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Spatial Regeneration for Preservation of Historic Urban Features and Improvement of Living Conditions in High-density Historic Districts: Urban Renewal Design Strategies for Shanghai's Old Town

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Abstract

Being the origin of Shanghai City, the Old Town presents a high-density spatial texture, a characteristic of local living conditions in the Shanghai context. However, the Old Town is faced with competing interests: the preservation of historic urban features and the improvement of contemporary living conditions. In view of its high density and poor living conditions, this paper focuses on two types of blocks for urban design research, and proposes two spatial regeneration strategies, as "overlapping lilong" and "texture continuity". It is expected to inherit the regional characteristics of urban space, improve the plot ratio and supplement the mix of functions, through the translation of the traditional lilong typology and the reproduction of historical streets and alleys, so as to provide operable spatial strategies and design methods for the organic renewal of Old Town and other historic districts.

Keywords: Living Conditions, Overlapping *Lilong*, Preservation of Urban Features, Shanghai Old Town, Texture Continuity

1. Shanghai CHINESE old TOWN in transition

Shanghai Chinese Old Town covers an area of 199 hectares in the downtown area of Shanghai (see Figure 1). It is adjacent to the Bund in the east and across the river from the central area of Lujiazui in Pudong. As the root of the growth of Shanghai city, Old Town used to be Shanghai County. In 1267, it was established as a town administration, and then upgraded to a county in 1292. Since the Southern Song Dynasty built the town, through the Yuan, Ming, and Qing Dynasties, and early Republic of China, to the Northern Expedition, Old Town has always been the political, economic and cultural center of Shanghai (after the opening of the port of China). It has retained the material and immaterial historical remains of Shanghai in all stages of urban development for more than 700 years, and embodies the traditional urban culture of Shanghai after the late Qing Dynasty and the early Republic of China.



Figure 1. The remnants of historic districts set against the backdrop of new high-rise buildings.

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1.1. The Development of Old Town

Shanghai's Old Town has undergone two tremendous transformations. The first happened in the early 20th century. With the expansion of the city, the early Chinese traditional buildings and part of historical streets in Old Town were replaced by the then modern *lilong*. The city wall was removed and transformed into a ring road, and the original watercourse was filled in and transformed into urban roads. This transformation did not bring huge changes in the spatial structure and scale of Old Town. The natural form of Fangbang Middle Road can still still follows the path of the original watercourse. The second round of transformation took place after the reform and opening up of the late 1970s. Fuxing Road and Henan Middle Road were widened to become the main roads, cutting Old Town into four portions (quadrants). A large number of high-rise buildings were put up in the edge of Old Town and along the cross road. As a result, two completely different scales were established and the integrity of the space was basically destroyed.

However, even now, Old Town can still be clearly identified on the city map, as its pattern is very different from that of the surrounding modern urban areas, forming an embedded "city within a city" with distinct morphological characteristics (see Figure 2). To start with, the boundary is clear. Since the town of Shanghai was built before the city wall, its outline was not square like other feudal cities in China, but was instead an irregular quasi-circular shape. Furthermore, there are interlaced streets and winding alleys, acting like capillaries of natural growth, continuing the criss-cross pattern of streets and alleys, as in a traditional southern Chinese water town. In addition, there are various types of space (see Figure 3), including *lilongs*, courtyards, streetside typologies, as well as spontaneous additions, which have the enduring value of continuing the historical context, and also have the practical significance of adapting to the contemporary city.

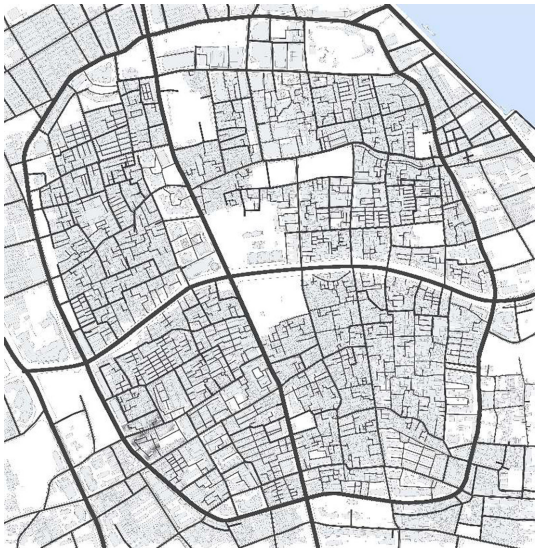


Figure 2. Analysis of street and lane texture of Old Town.

