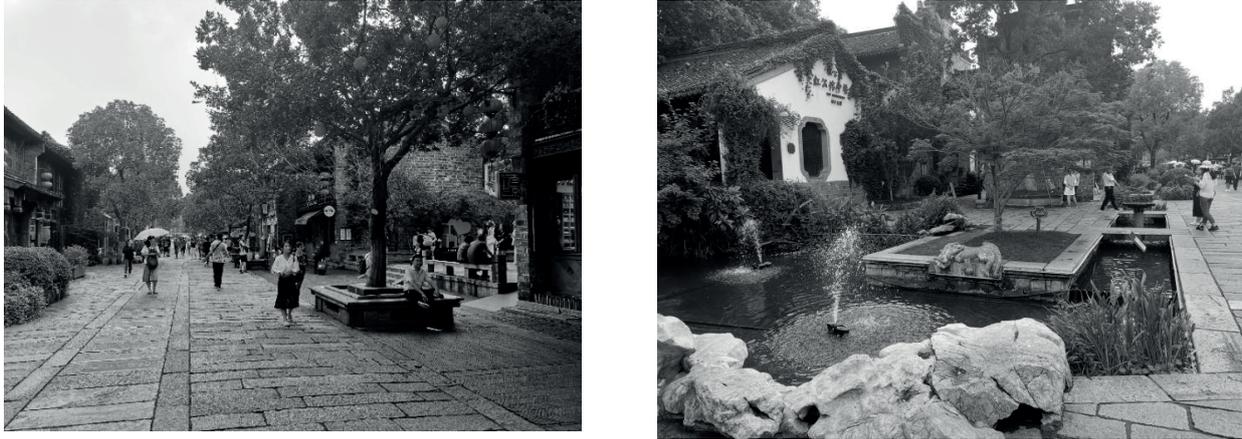


Figure 5. Way to build LaoMenDong, (a) Public streets for citizens and tourists, (b) Landscape in LaoMenDong to create historic memory.

space for the transit of the more public to the more private. Courtyard in the middle links front and rear building units, improving lightening and ventilation of the whole system. Wing rooms in the sides of courtyard, functioning as assistance rooms, are not necessarily exist. The back of the courtyard type was used as private space of family for living, communicating and rest. In the middle of the unit is the livingroom and diningroom for family members. Personal rooms are in the sides and lighting by courtyard. There is also a back door in the end of type or side of courtyard sometimes for informal travel.

The traditional building structure is formed with the arrange of special wooden frame in width. The combination of wooden frames forms a independent unit called “JIN” of house with the size limited for wood material and traditional rules of construction. The enclosure structure of traditional courtyard type is mainly wood and brick, independent of wood frame. Lightweight materials such as wooden doors, windows and panels are filled in the wooden frame and fixed directly to the structure. The brick wall is independent of the structure and is self-supporting by gravity and avoid the window opening.

Traditional courtyard type has its own precise construction to produce beautiful texture and graceful form in appearance. As it comes from lapping of small-scale components with purity, the joint forms of different element bring an aesthetics of Structure

5. Comparisons among building types happened in the urban renewal process

Combined with the historical review of the urban renewal of the old city of Nanjing, the historic protection has finally produced five key types of buildings after undergoing three renewal stages.

As the aim of this research is to study the role of types in the process of historic texture protection. Types in XiaoXiHu, ChangLeDu and LaoMenDong which formed similar traditional urban fabric are chosen. Building type in XiaoXiHu is considered as the typical example of traditional courtyard form as a reference for comparison because the area has not experienced the urban regeneration and contains well-preserved historical buildings. And types in ChangLeDu and LaoMenDong are the focus of study, which are produced under different ideas of protection with similar social background.

