

The Protection of Traditional Residential Buildings in Huize Ancient City Taking No.37 Courtyard of Sandao Lane as an Example

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Abstract. Based on the typical forms of traditional dwellings in Huize area and relevant literature, this study has protected and restored the existing details in accordance with the spatial patterns of traditional dwellings in courtyard 37, sandaoxiang, the ancient city, and partially demolished the later part of the traditional dwellings, and restored the spatial forms and details of the original traditional dwellings. At last, the function of the courtyard is replaced, so as to expand the use area of the courtyard building, improve the modern life infrastructure, meet the needs of residents' life and improve the quality of residents' life. In order to provide a certain reference value for the traditional residential building design in the similar historical blocks in China.

Keywords: Huize, traditional residence Protection.

1. Introduction

Huize historical city covers an area of 2.51 square kilometers from Tongbao road in the north, Jinzhong mountain in the south, Niujia ancestral hall of Dafosi temple in the West and Cuiping road in the East. From the middle of Qing Dynasty to the Republic of China, the urban built-up areas were mainly distributed in the south of Yitong River, the north of Jinzhong mountain and Lingbi mountain, the west of Cuiping road and the east of Niujia ancestral hall of Dafosi temple. Except for Zhongping street, Lingbi road and other newly built roads after liberation, most of the historical urban areas are traditional streets and lanes formed in history, basically maintaining the historical pattern and spatial scale, especially the traditional residential courtyards and street patterns of the first lane, the second lane and the third lane in the ancient city are well preserved. The buildings on both sides and streets such as Xiwai street, Beinei street, Dongwai street and Dongguan Street are also well preserved. There are still many traditional spatial patterns in the Confucian temple and its neighborhood. Zhongping street, Lingbi Road, Dongzhi street and Xizhi street have greatly changed their historical features. Xinnei street and dongnei Street are traditional commercial streets, and the scale and pattern of streets and lanes are basically in good condition.

The existing historical buildings in Huize historical city are mainly residential buildings, especially the traditional residential courtyards and streets of toudaoxiang, erdaoxiang and sandaoxiang in the ancient city are well preserved. The following from the architectural style, architectural quality, use of three aspects of its existing problems to be explained.

1.1 Architectural Style

Due to the vicissitudes and disrepair of the traditional residential buildings since they were built, their architectural features are damaged and destroyed to a certain extent. The destruction of their features is mainly reflected in the walls, roofs and doors and windows.

1.1.1 Wall

The walls of traditional houses in Huize ancient city are generally rammed walls or blue brick walls. In order to protect the walls and add beauty, the outer layer of some walls is covered with white lime layer. Because of its long history and disrepair, most of the white lime layer of the wall has been peeled off to a certain extent, and the rammed earth wall and brick wall exposed directly have also been corroded to a certain extent. In addition, due to the frequent occurrence of local earthquakes or other factors, some walls have cracks in varying degrees. There is also the

phenomenon that the original wall is demolished and replaced by brick wall in some extended houses.



Fig 1. rammed earth wall with weathered cracks Fig 2. brick wall after demolition

1.1.2 Roof

The roof of traditional houses in Huize ancient city is generally in the form of double broken tile roof, and the wing roof of some houses is in the form of asymmetric double slope roof. There are generally cat arch walls and cat holes on the local roof. Most of the existing cat holes are blocked by the residents and have no actual use function. Because the houses are old and in disrepair, the roofs of the houses are damaged to varying degrees. Some houses are replaced with new tiles by the residents, and some houses are directly added with a layer of cement asbestos tiles by the residents.



Fig 3. well preserved courtyard roof Fig 4. the roof is covered with a layer of cement

1.1.3 Doors and Windows

Huize traditional houses are generally not carved with beams and painted buildings, but the door and window practices are very particular. Each family decorates according to their ancestral habits and hobbies. Some carved doors and windows are high-grade decorative works of art. Due to the high thermal insulation and high cost, most of the damaged wooden doors and windows have been replaced by modern doors and windows by local residents, and there are few existing intact wooden doors and windows.

1.2 Construction Quality

According to the different quality of the existing traditional houses, they can be roughly divided into three categories: the basic intact category, the better preserved category and the dangerous building category. The following three types of traditional houses in Huize are described.

