

Typo-morphology and Urban Landscape Construction

A Case Study of the Ciyun Street Area, Chongqing

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Keywords: Typo-morphology; Morphological Elements; Historic Blocks; Protection and Renewal.

Abstract: As a key theory for urban form construction and evolution cognition, the typo-morphological approach integrates the analytical methods of architectural typology and urban morphology. It holds inarguable methodological significance to the protection of historical blocks in today's China. The lack of adequate existing cartographic materials, however, partly explains a stagnant status of Chinese typo-morphological study. This paper intended to make a theoretical exploration through a case study of Ciyun Street restoration project, trying to explain how typo-morphology as an approach can contribute to the protection and restoration of historical urban areas. The reconstruction of historical map and sites could be achieved by the comparison of historical images and limited existing archival materials to establish evolutionary process of built forms and the sense of place. The typo-morphological investigation would hopefully support the conservation and redevelopment plan of Ciyun Street area, in a way that effective methods of planning and urban design can be achieved for local historical blocks in Chongqing.

1. Theoretical Background

Lewis Mandford once stated “Cities-just as what people observe from history- is the maximum converge body formed by human social rights and historical culture”. Since 19th century, urban form has won wider and wider attention during the process of fast western urban development, especially around the world in cities with long historical culture where traditional blocks and historical architectures fully reveal the vitality of urban form and architectural type. Currently, most of Chinese urban historical blocks are faced with great pressure brought by rapid urban development. Thus, under such certain background, spatial structure, architectural protection and its form rules of urban historical blocks are studied in the hope of looking for the relationship of the past, present and future, which also represents an important task for protecting cities and renewing researches. It is widely accepted that Conzenian approach and Muratori-Canniggia have offered vital methods for this field of research and are outfitted with important theoretical value. Looking back the planning and design of Ciyun Street area, we have found that it is not only equipped with experience and sensibility in early period and at the same time, typo-morphology has provided solid theoretical base for the concrete practice of updating and protecting traditional historical blocks.

Typo-morphology does not merely combine Conzenian approach with Muratori-Canniggia. The two approaches have significant differences in theoretical base, morphological elements and the relationship between elements. These differences are caused by local features of theoretical origin places and school differences because urban morphology and architecture typology are two different schools with study background as human geography and architecture respectively. The theoretical base of typo-morphology analytical approach combines the features and advantages of urban morphology with those of architecture typology, reading internal structure features of physical forms in cities and towns by urban morphology constructional and conceptual analytical frames to analyze a logical relationship among the form and evolution of morphology, relevant factors and effects during the evolution process based on integrating the evolution ideas of morphology. In the mean time, the method has inherited the features of the two schools, that are gradation and periodicity. Thus, while analyzing the urban landscape with the method, we should start from the original cases and investigate its formation place and time, natural environment and cultural background, and the reasons why its typo-morphology evolved or disappeared until it evolved into new typo-morphology during analyzing its typo-morphology features (Table 1).

2. Typo-morphology: An Effective Method to Renew and Protect Historical Blocks

“Morphological Unit” and “Typological Process” are the results evolved during long-lasting urban history and contain deep traditional and cultural spirit, both of which offer a scientific method for analyzing urban material space and development process and hold practical significance in protecting urban historical blocks. It is helpful to determine the protection degree of historical

Table 1. *Core Theoretical Differences of the Two School.*

Name of School	Theoretical Bases	Research Elements	Relationships Among elements	Final Results	Research Targets
Conzenian approach	Since learning human geography in Germany, Conzenian is greatly influenced by Morphological gene research	Land surface: architectural plan, streets/streets system, plot/blocks and so forth; architectural forms: usable function of architecture and land	Morphological frame: ground-piston, architectural types, usable functions; (downward constraint layer-by-layer)	Plane elements: Morphological unit; urban landscapes such as dwelling district and marginal zone	Evolution rules and morphogenesis are explained in terms of geography, and system management schemes are put forward.
Muratori-Canniggia	Both are with architectural background and influenced by rationalism thoughts.	Construction plot; construction pattern/plane & vertical face; blocks; streets; basic/special types.	Architecture, street profile; urban texture, cities, zones; (upward organic compositional layer by layer	Synchronicity and diachronism features of morphology; urban texture; typological process and so on	Operating design method can be formed in terms of shapers to guide city design.

blocks by analyzing architectural type process; it contributes to determining the texture features and scope boundary by analyzing urban morphological unit. Although the development history of Chinese cities is different from that of western cities, their existing periodicity and gradation are most certainly reflected in urban physical forms. Thus, it is inevitable to study “Urban Morphological Unit” and “Architectural Typological Process” in China.

