

Material Expression on Huizhou Contemporary Regional Architecture

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Abstract—Building materials are not only the material basis of construction, but also an important carrier of regional architectural culture. With the development of The Times, building materials have also changed. How to use traditional and modern materials to show the regionality and contemporaneity of architecture is an unavoidable problem in the development of regional architecture and the goal of architectural creation. Taking Huizhou contemporary regional architecture as examples, this paper discusses the material expression of Huizhou contemporary regional architecture through three ways: the modern expression of traditional materials, the regional expression of modern materials and the juxtaposition of old and new materials.

Index Terms—regional architecture, tradition and modernity, material, expression

I. INTRODUCTION

Building materials are not only the material basis of construction, but also an important carrier of regional architectural culture. As an important aspect of regional architectural culture, building materials have been paid more and more attention and widely recognized. From the point of development of human civilization, building materials mainly include traditional materials and modern materials, the British scholar David Smith Capone think there are three main traditional materials: stone, brick and wood, "modern" of the three main materials: concrete, steel and glass, as well as various mixed materials, nonferrous metals, ceramics, plastics and other synthetic materials [1].

The materials used in traditional Chinese architecture are "five materials used together, civil engineering is emphasized"[2]. Through the scientific use of traditional masonry, stone and wood materials, Huizhou traditional regional architecture creates a human living environment and unique architectural form with the integration of nature and man. With the development of The Times, how to use building materials to show the regionality and contemporaneity of architecture is an unavoidable problem in the development of regional architecture and the goal of architectural creation. Huizhou contemporary regional architecture mainly includes three aspects to express regional characteristics through materials: the modern expression of traditional materials, the regional

expression of modern materials, and the juxtaposition of traditional and modern materials. Huizhou contemporary regional architectural creation, in the use of materials based on these three aspects, to create urban architectural environment with regional characteristics.

II. MODERN EXPRESSION OF TRADITIONAL MATERIALS

Traditional materials are green building materials with ecological properties. The use of traditional materials that are easily available locally will greatly reduce the construction cost, energy consumption and environmental damage. With appropriate measures and processes, most traditional materials can not only meet the needs of living, but also be renewable, biodegradable and environmentally friendly[3]. In addition, building materials intuitively reflect the cultural connotation related to materials and convey different spiritual intentions. Choosing building materials with regional characteristics is one of the important ways to convey the regionality of architecture. Traditional materials contain regional cultural attributes such as historical memory, nostalgic experience and unique place spirit. Wood has a warm texture, stone is rich in natural and primitive flavor, and brick and raw soil inherit local context. Traditional materials endow buildings with the passion of the earth, the vicissitudes of history, the vitality of life and the warmth of human nature, which are beyond the reach of many modern technologies and materials. In addition, it has the advantages of easy coordination with the surrounding environment, easy to use traditional crafts and hire local craftsmen [4]. It should be noted that traditional materials also need to consume a large amount of land and natural resources, and unscientific use is also easy to lead to soil erosion and environmental damage. Therefore, the use of traditional materials should have a rational attitude. At present, the use of traditional materials is more common mainly in the following ways: one is the recycling of traditional old materials in new buildings, the other is the regional construction of traditional materials, and the other is the use of traditional building repair, in addition, it is used as decoration in new buildings.

A. Recycling Use

Recycling use is mainly to reuse the old materials dismantled by tradition, so that the materials can be

recycled and the regional characteristics of the materials can be brought into play. Song Feng Cui Camellia oil factory, Zhongping village, Wuyuan Jiangwan town, adopts the new way of recycling old bricks and tiles, and adopts the structure form of frame as the main structure and brick mixing as the auxiliary structure "Fig. 1". The main building materials are recycled old bricks and tiles, old wood and old stone, etc., which makes the construction convenient and the materials are fully used. Brick is mainly used for wall self-bearing, space enclosure and heat insulation 3 categories. The facade of the building adopts clear brick wall, most of which have the surface traces formed by time accumulation. The material, laying method and window hole form are unified, and the whole building presents spontaneous and rich detailed changes[5]. Visually, the grey brick outer wall has a better color fusion degree with mountains, woods, fields and streams, which greatly reduces the pressure on the environment. The recycling of old materials reflects the adaptability and ecological type of regional building materials, environment and times, as well as the regional characteristics, which provides a reference for Huizhou's contemporary regional architectural creation.