1.2.1 Basic Intact Category

This kind of building mainly aims at the key residential buildings and other well preserved traditional buildings. In general, the column stone drum piers of this kind of buildings are basically in good condition, and the walls have no obvious settlement cracks; the wooden columns are basically free of deflection and bending, and there are few natural stress defects in the key stress parts; the wooden beams and braces are basically in good condition, and no natural defects are found in the key stress parts; the joint wood materials of the columns and beams are basically in

good condition; the roof structure is basically in good condition; the maintenance system is not obviously inclined, and the walls are not obviously under Sinking and bulging deformation. But there are still some problems such as root rot, wood column cracking and roof leakage.

1.2.2 Better Preserved

Generally, there is a certain water leakage phenomenon on the roof; there is a certain tilt in the maintenance system, and there is a sinking and bulging deformation phenomenon in the wall. This kind of building is mainly aimed at the traditional style building with relatively complete traditional pattern of courtyard, or the building with uncoordinated factors, and the disordered courtyard building which has lost the traditional courtyard space pattern.

1.2.3 Dangerous Buildings

It is mainly aimed at the traditional residential buildings with no reserved value, which have become dangerous houses. In general, most of the wooden column bases of this kind of buildings are buried in the foundation soil without anti-corrosion and moisture-proof treatment. The columns are seriously rotted and cracked, and the wall part has obvious settlement cracks; the wooden columns also have some degree of deflection and bending, and the key parts under stress have some stress defects; the wooden beam and brace joints are not stable, and the key parts under stress have days However, there are obvious shrinkage cracks in beams and braces; the roof structure is damaged obviously, and the roof generally has water leakage; the maintenance system part has a certain inclination, and the wall part has obvious sinking and bulging deformation.

Courtyard 37 is located in the south of Sandao lane, adjacent to courtyard 39 and Jiangxi guild hall in the west, and courtyard 33 in the East. Courtyard 37 is a key residential building with a complete pattern. It is a "sun" shaped plane with two entrances, which means "sun is beautiful in the middle of the sky and shines brightly in the court". (the basic spatial composition units of local residential buildings are in the shape of "mouth", "back" and "Chang", etc., which are unified in the overall "well field" layout of the city) as shown in the figure below.

2. Problems

The door head of the main entrance is basically well preserved, but later the gate is changed to large and small iron doors. The exterior wall has a large area of white ash peeling, which is full of the sense of historical vicissitudes. The aisle is basically well preserved, with some traditional decorative patterns. Because the roof was rebuilt in the late period of the leakage, the old and new buildings are juxtaposed, which shows the historical context.

In the first entrance wing room, there was later construction, which basically disappeared the courtyard space. However, when entering the west side, it was found that the doors and windows of the original wing room were still in good condition, which were exquisite traditional residential door leaves. In order to expand the use area in the East side, the original doors and windows had been removed.

2.1 Unit 1

Part of the gable of unit 1 of No. 37 courtyard, Sandao lane, Huize County is replaced by brick, the west wing is expanded by 1.25m, and the east wing has replaced all rafters and tiles, but there is still water leakage, some wood members are damaged and decayed; there are local damage and potential safety hazards, some structures can not meet the normal use function, forming local dangerous houses, so reinforcement or maintenance measures must be taken. The evaluation grade is C.

2.2 Unit 2

Most of the columns in the second unit of No.37 courtyard, Sandao lane, Huize County are cracked, the columns are rotten and wormed to varying degrees, most of the beams, braces and purlins are dry shrinkage cracks, some of the purlins and rafters are damaged and rotted by moisture;

tenon pulling occurs at the joints of columns and beams, and some of them are seriously damaged and have major safety hazards, which can not meet the normal use. The adobe wall is corroded and cracked by water, and the wall skin is peeled off in a large area; the roof is overgrown with weeds, the tiles are weathered and damaged in varying degrees, and the water leakage is serious. Therefore, the unit structure constitutes the whole dangerous house, and the evaluation grade is d. It is recommended that this unit be demolished and rebuilt.