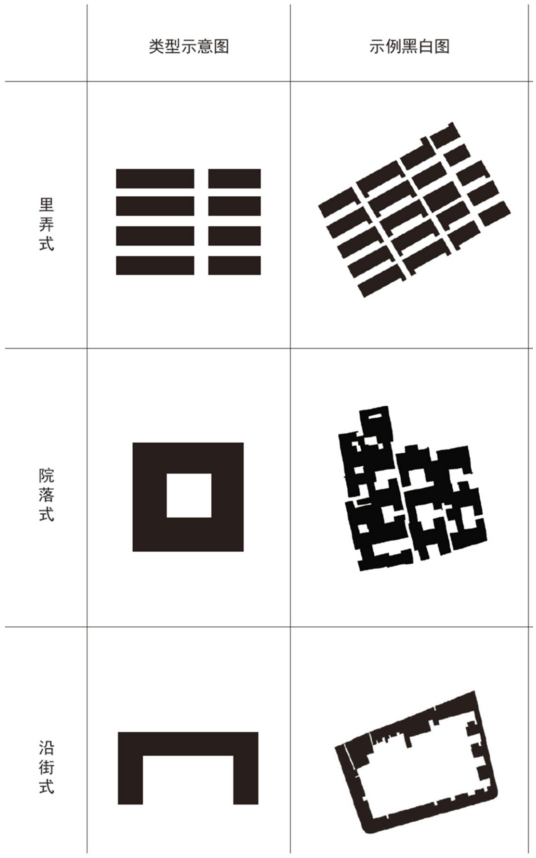


Figure 3. Analysis of traditional typologies in Old Town.



Figure 4. A traditional alley next to high-rise residential construction.

Although the urban fabric of Old Town shows the characteristics of fragmentation, the remaining historic districts have always maintained the high density, small scale and spontaneous growth. Until today, it still has a strong atmosphere of historical neighborhood and street culture. People work and live under the same roof. Residents have friendly conversations in the streets and alleys, trim vegetables and sunbathe together outside their homes, and children chase and play in the alleys (see Figure 4). Old Town has become the last refuge of this lost culture in the process of modernization, and its community life has turned into an important part of its unique profile.

1.2. Double Pressures of Preserving Urban Features And Improving Living Conditions

Old Town has its own historical and cultural values, but its residents have difficulties. As is common in other high-density historic districts in China, there are many dilemmas in improving living conditions. Most significant, is a high population density: the per-capita living area is only 10 square meters per person, and even less than 4 square meters per person at the extremities. Moreover, an average of six families live in a courtyard. Secondly, a large number of residential buildings have been overloaded for a long time, and used irrationally, and have not been regularly maintained,

as well as succumbing to serious alterations and additions, that have damaged the surroundings. As a result, the urban features are difficult to be discerned, and the heritage value has been tarnished. In addition, problems such as lack of public space and weak infrastructure affect the quality of life for residents.

Today, Old Town's very survival is threatened. On the one hand, the superior location of Old Town and the high land values require new developments to be high-capacity, and most of the space capacity required by the project conflicts with historical protection. Further, the imbalance of the scale of new development projects leads to the damage of historical texture, with the default outcome being that original homogeneous low-rise and high-density features are destroyed. On the other hand, the living environment's quality problems, single-function land use, aging buildings, lack of public service facilities and green space seriously affect the quality of life, causing a higher degree of socio-ecological problems, that lead to serious backwardness of development, causing the neighborhood to gradually lose its attractiveness and fall into decline.

At present, there is no obvious difference between Old Town and other general old districts of the city in terms of urban renewal, which is based on expectations of investment return. Therefore, Old Town has not yet explored effective methods and implementation strategies to achieve the goal of protection and renewal, that would not only inherit the historical features and cultural heritage, but also improve the spatial capacity and building quality, and drive sustainable development in the future.

