

Suture and Revival of Historical Blocks in the Context of Modernity

Comprehensive Planning and Architectural Design of the Leqiao-Caoqiao Section in the Ancient District of Ganjiang Road, Suzhou City

Ziyi Xin¹, Yingpeng Zhang², Jinxiu Wu^{1,*}

¹School of Architecture, Southeast University, Nanjing, Jiangsu, China

²9-Town Design Studio for Urban Architecture, Suzhou, Jiangsu, China

*Corresponding author. Email: 563058929@qq.com

ABSTRACT

In the context of the modernity of urban development, Suzhou Ganjiang Road, as the main road in the ancient city, has been unable to meet the existing urban needs, and the contradiction between the ancient city's infrastructure and modern lifestyle has become increasingly prominent. In this paper, Ganjiang Road Leqiao-Caoqiao sections were integrated through planning and architectural design, based on the new urban transport network in order to protect the ancient city and cultural renaissance. By the studies of urban fabric type and morphological and long-term optimization of the urban building space, applying urban design methods to organize dimensional traffic system, new exploration was made on the suture and revival of the ancient city section of Ganjiang Road in Suzhou in the modern context.

Keywords: suture and revival of historic district, urban design, style, linear space, long-term optimization

I. INTRODUCTION

Suzhou City, Jiangsu Province, a 2500-year-old oriental water city in the lower reaches of the Yangtze River in China.

Since the ancient city of Suzhou was established in the Spring and Autumn Period of Wu Guo (514 BC) to the present, according to archaeological excavations, the ancient city although after repeatedly destroyed and rebuilt, but the city size and texture streets remained the same. With the continuous development of social development, the ancient city of Suzhou has formed a unique waterway double checkerboard street space pattern, with a highly recognizable image of "Low bridge, stream running, cottages".

The Ganjiang Road in Suzhou was first built in the early 1990s. According to the city planning and development at that time, it was built into a modern east-west urban transportation arterial with strong connection properties [1]. In urban road regulatory plan, the road width control is 50 meter. In urban building regulatory plan, the building height control on both sides of the road is 24 meters. The Ganjiang Road is two-way 6 lanes, with the Ganjiang River in the middle as a landscape belt (see "Fig. 1"). The Gan Jiang Road Leqiao-Caoqiao study section is located in the core of the ancient city area, and on both sides of the street feature-rich format, stand a transportation hub, historical heritage buildings, commercial office, residential hotel, education and other functional properties. The historical district has a complex built environment and outstanding problems which are

representative and exemplary.

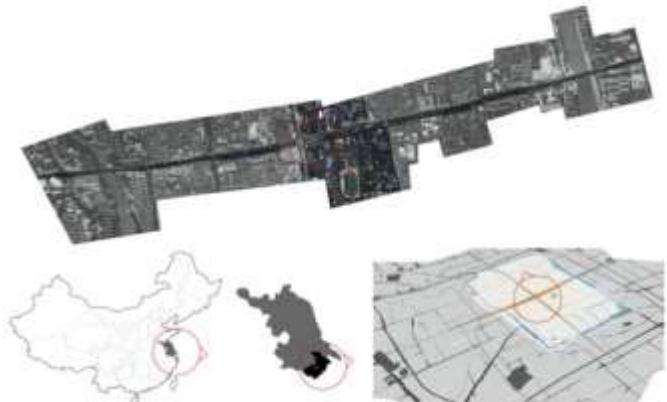


Fig. 1. Location.

II. METHODOLOGY

A. Urban design and cultural imagery

Urban design is becoming a hot topic in academic discussions and engineering practices in urban transformation of China [2].

