Technology Design of Ecological Architecture of Traditional Houses in Huanggang

Xue-Song Lu

ABSTRACT: Chinese traditional houses are rich in ecological building design technology skills. Taking traditional houses of Wushi Hall in Huanggang as an example, through field investigation and comprehensive analysis of aspects of Wushi Hall construction site, building layout, building construction and other ecological technology design strategies are analyzed one by one. The results show that Wushi Hall building technology is to meet the functional at the same time, and it considers saving resources, saving energy and reducing the ecological technical purposes contaminated buildings. This technology design can provide a reference for sustainable development of modern architectural design and build a socialist beautiful village.

KEYWORD: Traditional House; Ecological Design; Building Technology

1 INSTRUCTIONS
Chinese traditional houses of local conditions, adaptability, simple and practical, to create a flexible, rich ethnic and local characteristics, has a unique history, culture and artistic value, it can be left to the history of our precious heritage. These residential buildings based on local natural geographical and climatic conditions, based on local natural resources and simple application of the construction technology, through clever architectural design, with simple ecological building technology design. With global resources and environmental crisis, the world will be developed as a model for sustainable building focus, as one of the treasures of traditional houses, according to local conditions, people-oriented, the architecture, the environment, organic three people linked together, which contains rich ecological building technology design skills to our modern building technology creation and build a socialist beautiful villages provide a good reference and inspiration.

Wushi Hall is located in Hubei Province Hongan Baliwan steep mountain village, is the best preserved Hongan highest architecture of a building, it has a Edong first temple, the honorary title. Wushi Hall was built in the Qing Dynasty Emperor Qianlong twenty-eight years (AD 1763), later destroyed by fire in the Tongzhi years (AD 1871) rebuilt again, also affected by the fire, the building destroyed by fire twice, until Guangxu eighteen years (1902 AD), doing business outside the steep mountain village of Wu brothers join together decades of savings, Juanyin eight thousand two hundred, led Wu Temple rebuilt, Serbs have responded to a total of more than million two silver consumption, which lasted 2 years built. Because of its high historical and cultural and artistic value, in 1992, approved by the Hubei Provincial People's Government, Wu Temple was listed as the provincial key cultural relics protection units. 2006

Xue-song Lu, Huanggang Normal University, Huanggang, Hubei 438000, P.R. China
approved by the State Council, Wu Temple has been announced as a national key cultural relics protection units. In order to analyze the ecological building technology design skills Huanggang traditional houses, the paper selected typical traditional houses have Huanggang Wu Temple characterized as a case study.

2 ECOLOGICAL DESIGN OF WUSHI HALL BUILDING CONSTRUCTION

2.1 Building structure

Hongan sunshine, abundant rainfall, the main local rich forest, stone. By natural conditions and inaccessible impact of local people based on the use of local materials in the construction of residential, so the stone, wood and bricks of different materials is the main material of residential construction. These local building materials, to a certain extent, also determines the Wu Temple building structure. Wu temple structures are mainly two kinds: one is inherited the characteristics of China's ancient wooden structure, using a lifting beam with Chuandou hybrid structure. Chuandou and lintel this hybrid structure, as opposed to completely put bucket, lifting beam is concerned, this structure not only to meet people to create more interior space requirements, but also can reduce the use of wood beams material strength requirements, more scientific and reasonable force; the second is the emergence of modern times mixed brick structure, we can say this is the craftsmen building technological innovation, the main benefit from improved brick-making technology. This structure with respect to the ancient wooden buildings, the biggest feature is no indoor wooden beams and wooden pillars, space is relatively simplistic. Wu Temple building structure can be said to reflect the level of technology at the time the building, structure when it is used according to the building material of choice, simple and direct, applicable, and the concept of ecological architecture coincide.

2.2 Building components

Wu Temple wall design is divided into two parts: one part is 1.5 m or less, using local stone into a large block of granite, polished smooth and detailed; the other part is more than 1.5 meters section, fired using local gray brick into, in order to ensure the quality of the brick, the use of specific standard model is made, each block has the same size, "Wu Temple" in the name, so as to ensure a dedicated system, so that the most economical constraints difference defective brick kilns inflow, after investigation each brick is ancient brick standard brick size. Such wall design is very scientific, because the red safety rain, combined with heavy mountain humidity and moisture, this design can effectively avoid the invasion of moisture on the brick, so Wu Temple brick used a hundred years later, has not yet appeared a brick weathering avalanche phenomenon, showing that although the low temperature fired gray bricks, but the quality is quite excellent.