In recent years, more and more scholars apply the theory and method of typo-morphology to Chinese urban renewal and protection practical projects and have achieved excellent results. Scholars Gukai, Tian Yinsheng, Duan Jin and Song Feng actively introduce research frame and theory of various urban morphology. In 2007, Gukai and J.W.R. Whitehand had thoroughly analyzed the plane elements of Pingyao Ancient City. Shen Kening is the earliest one to introduce Architectural Typological theory of A. Rossi into China. Driven by his research, Muratorian approach has been gradually familiar to Chinese scholars. However, current research results in China mainly concrete on cities with better historical looks and detailed data such as Beijing, Guangzhou and Suzhou. Based on current western typo-morphology research results, Chen Fei (2008) discusses the relationship between Chinese urban construction and typo-morphology and offers localization research frame of China traditional cities and takes advantage of seven research elements, residence, public architecture, public space, blocks, street and street network, skylines, general urban layout, to demonstrate traditional blocks of Suzhou and Nanjing. Other researchers like Chen Jintang and Tian Yinsheng (2015) use typo-morphology method to explain external features and internal rules of Guangzhou construction new village evolution. In this context, Chen Jintang, Tian Yinsheng and Yaosheng (2015) further examined the model of thinking, analytical framework and localization application through summarizing the western typo-morphology and its application in the past several decades. At the moment, the research and application of typo-morphology in China mainly focus on the theoretical introduction, construction and case study but lack practical results.

3. A Study on Planning and Protecting Ciyun Street Area in Chongqing

3.1. *Introduction to the Project*

The project is a crucial part of “Ciyun Temple-Mishi Street-Longmenhao Historical Cultural Protection Blocks”, a key protected area of Chongqing Municipal Government. Ciyun Street project is located at the junction of Yangtze River and Jialin River, right next to Danzishi central commercial and residential area. It faces Chaotianmen Wharf and Jiangbeizui Grand Theater across the river, featuring itself ideal display panels along the shore (Figure 1). The project includes many traditional blocks such as Xuantan Temple Centre Street, Huangjia Lane, Octagonal Lane, Renji Road, Tianxin Bridge and Haishi Road.

Ciyun Street belongs to original Xuantan Temple Sub-district and was known for Ciyun Temple built in the 22nd year of Qianlong Reign (1757). Since from the end of 19th century to the Republican Period, the industry and commerce of the southern bank next to Yangze River had been booming along with the port opening and moved-in Nationalist Government. The prosperity brought in customs, areas for collecting ships, working and accommodations at the Shizi Mountain of Xuantan Temple, which was known as “foreign wharf” at that time. As an importance part of historical cultural blocks for the local municipal government, Ciyun Street area is accumulated with various cultural relics in many historical periods. The preserved lanes and historical architecture evidenced the port-opening period of the city and it as the auxiliary capital during the WWII, being reflected the area’s history and forming special local cultural phenomena (Figure 2).

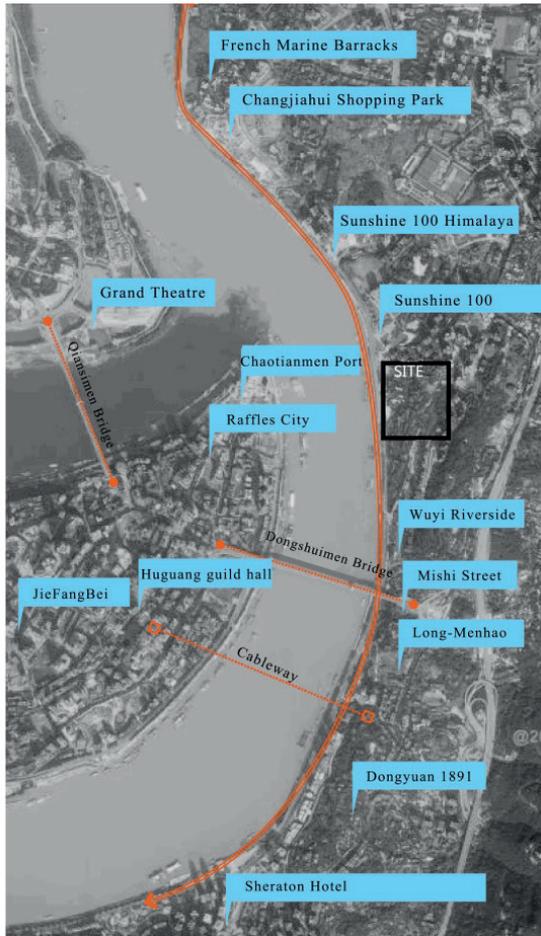


Figure 1. Location Map of Ciyun Street Area. Data source: drawn by the author.

3.2. An Analysis on Typo-morphology of Ciyun Street Area

Ciyun Street Area lasts three major periods: Chongqing Port Opening (1890-1936), Anti-Japanese War and Liberation War (1937-1949), PRC (1950-present), showing different arrangement features of spatial morphology respectively. Targeting at the core theory and research elements of the typo-morphology mentioned above, the author would discuss following four aspects: street and street system at different periods, block and plot, architectural plane layout and architectural type, in the hope of mastering the morphology features and providing a basis for establishing planning and protection scheme.