There are many opinions on the conceptual connotation of urban design. The British Encyclopedia defines it as "urban design refers to the concept of form in order to achieve human social, economic, aesthetic or technical goals. It involves the form that the urban environment may adopt" (British Encyclopedia). It is given contemporary connotation in the

*The financial support from the Research Program of National Natural Science Foundation of China (51678123, 51208089) is acknowledged.

third edition of the Encyclopedia of China that "Urban design mainly studies the construction mechanism and place creation of urban spatial forms. It is the design research, engineering practice and implementation management activities of urban human settlements including human, nature, society, culture, and spatial forms. "(China Encyclopedia 3rd Edition Trial Entry, 2017)

Unique urban cognition and urban values require unique cultural images as the basis. With the evolution of the social and historical development of urban design, urban spatial form and place-making constantly updated. Modernist urban design is produced in the industrial revolution that accompany rapid urbanization and industrialization, emphasizing the urban efficiency, and to meet the rapid development of the real needs of people gather daily work life to live and so on. With the advancement of the social and historical process, the efficient space for urban development cannot support people's growing spiritual space needs. In the study of Kevin Lynch, Aldo Rossi et al. sought to oppose functionalism excessive interference in the form of the value of urban space. In the book "The Image of the City", Kevin Lynch analyzes the "imaginability" of the city through people's cognition, and briefly summarizes the five meta-elements: roads, borders, regions, nodes, and landmarks. Imagery was to explore the role of the form itself [3]. Aldo Rossi believes that too much attention to affect the function of the region has limitations, and it denied the city's most important architectural structure in the intrinsic value [4]. The view was expressed that the necessary steps have links with history, is to give legitimacy building within a particular culture, types have to create a reasonable and lawful inherent ability Urbanism, can be used against Le Corbusier the "city of tomorrow" modernist ideology cities represented.

B. Type morphology and urban texture research

Type-morphology is a method of research on Urban Morphology Framework in urban design. This research method integrated Conzenian school of Britain and Germany's study that focus on morphology, and Muratori school of Italy focuses on building types. American scholar Mu Dong deepened his research on this framework after 1987, using the term "Typo-morphology" proposed by Italian architect and planner C. Aymonino as the framework, then gradual integration of the Western urban studies thus frame. Chinese urban type-morphology study began in 1990, has been developing rapidly in recent years, combined with national conditions and localization of a lot of research [5].

Urban fabric is a symbolic memory of the city, carrying the regional cultural genes. Colin Rowe proposed in 1984 to use the figure-ground relationship to research and analyze urban texture [6], and became one of the main methods of urban texture research. China has made evolution of the urban fabric in the 1990s from the area, land, building analysis. Numerous studies to study the morphology of the frame type, through figure-ground relationship of succession study the urban fabric.

C. Street linear space form and comfort of modern city

Modern urban linear space is one of the main components of urban space which is the skeleton of urban structure. Linear

space is defined on the typology of indefinite space, and connected with an excessive role in the function, while the bearer traffic, recreation, landscape, ecological role.

The linear space of the street is mainly composed of the bottom interface, the side interface, the top surface and the ancillary facilities. Among them, the factors such as the openness of the sky enclosed by the interface, the aspect ratio of the street section, the street alignment rate, and the integration of the street directly affect the comfort.

D. Long-term optimization of completed urban space

Social development drives the development of the urban space. By means of urban design, urban functions are being constantly improved. In the process of function enhancement, some existing city functions may have some negative effects on future development.

Long-term optimization is a concept that multi-use in study of completed construction, to explore building adaptability variability problem. Introduce the concept of long-term optimization in urban space renewal, emphasize the introduction of the perspective of time dimension in the use of the built environment, based on human economic and social activities, continuously optimize and adjust the space according to new functions [7], and introduce deformable concepts such as modulus actively respond to the social development needs to provide flexibility and adaptability to the new features of the city.

III. COMPREHENSIVE PLANNING AND ARCHITECTURAL DESIGN OF THE LEQIAO-CAOQIAO SECTION IN THE ANCIENT DISTRICT OF QIANJIANG ROAD, SUZHOU CITY

A. Preliminary investigation

The Leqiao-Caoqiao section of Ganjiang Road in Suzhou City is located in the central area of the ancient city. On both sides of the section in the north and south distribute important urban vitality points. The field research started from the subway Leqiao Station, and was carried out around the segmented road and a total length of 1 km from north to south. By recording important vital points with dense personnel, the in-depth study of the key areas was carried out twice or more (see "Fig. 2").