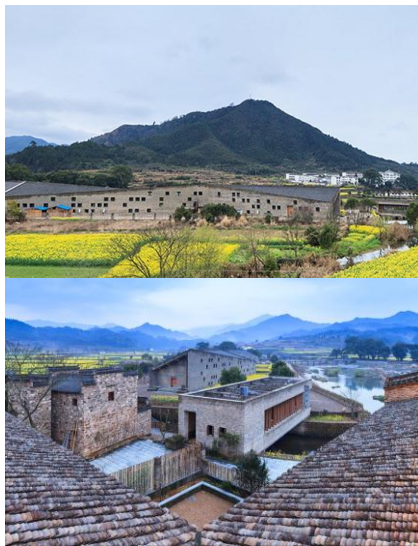


Figure 1. Traditional old materials are used for recycling

B. Regional Construction

Regional construction mainly adopts traditional materials to construct, which reflects the logic of materials and the expression of regional architecture on the ground. Frampton called it poetic construction after his "critique of regionalism." [6] Huizhou traditional architecture contains a complete set of material construction system, brick, stone and wood traditional materials in their proper place, the construction of a unique regional architecture. "↗" house, located in Qimen county town Taoyuan village, the designers through the in-depth study of traditional material system, and reshape the construction of the material logic "Fig. 2". The designers retained the four facades of the old house, including a rough white slotted hollow brick wall, with

beams and columns of cedar, the most common in the area. On the first floor, the wooden structure still supports the floor slab in the traditional way of bucket-through, while on the second floor, where the roof is supported, the wooden structure adopts a kind of pseudo-materialized formal language, which cantilevers the roof outwards in the form of tree canopy to cover and protect the old wall [7]. Overall, the building achieves the logical expression of material construction.



Figure 2. Traditional materials for regional construction

C. Traditional Restoration

Traditional restoration mainly uses traditional building materials to repair ancient buildings, which reflects the principle of restoring the old as before. Huizhou traditional buildings are mostly built of masonry and wood materials. In the process of restoration, traditional building materials and techniques need to be used and improved. Shexian county government restoration project, use traditional materials and technology, highlighting the regional characteristics of Huizhou architecture in the middle of the Ming dynasty "Fig. 3". Detail respect is straight column, beam still is door plank, lattice window, lumber uses hawthorn tree lumber, flaxen and slightly aglow, stone drum, door edge, fence, slate all stone all use egg white granite. The architectural style and color reproduce the plain and vigorous style of Huizhou middle Ming dynasty architecture, making the overall architecture generous and elegant. The white wall, the green black tile, the gray brick carving gate building, the high and low strewn at random horse head wall, fully reflects the unique charm of Huizhou architecture [8]. At the same time, through the improvement of modern technology, such as the use of modern wood structure fire prevention, waterproofing and ant prevention technology, Huizhou government office became a new building of

traditional style conforming to the safety of modern buildings.



Figure 3. Traditional material restoration

III. REGIONAL EXPRESSION OF MODERN MATERIALS

Modern materials mainly refer to the materials that must be artificially synthesized and deeply processed, such as concrete, steel, glass, synthetic materials and so on. These building materials have a strong sense of modernity. The wide use of modern building materials, its advantages are obvious, reinforced concrete has better mechanical properties, glass has better daylighting insulation performance, aerated concrete blocks have better insulation performance and so on[9]. Although compared with traditional building materials, modern building materials lack some natural and warm psychological feelings and cultural connotations, they are not in complete opposition to regional buildings. Critical regionalism believes that modern architectural design by combining modern design methods, structures and structural features with local elements, methods and features can find a convergence point between tradition and modernity, globalization and regionalism[10]. A lot of built work has proved that skillfully mastering the characteristics of modern building materials, skillfully using modern materials and modern technology, also can build a regional architecture, especially in the large-scale urban construction, using the modern building materials and modern construction technology system more in line with the needs of the development of era, has the stronger operability and practical significance. In the creation of contemporary regional architecture, modern materials, such as concrete, steel, glass and so on, are used to make modern materials have the connotation and life of regional culture and highlight regional characteristics by integrating regional cultural elements. There are three main ways for modern architectural materials to express regionalism. One is to imitate traditional regional architectural forms, the other is to simplify the inheritance of traditional regional architectural forms, and

the other is to translate the cultural connotation of traditional regional architectures through modern forms.