3.2.1. Street and Street System

Since Chongqing port opening period, there have been no obvious grade differences among street system in the blocks. Owing to special mountain topography and lanes naturally formed by original residents for long time, the street shows two layout forms with local features: one is the street parallel to topographic contour with mild slope; the other is the ladder way bevel even vertical to contour line with large height differences, which is the main way for original residents to resolve vertical transportation. The two street layouts have made the general blocks form a kind of lane layout with Octagonal lanes, Huangjia Lane and Haishi Road, that is to say “two horizontals and two verticals” (as shown in Figure 3). In brief, the features of Ciyun Street Area and street system morphotype are as follows: firstly, influenced by mountain topography, streets are built leaning on the mountains in the form of step style with slab stones or paved flag stone



Andasen Foreign bank

Huang Xizi Villa

Tea Factory Building



Jufu Foreign Bank

Jufu Foreign Bank

Jufu Foreign Bank



Figure 2. *The Existing Architecture and Environmental elements of the Ciyun Street Area. Data source: photographed by the author.*

form; secondly, because of dense population and streets are mainly used for daily transportation constructed with house or courtyard wall as the boundary so that the block streets are commonly crowded and narrow and their width are not the same because of the houses on both sides; in addition, since unified planning is lacked, the streets show irregular curves and broken lines winding forward, among which streets with large up and downs are relatively wider than flat sites; last but not the least, in the streets, Huangjia Lane and Octagonal lane areas have formed traditional street space features in network forms but part of horizontal and vertical connections are cut off so that people traffic circles are not be formed.

3.2.2. Block and Plot

The block of Ciyun Street is generated with grand staircase around the wharf and with block features of various modern architecture concentration area based on massif features. The main body of the plot shows morphology features naturally combing architecture style with natural environment. With the opening of Chongqing port, colonists entered Chongqing southern bank and built foreign banks, factories and churches according to the original street texture. Meanwhile, with increasing population of the block, the architecture scopes are extended so that life streets between architectures make blocks generate, whose structure morphology is still influenced by wharf and terrain with irregular block morphology features. Since 1990s, the block of Ciyun Street Area has been changed greatly. After Chongqing became the fifth opening cities along Yangtze River, the industry and commerce of Chongqing has developed quickly and then, the urban area in Chongqing has been expanded rapidly influenced by development fashion of “Group Layer” which is taken by urban structure of Chongqing. As a part of the main urban area, the southern bank shows an integrated development trend along the river. As a result, the block morphology pattern of Ciyun Street Area has changed significantly and the original relatively independent traditional blocks are fused into larger blocks. Part of existing block morphology pattern is divided into many small blocks caused by the increase of street density. At the moment, the change rules of block morphology have not been influenced by traditional elements such as wharf and modern architectures, showing a layout form with traditional blocks and modern blocks “mixed joint” (Table 1).



Chongqing port-opening period

Anti-Japanese War period

PRC period

Figure 3. Morphology Evolution of Street and Street System. Data source: drawn by the author.

3.2.3. Architectural Plane Layout

Before the port-opening period, the architectural plane of Ciyun Street was rather flexible and did not attach importance to architectural morphology, so it employed substation construction based on the terrain trend. On the whole, the block adopted free-style architecture layout fashion which refers to with sufficient sunlight and ventilation, the architecture followed the morphology of terrain, rivers and paths to build flexible layout freely. The free-style layout emphasizes smoothness of street lines and flexibility of architecture. There are scattered, curvilinear, bevel gauge and point group in layout forms with an irregular layout. Since the port-opening period in 1891, many western architecture have sprang up with churches developing gradually at first and then foreign banks, missionary hospitals, schools and even detached villas appearing in succession. Thus, detached villa architectural style appeared in this period, whose layout was rather compact and even was established on the ordinary residence, and special space was set up in front of or inside of the architecture, which differed greatly from the ordinary residency. Furthermore, the architectural style in the block had gradually changed from Chinese style into combination of Chinese and Western elements and then to western style, however, all of which have a great influence on traditional architectural plane layout.

After examining historical images taken in 1925, the author noticed that residential architecture and public architecture tiers upon tires of Ciyun Street extended to the riverside (as shown in figure 4). In general, clustering shape of mountainous city in block architecture had

Table 1. Morphology Evolution and Type Features of Ciyun Street Blocks. Data Sources: drawn by the author.

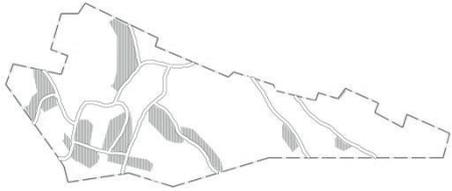
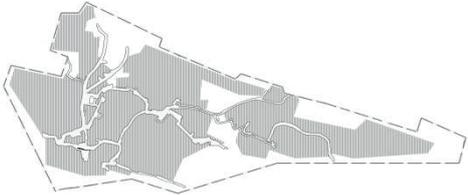
Period	Type Features	Land Function	Block Form
Port-Opening Period	Relatively small block structure and irregular morphology forms	Mainly used for residence and commerce along the street	
Anti-Japanese War Period	Several blocks are built and block size is extended with irregular polygon	Mainly used for residence, stores along the street and unit courtyard	
1949 to present	Almost no changes in the internal blocks but with secondary branches and block sizes expanded	Mainly used for residence and unit courtyard	



Figure 4. *Historical Image of Ciyun Street Area (Left), Looking at Xuantan Temple Wharf from Chaotian Gate (Right). Data source: Historical Image of Southern Bank (Left), Old Architectures of Chongqing by Ouyang Hua (Right).*

been reinforced. Because of limited technology and resources back to 1920s, it was an obstacle for block construction how to effectively use existing land to expand the number of habitable population. However, with the rapid development of city size, steep and complex mountain area had gradually been chosen for constructing cities so streets or architecture complex bevel to or even vertical to contour lines had been formed naturally.