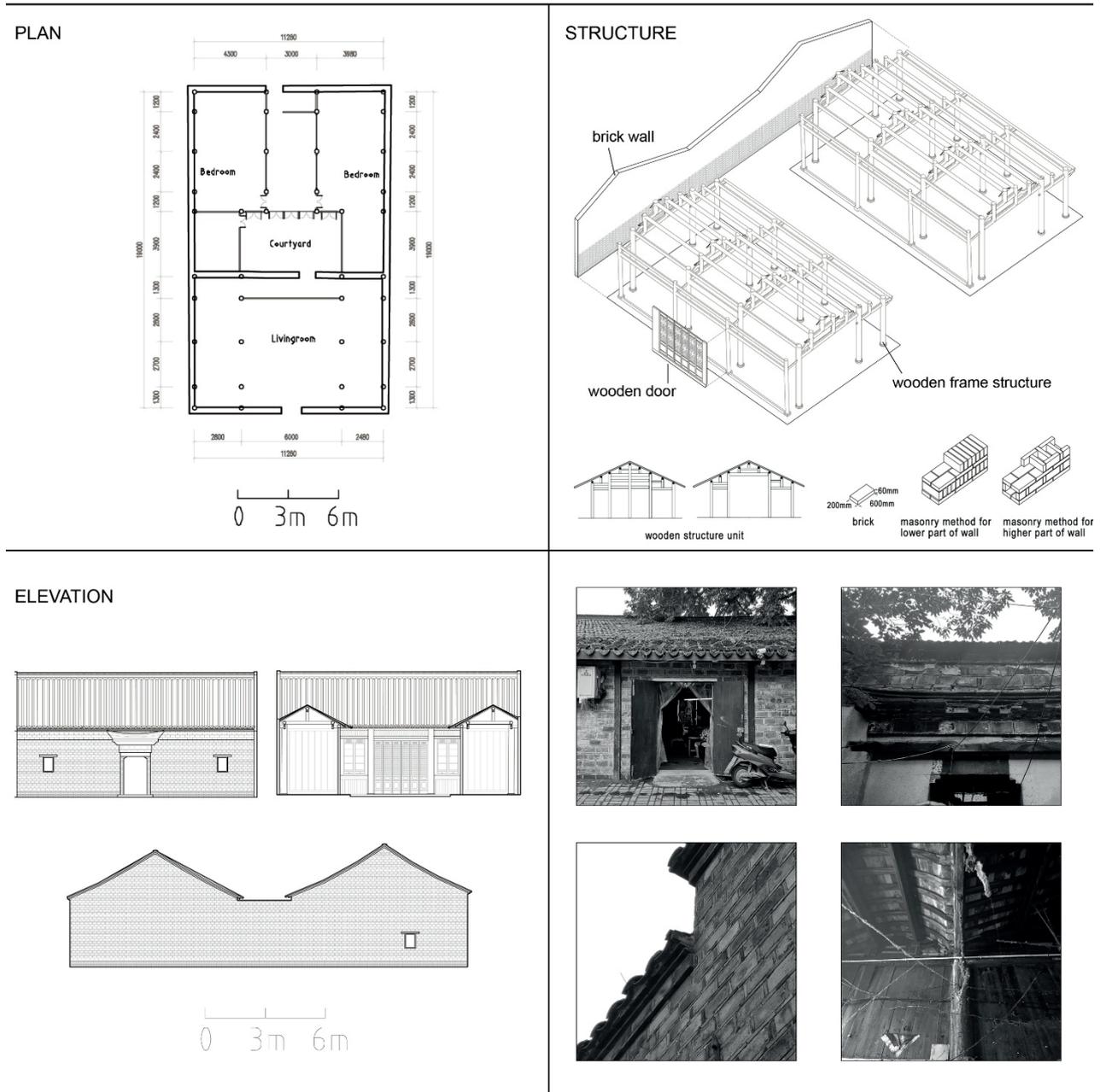


Figure 6. Connotation of traditional Chinese courtyard type

During the research, type in Confucius temple area and multi-storey residential area will be treated as a product of modern life to compare its function with others.

5.1. Function adaptation behind change of lifestyle

a. Change of space structure

The use structure of traditional courtyard is of axis type, and there are multiple small cores with equivalent connectivity in the overall structure. These cores are connected in series to form



Figure 7. Building types happened during urban renewal

the axes of traffic, which is connected to all the spaces in the room. The overall structure of ChangLeDu is consistent with modern multi-storey apartments which is centripetal. Corridor space replaces courtyards and halls in traditional types and becomes the core of transportation. The connectivity of the Changledu corridor space is much larger than that of the traditional courtyard hall and courtyard.

Traditional courtyard types can be separated by courtyards and corridors with different private densities. Multi-storey houses and ChangLeDu are separated by halls with different private densities of outdoor streets and private houses. However, the change of privacy in the building is reflected only by the extension of a corridor space, so the perception of the change of privacy is weak.