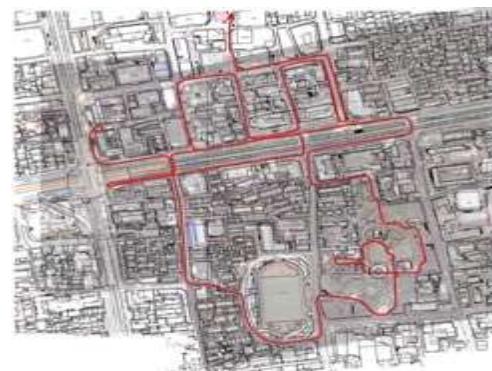


Fig. 2. Survey route diagram.

B. Historical Changes

Ganjiang Road, which runs through the center of the ancient city of Suzhou as the aorta of the area, has a long history of five centuries, and itself has a very rich content and performance (see “Fig. 3”). The Leqiao-Caoqiao section studied in this article was convenient for commercial activities near Leqiao Bridge and Ganjiangfang neighborhood in the Qin Dynasty, and matured to the form of urban streets in the Song Dynasty. In the nearby area were marketplace and apartment block consisting of streets and water lanes (see “Fig. 4”). After the first expansion from 1992 to 1994 and the second reconstruction from 2007 to 2012, it has become an important backbone of life transportation in Suzhou and a link connecting other urban functions. It is also the east-west city central axis and cultural corridor in Suzhou ancient city.

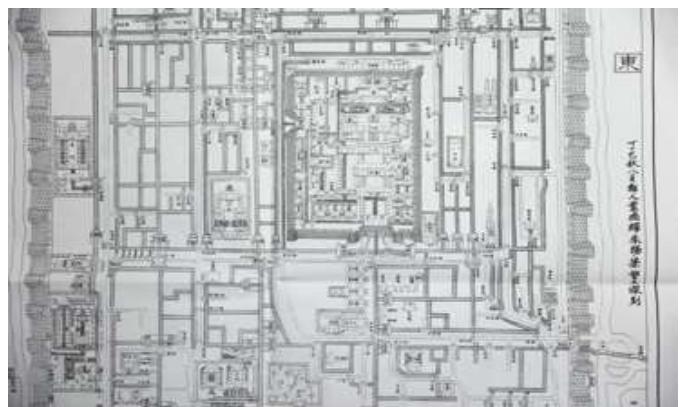


Fig. 3. Detail of Pingjiang map (drawn in 1229 in the second year of Shaoding in the Southern Song Dynasty).



Fig. 4. One part of Suzhou's Golden Age, works of Xu Yang in Qing Dynasty.

C. Sorting out the status quo

Ganjiang Road is centered on Leqiao bridge, with east and west sides divided into Ganjiang East Road and Ganjiang West Road. Leqiao-Caoqiao section is located at the center of the ancient city of the commercial area of Ganjiang Road.

Ganjiang Road serves as the central axis of the east-west city of the ancient city, and connects the urban sub-central areas on both sides of the ancient city — Tiger Hill District in the west and Suzhou Industrial Park in the east of the city. The Ganjiang Road divides the north and south sides of the ancient city. There are mostly historical districts in the north of the road and the northern region has different degrees of commercial development which has strong cultural and commercial attributes. There are mostly historical and cultural nodes in the south of the road, which is also inserted into the public activity area of the citizen, and the southern region has strong cultural and living attributes.

After 1992, the widening of Ganjiang Road did solve urban public municipal functions such as ground transportation and underground pipeline networks in a timely manner. However, based on the current city status and field investigations, the current status of Ganjiang Road Luleqiao-Caoqiao section was sorted out:

- The status quo of the block presents the problem of insufficient capacity in the city.
- Road to six lanes, the width is too large, fragmented ancient city of the original texture space.

