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ID 1528 | RESEARCH ON THE HUMAN SETTLEMENTS CONSTRUCTION WISDOM OF ZHASHUI PHOENIX ANCIENT TOWN IN CHINA BASED ON NATURAL LANDSCAPE

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1 INTRODUCTION

China has a vast territory in which the settlement areas, after more than 5,000 years of civilization development, have gradually evolved into the living environments with different characteristics, rich traditional oriental cultures and unique constructing methods and wisdom, showing their own styles in the history of city construction in the world. However, the rapid development of urbanization in China has posed a certain impact on the local traditional space, and the historical context and spatial features of many traditional settlement areas has been submerged in the tide of rapid urbanization. Under this background, it is somewhat unusual for Phoenix Ancient Town of Zhashui County located in the hinterland of Southern Shaanxi Qinling Mountains to retain the whole living environment of the traditional characteristics. Here the traditional street space is integrated with the surrounding landscape, which is a precious historical and cultural heritage, and implies the Chinese wisdom in the construction of the traditional living environment.

2 CHARACTERISTICS OF THE LANDSCAPE SPACE OF PHOENIX ANCIENT TOWN

Phoenix Ancient Town was originally built in the Tang Dynasty and flourished in the Ming and Qing Dynasties. Since the Tang Dynasty, it had experienced ten dynasties, including the Five Dynasties, Song, Liao, Jin, Yuan, Ming, Qing Dynasties and Republican Period, being more than 1,400 years old now. The Town started its development from Tang Wude 8th Year (A.D. 625) when the first batch of immigrants of 53 households from Wu and Chu states settled in the Town which was called "Sanhahekou" at that time. During the Ming and Qing Dynasties, the mule post road and shipping waterway were developed gradually, and the business began to boom here. Even in the Republican Period, the Town was an important commercial town. After that, the Ancient Town lost its former position and function due to the exhaustion of water transport and the improvement of highway transport, but its style and features, street spaces and ancient residential buildings have been preserved so far.

China has the cultural origin of advocating the natural environment from ancient times. And Confucius said: "The wise enjoy the waters, the benevolent enjoy the mountains." As affected by this thought, the construction concept of the traditional Chinese town advocates the integration with the natural

environment, and together with the limited ability to transform the nature, the construction of many towns shows a great dependence on the natural environment and is gradually integrated into the natural landscape along with the development and succession of the space. Phoenix Ancient Town is exactly an example which is constructed with dependence on the landscape.

Today, Phoenix Ancient Town of Zhashui County is located north of Daliang Mountain and south of Duchuan River. The Town is surrounded by mountains on three sides, forming a semi-closed plain. Duchuan River flows from west to east, the plain surrounded by the landscape features fertile soil and abundant water sources, Zhaohe River comes to a T-shaped intersection with Duchuan River on the north, which gives a picture of the gurgling streams, the green mountains and rivers silhouetted against each other, and the green gardens extending to the sidehill. In the view of Chinese traditional geomantic omen, the Town is a place where the mountains and rivers gather together to constitute a good geomantic omen, and also is a good place to live and work in peace and contentment.

3 WISDOM OF THE ECOLOGICAL CHOICE OF PHOENIX ANCIENT TOWN

As early as the Spring and Autumn period, the legalist school Guan Zhong made a wonderful exposition of the town location. As written in his works "Guanzi - Chengma", "A national capital must be built on the highland rather than under the mountains, and the plenty of water is available when living a highland away from mountains and there is no worry about the embankment work when living in a lowland away from rivers." In addition, "Guanzi - Dudi" also talked about, "The capital that is selected by a sage must be a unassailable place where there are fertile lands, mountains, rivers and lakes nearby." The location of Phoenix Town gives a full presentation of the concept mentioned above. The Town stays in front of Daliang Mountains, faces towards Duchuan River, and is connected with Phoenix Mountains across the river.

3.1 EVALUATION OF THE ECOLOGICAL SUITABILITY OF THE SITE

In order to explore the ancient's wisdom in selection of the site, ArcGIS system is used in this paper to analyze the topographical features of the Town site. And the terrain elevation, terrain slope and flood inundation line are selected as the factors to evaluate the ecological suitability (Figure 1).