Wu went into the temple courtyard, found on both sides of the wing buildings are covered with Sunshade and rain shield. Due to the building structure inward-looking layout, Sunshade and rain shield is interior rooms of the second floor, to the building from a distance look like dressed as shown in Figure 1. Shade rain board design is very scientific, each plate is designed to shade rain width 1.5 m, height slightly higher than the height of the second floor, about 2.5 meters, the outer surface of the shade rain tung oil brush plate surface that is not flat surface in order to prevent water slip, uniformly covered with 0.5 cm above the height of the stripes when exposed to sun and rain board will follow the stripe groove shed, thus enhancing the drainage perfor-
Another effect is the sun shade rain board. Red On hot summer weather, high temperature timber under the sun exposure, long time high temperature irradiation timber prone to distortion. Shade rain board can be used to shade, the room can get some shade, both can bring cool, and can extend the life of wood. Wu Temple has exquisite carvings can be well preserved, there is a shade rain board is one of the effective measures to protect both the building carvings, but also extend the life of the building, which is a manifestation of ecological building design.

Figure 1. Sunshade and rain shield.

Wu pillar temple buildings are wooden pillars and columns when two types. Poles are mostly round and square, slightly rounded poles up collection points, such as the design of the force fit the requirements, but also has a good visual effect. View music upstairs next layer, the lower the use of stone pillars, then with upper wooden butt. The main reason of this design, one concept of Lok House is one of the most important buildings Wu Temple, larger space, a large timber materials, material force requirements are relatively high; the second is rich red safety rain, plus big mountain moisture, this design ensures that when it rains, the rain splashed hit the lower pillars, the upper layer wooden little effect, column bases carved from the point of view, after centuries of erosion, texture carving clear, and therefore rain the basic structure of the pillars of moisture does not have a big impact.

Wushi Hall plinth in all columns, column bases directly on Wuji. Large stone plinth bearing capacity, can be very good to spread Wuji upper loads, moisture and rain can also play a role. Wu Temple plinth majority consists of three parts, the upper, middle and lower three parts, namely the top of the foundation, the foundation and the foundation base waist. Plinth forms, polygonal, drum, pumpkin-shaped, lotus-shaped, etc. bottleneck-shaped, column bases of these architectural styling enhances the decorative effect, but also enrich the indoor environment, brings beauty, ecologically humanities spirit.

Tile pieces Wu Temple building has two main forms: gray tiles and Ming Wa, as shown in Figure 2. Most materials used on the roof tiles, from a distance, Wu Temple, brick tiles, is located in the mountains among the green water, the overall building color harmonization with the surrounding environment, embraced, great picture effect, giving the band to enjoy the beauty. Another effect is that gray tiles are cooling rapidly, when the hot summer evening when the gray tiles, tiles can quickly heat, so that is conducive to the building with the indoor heat radiating heat to the sky through a large area of the roof tiles the indoor temperature is lowered. Wu Temple worship hall in
the second side of the roof tile surface appeared the Ming Wa, as shown in FIG. Since
the housing depth long facades without windows, dimly lit room, the use of gray tiles
can solve the problem of indoor lighting. According to the survey visit, the two sides
of the building Baidian is the modern reconstruction and the emergence of Ming Wa,
we can say that this is a manifestation of the building of technological progress.

Sparrow brace also known as arch support, which will mainly outside the building
to pick endurance and overhanging eaves gravity wood, the spread between the eaves
purlin and Yan Zhu, make the building more secure. According to preliminary statis-
tics, the total size of the Wu Temple building hundreds Sparrow brace, Sparrow brace
middle strand empty Interlocking made most distinctive pattern, the only difference is
that the music upstairs Wu Temple View Sparrow brace amazing. The Sparrow brace
bulky, is a huge phoenix pattern, as shown in Figure 3. According to investigations,
the concept of music upstairs Phoenix Sparrow brace is a whole piece of wood carv-
ing processing, the biggest difficulty is that it is necessary to ensure the integrity of
Sparrow brace wood carving, but also in line with the force let Sparrow brace re-
quirements, so that the Sparrow brace only meet the functional requirements of the
force, but also play a decorative effect, over a hundred years later, Wu Temple Spar-
row brace actually preserved, it can be said that such a set Sparrow brace manufactur-
ing strength and beauty in Outlook one, greatly reflects the technical philosophy and
humanities mentally modern ecological architecture.

Figure 2. Tiles and Ming Wa.