The gables and back walls of the East and West Wing rooms of the main building of the second entrance courtyard are adobe walls and the face walls are brick walls. At present, the earth wall is partially fallen off; the roof is overgrown with weeds; the main roof and the west wing are partially covered with asbestos tiles to prevent rain; the ends of some wood components are decayed, and the cornice is slightly drooping.

2.3 Three Units

The gable and back wall of the East-West wing room of unit 3 of No. 37 courtyard of Sandao Lane in Huize County are adobe walls and the front wall is brick walls. At present, the earth wall is partially fallen off; the roof is overgrown with weeds, and the back roof and the west wing are partially covered with asbestos tiles to prevent rain; the ends of some wood components are decayed, and the cornice is slightly drooping, so reinforcement or maintenance measures must be taken. The unit is rated as level C, as shown in the figure below.

3. Transformation Plan

3.1 One Unit Treatment

In order to ensure the subsequent safe use of the building, the following treatment was carried out for unit 1 of No. 37 hospital:

in case of roof unevenness and water leakage, the weeds on the roof shall be removed in time, and the rafters affected by damp, decay, deformation and deflection shall be replaced; the weathered and incomplete small green tiles and asbestos tiles shall be replaced; the loose tiles can be fixed by adding vertical tile nails on the tile surface, or by using mortar and a small amount of adhesive.

Purlins with Deflection and Decay Shall be Replaced

for columns with dry shrinkage cracks, first remove the deposit in the joints, and then use putty to mark the cracks tightly.

3.2 Two Unit Processing Mode

After the above analysis, the unit structure constitutes the whole dangerous house, and the assessment grade is d. The unit should be demolished and rebuilt.

3.3 Three Unit Treatment

In order to ensure the normal use of the building in the future, the following treatment is recommended for unit 3 of No. 37 hospital:

The leaky roof shall be maintained, the damp and rotten rafters shall be replaced, and the weathered and incomplete small green tiles shall be repaired.

The adobe wall shall be treated with rain proof and anti-seepage measures.

3.4 Final Plan

According to the typical forms of traditional houses in Huize area and relevant literature, the existing details of courtyard 37, sandaoxiang, ancient city, which conform to the space style of traditional houses are protected and repaired, and the later part of the traditional houses is partially demolished and destroyed, and the space form and details of the original traditional houses are restored. At last, the function of the courtyard is replaced, so as to expand the use area of the courtyard building, improve the modern life infrastructure, meet the needs of residents' life and

improve the quality of residents' life. Due to the particularity of the building itself and its location, it is necessary to protect the original building to the maximum extent and restore the style of the ancient city in the design stage. In order to provide some reference value for the design of traditional residential buildings in similar historical blocks in China, the following design scheme is obtained.

