ATLANTIS PRESS

Advances in Engineering Research (AER), volume 72

2016 International Conference on Architectural Engineering and Civil Engineering (AECE-16)

Study and Reform of the Regeneration of Traditional Folk House

A case in Zhongjie Street of Shenyang

Xuefeng ZHAO
Shenyang University
Shenyang, China
e-mail: 446489101@qq.com

Huasong XU
Shenyang Jianzhu University
Shenyang, China
e-mail: 305713287@qq.com

***Abstract*—This paper combines the mobility protection and construction practices on traditional dwellings in Zhongjie Street, Shenyang to explore the regeneration design methods of traditional architecture, trying to discuss the regeneration design from the perspective of the fusion of old and new architecture as well as dynamic remodeling under the guidance of the theories and principles concerning traditional architecture protection, also to analyze the reference significance of this project to the protection and regeneration of Chinese traditional architecture in terms of methodology.**

Keywords-traditional architecture; exsitu protection; regenerate; dynamic remodeling

I. INTRODUCTION

The Liu courtyard and Huang courtyard Located in Shenyang Zhongjie Street. The courtyard shape, appearance, construction technology has obvious regional characteristics, has good construction techniques and decorative art value (figure 1 and figure 2). But with the destruction of the historical block form, two courtyards also lost the vitality of the original and not included in the scope of legal protection, in the process of modern urban development can not be preserved in situ. For the preservation of the artistic value of construction, Shenyang Jianzhu University put the two traditional architecture for ex situ conservation of regeneration, the original function of single traditional courtyard style houses transformation into traditional local style dwelling houses building set to display, teaching, and the conference office in one of the activity space. After the regeneration, we are not only retaining the historical elements and architectural style of this traditional architecture, but also to adapt to the requirements of the development of technology and modern space. So this article will be from the perspective of space construction and technology applied to the innovation of the traditional and modern ways to dealing with relationship.

Figure 1. Courtyard appearance

Figure 2. Courtyard architectural details

A. Building the Space of Traditional Place

The southwest area of the university campus is designated as the traditional teaching demonstration zone. There has built a hall of the old Eight King Buddhist temple relocated from the Shenyang old blocks. So in the layout of the buildings must be fully considered the space create with Eight King courtyard will be north-south layout in the west Buddhist temple, Two side of the pond and the Eight King Buddhist temple, on the north side is Huang courtyard, on the north side is Liu courtyard. After the relocation of the courtyard building group, The Square in front of the Eight King Buddhist temple and the southeast side of the hills constitute a wetland pond as the center landscape reserved space. In this place, teachers and students can organize a wealth of learning and entertainment activities (figure 3).

Figure 3. Courtyard architectural plan

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B. Regeneration Design of Architectural Space

The creation of vitality is not only in the environment, but also the construction of the building space. Considering the Huang courtyard space scale, which is more close to life, after the completion of the house, will be used as a display of traditional Manchu residential interior decoration features and guest accommodation. In modern times we have not used the traditional kitchen, and for the convenience of living, we will re-separate the entrance space. Rooms are still using the traditional Manchu Kang shape; it is a major feature of Manchu interior space, so we will this preserved (figure 4).

Figure 4. The Huang courtyard

Lu courtyard will as a research center for modern office and teaching use. In traditional architecture, due to restrictions on the wood structure system, material, construct less space, can not be too good for the modern work learning to use, also in order not to destroy the shape of the traditional space environment. So we put the main office space under the ground. Construct the underground space under the Liu courtyard, So that we can have a whole open space, can be used for students to design learning and academic exchanges (figure 5).

Figure 5. Interior of the expansion space

In the construction of more than 900 square meters of modern space, the new and old interface to undertake, the integration of traditional and modern space can be resolved through the processing. In order to reduce the impact on the history of architectural style, and to meet the capacity, In the processing of the entrance space, through the northwest corner of the courtyard set a small sink to the ground floor of the courtyard. Sunken courtyard design fully considered as a new and old interface to undertake and activities of the exchange of space. This will not only highlight the traditional architectural style, but also create a good entrance space and lighting environment (figure 6).