As a commercial building, Lao Men Dong’s building type is recreated in the form of traditional courtyard. For adding commercial use, the traditional courtyard which used to have only one ownership is divided into two ownership units according to the unit of “JIN to achieve more shops opening to the street. Thus, the use pattern in LaoMenDong is the same as its in

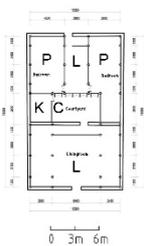
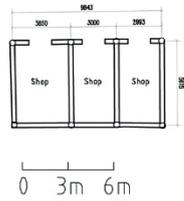
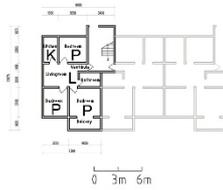
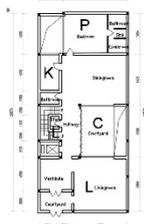
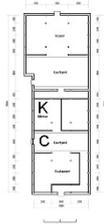
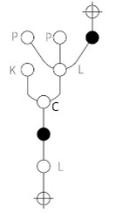
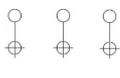
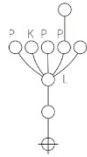
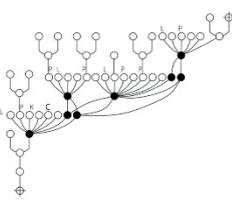
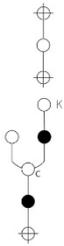
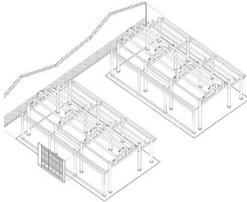
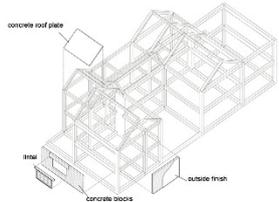
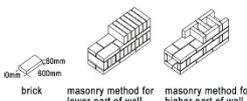
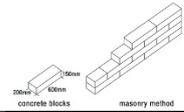
Without Regeneration	Period I 1980s - 2000s		Period II 2000s - 2010s	Period III 2010s - 2018
XiaoXiHu traditional courtyard	Confucius Temple area	Multi-storey dwelling area	ChangLeDu area	LaoMenDong area
				
				
				
				

Figure 8. Comparisons of functions among types

Confucius Temple. The spatial structure within each ownership is similar to the traditional courtyard type. But the functional organization is different. For example, LaoMendong type uses corridors as traffic space, same as ChangLeDu. Because of its simple structure, there is no obvious axis or core in LaoMenDong type.

b. Changes in specific function

The courtyard in the traditional type integrates the functions of transportation and lighting and ventilation between “JIN”. However, in the modern type of multi-storey type and ChangLeDu type, it become a simple use space and is located at the end of the space structure. In the case of the multi-storey type with tense residential area, the function of the courtyard will be abandoned.

As the core public space of each unit in the traditional type, livingroom integrates the functions of family gathering and transportation linking other space. Such mixed functions of livingroom are retained in the type of multi-storey dwelling with insufficient area and change to the core of the whole type. But in the Changle Du type, the traffic function of the livingroom is separated to the special traffic space, and the livingroom becomes the common use space, which is at the end of the space structure.

The corridor space is a small square space in the traditional type, which is separated by the partition wall in the livingroom and used to separate the space with different private density. In

Changledu type, corridor is the core traffic space of each floor. The space is striped, extending to the depth and connecting other spaces. ChangleDu also emerges special traffic space such as elevator shaft and stairwell, which integrates with corridor to connect other use space.

The kitchen of the traditional courtyard is directly connected to the courtyard, which is conducive to ventilation and emergency fire fighting. For the development of technology in kitchen, it become close to the diningroom for easy meals serving in the multi-storey residential type and ChangLeDu type.

Private space of each type has always been at the end of the spatial structure to ensure the privacy of the space. At the same time, in order to improve the use quality of the space, the Changledu type has increased the spatial level in the private space, enriched the function of the private bedroom, and added the bathroom with dry and wet separation and the cloakroom to facilitate the user's life.

The space structure of traditional type varies in the history of protection. In residential buildings, due to the habit of functional partitioning of modern houses, the traditional mixed spatial functions are singularized, and the traditional type of use structure has changed from an axis multi-center structure to a centripetal structure. Commercial buildings have weaker requirements for spatial function segmentation, and the spatial structure of traditional courtyards has reservations. Moreover, due to changes of use habit in commercial and residential types, space use is also different. Types in ChangLeDu and LaoMenDong are the same as modern use pattern in period one of regeneration but not as the historic type.

5.2. *Materials and structures*

The form of Chinese traditional courtyard comes from the real expression of its own structure. The wooden frame requires that the weight of roof should be shared equally among the columns in the width span of the room, and to reduce length of wood beam should to save material. Therefore, the trisection in width of house has been formed. In the depth direction, the wooden frame is formed into a triangle by lifting the beam to span long distance, so a Chinese-style sloping roof is produced. The traditional Chinese buildings are expanded their area by duplicating the unit, and the space between each "JIN" forms courtyard used for daylighting, ventilation and traffic.