A. Imitation of Tradition

The imitation of modern building materials on regional traditions is mainly reflected in the adoption of traditional forms in architectural forms, reinforced concrete structures in architectural structures, and concrete components in architectural components to imitate traditional details, colors, textures and patterns. This method is mainly used in the renewal and construction of the traditional historical environment. In order to form a harmonious and unified style with the traditional historical environment, the traditional architectural form is often imitated and modern materials are used in the building materials. Ancient city Hui-garden street, in the design of buildings with reinforced concrete frame structure, the reinforced concrete columns of imposing chestnut shell color coating are imitations of Huizhou traditional regional architecture wooden pillars and performance, horsehead walls and gates adopt concrete prefabricated, use wood doors and windows, build a harmonious unity of the traditional architectural style, to adapt themselves to the integral atmosphere of the ancient city of Huizhou "Fig. 4". Yixian Ink Hongcun is located in the west of Hongcun, a world cultural heritage site. In order to coordinate with the overall environment of Hongcun, modern building materials are also adopted to express the traditional overall layout and architectural form "Fig. 5". Compared with traditional buildings, its architectural functions meet the new living needs, and the architectural forms are concise and rich in local characteristics. Modern building materials imitate traditional methods and have their special urban environment and architectural style requirements. If they are abused arbitrarily regardless of surrounding environmental conditions, it is easy to form fake antiques, which should be avoided.



Figure 4. Shexian Hui-garden



Figure 5. Yixian Ink Hongcun

B. Simplified Tradition

Modern building materials simplify the inheritance of regional traditional architectural forms, mainly to simplify the extraction of traditional architectural forms, the main structure of modern materials, local details adorn the use of traditional building materials, the overall embodiment of traditional architectural charm, highlight the regional characteristics of the building. The office building of architectural design and research institute of Huangshan city is located at Qiyun avenue, Huangshan city "Fig. 6". The building forms a courtyard space surrounded by the north, south and east sides. The main body of the building is made of reinforced concrete, the wall is made of white waterproof paint, local use grey face brick, the roof is made of deep blue grey resin wave tile, the horsehead wall is made of dark cyan gray fluorocarbon, and the balcony and air conditioner are made of wood colored aluminum alloy. Glass, steel and other modern materials are used in the entrance gateway, while stone, brick and other traditional materials are used in some parts. Traditional wood and stone are used in the inner courtyard and outer corridor. The main body of the building adopts modern materials, but due to the simplified inheritance of traditional forms and the partial use of traditional materials and colors, the building as a whole reflects the charm of traditional regional architecture. Due to the use of modern architectural functional layout, material technology and simplified traditional forms, this method not only meets the needs of modern functional use, but also has a positive significance for the unity and coordination of urban features, which has a wide range of application value in Huizhou contemporary regional architectural creation.



Figure 6. Simplify expression of modern materials

C. Translation of Tradition

The translation of traditional regional cultural connotation by modern architectural materials is mainly based on the form of modern architecture. Modern architectural materials are used in the architectural structure and details, and the elements of regional architecture are simplified and refined by using modern architectural materials to reflect the cultural connotation

of regional architecture. In the architectural creation of the wind and rain playground of Huangshan University, the architects extracted the classic elements of Huizhou architecture, such as white walls, black tiles, wooden grilles and leaky Windows, and translated them with modern materials "Fig. 7" [11]. The solid wall of large area considers the change combination of dimension of unit of light color stone material, coping is pressed with material of dark gray metal top, make its achieve force feeling and heavy feeling. The image display surface of the two main spaces facing north adopts transparent folded glass curtain wall, which can meet the requirements of daily lighting and integrate the interior and the environment. Local use wood lubricious metal grille, satisfy functional demand already, also blend in wood lubricious very well between black and white. The building as a whole shows the beauty of the masculine power of modern materials while revealing a ray of warm color. At the same time, the use of the details of Huizhou elements represented by these modern building materials makes the building style of wind and rain playground blend harmoniously into the regional architectural style and natural environment, making people feel the atmosphere of regional culture.