Figure 1 - Ecological suitability evaluation chart
(Source: Author self painting)

Ecological suitability level	The most suitable area	More suitable area	Not suitable area	Prohibited area
Indicator range	1~1.8	1.81~2.6	2.61~3.4	3.41~5

Table 1 - Ecological suitability evaluation results

As indicated by the evaluation results (Table 1), the Town is surrounded by mountains and rivers, and the area suitable for construction is limited; within the range of 2.5 km around, the current site of the Town is the preferred area suitable for construction and can provide the spatial carrier required for further development. It is proved that ancient Chinese can, without the support of advanced technology conditions, select the construction site of a town by virtue of their unique historical construction experience, and the scientific and rationality in the site selection is not second to the judgment based on modern engineering technology.

3.2 SUMMARY ON WISDOM OF THE SITE SELECTION OF THE TOWN

The social productivity is very low in ancient times, the human survival condition is limited to local landscape and material conditions, and the people "live from what the land can provide" and fully benefit from the natural environment. As a result, the selection of the construction site always embodies the idea of advocating the nature, making a clever use of the natural landscape pattern.

The mountains surrounding the Town can, to a certain extent, reduce the monsoon and guarantee a good climate. The rivers nearby provide the necessary conditions for agricultural production, and the

convenient shipping waterway lays a foundation for the development and prosperity of business. At the same time, a certain distance is kept between the Town and the rivers to prevent flooding, and the higher terrain in the south than the north is conducive to drain water to the rivers in the north. The town site is exactly located at the "convex bank"(Figure 2), which refers to the inner ring zone of the river turn. Due to the physical inertia and centripetal force of water flow at the convex bank, the river water will flow slowly, the water level will drop, and the sediment in the river water is prone to settle here and causes the increase of the convex area and the land available, which proves the ancient's wisdom in the selection of the construction site.

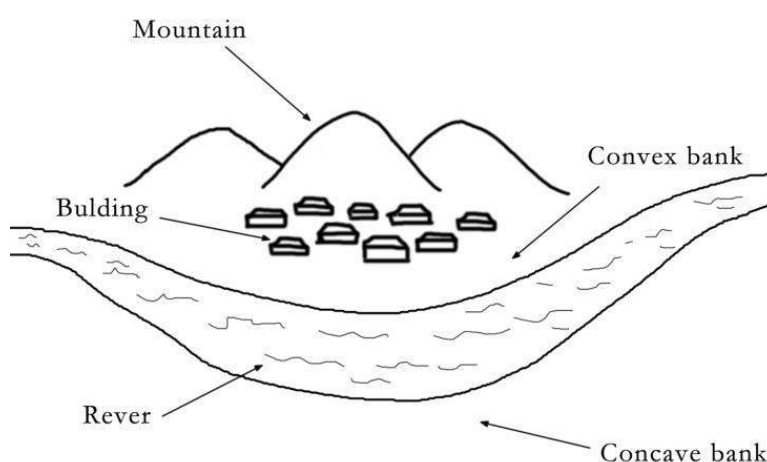


Figure 2 - Location diagram
(Source: Author self painting)

As reflected in the site selection experience on the living environment of Phoenix Ancient Town, the ancient Chinese made a careful investigation of the surrounding landscape pattern at the beginning of construction of a town, exploring the link between the town and the natural environment. For example, Phoenix Ancient Town stays in front of Daliang Mountain and faces towards Duchuan River, the residential houses are constructed on the beach at the convex side of the river, and the surrounding mountains reduce the monsoon power in winter and summer and improves the microclimate here. At the same time, the rivers create good conditions for agricultural irrigation and water transport, and the fertile land on the bank side creates the basic conditions for agricultural farming. The site selection of ancients of great wisdom creates favorable conditions for the subsequent development of the Town. Except the influence of human factors such as war, the Town has never suffered any large-scale flood or other disasters, and to this day, the people still lives and breeds here.

4 WISDOM OF THE SPATIAL LAYOUT OF PHOENIX ANCIENT TOWN

The overall layout of the Town is a strip shape, the main axis of space is the historical street running from east to west, and the residential houses are winding on both sides. The traditional residential houses are characterized by front shop and rear house, in which the room facing towards the main street serves as the business facade, and the inside of the courtyard serves as the living space. On both sides of the main street, there are several north-south alleys leading to the house inside, and main streets and alleys constitute the transportation network of the Town.