Main facade of the building tends to use light material of wood which is easy to open holes for lighting and ventilation. And brick walls are mostly used for side facades of courtyard type which can separate the house from streets or neighbors to prevent fire from spreading among neighbors. A compact masonry method is usually used to stabilize the wall foundation on the lower part of the wall as well as an empty bucket masonry method is used to reduce the weight of the wall on the high part.

ChangleDu uses the frame structure of modern architecture, the material is mainly reinforced concrete. It immitates courtyard form because of the freedom of the frame structure in the modeling ability. Modern frame structure increases its span and bearing capacity by increasing the amount of reinforced concrete. The plasticity of concrete joint also simplifies the structure of beam-column joint in special-shaped. Therefore, when imitating the scale of traditional buildings, the frame structure has no requirement of falling columns in the direction of width, instead of forming trisection in width of house, it has become more economical with dichotomy. At the same time, there is no need to use complex wood frame form to form a triangle to increase the bearing capacity. In order to imitate the sloping roof of the traditional

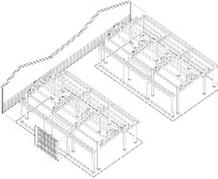
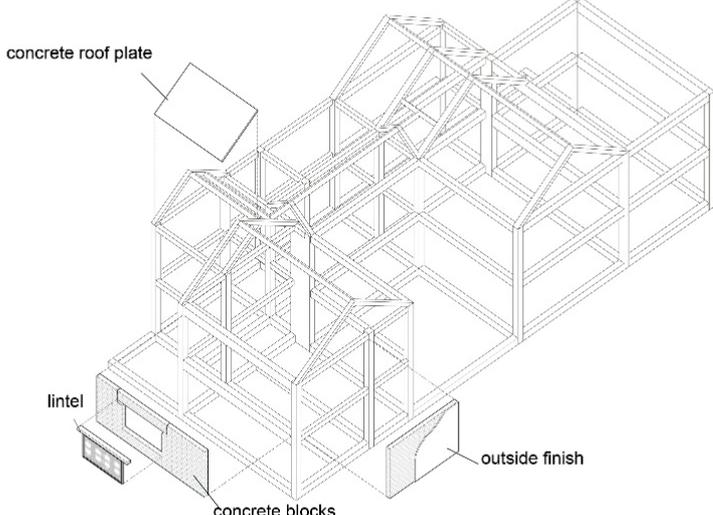
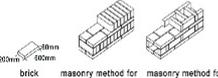
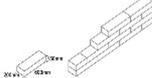
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Figure 9. Comparisons of structures among types

courtyard, the frame structure of the roof of Changledu type directly constitutes the triangle three sides.

Compared with the traditional courtyard building, the structural logic of ChangLeDu takes the whole building as a basic unit and digs out the central courtyard in a volume equivalent to two courtyard buildings.

The maintenance structure of Changledu is also dominated by concrete. The wall, doors and windows are filled between the frame structures. The walls are filled with modern lightweight blocks which are out of the traditional brick size. When the block is filled, the beam is erected and reserve a hole. The prefabricated door and window frame can be installed in, which reduces the problem of lighting and ventilation in the traditional courtyard. However, the advantages of the frame structure also bring about the homogeneity of the type of facade.

LaoMenDong mainly used the same reinforced concrete structure as type in ChangLeDu. However, the area used bricks which are similar with traditional bricks material in original type in outer layer of the wall to imitate construction.

The traditional courtyard type stems from its traditional structural approach. In the process of historical protection, the continuous development and optimization of structural technology and materials make the duplication of traditional structures become resource-consuming, which is not conducive to the capital operation of developers. So, when the ChangLeDu and LaoMenDong type was created with modern structure, the type of building in idea of structure changed dramatically. And, in the process of construction, some optimization methods using modern materials and technologies in enclosure structure will reduce the characteristics of traditional courtyard types.

5.3. Representation in texture units

In order to protect the traditional historic texture in the process of historical protection in China, the traditional roof types and courtyard forms are emphatically protected because the size and texture of the sloping roof and the existence of the courtyard form the basic feature of the whole texture area.

The roof units are similar in all three types. The textures of roofs are all form by slope roof with material of tile. Courtyard which treated as core feature of the traditional type has been preserved, which sometimes change to flat roof to meet the needs of using in ChangLeDu. And the size of roof and courtyard is also contorled to imitate those in traditional type. And combination and dislocation of those units in large areas finally result in similar porosity in historical urban fabric.