3.2.4. Architectural type

During the port-opening period in the late Qing dynasty, southern bank along the river was outfitted with rather developed industry and commerce and worked as the pivot for collecting goods in upper reaches of Yangtze River and the termination of foreigners who established customs, made concessions, built factories and opened foreign banks. The space of the block was unique with numerous traditional architectures, where public architectures such as French Navy Military Camp, Andasen Foreign Bank, Jufu Foreign Bank, Qianghua Steamship Company and Huangxizi Mansion, which showed that western architecture style combined with unique mountain environment and architectural culture of Chongqing, forming a combination of Chinese and Western elements in the port -opening period.

From 1937 to 1949, Ciyun Street Area became dense with houses and population in southern bank, an ideal address for high officials and noble lords to dwell and for cultural associations. During this period, the architecture type focused on residence and factory storage, the conjunction form between architecture and terrain and architecture combination pattern fully showed special morphology features of traditional mountain architecture. Chunan-dou type of wooden framework, streets with slope eaves and yard with pulling at outseam or inseam were the main architectural style and streets along the mountain city and Bayu ancient town were the main special forms, leaning mountain advantages and stacked houses for residence were fully conveyed.

Since the founding of PRC (1949), in order to satisfy the demands increasing residential population, the architecture layout kept traditional architecture in the port-opening period and mesa courtyard style of traditional mountain residential architecture. The layout took advantages of mesa to build lots of architectures mainly used for residence. Through surveying and

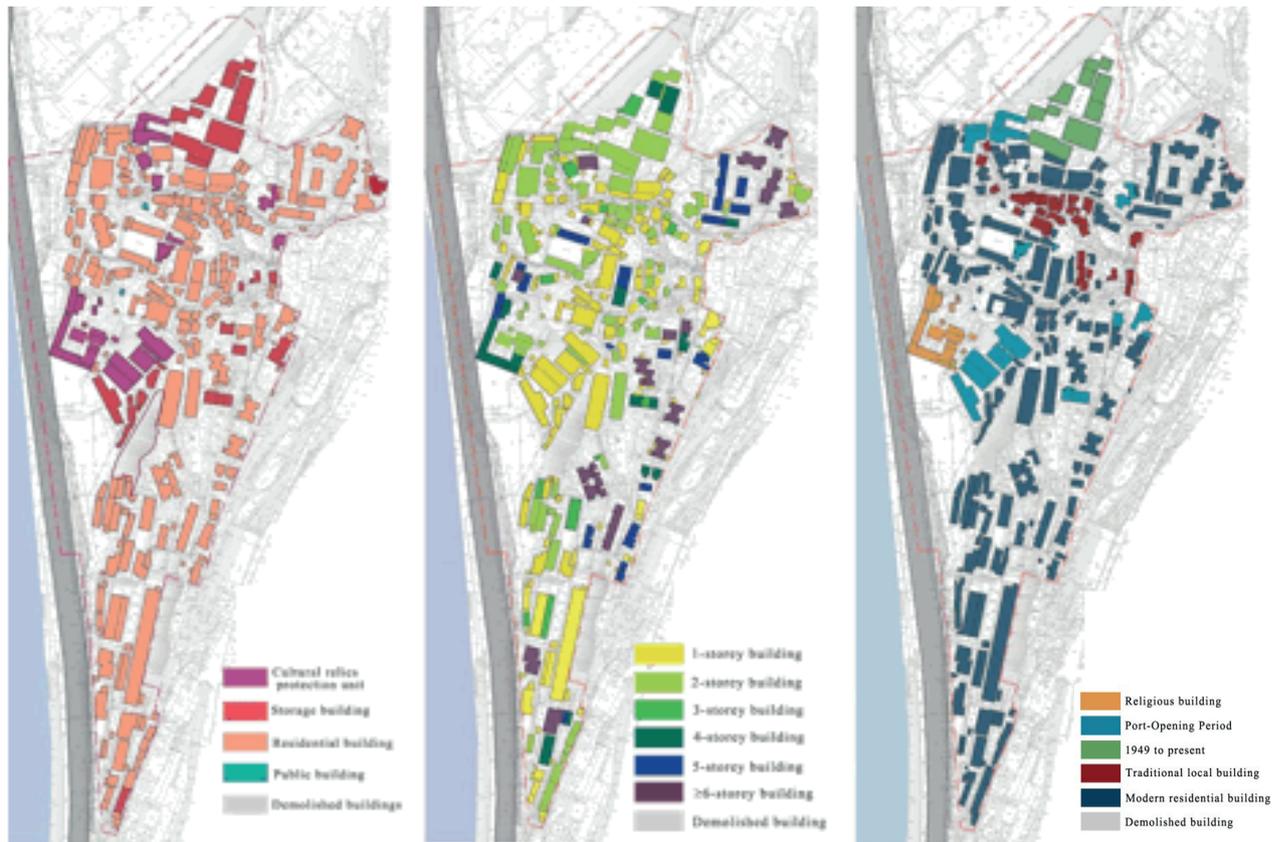


Figure 5. An Analysis Graphic of Architectural Type in Ciyun Street Area. Data source: Drawn according to Ciyun Temple-Mishi Street-Longmenhao historical cultural block protection and plan data.

mapping on the spot, the traditional architecture of blocks reached 3,041 meters, the protected historical architecture in opening port period sum to 6,027 m², historical architecture in the Republic of China Period 3,611 m², religious architecture 5,700 m² and modern residential architecture about 19500 m² (figure 5).