Figure 6. Entrance sunken courtyard

II. Renovation and Renewal of Historical Elements

A. Component Location in the Process of Residential House Dismantling

The process of dismantling is equivalent to the inverse process of construction. Location of components in the dismantling process is to protect the building old relationships and historical information, also timber by moisture content, stress, and handmade accuracy, and preservation factors influence, even similar components in reconstruction also can not substitute for each other. In order to ensure that the component is in the position of the component, the position of each component must be accurate. The cleaning of component after the demolition ,we found almost every building components have the component name on the shelter .In the process of dismantling, the position of the component is adopted by the method of replacing Chinese characters with numbers and letters instead of Chinese characters, In the process of dismantling, the component location is adopted by the method of replacing Chinese characters with numbers and letters, To makes the label writing concise, reducing the number of hours required, At the same time, it is convenient to set up the component information and establish the database. Some building components has been lost or decayed, so the first to classify the building components, and statistic the damaged and missing situation of the components (figure 7).

Figure 7. Surveying and mapping of components

B. The Protection and Restoration of Historical Elements

Wooden column plays a major supporting role in the Zhongjie Street in traditional houses, Because of its

particularity, because the air in it is not in circulation, cold and heat exchange brings the humidity can cause the column to be corroded. According to the construction of inner column decay degree is different, the repair technique mainly Prepare Your Paper Before Styling includes column patching, package inserts, and then replace the pier. The beam head construction often exposed to the outdoors, it is easy because of leaking damp and decay affects its carrying capacity. When the degree of decay is not deep and can be treated with a Wrap method (figure 8). If the rot seriously affects the bearing, we should choose a new material to replace the original components, to ensure the safety of the building and safety.

Figure 8. Repair of the beam head

Figure 9. Engraved the window opposite

Brick and tile is an important part of the traditional building external envelope structure, due to a smaller size, and has the brittleness, the damage of brick in the dismantling process unavoidable. Before the roof tiles and brick to use, we should deal with the surface of the residual ash, and in accordance with the design requirements of the size of cutting. Other components, such as rafters, fly rafter, sheathing, window panels, window middleman, Jiachi, mainly to repair, under the conditions of the helpless can take the new system.

III. THE APPLICATION AND RENEWAL OF TRADITIONAL TECHNOLOGY

Traditional building construction practices can not meet the modern specifications and technical requirements, so in Zhongjie Street historic buildings reconstruction process of fire protection, thermal insulation, heating and other technical practices were updated and improved. In order not to affect the expression of the traditional style, in the wall, roof, doors and windows, heating system for material technical updates using the following methods.

A. Thermal Insulation Design of Retaining Structure

The original house wall thickness of about 420mm, the wall is used the all horizontal arrangement, five layers of horizontal arrangement plus a layer of vertical arrangement, all the vertical arrangement of the three kinds of masonry. The vertical arrangement of brick masonry method is mainly used in the facade of the main house; Liu courtyard of the wing, the remaining masonry method used five layers a layer of horizontal vertical. In order to save the brick, keep the original form of the facade of the building, we studied on the wall of the structure design of the new, the construction method is still using the original brick wall, 80mm thick polyethylene foam insulation layer for middle layer, the internal use of hollow brick 390x190x190mm, the inner surface of plaster leveling. Wall masonry and the corresponding water, heating, electricity and other municipal pipelines laying (figure 10).

Figure 10. Thermal insulation wall construction

The original traditional courtyard roof whether in water or in thermal insulation can not meet the requirements of the specification, so the reconstruction of the building on the roof of the practice of transformation. Roof insulation benzene plate instead of the original clay, straw and other native materials, is easy to install and remove, and greatly improve the heat preservation effect.