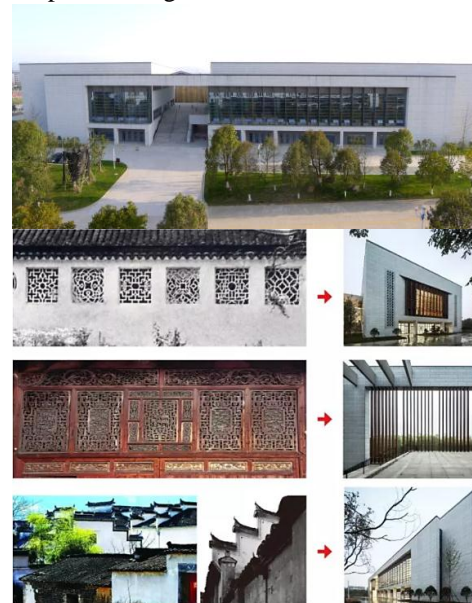


Figure 7. Modern building materials translate traditional elements

IV. JUXTAPOSITION OF NEW AND OLD MATERIALS

Traditional building materials have the inherent characteristics of being close to nature, using local materials and reflecting regional culture. Modern building materials have the advantages of excellent structure and physical properties. Philosophically speaking, pure things must have strong repulsion and low adaptability [12]. Juxtaposition of materials is achieved by injecting heterogeneous elements into the matrix to achieve a new balance. The juxtaposition of traditional building materials and modern building materials can give full play to their respective advantages, so as to meet the needs of modern building lifestyle and function, reflect

humanistic care and highlight regional cultural characteristics. Regional architectural creation pays attention to the connection between tradition and modernity, combines traditional architectural materials and techniques with modern architectural materials and techniques, and harmonizes the form, texture, color and other aspects. The juxtaposition of traditional and modern materials has brought more opportunities and choices to regional architectural creation, and they complement each other in reasonable juxtaposition and use, so as to achieve a harmonious and unified integrated state.

The juxtaposition of traditional and modern building materials has great potential in regional architectural creation. Tunxi Liyang In Lane, Huangshan city, is opposite Tunxi Old Street across the river. Its predecessor is Liyang old street, known as "Liyang in Tang and Song dynasties, Tunxi in Ming and Qing dynasties". In 2013 to develop and utilize, in order to create a fusion of traditional and modern neighborhood environment, the architect makes a deep thinking on material selection, by retaining, transplantation, the concept of innovation form the fusion of traditional and modern material, to retain the traditional, old and new harmony, heterogeneous isomorphism in three ways in block form and state, present a blend of traditional and modern landscape.

A. Retention the Tradition

The retention of traditional buildings is the basis for the historical weight and regional characteristics of blocks, as well as the juxtaposition of tradition and modernity. It can be achieved through the overall preservation of buildings, the retention of building components and the recycling of building materials "Fig. 8". The retention of traditional buildings is mainly based on the use of traditional materials, which creates the site matrix for the contrast and fusion of tradition and modernity, and is an important foundation for the formation of overall juxtaposition.