3.3. Strategies and Measures for Renewing and Protecting Ciyun Street Area

3.3.1. Retainment and Sustainability of Street Texture

The reason why morphology features of Ciyun Street Area is analyzed is to find substitute and evolution rules of spatial forms in blocks so that comprehensive and dynamic protection towards existing space can be protected. Partial space texture of Ciyun Street Area has been destroyed through several demolition activities so during protection and planning, first based on well documented figure-ground relation of early Ciyun Street Area, spatial texture modes are straightened out, street system in the space, blocks and plots and architectural layout order are re-built, including Andasen Foreign Bank unit, Zishui unit and Haishi branch road (as shown in figure 6); at the same time, the relationship of public space enclosure, street space advance and retreat and collecting and receiving courtyard space is inherited, and the “two horizontals and two verticals” traditional lane pattern of original Octagonal Lane, Huangjia Lane and Haishi Road is remained. From the final integrated block morphology texture, we can see that, the contract ratio of renovated texture and original texture is about 70%, and the partial space failed

to be superimposed was spread with a quantitative approach on Morphological texture. The super-high and super-large architectures re-built after 1980s, which is rather inconsistent with traditional historical style (as shown in Figure 7). These architectures should be torn down since they are poorly protected without any reserved significance to have the morphology texture of the blocks recovered and intensified so that the morphology features can be continued.

3.3.2. The Integration of Block Space

Because of complex terrain in Ciyun Street Area, most streets are bent along the curves so that winding and zigzagging street system are formed with the terrain. Owing to such kind of street system, most street blocks are divided into free-style and irregular morphology.

In current morphology texture of Ciyun Street Area, numerous heterogeneous architecture and streets can be found, which results scattered forms, messy blocks and plots. These are negative factors in block morphology that destroys the well-organized evolution of morphology types. The reason for explaining negative factors is not only they are not well-planned in early period but also the morphology mutation caused by land function and modes of transportation during historical process. Thus, when protecting and re-molding blocks, blocks space pattern of historical pattern are needed to be further integrated to make the negative factors disappear or transform into active elements, and as a result, the vigor of the whole blocks can be enhanced (as shown in figure 8).

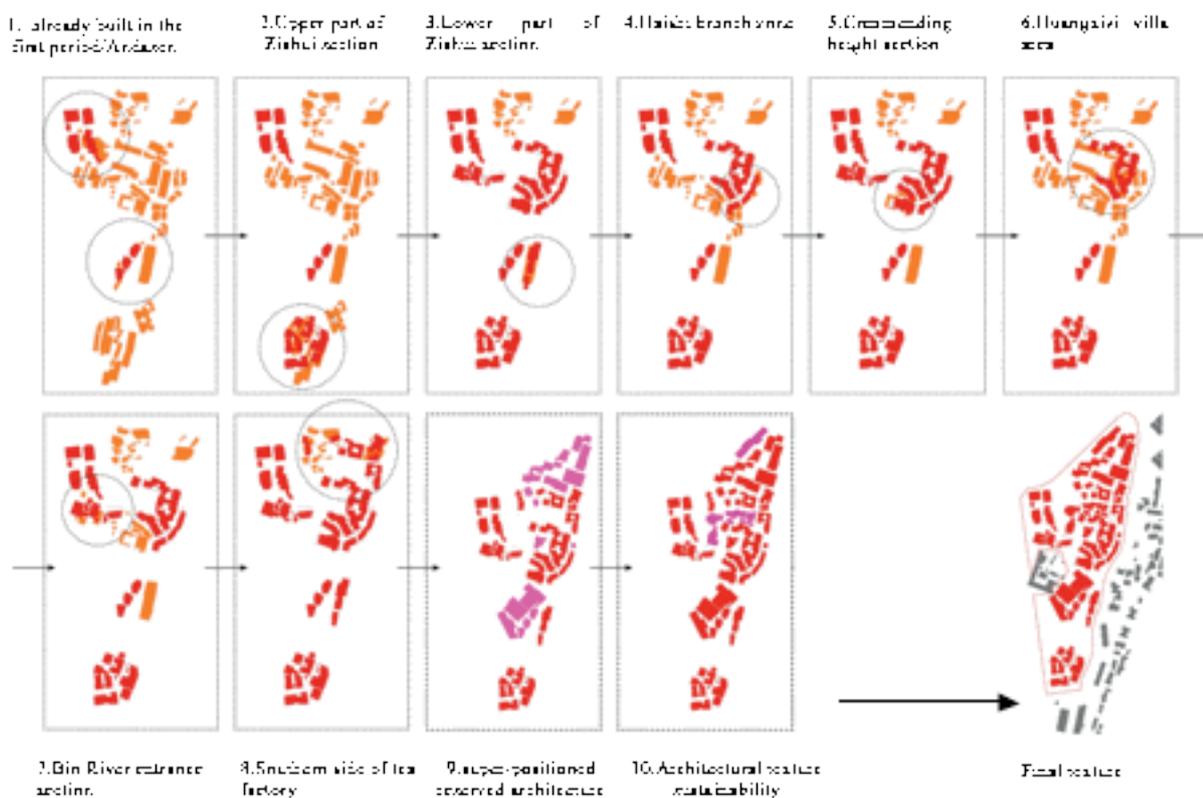


Figure 6. Grooming regional space texture.

