The Key Technical Analysis of the Reconstruction of the Wooden Structure Under the Historical Environment

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ABSTRACT

Cultural relic buildings can reflect the social life style, cultural aesthetic orientation and scientific and technological level in a historical period. Erxian temple is the Key Cultural Relics Site Under the State Protection. In the process of repair work of Erxian temple, the application of several new technology and new technology, to solve the several problems in the renovation construction, to ensure the project implementation after the ontology of cultural relics of the reality, preservation, the continuation of the true historical information and value of cultural relics.¹

KEYWORDS

Culture Relic Building, Repair Project, Erxian Temple

INTRODUCTION

Cultural relic buildings can reflect the social life style, cultural aesthetic orientation and scientific and technological level in a historical period. The information is hidden in the overall layout of the complex, the structure and appearance of the monomer building, or the interior space, construction mode and even building materials. The process of repair work of Erxian temple is like the medical treatment in traditional Chinese medicine. The repair through scientific tests, the problems can be detected in advance, and the risk factors can be

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identified. In this way, we can take measures to avoid unnecessary destruction of cultural relics buildings.

Figure 1. Photos of the present situation of Erxian Temple.

The process of repair work of the Erxian temple in Xiaohui Mountains, Lingchuan County, Shanxi Province, strictly observes and adheres to the principle of "not changing the original state" of the Law on the Protection of Cultural relics, minimizes interference as far as possible, protects the original state and historical information of the existing objects, and protects the original state and historical information of the cultural relics. To protect the historical authenticity of cultural relics. The process of repair work of Erxian Temple adheres to the tradition of technology, technique and materials and preserving the authenticity of historical information. To ensure that all technical projects and technical measures will make greater use of the original components, reduce the replacement of the original components, protect the original components, preserve the original materials, maintain the existing state, and maintain the integrity of the environment and the architectural arts.

Figure 2. Erxian Temple master plan.
Erxian Temple is located in Lingchuan County, Jincheng City, towns of Xiaohui Village Southeast of XiaoHui Mountains. It was listed as the fifth batch of the Key Cultural Relics Site Under the State Protection in 2001. We don’t know when it was built, according to inscriptions on the pedestal of incense furnaces in the temple, which was established in Jiayou eight years in the Northern Song Dynasty. The overall architectural composition of the temple sits on the north toward the south, and on the central axis there are gate to a monastery, offering halls, main halls, both two sides have stacked buildings, galleries, halls, ear halls. The main hall was built for the Song Dynasty and the rest for the Ming and Qing dynasties. Although the scale of the main hall is relatively small, it is grand and colorful with materials, and six rafters connect with the eaves before and after, giving people a stout, not clumsy, small and exquisite architectural art enjoyment, which has extremely high architectural scientific research value. It was used as a livestock factory. There is a temple fair here in April of the lunar calendar. In 2013, the Shanxi provincial cultural relics Technology Center began construction of repairs.

THE PRESENT SITUATION OF ERXIAN TEMPLE

After being renovated into the present courtyard pattern in 1905, the ancient buildings have not been thoroughly inspected and renovated anymore. After a hundred years of wind and rain erosion, the Erxian temple complex has a relatively serious structural safety hidden danger. Wood components decayed, deformed and cracked, the foundation of the wall sinking, the wall deforming, the roof sliding cracking and leaking rain, endangering the safe use of the cultural relic building.[1]

The Front Gate, Stage And Building Where Woman Live

The leakage of the roof is the key to the damage. Instability and major hidden danger come from the wall, which has affected the safety of buildings, and the situation is more serious.

East-west Corridor

This section must be in one column.

Hall and Hall of the Things Pile

Due to the seriousness of disrepair over a long period of time, the column is slanted, the roof tiles are loose, and the girder frame pieces are cracked and rotted. In the back of the wall, the gutter drainage resulted in the disruption, and some of the components were missing.
The Hall

Column:
The degree of damage and safety hazards are very serious, and there is no bearing capacity at all. Once the wall is unstable, it will cause the wall to collapse.
architrave:
The mortise-tenon are all extruded deformation and fracture.
bracket set:
The natural weathering and decay, the loss of the fighting pieces, the rupture of the bracket, bracket set of deformation and instability, part of the ang, tie beam of luohan was cut off by the artificial.
hip rafer:
Hall four tail of hip rafer being cut back, to prevent eaves falling, pull back to iron in the lead, fixed in flower arm of eight bracket set on column, to more than two flower arm oblique upward force, make the whole bracket set is distorted, now temporarily not splitting.

Hall overall harm came mainly from the iron of the solid hip rafer structure, the safety of the building to bring huge hidden trouble, once the second flower arm split, or bracket set for structure is spread, and the whole bracket set for damage, not only its tie beam of luo han, column tie beam, eave tie beam also can produce chain link components such as reflection, the consequences will be very serious, at the same time, after the hip rafer instability will cause the upturned roof-ridge forward tipping and roof collapse.