4.1 ANALYSIS OF SPATIAL SYNTAX OF THE TOWN

Spatial syntax is a kind of theory and method used for quantitative analysis of the space, and the integration analysis can give a good expression of the relative accessibility of some nodes and areas. In order to probe into the spatial structure characteristics of the Town, UCL Depthmap software is used in this paper to analyze the whole integration of the space of Phoenix Ancient Town, and the result is shown below (Figure 3).

As indicated by the analysis results of the whole integration, the Town obviously features the single center structure. Main streets extends from east to west and runs through the whole town, and several south-north alleys go deep into the houses inside. The center area is of the best accessibility, and also is the area which witnesses the commercial prosperity with a number of shops in the history of the Town. Historically speaking, the Town just starts its history here and then grows into the scale today. The town center and the southern Dalian Mountain and the northern Phoenix Mountain stay in the same axis from south to north, and the concentrated construction area is located in the central position of the two mountain peaks, which reflects the “moderate thinking” (Figure 4) in the Chinese traditional culture. The east-west street serves as the main internal axis, and the residential courtyards are arranged on both sides in neat order. The layout of the ancient street is preserved today, and then the residential houses are built around, achieving ancient and modern compatibility. The ancient street, as the main development axis of the Town, is coupled with the surrounding mountains and rivers (Figure 5), and the rationally curved street in line with the trend of the surrounding landscape guarantees the accessibility, and also is full of fun thanks to its appropriate change.

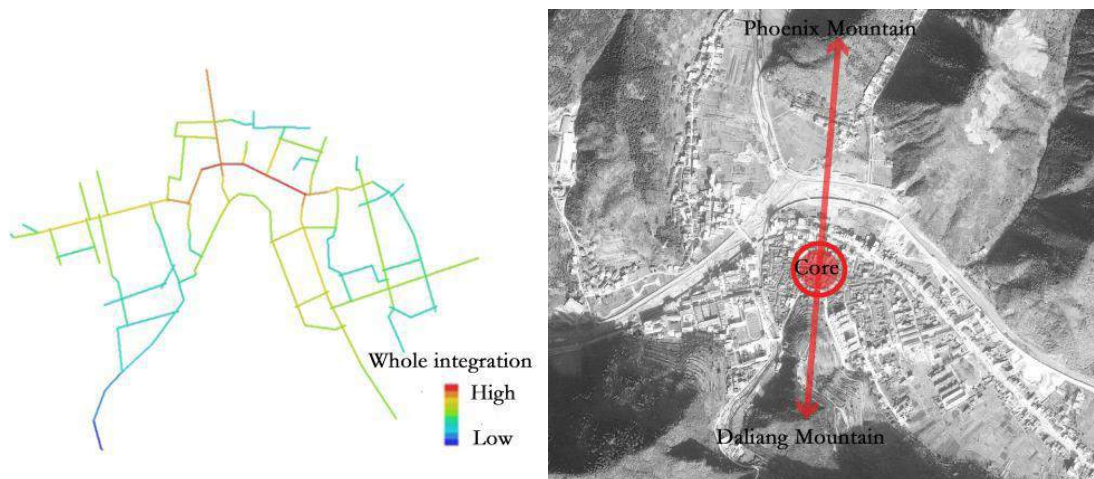


Figure 3 - Whole integration analysis | Figure 4 - Landscape axis relationship diagram
(Source: Author self painting)