Because the style of roof in modern architecture can be designed separately from the space structure and usage mode of buildings, also the roof is recognized as component unit of the traditional texture, it is simple and effective for designers to retain the combination of sloping roof (entity) and courtyard (virtual body) to reform historic fabric.

5.4. Representation in sections

Main facade of traditional type if axisymmrrtric. It combines brick wall in the eave and texture of tile in the above the eave. The gate in the middle starts the transportation axis through the whole

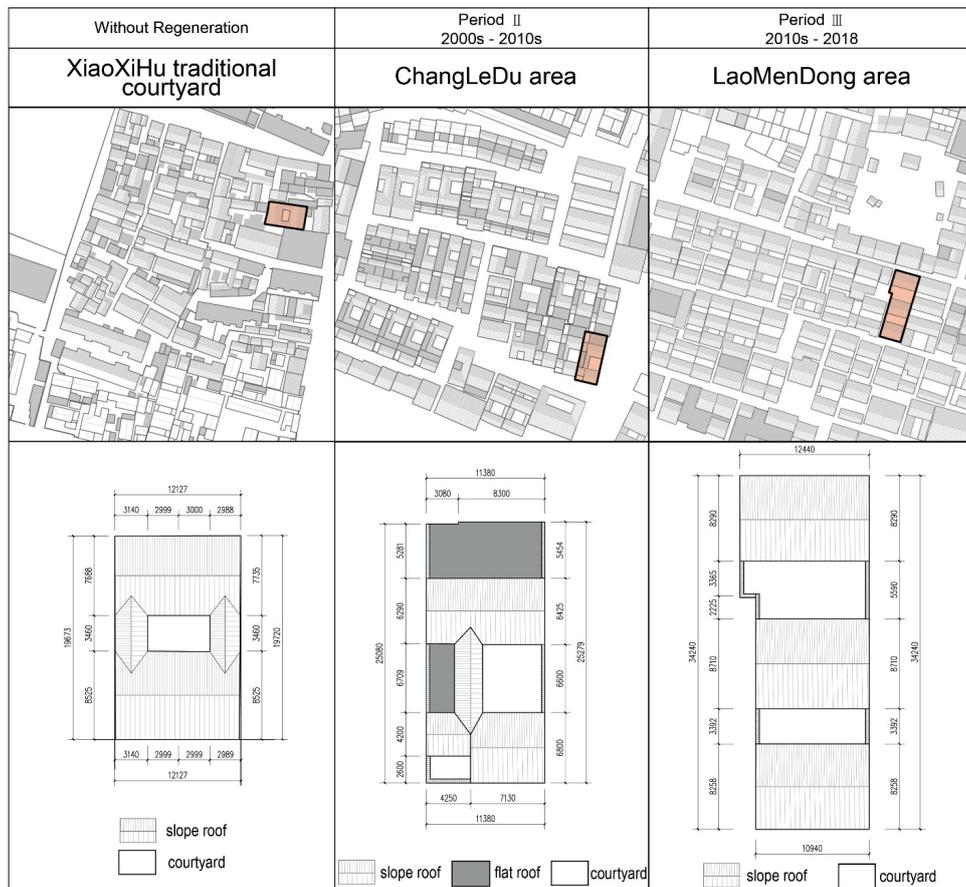


Figure 10. Comparisons of texture units among types

building. Small windows on the both sides are used for hall lighting. Wooden facade of second “JIN” consists with large wooden door in the middle and large windows on the both sides, filled in the whole frame to lengthening and ventilation of the livingroom and private room in the sides. The side facade of traditional is constructed by brick with few windows. The upper line shows the rhythm of slope roof and horizontal wall of courtyard. There are two layers on the brick wall, for the solid masonry method close to ground and light masonry method on the top.

Although the main facade of ChangLeDu type lacks the symmetry of the door and windows because of inner space. The façade is divided into two parts, the left side which is lower corresponding to the small courtyard of the entrance and the right side which is two floors high containing a livingroom in the first floor and a bedroom in the second. it uses similar epidermal appearance of traditional type, such as door with same traditional form, floral windows which regardless sight difference in size and location for different lifestyle or just decoration (Fig.12), and skin of external wall in brick divided into two layers. The upperline on the side façade presents similar rhythm of traditional type. Except for the flower window of the courtyard wall, opening is avoided. The side façade uses both brick walls and white wall to increase the color and rhythm of the façade, and avoiding the volumetric cognitive errors caused by the two high-rise “walls” on the right side.