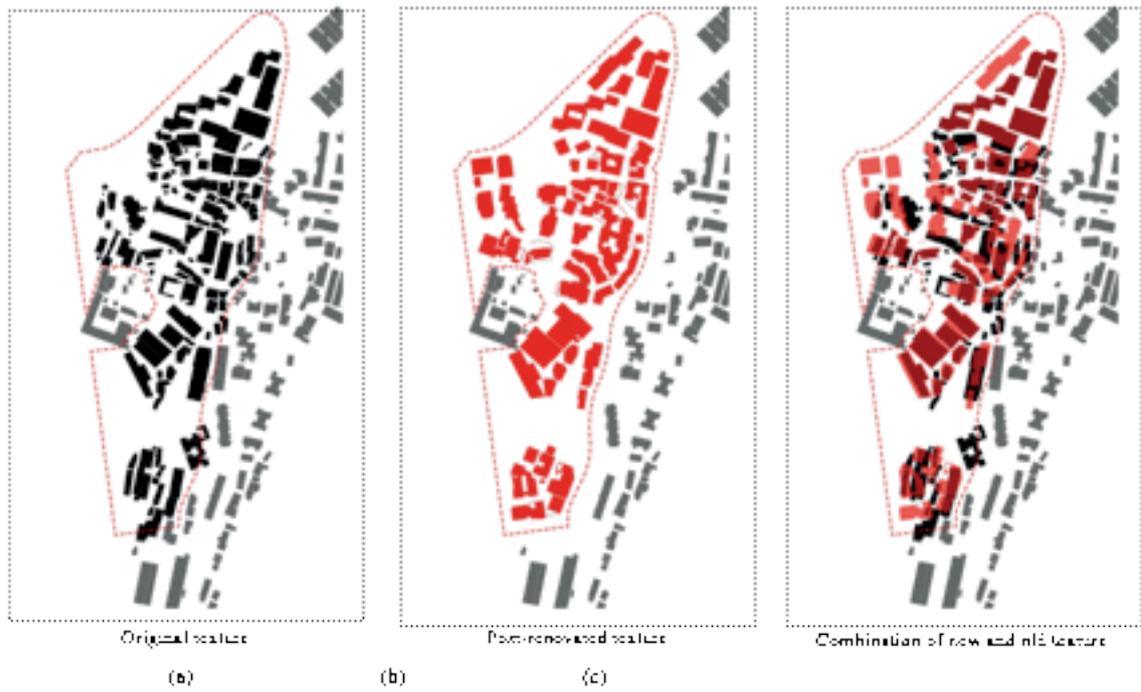


Figure 7. The Existing Architectures and Environmental Elements. Data Source: Chongqing Xiangbei Agency

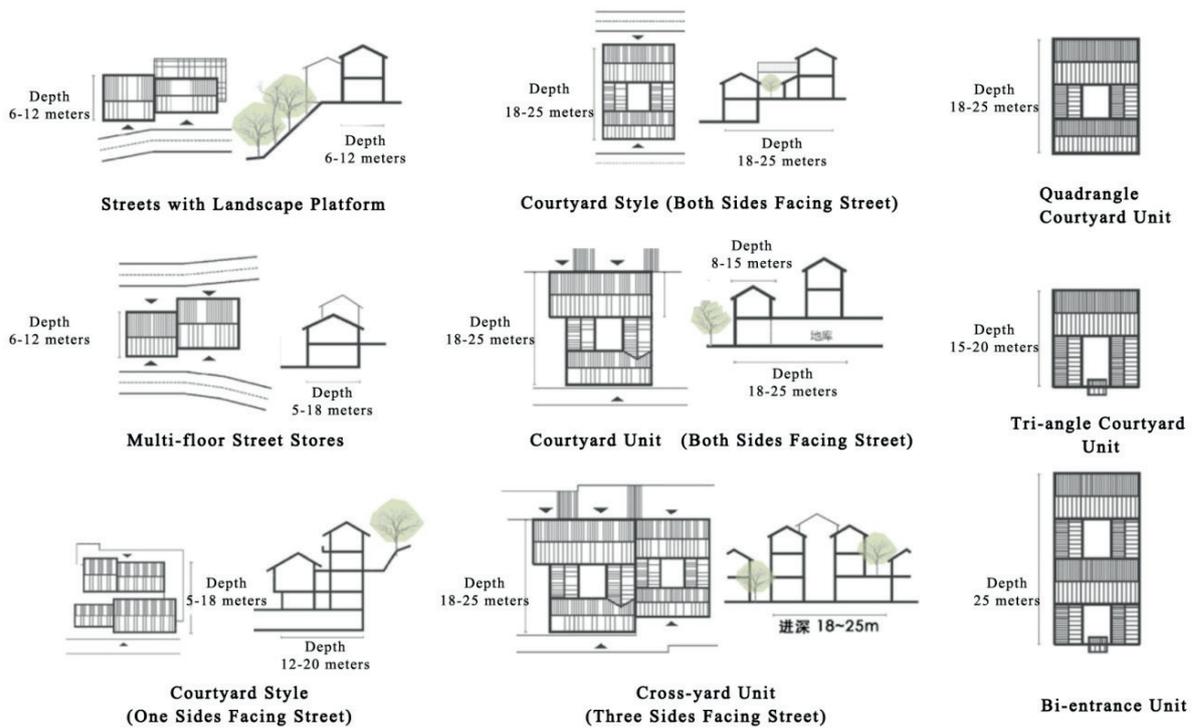


Figure 8. Optimization of Ciyun Street Area Space Size. Data Source: drawn by the author.