2. Two Types of Transformation Strategies

After the comprehensive analysis of the various unsuccessful cases of the transformation of Old Town in recent years, we can draw a clear conclusion: to protect the historic urban features, it is impossible to continue the present form of marketization. What needs to be discussed is the limit of the plot ratio that can inherit the historic urban features, and a spatial strategy to display those features. In support of this objective, the research group, working on the final project as part of the Master's degree in Architecture program at Tongji University 2020, conducted systematic research on the regeneration potential of Old Town. "Scale" and "type" became the watchwords that would reflect the historic urban features, which are associated with plot ratio and density. On this basis, the plot ratio could be doubled, and the height limit of buildings could be set at 24 meters. Based on these two core data indices, the design research was carried out, and the performance of various factors in the design results were analyzed, so as to explore a new way for the development of Old Town.

In this research, two types of typical plots were selected for exploration (see Figure 5). One type is the demolished plot, located on Zihua Road at the junction of new and old areas in the first quadrant. This kind of "empty land" is not rare in the historic district. Through the relatively open intervention, the innovation potential of traditional space types was explored. It was determined that feature inheritance, condition improvement, and the balance of development cost would be achieved, while taking into account the multiple factors of history, culture and society.

The other type of plot can basically show the typical characteristics of the historical texture, and for this, the researchers specifically selected two neighborhoods along Ninghe Road East and West in the fourth quadrant. The two neighborhoods both have a relatively complete network of streets and alleys, a variety of building types and continuous space interface, but the living conditions are terrible, including common problems, such as the tiny area, lack of an independent kitchen and bathroom for each house, poor living environment, etc.

According to the principle of adjusting measures to local



Figure 5. Figure-ground map of Old Town and site locations.



Figure 6. Figure-ground map of Old Town and renewal designs.

conditions, two targeted urban design strategies are adopted separately (see Figure 6): for the "empty land", a new typology "Overlapping *Lilong*" is constructed through the translation and reorganization of the traditional *lilong* typology. For the plot with typical features but terrible living problems, the valuable buildings are retained and the dilapidated buildings are replaced judiciously, so as to achieve the continuation of the spatial texture and inherent historical features, on the basis of improving the plot ratio of the neighborhood.

2.1. Strategy I: innovative texture

"Overlapping *Lilong*" fills the "empty land" with an innovative space-organization mode to realize spatial regeneration. The row and column volumes of *lilong* typology are selected, and the volumes of the upper and lower layers are overlapped orthogonally to form the basic structure of the Overlapping *Lilong* (see Figure 7), so as to continue the characteristics of the determinants and permanent texture of small-scale streets and alleys of the Shanghai traditional *lilong*. By superimposing the volume of the *lilong*, the new typology can generate multistory and high-density typology on the basis of traditional low-rise, high-density neighborhoods, for the sake of greatly improving the plot ratio.

As the Zihua Road plot is located between the new commercial district with multistory, large volumes and the traditional *lilong* district with low-rise, high-density, settlement, the multistory and high-density Overlapping *Lilong* typology can fill in the context fracture between the two, to provide a continuous urban spatial form (see Figure 8). Through the rotation of the *lilong* form, the upper and lower layers maintain the appropriate spatial scale of traditional types, and build a three-dimensional *lilong* system, continuing the multilevel *lilong* space. In addition, the two levels of alleys are superimposed together, naturally forming a series of courtyards and enriching the spatial experience of alleys.

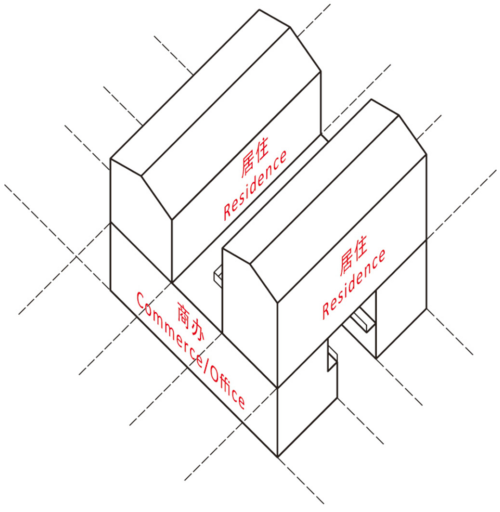


Figure 7. Spatial diagram of Overlapping *Lilong*.