The facade restored the original traditional type of symmetrical relationship in LaoMenDong. Door is kept in the middle of the wall, and modern-sized windows in the left and right sides. There are different kinds of façade with various traditional features in LanMenDong. Inner courtyard facade is often used in the street facade with the demand of openness of business (Figure 12). The number of doors in side façade increases to add the publicity of the courtyard. The brick wall is still divided into two layers.

The overall shape and symmetry of the facade are the response of the structure and its corresponding space use. In the process of historical protection, the facade of LaoMendong type is

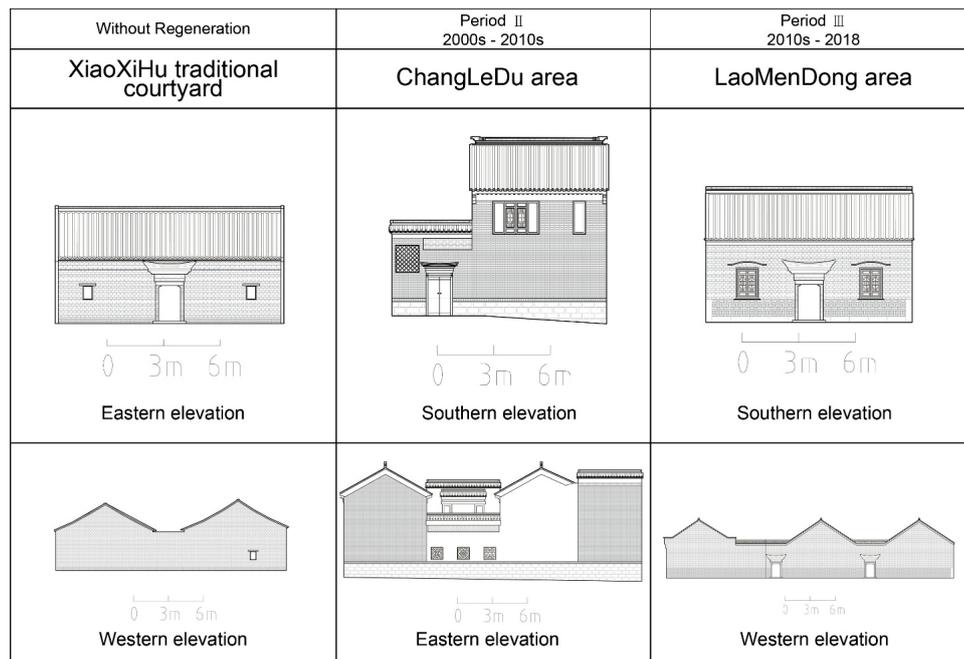


Figure 11. Comparisons among types' elevations.

almost the same as that of traditional type because it retains the structure of traditional courtyard type. The replacing structure of the Changledu type resulted in the difference façade with the traditional building type. However, features formed by components on the traditional type can be imitated by modern practices to recall the historic memory.

6. Representation in constructional detail

In the process of historical protection, due to the difference in structure and materials, the presentation of details in the Changledu and Laomendong types slightly differ from those in traditional types. Due to the simplification of modern materials and structures, some of old architectural details are divorced from the needs of use and are imaged in modern types. Other parts of the details are optimized in material and structure and are retained in similar form. Their epidermal appearance in the constructional detail experience the preservation and translation during the renewal.

As the case of eaves in the 3 types, the appearance of them are highly similar with each other. All of them can be recognized as a traditional type for holding the same characteristic of slope



Elevations in ChangLeDu



Elevations in LaoMenDong

Figure 12. Different elevations in ChangLeDu and LaoMenDong areas.

tile roof slight out of eave wall for roof drainage. Different construction of 3 types showing the difference in detail. In type of traditional courtyard, out part of roof is supported by tiered bricks out of original eaves wall. LaoMenDong changes the tiered bricks to a Precast concrete member fixed in brick wall around eaves to hold the roof. ChangLeDu type, with the totally different structure, combines the support part with roof plate. Method of roof drainage is also changed in modern building practice by using gutter which allows the situation of an impossible traditional form because of completely different construction logic.

The appearance of brick wall in three types are similar with their texture and number of layers. Both type in traditional and LaoMenDong use real brick as material along with the type in ChangLeDu maintaining texture by facing brick imitating real brick. All of traditional type of walls are recognized as three layers. The construction for the same reason results from needs of stabilized wall foundation and ease the weight of upper wall in both traditional and LaoMenDong type, while improving material is used in the latter. Type in ChangLeDu copies the image only for its different structure avoiding the self-bearing of wall.