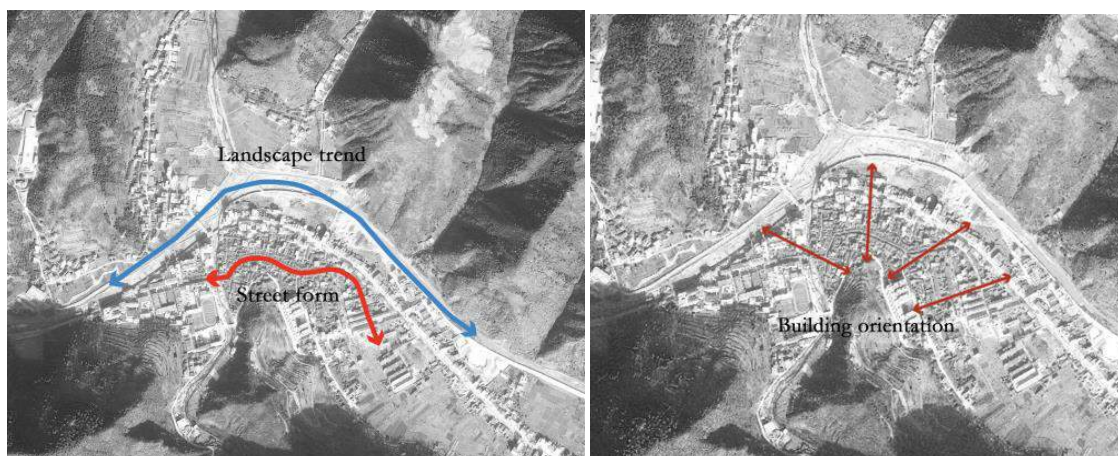


Figure 5 - Analysis of street trends | Figure 6 - Building orientation analysis
(Source: Author self painting)

4.2 SUMMARY ON WISDOM OF THE SPATIAL LAYOUT OF THE TOWN

Influenced by the neo-confucianism thought, the space of Chinese ancient towns has a strong sense of order. Whether it is a large palace, a city, a small temple or a street, there is a definite axis relationship everywhere. At the same time, the mountains and rivers are linked organically with the axes of heaven and earth, and the mountain peaks are taken as the key factor in the construction of an urban space. "Axis of heaven and earth" and "centering and preserving" are the two basic cultural characteristics of Chinese ancient settlements, which gives rise to the axis relationship of ancient settlement spaces. In addition, the Chinese traditional thought attaches great importance to the ingenious arrangement of artificial construction in the natural order in line with the laws of nature, achieving the ideological realm of "harmony between man and nature".

The center of Phoenix Ancient Town is located in the center zone between southern Phoenix Mountain and northern Duchuan River, and forms an "imaginary axis" from south to north, which fully embodies the ancient traditional thought of order and centering thoughts. The east-west axis of the Town is coupled with the surrounding landscape layout, which complies with the trend of the mountains and rivers, and the residential building orientation is of the centripetal layout perpendicular to main street (Figure 3), which, on one hand, renders the leading position of the central ancient street, and on the other hand, creates the orderly plane form and integrates the space of the Town with the natural landscape, reflecting the Chinese traditional idea of "harmony between man and nature".

5 INSPIRATION AND INHERITANCE OF THE RESIDENTIAL WISDOM OF PHOENIX ANCIENT TOWN

The construction of the today urban living environment should draw lessons from the ancient living wisdom, keep harmony with the modern construction, carry on the historical and cultural context while guaranteeing the economic development, and avoid the elimination of the historical and cultural characteristics due to the neglect of the historical construction experience. The development of Phoenix Ancient Town can stand the test of time only by way of maintaining the historical characteristics of human settlements and inheriting the historical context.

5.1 INHERITANCE OF THE LANDSCAPE PATTERN

The main purpose of inheriting the landscape pattern of the historical towns is to keep harmony between the nature and manpower, emphasizing the integration with the natural landscape pattern. It is the primary living wisdom to be inherited by the construction of the today towns to integrate the construction of the ancient towns with the natural environment. The ancients make a reasonable selection of the urban construction site based on the overall landscape space environment, and the site selection is not only

consistent with the Chinese traditional concept of geomantic omen, but also is consistent with the actual urban construction requirements, which should be affirmed and inherited. With reference to the experience and wisdom of the ancient site selection, the construction and development of ancient towns should fully take into account the order relationship with the surrounding environment of the order, maintain the Chinese traditional "centering" thought, and pay attention to the overall pattern in which the urban construction keeps harmony with the surrounding landscape environment.