3.3.3. Vitality of Historical Architecture

During the process of renovating Ciyun Street Area, architecture types in different periods are analyzed to extract morphology features of architecture in blocks. Architectural substantive characteristics are renovated in an effort to show the original style of architecture. Through practical investigations and analysis of traditional lane mapping drawings, current preserved architecture along the river is mainly port-opening period style, which includes public architecture such as Jufu Foreign Bank architecture complex and Andasen Foreign bank complex. Historical images tell that Andasen Foreign Bank complex was arranged paralleled to contour lines, forming a landscape where mountain wall falls off with characteristic mountain features. For the architecture in this area, restoration and reinforcement is highly suggested. Original architectural style and texture should be preserved with previous vertical narrow stairway renovated.

The internal architecture of Tea Factory Unit kept its original industrial style that continuously changed from 1930s to 1950s. The renovation is executed according to these two principles— “Basic Renovation and Reinforcement” and “Structural System Reinforcement”. The part that cannot be used or is lost shall be changed or supplemented. The Structural System principle targets at components needing large repairment and sectional dimension and holding force of beams, pillars and floors are checked one by one, and reinforcement and renovation measures are taken to guarantee the original architectural style; as for the axial pressure ratio of column leg, beam section size and board width of newly added concrete structure, they should suit to relevant rules requirement (figure 9).

The rear and belly part of Ciyun Street Area has fully showed the traditional local architectural style. The architecture within this area was mainly used for residence from the port-opening period to after 1950s. In the late 1980s, the architecture was rebuilt additionally or changeably so some of them were oversized, illegally built or discordant with limited value to be reserved. As to this, renovation and renewal should be achieved in the principles of no changing depth-width ratio after taking measures to sustain space size of major lanes, minor and ordinary

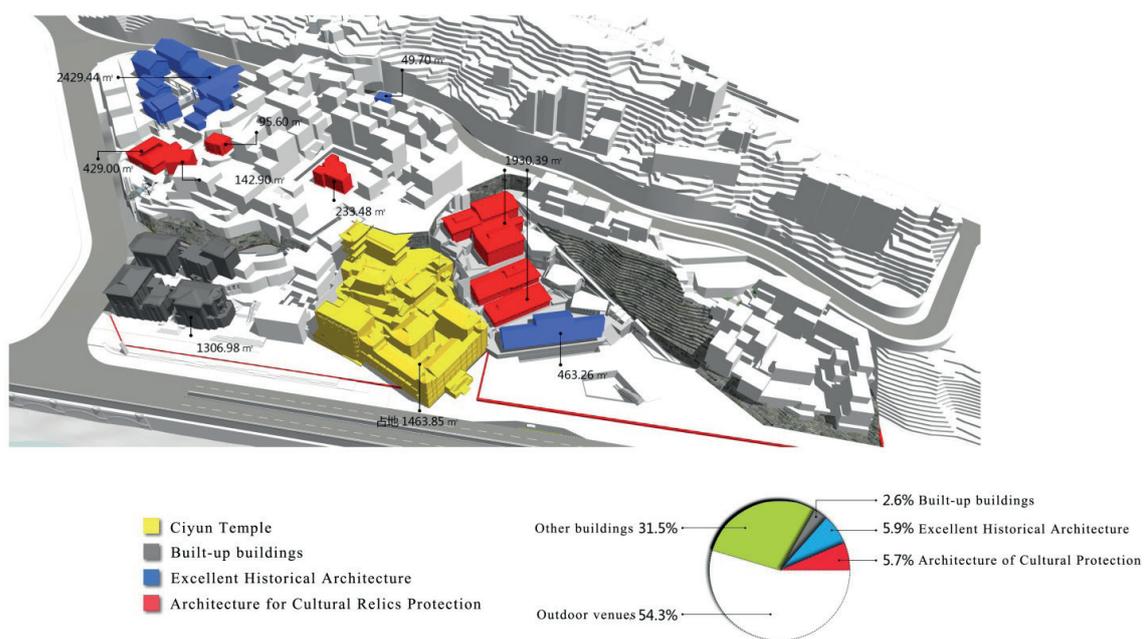


Figure 9. Existing Arch contrastitecture in Ciyun Street Are Picture . Data Source: Chongqing Xiangbei Agency.

lanes (figure 10) . The volume, number of floors, roof forms, façade forms, decorations and color of restored architecture should fit in with surrounding environment.