Flower window from traditional type with no transparent material and uses grille to balance with privacy and lighting. The sash is directly linked with structure of wooden frame. The view through frame increase depth with light and shadow, become an artistic conception in the traditional type. Nowadays, with simplification of window structure and the higher demands of

Without Regeneration	Period II 2000s - 2010s	Period II 2010s - 2018
XiaoXiHu traditional courtyard	ChangLeDu area	LaoMenDong area
		



Figure 13. Eaves and roof drainage

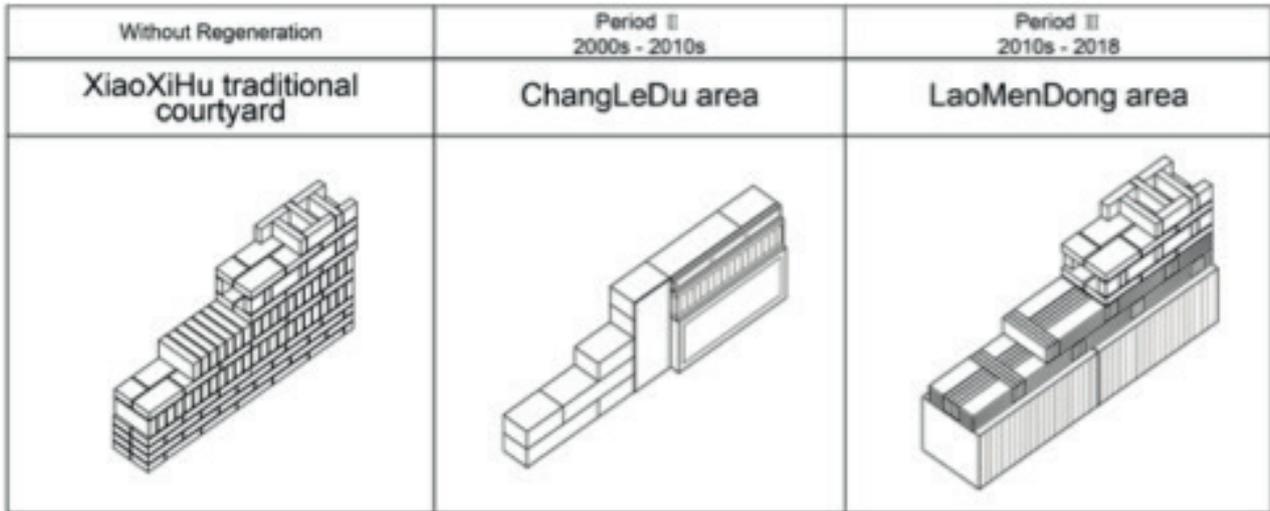


Figure 14. Masonry methods in different types.