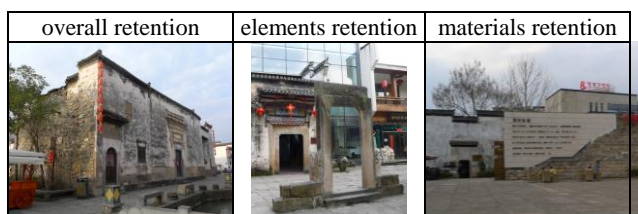


Figure 8. Three ways of retention on traditional architecture

B. Integration of Old and New

Traditional architecture and modern architecture are quite different in material, function and form. In order to realize the integration of tradition and modern architecture, the old and new buildings are mixed and juxtaposition to form the three relations of connection, apart and adjacent "Fig. 9" [13]. When the connection between the traditional building and the new building is maintained, the architect adopts the modern glass material to form a strong contrast with the material. The top of the glass block adopts the steel edge, and the gable part adds the symbol of horsehead wall to form the contrast and unity between the traditional and the modern.

The new and old buildings on both sides of the main street form a relationship of facing each other across the street. The new buildings echo the traditional buildings on the opposite side in height, color and roof folds, and coexist with the old buildings in a humble attitude. When the new and old buildings are adjacent to each other, architects adopt a variety of building materials and modern building forms, forming a fusion relationship with traditional buildings.

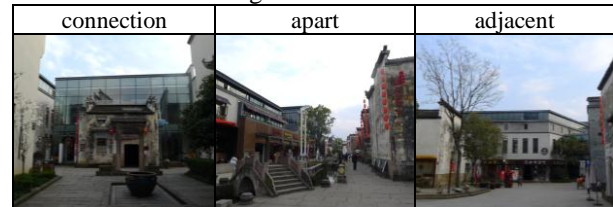


Figure 9. Three ways of juxtaposing old and new buildings

C. Heterogeneous Isomorphism

The choice of building materials in Liyang In Lane is rich and diverse. There are not only traditional materials such as blue brick, red brick, wood and stone, but also modern materials such as steel, glass and concrete. Different building materials form diverse and unified architectural forms by means of heterogeneity and isomorphism "Fig. 10". The new building extracts the architectural elements of Huizhou, such as horsehead wall, brick carving, leaky windows and doorways, and combines them with modern materials such as glass and steel to form a fusion of tradition and modernity. In the exterior wall part, the architect adopts traditional building materials of grey brick, and presents both modern and traditional charm by imitating the texture of traditional buildings. In addition, the building innovates by extracting traditional elements and integrating them into modern concepts. The architects simplified, deformed and replaced the horsehead walls and roofs with Huizhou features. Eaves and brim pressing eaves of horsehead wall were extracted and simplified to black edges; topological deformation of slope roof is folded line. Eave is replaced for i-steel, roof small green tile replacement for concrete block tile. The refinement and simplification of formal elements and the replacement of building materials have formed a new regional architectural form in which tradition and modernity blend and coexist harmoniously.

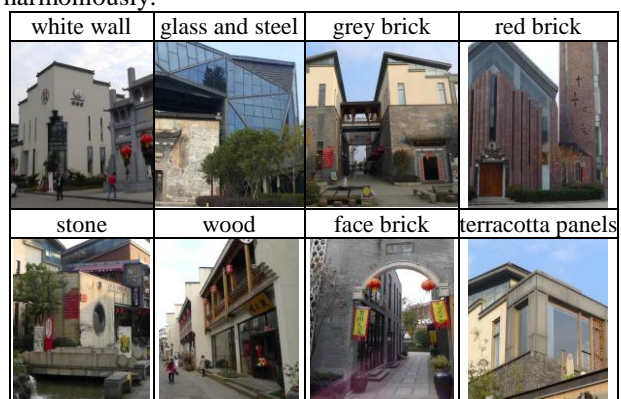


Figure 10. Juxtaposition of materials

V. CONCLUSION

Huizhou traditional architecture adopts traditional brick, stone and wood materials to create a unique regional architecture. With the development of The Times, modern materials are widely used. Huizhou contemporary regional architecture does not adhere to the tradition, but through the integration of traditional materials and modern materials, it not only continues the tradition, but also integrates into the modern civilization, forming a modern urban landscape with regional characteristics. In the construction of modern cities and towns, there is no complete separation between the use of traditional materials and modern materials. They can also show the regionality of architecture, and regional culture is still of great value in coping with the challenges of globalization and maintaining cultural diversity.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

The paper was written by the author alone.

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