Investigation and Suggestion on the Building Environment of Traditional Courtyard House in Ancient City of Pingyao

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ABSTRACT

The ancient city of Pingyao is the world cultural heritage, it has a complete preservation of the wall, the Yamen, the temple as well as numerous traditional commercial shops and the dwelling house, it is the Chinese historical economic and cultural development real testimony. With the development of society, there are great changes in family structure and life style, and people's demand is more and more abundant. People living in traditional courtyard house need to improve their living facilities and building environment and improve their living comfort continuously. We need more exploration and research on how to preserve the authenticity and integrality of the heritage value, improve the living environment, improve the quality of life of the residents, and let the residents actively participate in the protection of the heritage and enjoy the achievements of the heritage protection through the restoration of the traditional courtyard house in the ancient city of Pingyao.¹

KEYWORDS

Ancient City of Pingyao, Traditional Courtyard House, Building Environment, Renewal and Transformation.

BACKGROUND OVERVIEW

The ancient city of Pingyao is located in Pingyao county, Jinzhong city, Shanxi province. It was first established during the Western Zhou Dynasty around 827-782

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B.C. As a county—in its current location—it dates back to the Northern Wei Dynasty around 424-448 A.D. The Ancient City of Pingyao is one of the most intact ancient walled cities in China. It provides an outstanding example of a Han Chinese city of the Ming and Qing dynasties (14th-20th centuries), retaining its original features to an exceptional degree. Moreover, Pingyao showcases the cultural, social, economic and religious development in Chinese history, and it is of great value for studying the social form, economic structure, military defense, religious beliefs, traditional thinking, traditional ethics and building styles and forms. The Ancient City of Pingyao was declared a National Famous Historic and Cultural Town by the Chinese Government in 1986. It was inscribed as a UNESCO World Heritage site in 1997. The ancient city has a complete preservation of the wall, the Yamen, the temple as well as numerous traditional commercial shops and the dwelling house, it is the Chinese historical economic and cultural development real testimony. [1]

Figure 1. Pingyao ancient city partial aerial view.

The spatial arrangement of traditional architecture in Pingyao is deeply influenced by ancient beliefs and ceremonial protocols, of which the hierarchical relationship is clearly defined. All of the public, commercial and residential buildings are in courtyard form with clear axial lines and symmetrical layout. Most Pingyao traditional courtyards are narrow si-he-yuan style (quadrangle), characterized by a clear axis, symmetrical layout and a distinct hierarchical order. Some residences comprise two or three entrance gates along the axis, arranged in the shape of the Chinese character “日 (ri)” or “目 (mu)”. The courtyards are separated by low walls with floral-pendant gates. In general, the principal house (usually facing south) has a cave structure with three or five rooms, also has a wooden gallery in the front and a flat roof. The wing house and Daozuo are of masonry-wood structure and have a single-slope or double-slope tiled roof.

With the development of society, there are great changes in family structure and life style, and people's demand is more and more abundant. People living in traditional courtyard house need to improve their living facilities, increase their kitchens and bathrooms, increase air-conditioning, increase their wireless networks
and so on, and constantly improve their living comfort. In order to meet the requirements of world cultural heritage protection, the traditional residential buildings and their facilities in the old city of Pingyao need to be improved to meet the needs of modern life. The following are some surveys and suggestions from the architectural environment.[2]

Figure 2. Pingyao Ancient City Street Lane.

CURRENT SITUATIONS

Thermal and Humid Environment of Building

The climate characteristics determine the architectural form. This is well reflected in traditional courtyard houses. Traditional courtyard houses generally pay attention to the improvement of the thermal environment of the building. In terms of Pingyao, which is cold in winter and hot in summer, the preservation of nature is the most important. The residential buildings in Pingyao ancient city are mainly composed of wooden buildings and cave buildings. The maintenance structure of the building adopts the thick wall, which has good thermal insulation performance, especially the cave indoor is warm in winter and cool in summer. Building heating is mainly Kang in winter, with the development of society, become a coal-fired furnace, now more use of boiler heating or electric heating. Some relied on the eaves of ancient buildings in summer, others used lush plants or reeds or cloth made of curtains. Nowadays, people are eager to add air-conditioning to buildings in order to get better comfort.

Indoor Air Environment

Indoor air conditioning, mainly depends on the opening or closing of doors and windows to achieve. No mechanical ventilation equipment. Winter indoor use Kang
heating, at the same time as cooking stove, indoor and outdoor ventilation is not smooth in the winter, indoor air quality is not good. In winter indoor after all airtight, the use of coal as fuel also easily cause carbon monoxide poisoning. Nowadays, indoor air conditioning is based on natural ventilation or the installation of air conditioners or ventilation fans.

Other Living Facilities

The traditional residential buildings in the ancient city adopt the Courtyard form, and the noise influence is less. The way of lighting pasting paper on the building window has been replaced by glass, the continuous improvement of lighting facilities, indoor lighting has been greatly improved. Fire prevention facilities in traditional houses are relatively scarce, and the infrastructure and underground pipe network of streets and lanes are not perfect.

Inevitably, traditional architecture is no longer able to meet the demands of a modern lifestyle. Building needs to add more advanced living facilities, such as toilets and other facilities. Of course, to experience the traditional way of living, there will be sacrifices, not in the present way to ask.
IMPROVED SUGGESTIONS

The ancient city of Pingyao is a world cultural heritage and is also a national key cultural relics protection unit. Any construction and renovation activities we carry out in the ancient city should first meet the requirements for the protection of relevant laws and regulations and be implemented in accordance with the promulgated guidelines. Adhere to the principle of authenticity and integrity in the protection of cultural heritage.

For the buildings that the aborigines are living in, the professionals should respect and pay attention to the reasonable demands of the local villagers before carrying out repairs and design. The designers should consider the convenience of living and the reversibility of new living facilities. The newly added equipment and facilities will strive to be implemented simultaneously with the renovation project. At the same time, the transformation of the water, electricity, heating, ventilation and other equipment shall be considered to avoid the disturbance of the secondary construction to the building itself.

Preserve the physical elements of traditional houses, such as wooden doors, windows, chimneys, etc. In accordance with the requirements of the residents' living comfort, appropriate kitchens, toilets, and air conditioners are added.

To reduce pollution, coal or honeycomb coal should not be used as fuel for heating and cooking. Centralized heating systems or gas/electricity boilers for heating and gas or electric stoves for cooking should be used if possible.

Each courtyard should have a fire extinguisher in a prominent location. The courtyard with special high value should have automatic fire alarm and linkage control system.

In the transformation of traditional courtyard house, the active participation of residents can help designers better integrate with the actual situation in the local area, avoid the emergence of blunt transplants of foreign design concepts, and allow these renovation projects to better demonstrate their role.

However, we must not forget that the transformation of a large number of traditional courtyard house will inevitably cause the cultural heritage to gradually lose its cultural connotations. Therefore, we need to achieve a balance between protection and development.[3]

Figure 4. Traditional houses after Renovation.
CONCLUSIONS

From the above analysis, we can see that the modern way of life integrated with traditional residential and ancient architectural conservation, such as how to design and layout of the ancient buildings fire, water, electricity, gas and other facilities, both ensure the security of the ancient buildings, and ensure that people use, and shall not affect the ancient style, all need more professional input and collaboration. We need more exploration and research on how to preserve the authenticity and integrality of the heritage value, improve the living environment, improve the quality of life of the residents, and let the residents actively participate in the protection of the heritage and enjoy the achievements of the heritage protection through the restoration of the traditional courtyard house in the ancient city of Pingyao.

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