Compared to Beijing, Shanghai or Guangzhou that are outfitted with well-preserved historical style and detailed pictures and maps, typo-morphology of Ciyun Street Area is faced with challenges for lacking historical maps. The old map of Chongqing found in archive center usually just described streets, rivers or walls but in the absence of comments on ordinary residence. According to the analytical method of typo-morphology, the existing information is not sufficient to fully explain the development process of the city. Although there is relatively thorough architecture mapping helpful to field research and collect urban form data and make more possible analysis on “Morphology Unit”, owing to the short life cycle of traditional architecture especially residence architecture, historical blocks lack spatial and time continuity for the large-scale old city updating, which makes more difficult to analyze and localize “architecture type”. In spite of this, the author found corresponding method that during the planning and designing program, Ciyun Street Area is comprehensively and carefully analyzed and explained through continuous historical images to find its spatial evolution features and architectural development rules so that the lack of existing historical map data can be remedied (figure 11). In addition, the research group interviewed local residents and made social research, through which the spatial evolution process of Ciyun Street Area can be fully analyzed (figure 12).

3.5. Explanation of Historical Images

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Figure 10. Ration of Height and Width for Ciyun Old Street Architectures. Data Source: Chongqing Xiangbei Design Agency.

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4. Discussion and Conclusion

As a spatial vehicle for human activities, city is a time capsule of human historical process as well. Faced with major issues for renewing cities, we have to admit that our plan and design to some extent lack systematic methodology basics and effective explanation of urban street blocks.

The design and planning exploration in the Ciyun Street project is intended to find out and employ effective, practical methods. Obviously, the studies on the project of the research and design group in early period were intuitive and experimental (although it is also the soul and value of a program planning). The research group looked for the past traces in the valuable urban textures and historical images and stroke a balance between the live protection, cultural theme, commercial logics and people flow dynamic line of historical blocks and strictly superior and planning in traditional blocks (especially texture and style). These endeavors and exploration gradually reveal rich implications of the program. In lack of more effective method, however, the planning and design of this project is not well-controlled or adequately persuasive until the research method of typo-morphology came into our view. The significance of typo-morphology lies in protecting future cities and offering basis for urban design and architectural design to build a bridge for urban history and research, especially in protecting and designing historical cultural blocks. In the long-term evolution process, Ciyun Street Area holds its own organized growth rules and only by emphasizing its natural morphology features can we deeply explain and understand its context meaning.

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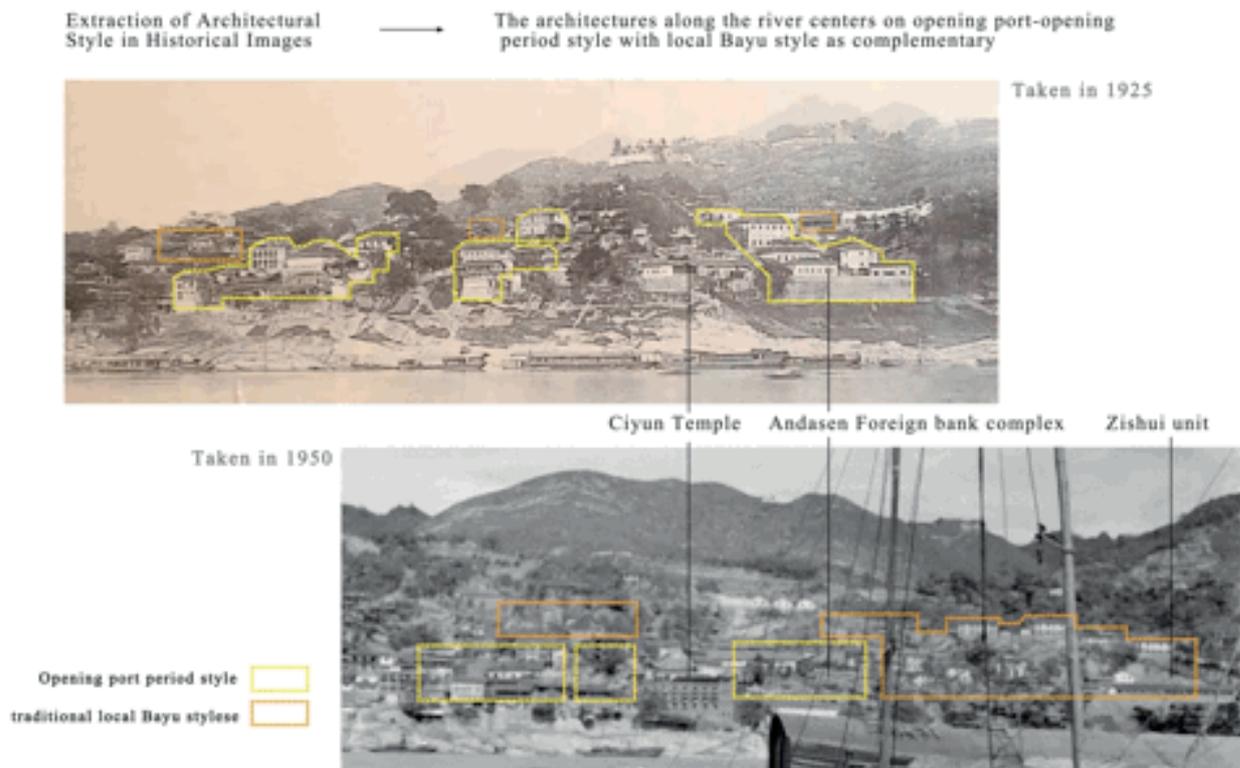


Figure 11. An Analysis on Historical Images Record of Ciyun Street.



Figure 12. Scenograph with Infusion of Practical Scenery of Ciyun Street along the River. Data Source: Chongqing Xiangbei Design Agency.

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