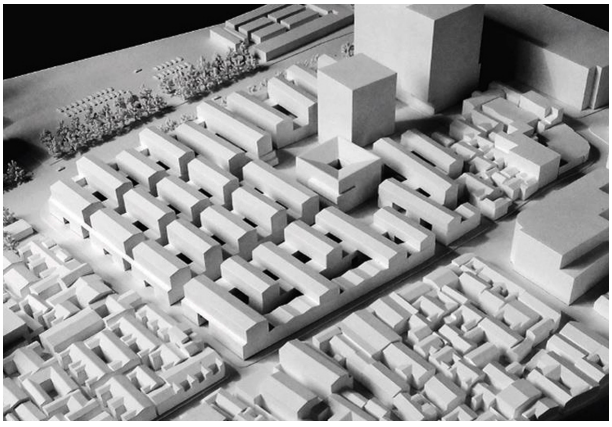


Figure 8. Model of Overlapping Lilong.

The function of Overlapping *Lilong* is mainly for residences, but also for commercial, office and supporting services. It reinterprets the traditional residential-work integration mode, and reproduces the diversified functional configuration of the traditional blocks in Old Town, so as to continue the traditional life atmosphere. The North-South volume of the upper part of Overlapping *Lilong* has three to four floors, which is used for residences, ensuring the privacy of the residents and meeting the needs of lighting and ventilation. The East-West volume of the lower part has two floors, which is closely related to the urban space. It is mainly used for commercial, office, supporting facilities and other public functions, serving the entire neighborhood and surroundings. Hence, Overlapping *Lilong* can provide a good deal of living space and public space for Old Town, which is conducive to the improvement of the quality of life and the economic balance of the project.

After developing the "Overlapping *Lilong*" topology, the next task was to adjust it to the Zihua Road plot (see Figure 9). In order to continue the freely scattered and unobstructed street pattern, the two north-south branch alleys are not connected, except for the east-west main alley. The intersection of T-shaped volumes forms a criss-cross plane form, which provides a new spatial variance in the neighborhood. The three streets all continue the small-scale characteristics of the traditional streets, to create a friendly and pleasant street atmosphere.

The Zihua Road plot is divided into four small blocks, of which the smallest northwest block has an area of 4,200 square meters, and the largest southwest block has an area of 11,400 square meters. In order to conform to the traditional spatial texture of Old Town, the streetside typology and the Overlapping *Lilong* typology are comprehensively placed in the four small blocks. The streetside typology is placed along the boundary of each block, while the Overlapping *Lilong* typology is placed in the interior. At the intersection of the East-West main street and the North-South street, the central square, cultural activity center and high-rise apartment building are set up to organize a public space node.