Roof:
The roof tiles are loose, and the wen shou, the ridge, the eave tile and the drip tile are seriously damaged, and the water in the front eaves (the gutter) is washed away from each other, causing the rafters of the two sides (the hall) to be seriously damaged.

Ancillary Relics

The existing stone relics are weathered and broken at the edges of edges and corners. Murals, painted images with blurred images, severe fading.

Yard Ground

Uneven ground, most of the bricks have been damaged, near the wall serious seeper.

Courtyard Walls

Soaking and natural weathering have caused a safety hazard in the lower part of the wall.
Surrounding Environment

The farmland is too close to the cultural relics, and the natural environment and ecological environment are good.

ANALYSIS OF PARTIAL STRUCTURAL REPAIR

Hall hip rafer reinforcement renovation plan: repair, reinforcement of existing hip rafer reinforcement maintenance, After the rear tail by wood with a palm. Tenon extend back to 7-purlin beam, buckles on the beam tail existing mortise. The tail of hip rafer ending on the short column, the tail of hip rafer with hoop with beam firm. Put the original piece of iron back in place. This scheme has some advantages but also disadvantages, advantages: traditional mortise and tenon technology combined with modern materials. Defects: a large part of the old component intervention. The reason why we adopt this scheme is to respect the original components, adopt the traditional technology and eliminate the hidden danger.

The angle beam is placed on the horizontal cushion of equal length, and the iron hoop is mounted on both ends with two jacks to support the top iron hoop, and the angle beam is gradually corrected by slowly pressing the Jack. The correction needs many times to strengthen the strength of the two ends of the support each time to prevent one correction from breaking the deformation of the member and the block must be set between the Jack and the corner beam and the cork in the iron hoop in the single step beam. Embed No.12 channel steel in the back of the corner beam, so place the channel steel on the corner beam and draw the line along the edge. The angle beam epithelium is removed about 0.5cm thickness from the plane to ensure that the channel steel embedded is the same plane as the upper surface of the original angle beam. The welded channel steel is inserted into the groove, and if the joint is not tight, the grooving is continued, and the nail hole is drilled in the back of the channel steel after the joint is tight. After the epoxy resin glue is smeared evenly, the embedded steel groove is immediately hit, and the spilled glue is applied to the slot between the channel
steel and the corner. In order to strengthen the integrity of channel steel and corner beam, two iron hoops are used, the interface is a barbed nail, and the iron hoop is made into a square according to the side length of the corner beam. Finally, the wire fastener is used to tighten the hoop. After the Houwei is made, the angle beam is pre-installed, and the four angles are measured separately. Because of the deformation of the component for many years, the size of the Houwei of each component is different. After the completion of production will be in the frame of the line tenon, ensure that each corner beam is well-jointed. At the joint of new and old components, use No.12 channel steel is slotted up and down, and then fastened with bolts, then iron hoop is set up. After the manufacture is finished, it is installed, and then the steel hoop is used to tighten the hind end and the rear tail, the rear tail and the Ding, the six rafters, and the melon column.

CONCLUSIONS

The hall of the Erxian temple is a rare architectural remains of the Song Dynasty in our country. It is the most important building of the Erxian Temple, and it is also the key point in the implementation of the project, and the reinforcement of the beam in the hall Corner is the most important part of the construction. In this paper, it is analyzed and demonstrated whether to reinforce or preserve the original state. After many discussions, it is decided to reinforce it, and then a variety of reinforcement schemes and measures, including the application of new materials, are put forward. The leaders of the department in charge of cultural relics at a higher level hereby give instructions and demonstrate the organization experts of the proposed maintenance plan. At the same time, the scheme demonstration is carried out at the same time as the expert group of the early building protection engineering in the south - west of the mountain. After determining the repair plan, the mechanical calculation and mechanical analysis of the reinforcement measures were carried out again. After making sure that the loading condition is satisfied, the preparation of the material is carried out, the material is scientifically identified, and then find the local dry materials. Finally, the project is determined, the components are made, and the measures are taken to reinforce it. The bearing capacity is strengthened, the original structure is restored, the historical information is corrected, and the new recovery part remains identifiable.

The principle of minimum intervention and no change in the original state of cultural relics was observed in the reinforcement and restoration of Erxian temple corner beam. Scientific analysis and research were carried out throughout, and accurate data were obtained. With the application and breakthrough of traditional technology and modern technology, the combination of scientific research and scientific research can truly demonstrate our achievements in repairing ideas and techniques, and ensure the authenticity and preservation of cultural relics after the
implementation of the project. Continuation of the real historical information and value of cultural relics.

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