Research on "Boundary Thickening" Strategy under the Protection and Renewal of the Old Urban District——Taking Yulin District of Chengdu as an Example

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Abstract. The old urban district is the carrier of urban development, and its protection and renewal is of great significance for urban construction. This study with a view to protecting and renovating the old urban district by the boundary space design, taking Chengdu Yulin district as an example, proposing the "boundary thickening" strategy, and put forward the complete walking system, multiple public space, LID water purification corridor and compound functional wall four specific design measures, in order to enhance the space vitality of the entire district through the transformation design of the boundary space. It will help the protection and renewal of the old urban district, and provide some reference for the design of the same type of block boundary space in the future.

With the continuous development of urbanization, a large number of communities built in the last century are gradually aging and declining. But at the same time, as an important carrier of urban development, the protection of the old city needs to be based on the specific living situation and site memory, and explore more new development possibilities in limited space. This paper takes the Yulin district in Chengdu as an example to explore how to enhance the spatial vitality of the whole block through the design of boundary space, to facilitate the protection and renewal of the old town, and to provide certain reference for the design of boundary space of the same type of block in the future.

1 Yulin district status

Yulin district was built in the 1980s and has a total area of 0.21 square kilometers. It is the earliest developed modern district in Chengdu. The micro-communities built in various eras are connected in series by small streets, making the Yulin district complex and diverse. All social strata in the community live in harmony and create an "identity" of the community. The city and modernity are intertwined in Yulin Street, which preserves the fireworks of Chengdu's traditional streets and lanes, and also incorporates a diverse modern urban lifestyle.

2 Site perimeter analysis

2.1 Analysis of settlement patterns

Yulin district is densely populated and consists of several small-scale communities. It is mainly composed of multi-storey and high-density residential buildings built in the 1990s. Most of the residential buildings are street-facing shops. The building has various forms but the layout structure is uniform, showing an orthogonal grid-like distribution, which makes the external space of the building pleasant.

Fig. 1. Analysis of settlement patterns.

2.2 Analysis of traffic

Yulin district is located in the south of Chengdu city center, and the traffic around is convenient. There are multiple bus stops nearby, and it is close to Metro Line 1 and Line 3. There are many lanes in the site, and the accessibility is high. In addition to the traffic function, the low-level street roads are also the main places for social interaction in Yulin district.

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Fig. 2. Analysis of traffic.

2.3 Analysis of land use

The small squares and green spaces in Yulin district present a “acupuncture-type” distribution, which are pleasant in scale and high in utilization rate. This public space and the layout of public facilities make the public social activities in the community very prosperous.

Fig. 3. Analysis of land use.

2.4 Analysis of space utilization status

By investigating the daily activities of different types of users in Yulin district and analyzing the frequency of public space use, it is concluded that the use of public space in block is unbalanced and out of place. The utilization rate of green space inside the community is low, while the external public activity space is insufficient, which fails to meet the needs of residents.

Fig. 4. Analysis of space utilization status.

2.5 Analysis of main streets

Yulin Street, as the most reasonable main street in the inner planning of Yulin district, has relatively complete service facilities for sidewalks, and residents have a high degree of leisure utilization. The motor vehicle lane has three two-way lanes and the non-motorized lane has two two-way lanes, so as to meet the needs of people in the community.

Fig. 5. Analysis of Yulin Street.

One side of Yulin First Lane is a high-end residential area and the peripheral middle and high-end residential area. There is a street square about 20 meters wide, with more activity space. The other side is for construction land, isolated by enclosed walls, narrow sidewalks.

Fig. 6. Analysis of Yulin First Lane.

Yulin Second Lane is a commercial block with food and cheap department stores as its main business. The flow of people is concentrated at 9:00-11:00AM/3:00-6:00PM. The social relations among the migrant population are complex and lack of security management and infrastructure management.

Fig. 7. Analysis of Yulin Second Lane.

The boundary of the fourth lane is residential enclosure with strong sealing property. Lanes are mostly used by non-motor vehicles, and sidewalks become the main activity place for residents, but the width is narrow, and illegal occupation of sidewalks has a certain safety hazard.

The seventh lane is a walking path between the old residential buildings in the district, one side is the residential wall, the other side is a public garden with very low utilization rate, with fewer vehicles.

Fig. 8. Analysis of Yulin Fourth Lane and Seventh Lane.

Yulin Horizontal Street is a lettered cultural street under repair. The small exhibition hall selling souvenirs across from the imitation of the republic of Chinese traditional style building is in a state of disuse. The main business is commodity retail.

Yulin East Street is located in the eastern central part of the district, connecting with Renmin Road and has a large traffic volume. The ground floor of buildings on both sides of the street is for shops with mixed business forms.

Fig. 9. Analysis of Yulin Horizontal Street and East Street.

3 Proposal of "boundary thickening" strategy

Based on the analysis of present situation of Yulin district, aiming at the protection of the old city renewal, dominated by "Boundary thickening" strategy, adding the shared streets configuration and new urban landscape system, breaking the rigid boundary of public space and private space, strengthen the social functions of traffic within the right of way, and make a more dynamic, advancing and stimulating public space, and re-establishing the city status of Yulin district.

Fig. 10. "Boundary thickening" strategy conception.

3.1 Boundary - complete walking system

Combing the road system of the district, connecting the boundary space between the residential areas, and forming a complete pedestrian system of the whole block in series. Based on the green and healthy pedestrian road, the vehicular road system is superimposed on the area where the traffic function is concentrated or connected to the main road. Make the road in holidays or special occasions can be used as a pure walking or non-motor vehicle space, fully meet the needs of the community residents.

Fig. 11. Complete walking system design.

3.2 Boundary - multiple public spaces

According to the demand of residents in Yulin district for public activity space, the internal and external boundary space of the residential area is planned to form a three-level green space system: parkland, street green space and central square. With the introduction of movable urban furniture, community residents can freely combine and utilize according to different needs, and flexibly change the functional form of block space.

Fig. 12. Multiple public space design.

3.3 Boundary - LID water purification corridor

The concept of LID water purification was introduced, and rainwater garden was added, which was combined with pedestrian walkway and ran through the whole

block to form LID water purification corridor. In addition to the main functions of rainwater treatment, it also has the functions of regulating the microclimate of the block, promoting plant diversity and providing ecological habitat for small animals in the urban environment. At the same time, the thickened ecological boundary can also greatly improve the street landscape, attract and accommodate more public activities, and provide support for ecological, cultural and residential functions.

Fig. 13. LID water purification corridor design.

3.4 Boundary - Compound functional wall

The single configuration of the existing residential area fence is reformed, and various public activity devices are introduced to enrich the form and function of the boundary and activate the boundary space of the block. This is reflected in the multi-functional game devices designed for children, chess and card tables designed for the elderly, street fitness facilities, street rest and office facilities designed for social workers, etc., which effectively use the boundary space to meet the needs of different groups of people.

Fig. 14. Compound functional wall design.

4 Concluding remarks

On September 15, 2019, The General Office of the State Council forwarded the guidance on improving the quality assurance system and improving the quality of construction projects issued by the Ministry of Housing and Urban-Rural Development, which proposed to "support the rational reservation and utilization of existing buildings. Promote the protection and renewal of old urban district and industrial areas, and guide innovation in the design of existing buildings." How to reasonably retain and utilize the existing buildings in the protection and renewal of the old urban district, and explore innovative renovation design, the "boundary thickening" strategy proposed in this study, may provide some thoughts from the perspective of boundary space design, and hope to provide some references for the same type of block renovation design in the future.

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