As the landmark building of Zihua Road plot, the

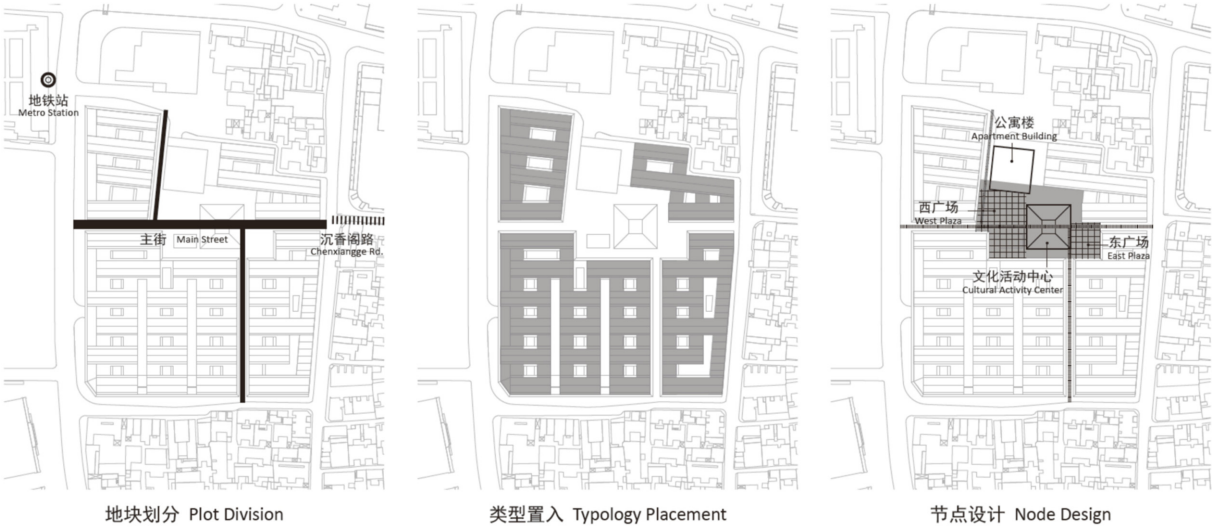


Figure 9. Design steps of "Overlapping *Lilong*".

cultural activity center, with its high-rise apartment building in the north and the central square in the middle of the west, forms a kind of contemporary typology, which interacts with the rest of the plot, thus creating the diversity of space. The plot ratio of Zihua Road plot, constructed by "Overlapping *Lilong*" increases from 1.25 to 3.14, while the building density keeps 70 percent of the traditional district. The average living area per person has been increased from 10 square meters to 22.2 square meters, and the average building area of a house has been increased to 77.9 square meters, which basically meets the living demand of the modern city. The renewal not only greatly improves the living conditions, but also sets the stage for the functional diversity: 47.8 percent of the newly built neighborhoods are occupied by residences, 15.8 percent by commerce, 31.6 percent by offices, and 4.6 percent by public functions. Thus, the richness of life has been guaranteed.

2.2. Strategy II : continuous texture

The spatial regeneration strategy of "continuous texture" focuses on the protection and continuation of the street and alley system, preserving its capillary-like morphology and the predominant small-scale, high-density spatial texture. Specifically, it can be divided into three levels: maintaining spatial pattern, inheriting spatial typology and continuing spatial scale.

On the east plot of Ninghe Road, the street system is the pivotal element for organizing the spatial structure of the neighborhood. To maintain the growth of the historical spatial pattern of the neighborhood and its surroundings, it is necessary to sort out the streets with historic feature value and maintain and continue their structure, form and hierarchical relationship. At the same time, the width of streets and alleys should be adjusted appropriately, such that the narrow part should be widened to meet the current building code. In addition, opening up the cul-de-sac and



Figure 10. Renewal of street and alley system in east plot of Ninghe Road.

strengthening the connection between streets and alleys are positive measures for "combing the capillaries". On this basis, three new alleys are added to connect with the circumjacent streets. On the whole, this strategy continues the spatial growth logic of the neighborhood, further develops the street network on the original basis, and segments the original large-scale plots, to strengthen the integrity of the street and alley system (see Figure 10).

The key strategy of east plot of Ninghe Road is to maintain the existing adjacencies to the maximum extent (see Figure 11), and to adjust it, via two strategies: merging the smallest blocks to ensure a reasonable scale of residential units and set apart public space; and adjusting the irregular boundaries with concave and convex corners to make the block space more commodious to use. By adjusting the shape of the inner block, a new relationship of adjacencies is formed at the origin. In the light of the basic continuation of the block scale and size proportion relationship, the architectural layout is carried out according to the block boundary. Here, the overall maintenance of the adjacencies becomes the logic of texture renewal.

Three typologies are built into the block, including the

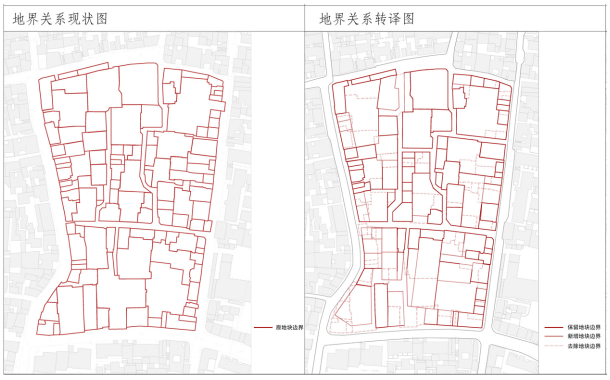


Figure 11. Translation of the street-to-building relationships in the east plot of Ninghe Road.