5.2 COMPLIANCE WITH THE NATURE PATTERN

Compliance with the natural pattern is an important principle for the spatial development of Phoenix Ancient Town. The street trend and building layout of the ancient towns should be integrated with the pattern characteristics of the natural environment, so that the artificial construction can keep harmony with the natural environment. For the construction of the ancient towns, the selection of the street space scale should refer to the scale characteristics of the historical ancient houses and streets, because the historical space is full of the ancient residential environment construction wisdom, is the precious wealth left in the history, and is in line with the space characteristics of the daily life. Furthermore, under the premise of ensuring the inheritance of the overall landscape pattern, attention should be paid to maintaining the relationship between the building and the streets and the nature, as well as the visual connection between main buildings within the town, the reasonable combination pattern of the architectural scale and space should be adopted so as to comply with the growth and development of the natural pattern. Under the background of the new times, the volume and height of new buildings around should also be harmonized with the style of the town, so as to avoid the destruction of the characteristics of the town space.

5.3 HIGHLIGHT OF REGIONAL CULTURE

The "location with mountains and rivers" is the spatial characteristic of Phoenix Ancient Town. The construction and development of the town should make full use of its own natural characteristics and historical and cultural relics, and continue and highlight its regional cultural characteristics. On one hand, it is necessary to improve and beautify the surrounding landscape environment and recondition the waterfront shoreline. On the other hand, it is necessary to meet the needs of the times, make a rational use of the historical and cultural heritage resources to develop the tourism industry, and embed the appropriate new tourism space, such as waterfront leisure business streets, ecological recuperation center, etc. The tourism industry can drive the protection and the development of Phoenix Ancient Town, and also can provide a broader cultural display platform to let more people understand the Town and experience the spatial characteristics of the Chinese traditional residential environment.

6 CONCLUSION

Phoenix Ancient Town that is constructed according to the natural landscape gives a full play to the Chinese traditional residential environment wisdom "living with mountains and rivers", and the historical spatial pattern pays attention to the integrity and order and inherits the historical context, which is an important carrier of the Chinese traditional culture. In this paper, the qualitative and quantitative method is used to analyze and summarize the residential environment construction wisdom of Phoenix Ancient Town, and the development strategy and suggestions are proposed for the inheritance of the landscape pattern, the compliance with the natural pattern, the highlight of the regional culture of the town, which can provide reference for the development and construction of the ancient towns in other regions. As a matter of fact, the general villages and small towns should also learn from the experience and wisdom of the construction of the Chinese traditional human settlements, and extract and highlight the regional characteristic culture, so as to avoid the situation of "the similarity of 1,000 villages and towns".

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ID 1529 | THE SCHOOL TRAVEL BEHAVIOR CHARACTERISTICS AND ITS CONSTRAINT OF THE PRIMARY SCHOOLS IN XI'AN CITY

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1 INTRODUCTION

The urban primary school travel in China is the necessary life behavior in the family daily life. For the adjustment of the urban population structure and the diversification of the transport means, as well as the unbalance public education resources and the school choice behavior, there are large spatial-temporal differences among the families school travel modes, all of the factors above cause the unsuitable of the urban primary school layout method which is only dependent on the service radius and the thousand people index. Combining the travel behavior with the layout of the urban primary school is one of the leading directions to improvement the urban primary school planning(Zhang,2014). Xi'an is the dominant city in the northwest area in China. The types of the urban primary school in Xi'an is multiple, and the city also concentrates more excellent educational resources and students enrollment. The paradox between the pupil number and the land area, and the spatial-temporal accessibility of the school travel issues become more fierce. This paper takes Xi'an as the example and analyzes the school travel constraint mechanism based on the summarization of the urban primary school travel characteristics, as well as doing the basic job for the future study which is to optimize the urban primary school layout from the perspective of the urban land and transportation integration.

2 RESEARCH METHOD AND DATA SOURCE

2.1 RESEARCH BOUNDARY AND THE SUBJECT SELECTION

School travel means school commuting of the the pupil. The primary school travel includes 2 layers: the first layer is the school travel mode (which include the go to school alone and and picked up by others); the second layer is the school travel characteristics (which includes the travel subject, mode, time and distance). By comprehensively considering the conditions of the urban primary schools (establishment time, school scale, education quality etc.) in Xi'an and the city build environment, and this paper choose 2 primary schools respectively from the 6 main administration districts between different areas within the Third Ring road in Xi'an. 6 in total, as the sample, which are Houzaimen primary school (A) , Primary school attached to Xi'an Normal university (B) , Primary school attached to the Xi'an Architectural & Science university (C) , Cuihua Road primary school (D) , Qujiang No.1 primary school (E) , and South lake primary school (F) (table 1).