- Current roads focus on solving traffic problems and lack of urban living space.
- Road construction on both sides of the line high stick, walking area is too narrow, slow system inadequate public space, and mixed-line problem is more serious (see “Fig. 5”).
- Heavy traffic on roads, blocking commercial viability on both sides of the street.
- The Ganjiang River is located between the two-way lanes, and the public green space on both sides is cramped, with poor accessibility and low utilization, resulting in insignificant landscape effects and poor sight circulation.
- New buildings and historical buildings on both sides of the road are alternately distributed, but the skin texture on both sides of the street is more consistent.
- On both sides of the road building height limit of 24 meters high, has a large number of new buildings on both sides of the line of sight obstruction historic district.
- Historical and cultural buildings within the section along the street are mostly first and second floor, its small square in front of the area, landmark obvious.
- Important city square space surrounded by roads, poor accessibility of urban living space.



Fig. 5. Spatial scale of street walking.

D. Goal of reform

According to the status quo (see “Fig. 6”), in this design we leverage the comprehensive knowledge system of urban design, garden design and landscape design. Meanwhile the design was combined with Suzhou city culture and ancient city texture. The design combined street shape, the status quo on the area and the comfort of urban linear space, with adjustments of the street morphology and scale based on the three. We splits and reorganizes the fast and slow travel system, and uses the vertical system method to establish urban stereoscopic gardens and stitch the space texture of the ancient city. By extracting and reproducing the main functions of this section, the design intended to creates an open public communication place, and evitalize the historical and cultural nodes of the neighborhood, then activate business behavior, finally reappear the “Suzhou's Golden Age” (see “Fig. 7”).



Fig. 6. Status quo.



Fig. 7. Imagery of updated design.

E. Design conception

1) Texture research and type-collection: The overall design type is extracted from the shape and texture of the ancient city and Suzhou gardens, by the type of response to positive and negative elements of surroundings (see “Fig. 8”). Type elements include kiosk, platforms, buildings, pavilions, courtyard walls of Suzhou traditional gardens, along with placing the hanging gardens and chronic walkways, extracting window elements from Suzhou gardens and placing them along the whole height of the structure, in order to increase the hierarchy of sight.



Fig. 8. Elements from Suzhou traditional gardens.

2) Strengthening the area axis: Spatially connects Xuanmiao Temple, Juwushenye memorial archway, Qiyunlou pavilion, Suzhou Caoqiao Experimental Primary School, and Suzhou Park to make it as an imaginary culture axis of Suzhou ancient city (see “Fig. 9”), the spatial form is arranged through architectural methods and perspective relationships to open up the ancient city's vitality.

3) Highlighting the value space: Extract streamline intersections and crowds through spatial heat map and crowd behavior analysis; combine valuable historical buildings, cultural spaces and civic life circles on both sides of the block to extract important cultural points and points of interest in the area.



Fig. 9. The historic nodes and the imaginary culture axis.

4) *Connecting positive factor in series:* According to the distribution of regional business formats, five groups of groups were differentiated. The design integrates environmental considerations and uses route

planning to connect positive factors and value spaces. The characteristics of each area are shown in the following figure (see “Fig. 10”):



Fig. 10. The characteristics of each area.

5) Streamlined layering and overall system:

According to the street shape analysis and regional pedestrian and vehicle activity flow line analysis, combined with the respective environmental conditions and space nodes in the five groups, the pedestrian and vehicle flow lines are layered into a layer of pedestrian and vehicle mixed layers and a layer of two pedestrian platforms. The traffic flow line is maintained on the basis of the original road, and the accessibility of the pedestrian flow line is enhanced, so that the pedestrian flow line can cross on both sides of the road and in the Ganjiang River landscape belt.

Based on the functional properties of the buildings on both sides of the street, the platform system and the built environment are classified positively and negatively. Leave open space for positive relationships and inward avoidance for negative relationships.

Extracted 1-2 major node of the space environment to respond and solve problems through the garden space approach in the five groups each pedestrian platform layer to create landscape nodes; multi-point connection to contact as a whole (see "Fig. 11").

The overall system uses a long-span truss steel structure.