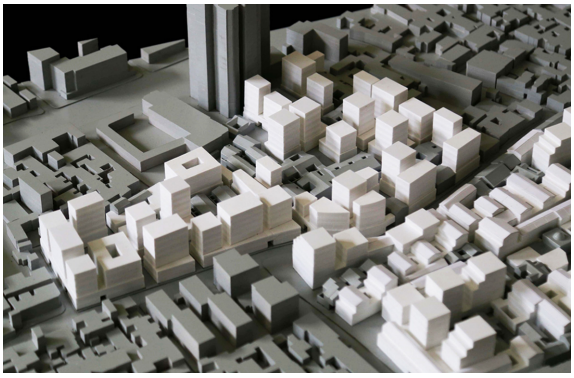


Figure 13. Model of Texture Continuity.

original streetside typology, courtyard typology, and the modern multistory point-tower typology. In order to continue the historical texture, and on the premise of ensuring the basic quality of life, the technical provisions of building interval, orientation and continuous interface have been implemented. For the demolition part, adhere to the principle of "two for one", that is, double the plot ratio of the neighborhood, and ensure that the total number of residential units after the renovations at least equal to the original condition.

On the west plot of Ninghe Road, the street and alley system was also preferentially regarded to be reserved and sorted out (see Figure 12). In particular, the courtyard is appropriately expanded to fulfill the needs of neighborhood communication, and to improve lighting and ventilation. The remaining buildings should be repaired, and the new buildings are all of the three-dimensional type of "base + body" (see Figure 13). This kind of architecture derives from the plot, and is generally freely interspersed throughout Old Town. These buildings provide support for free and changeable space. The "base" (commercial + office) continues the height of the low-rise building to maintain the traditional scale; the "body" (living space, limited to 24 meters' height) is a necessary measure to improve the plot ratio. The new type increases the height, but it has good spatial adaptability because of its small volume. It can be placed flexibly in every small space. Meanwhile, it evokes the memories of Old Town's lively streets.

In order to continue the pleasant scale of the traditional street, the cornice height of the buildings along the street is controlled, such that the cornice height of the new building is basically equal to that of the old buildings, and the upper portions are stepped back (see Figure 14). So, the alleys in the neighborhood could continue to support small-scale affinity, while avoiding the sense of oppression that can be brought by multistory buildings on both sides. In addition,

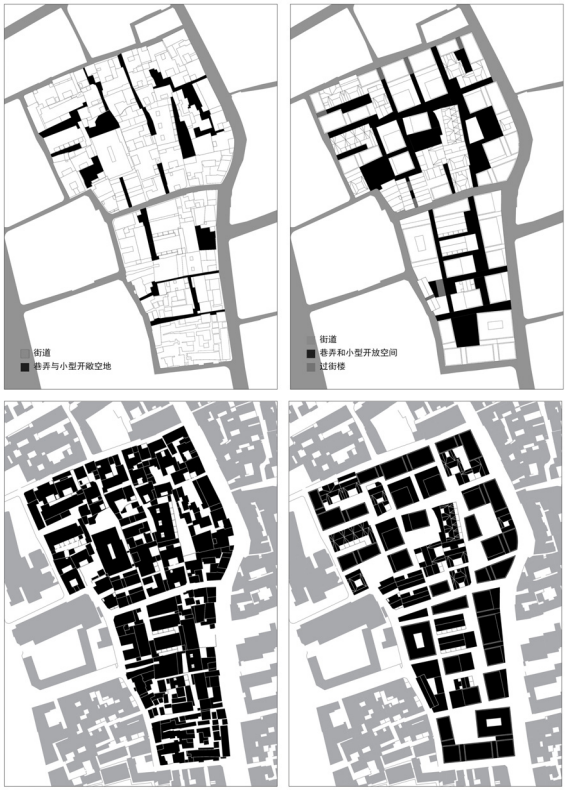


Figure 12. Analysis of street and alley system on the west plot of Ninghe Road.