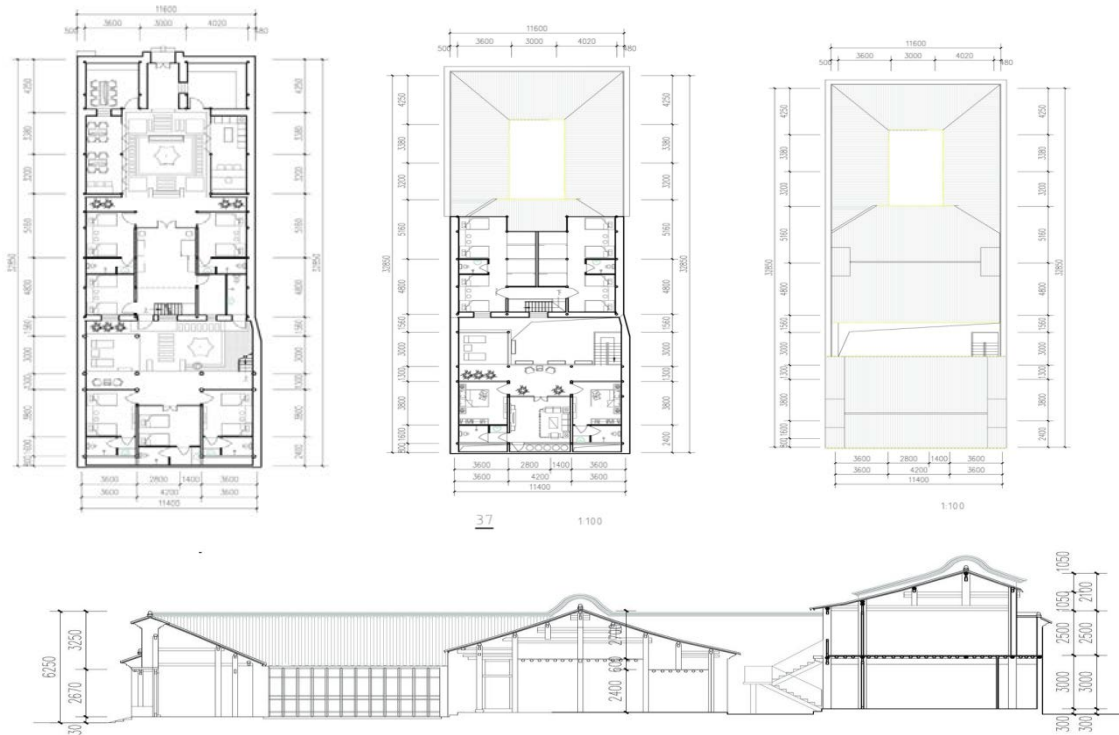


Fig 5. scheme drawing of No. 37 Institute after reconstruction

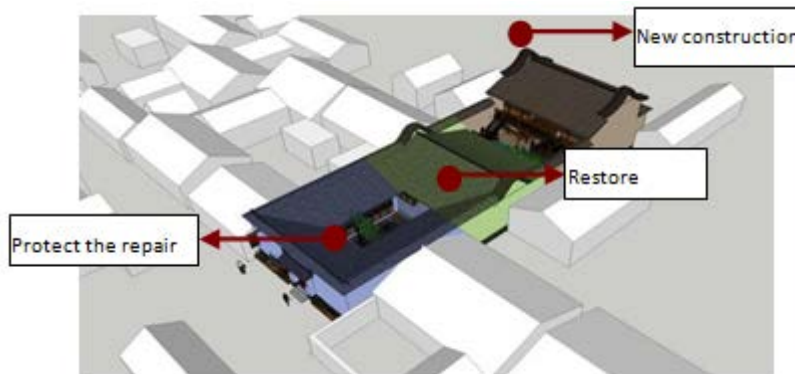


Fig 6. transformation strategy of No. 37 Institute

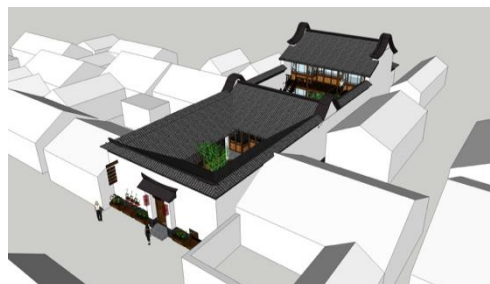


Fig 7. overall perspective of No. 37 Institute after reconstruction

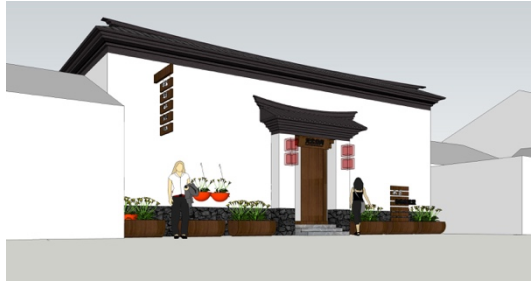


Fig 8. perspective view of entrance of No. 37 Institute after reconstruction

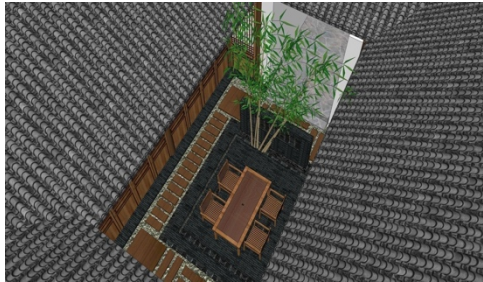


Fig 9. perspective view of the front patio after the reconstruction of No.37 courtyard



Fig 10. perspective view of rear patio after reconstruction of No. 37 courtyard



Fig 11. perspective view of atrium node after reconstruction of No. 37 Institute

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