Figure 3. Sparrow brace.
3 BUILDING FIRE

Fire is very important for wood construction, Wu Temple wooden structure mainly brick supplement. Fire mainly in the following two kinds: First, Wu Temple set fire wall on both sides of the building, and the fire wall without windows, so that once the residence of Wu Temple around the fire, which can effectively cut off the fire origin; the second is Wu Temple front of the house set fireworks Tong, Tong fireworks can be used for both collection and drainage Wu temple building, and can be used for fire, once Wu Temple of fire, the fire can be used in fireworks near water pond. Such resource-saving design and eco-design, energy conservation is unity.

4 CONSTRUCTION SITE

Wushi Hall Hongan steep mountain village located Wujiawan road junctions. Effect of Chinese feng shui by, Wushi Hall on the site, backed days steep hill, wooded hills, in front of the lift system Creek River and another at the intersection of "Erlongxizhu" can be described as poised, shrine in front of a pond excavated. Such a site environment, production and life of people can be said of your trip. Mountain vegetation can conserve soil and water, adjust the temperature, so that the surrounding air is fresh, easy to create a good ecological microclimate. [3] rivers and ponds can be used to meet people for drinking, irrigation and other production life. Wu Temple is located in the intersection of the road, which will help people in the village to facilitate the arrival at the ceremony, to solve the traffic problems.

Wushi Hall look northward, toward this relatively rare, after a field investigation, explore the reason, the original Wu Temple in the foothills of the mountain is to be in accordance with the site. Wushi Hall site, a combination of buildings, mountains, houses, ponds, fields and rivers of various factors, taking into account the characteristics of the surrounding environment, but also made the building waterproof. From the overall layout of view, behind the back of the Wu Temple days steep mountain, the mountain steep, steep mountain, so the rainfall season, water potential down the mountain experience quickly swept under. Wu ancestral location about 100 meters away from the mountain, the landscape of buildings in order to avoid rapid erosion and mudslides infringement, building land most forward slope of the ground is not, and there are houses, the building attached to the mountain, the mountain of their isolation Negative Effects. On this site, is the value of geographical landscape characteristics, to complete the building waterproof. From the modern ecological architecture design point of view, Wu Temple to local conditions, in close connection with the natural environment, but also give full consideration to the safety factors of residential water features, people-oriented, the organic link between architecture, people and environment combination of the three, which It is a modern eco-building design strategies, it is worth to learn from today's architectural planning and design.

5 LANDSCAPE DESIGN

Wushi Hall in the middle of the courtyard with trees, shrubs and trees planted on the one hand can make the courtyard to get some shade in the summer, people feel cool, it can withstand winter cold north wind, and trees can adjust the courtyard microclimate, reducing buildings to natural impact on the environment, on the other hand due to the rain Hongan rich, when faced with rainy weather, coupled with the housing structure Wushi Hall inward-looking, through the trees to fall into the courtyard through the
rain to reduce the rain leaves the buffer impact, rainwater into the ground to prevent rain blowing the wall, reduced to Wu temple construction timber damage, extend the life of the building.

6 CONCLUSIONS

Resources and Environment in the face of crisis, China made a strategic decision construction of two types of society, and take the road of sustainable development of the building became a necessity. We should modern thinking vision to re-examine traditional houses, scientific and rational extract of traditional houses in ideas and technical experience in ecological building, people-oriented, the architecture, people, natural organic link combine technical design and modern architecture building socialist beautiful villages and providing reference and inspiration, while science and technology and modern means of combining and gradually explore a new sustainable building system suitable for our country.

Resources and Environment in the face of crisis, China made a strategic decision construction of two types of society, and take the road of sustainable development of the building became a necessity. We should modern thinking vision to re-examine traditional houses, scientific and rational extract of traditional houses in ideas and technical experience in ecological building, people-oriented, the architecture, people, natural organic link combine technical design and modern architecture building socialist beautiful villages and providing reference and inspiration, while science and technology and modern means of combining and gradually explore a new sustainable building system suitable for our country.

Acknowledgements

This paper can be finished relying on Key Project of Humanities and Social Sciences of Hubei Education Department (No.15D119). I express my sincere thanks.

References

Wu Guozheng, Yu Hanwu, Wu Yue. The building art of traditional folk dwellings in Hunan Province. Building science, 2008, 24(3):129-133 (in Chinese).
Miao Xiaolong. Primary study on energy efficiency technologies of traditional residential buildings in Fujian. Building science, 2007, 23(12): 10-15 (in Chinese).
Allan Konya. Design Primer for Hot Climates, Architectural Press London Whitney Library of Design an imprint of Watson-Guptill Publication, New York, 1980.
Guo Wen. An Architectural Look at the Dwelling Houses of Northern Guangxi and the Potentials of their Sustainable Development. Journal of Guilin University of Electronic Technology, 2005, 25(5):74-79 (in Chinese).