Figure 14. Scale treatment of buildings along the street on the east plot of Ninghe Road.



Figure 15. An alley scene in the west plot of Ninghe Road.

the overall height of the buildings also kept in harmony with surroundings.

The height of the reserved buildings in the neighborhood is basically about 10 meters. The new buildings are built on the base of 12 meters' height, and the upper part is interspersed with 24 meter-high, multistory volumes, so that the combination of the preserved building and the new building forms three height levels of 10 meters, 12 meters and 24 meters respectively. Among them, the height levels of 12 meters and 24 meters are slightly raised from the existing 10-meter and 18-meterdatum lines, but a transition could be made through height controls along the street, thereby building a multilevel spatial height order that is coordinated with the surrounding environment (see Figure 15).

In order to preserve the historical features, as well as restore and improve the vitality of the neighborhood, through the main functions of residences on the upper floors, and commerce at street level, the diversity and mixing degree of the block are increased. While attracting new people to settle in, it promotes the integration of housing, consumption and employment, and contributes to the dual improvement of community spirit and function, so as to achieve the goal of increasing community vitality. The lower floor along the street is equipped with various daily functions of catering, leisure and culture, as well as Soho (small office / home office), which is meant to promote the development of a community where workplaces and residences are well-integrated. Statistics show that the plot ratio of Ninghe plot has grown from 1.16 to 2.38; the building density has decreased from 68.5 to 62.4 percent; small open space has been added in the neighborhood, and overcrowded neighborhoods have broadened out spatially. In terms of functions, the presence of small and micro-businesses has enriched the diversity. Residential occupancy accounts for 66percent of the built space, commerce for 15.3 percent, office for 15.2 percent and public functions for 3.5 percent. A total of 986 residential units are provided, with the per-capita living area increased from 11 square meters per person to 26.3 square meters per person.

3. Conclusions

The critical features of Old Town are "small": small streets, small buildings and small functional units; the contingency of form and organization between space and architecture enhances the "small" effect; and the high-density small-volume building is the most consistent and pervasive way to perpetuate this effect. The traditional typology of Old Town is of highly abstracted physical and social space. While retaining the space form of *lilong*, courtyard and streetside, adaptations to the buildings have continued the characteristics of mixed functions, low-rise and high-density, and constantly adjusts and develops with the times.

The two applied design strategies try to inherit and develop the historical features in different ways. The strategy of "Overlapping *Lilong*" is the innovation of typology, and "Texture Continuity" follows the logic of spatial growth. The former tries to excavate the traditional typological value, but transcends it. The latter strives to develop the "capillary" street and alley system through protection and translation, which continues the traditional spatial texture and reinstates the "small-space" experience of Shanghai's Old Town.

In the renewal practices of high-density historic districts, the contradiction between development efficiency and preservation of historical features is often difficult to reconcile. The above two spatial regeneration strategies do not take into account the current land financial mechanism in China; that is, the land transfer fee is not considered in the transformation cost, as the designs emphasize the preservation of historical features over development efficiency.

There is no doubt that historical features are priceless, and that they cannot be measured by real estate standards. In addition, this urban renewal design is different from the existing conservation and renewal practices of high-density historic districts today.

First, a new space type has been developed from the traditional approaches; the three traditional space types of Old Town have been translated and combined, leaving a collective memory of the traditional Shanghai *lilong*. Second, it continues the historical features, maintains the growth logic of spatial texture, and reshapes the proportion and scale of traditional space, historical buildings, reinforcing collective memory and sense of place. Thirdly, the residential area has been greatly enlarged, and various types of public space have been constructed to improve the spatial character. The compound use of land and the combined functions of buildings are optimized to stimulate the vitality of the spaces between them.

The design results present a critical, but positive response to the tradition: it not only inherits the historical features and creates a humanized urban living environment; but also provides countermeasures to today's high-density historical urban renewal methods. Meanwhile, it is future-oriented and provides diversified possibilities for long-term

dynamic urban renewal, through the translation and development of space typologies.

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