In the restoration of the traditional dwellings, style of the windows and doors are basically according to the building of the original shape and style production, but in order to save material, double window changed a single window; the double hollow Low-E insulating glass replaced the window paste paper, in the window with a layer of layering to fix. It can ensure that the overall thermal insulation performance is better.

B. Heating Design

In this project, for the requirements of fire prevention code and the internal space configuration of the existing building, the heating in this project is redesigned, and the whole courtyard is chosen as the heating mode of the ground heating. The Kang indoor of the Huang house courtyard also made improvements, the specific method is: the kang surface is reduced, in which the upper surface is covered with a wooden floor board, so that the surface of the wood floor is flush with the original kang surface. The inside of the Kang is similar to the geothermal heating, the hot water pipeline is laid under wood kang surface, use water heating cycle to make the surface heating up, meet the requirements of the specification and heating. Kang surface using wood, from appearance to look the same as before, but compared to the advantage of traditional soil Kang is wood is a poor conductor of heat, even if not be heated, sitting in the above

will not feel cold, excessive heat, will not feel very hot. In addition, the wood kang surface also appears to be very pretty elegant (figure 11).

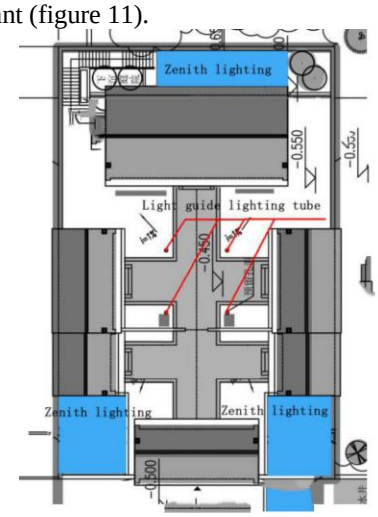

Figure 11. Liu courtyard plan

IV. APPLICATION OF ECOLOGICAL TECHNOLOGY

In order to reduce the energy consumption needed by the underground expansion space for lighting and ventilation, the underground space is used for the local characteristics of the northeast traditional residential courtyard space layout. The northeast is located in the cold area; the layout of the building will give full consideration to the construction of sunshine, so the courtyard space is relatively open. Design two sinking courtyard between the two sides of the wall and Liu courtyard, There is also a lighting courtyard between folk and backyard wall, a total of 3 yards, To provide ventilation and lighting for the underground space. This can not only reduce the energy consumption of underground space lighting, but also can planting plants under the roof of the space to regulate the underground space landscape environment. At the same time, the roof can be opened to the side, so that the indoor air flow can be increased (figure 13).

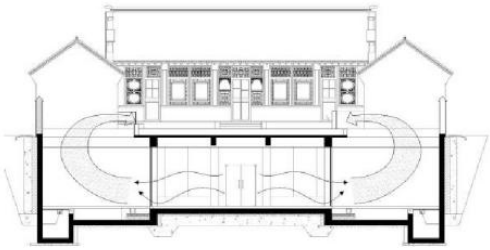

Figure 12. Zenith lighting

Convention and exhibition space is in the middle of the underground space, in the above setting large skylight is bound to affect Liu courtyard traditional style, so in the hospital set four solar optical lighting tube .Light guide light pipe collection of the sun through the lighting tube fold into the room, Through the diffuser diffusion to provide lighting for indoor space, Through the light cover, the underground light is reflected to the ground at night, and also can be used as a landscape lamp to illuminate the ground and reduce the energy consumption of the ground view illumination.

V. CONCLUSIONS

The regeneration of the Zhongjie Street conservation of traditional dwellings is a challenging regeneration construction practice. And modern combination practice through four aspects of the space construction, the protection of historical elements, the traditional technology and the application of ecological technology. The construction process can provide practical experience in the practice of the regeneration practice of similar general historic buildings in this project.

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