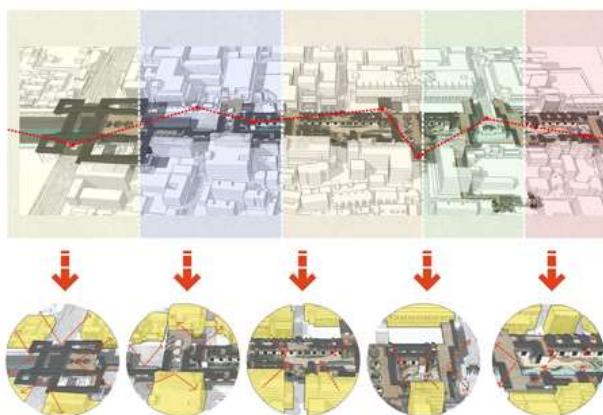


Fig. 11. System generation.

6) Placed in squares and Suzhou traditional courtyards: The design classifies the public space activities in the Suzhou ancient city area, incorporates barrier-free facilities into the transportation box of the whole system. Then we place the square and yard in the system according to the built environmental conditions on both sides of the street and people's interest points, while we taking full consideration of the space nature and street comfort. As a large space, the square is a vital space for public and exhibition activities; as a small space, the yard has a strong sense of enclosing, and as a private space for small activities(see "Fig.

12"). The combination of the square and the yard enriches people's activities and spatial streamlines, and the transportation box and the yard are arranged staggeredly to form a variety of spaces.

The platform system connects the square and the yard through low walls and green belts, dividing the inside and outside of the system without affecting the normal passage of pedestrians; adding a traditional corridor space to keep the pedestrian system unobstructed, improving the comfort of walking and the richness of internal and external vision, and can attract external system line of sight to the interior garden space(see "Fig. 13").

The yard, transportation box, and corridor on the platform system are mainly steel and wood structures. The building is organized with a modulus of $6600 * 6600 * 3300$. At the same time, through a space variant of the modulus of $6600 * 3300$, more diverse spaces and activities are organized.



Fig. 12. Components of the platform system.

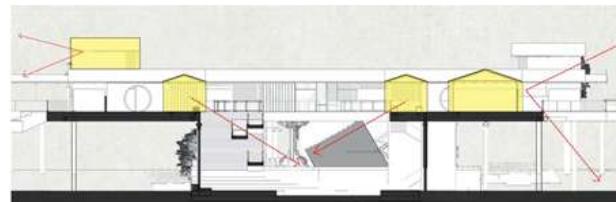


Fig. 13. Sight circulation relationship.

7) Possibility of activity experience: Through systematic suture and repair, the business and culture are concentrated in the platform system, and at the same time, it is combined with the surrounding living environment to create a rich functional space for the entire system, which meets the needs of local citizens in daily life and tourists experience in Suzhou.

IV. CONCLUSION

Leqiao-Caoqiao region of Suzhou city has particular research significance due to its unique historical and cultural background. The plan is designed to explore the new environment for the main road axis of the ancient city under the present conditions, a comprehensive upgrade. Quality cultural and spiritual connotations of the ancient city unique in the context of

modernity, how to revive neighborhoods through urban design methods, we need to focus on the memories of the city and cultural imagery, focus on city life and enhance the quality of public space environment.

References

- [1] Gao Jing. The Study on the Spatial Pattern Evolution of SuzhouGanjiang Road in the recent 30 years [D]. Soochow University, 2017: 27-48. (in Chinese)
- [2] Wang Jianguo. Four Generations of Urban Design Paradigm From A Rational Planning Perspective [J]. City Planning Review, 2018,42(01): 9-10. (in Chinese)
- [3] Kevin Lynch, The Image of the City [M]. Cambridge: MIT Press, 1960.
- [4] Aldo Rossi, The Architecture of the City [M]. Cambridge: MIT Press, 1982:40.
- [5] She Genjin. A Study on The Application of Typo-morphology In Organic Regeneration Approach [D]. South China University of Technology, 2018: 6-10. (in Chinese)
- [6] Colin Rowe, Fred koetter, Collage City [M]. Cambridge: MIT Press, 1984.
- [7] Fan Lin-lin, Research on Long-Term Optimization Design Method of Linear Campus Building Space [D]. Southeast University, 2019: 7-13. (in Chinese)