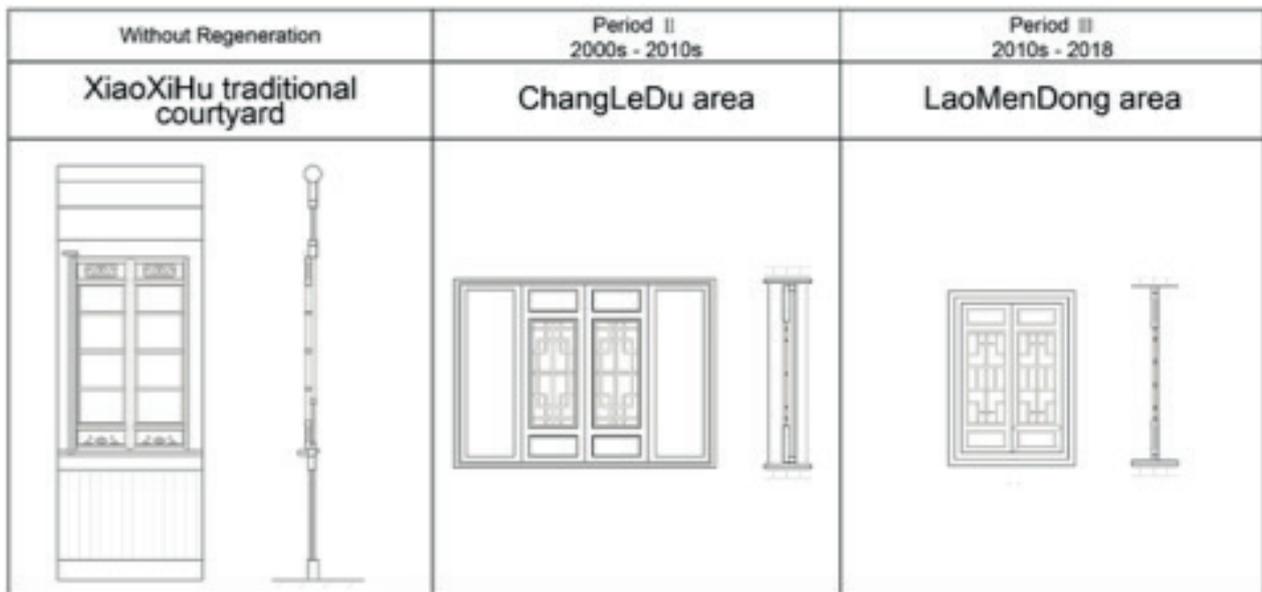


Figure 15. Flower windows

lightening, viewing and forming climate boundary in the house, the flower window has to add glass and has little advantage except for its artistic value.

7. Conclusion

Type is closely related to life. It reflects the social, economic and cultural background at that time, the habits of life and behavior, and the conditions of construction technology. Ancient China was sparsely populated and abundant in natural resources. Under the environment of advocating feudal class and etiquette, the traditional chinese type produced a courtyard building form with wood frame as the main structure, with characteristic of low volume ratio and axes and hierarchical division in space. However, in modern society, due to the high-density requirements of the city, the development of construction technology and the replacement of materials, the reduction of family size, the disappearance of feudal etiquette and the introduc-

tion of a new way of life, the traditional type lost its use value. The traditional type is replaced by the new multi-storey residential type, and the traditional residential texture is also eroded by the homogeneous texture of the residential quarter. The disappearance of traditional texture and traditional types has resulted in the loss of historical memory and destroyed the unique context of the city. In the 21st century, Nanjing began to protect the historic texture with original courtyard type, trying to re-apply the traditional type to life.

The protection of historic areas within old town of Nanjing during the 21st century mainly produces two types of buildings. One is a type of Chinese villa in ChangLeDu, the other is a type of commercial building in LaoMenDon. Although both types are similar in appearance to traditional types, but because of the different context of life, the types actually experience modifications from the traditional type. These changes are mainly due to development in life-style and construction methods.

On the one hand, with continuation and change of life style, although ChangLeDu Residence inherits part of the traditional type of functional space, the organizational structure of space and the use of space have departed from the traditional building type, but close to the use of modern multi-storey housing. The function and layout of LaoMenDong's space have also changed to be commercial space that can be freely divided by the owners and used like type in Confucius Temple commercial area. So, the result of historic protection idea today never can change the modern generalized use pattern during first period of regeneration. The concept of type protection tries to restore the traditional type of life by using courtyard space, but in fact, the status of traditional courtyard as the key transportation and a core for the whole building has disappeared. Courtyard in the modern type has become a common functional space for modern usage habits, such as viewing and lighting. That is to say, even if the scenes of life in the traditional type can be preserved, the life behavior has disappeared.

On the other hand, the emergence of a new material and structure, such as reinforced concrete, simplifies and optimizes the construction of traditional types of complex wooden frames. Because the traditional building type tends to be the faithful response of its own structure, the structural change eliminates the original type characteristics based on the formation of the structure at the same time. In the logic of reinforced concrete structure of ChangLeDu type, the trisection in width of house becomes the dichotomy, the courtyard becomes the holes which can be taken out in the whole structure of the building, and the location and size of the elevation holes are freer. Meanwhile, LaoMendong reproduced the traditional materials in outer layer of the type and traditional characteristics which preserved in LaoMenDong are indeed more than the ChangLeDu model. As the reconstruction in original structure is both unaffordable and unnecessary in the process of historical protection and renewal, the structure of traditional types can not necessarily go back to the past, and the building type has changed in aspect of structure.

In fact, in the process of urban renewal, the protection and development of the traditional texture actually protects the roof texture and epidermal appearance of the building type. The two new building types retain the image and size of the sloping roof of the traditional building type, retains the texture produced by the roof tiles, and the virtual and real relationship brought about by the existence of courtyard. The shape of facade and the details of the building are transformed into the appearance of skin and protected. ChangLeDu's type uses contemporary materials or modern structural practices to translate the characteristics of traditional types into images, which conforms to the reality of economic interests in the process of modern development. LaoMendong's type, by retaining traditional material practices, slightly assists

modern components to simplify the details, preserves the structural details of traditional types to a certain extent, and makes the external characteristics of traditional buildings more vivid.

Therefore, the idea of tradition types preservation as a whole unnecessarily exists in today's historical renewal process. Representation type of the buildings may adapt into modern life but never can the use or structure type during the protection of city historic fabric. And, a new type has already arisen to support historic texture preservation when we consider all three elements together as a definition of one type.

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