DISSERTATION

The Application of Architectural Semiotics in Adaptive Reuse of Chinese Vernacular Architecture

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CONTENTS

Abstract

This study is based on Morris' semiotic theory, dividing semiotics into Syntactics, Semantics, and Pragmatics, and integrates these three theories with adaptive reuse theory to explore the specific application of architectural semiotics in vernacular architecture design.

In the Syntactics section, the author focused on the construction methods of architectural signs in design. Through literature review and case studies, the representation techniques of architectural signs were classified into four types. These types provide diverse forms of expression for architectural signs, allowing traditional signs to be reinterpreted and applied in modern design. In the Semantics section, the study, combined with Peirce's semiotic theory, delved into the classification of signs. Based on the basic categories of icon sign, index sign, and symbol sign, a more detailed classification of these signs was developed. This classification aims to reveal the cultural connotations behind architectural signs and explore their translational use in contemporary architectural design.

In the Pragmatics section, the study emphasizes the impact of vernacular architecture or design works as cultural signs on users and society. Subsequently, the author combines these three theories with adaptive reuse theory to develop a design methodology, which is then applied to the design of three practical projects, demonstrating innovative use of traditional Huizhou Architectural signs, traditional Ganzhou Architectural signs, local Hubei architectural signs, and Song Dynasty aesthetics. Through these practices, the author investigates the practical application of architectural semiotics in the adaptive transformation of Chinese vernacular architecture in the context of new rural development and examines the resulting socio-cultural impacts.

This study aims to provide scholars and designers researching architectural semiotics with a new perspective, hoping to inspire further exploration in the field. The author also hopes that this research will bring new insights into rural renovation practices, infusing modern architectural semiotics with fresh vitality, and promoting continuous innovation and in-depth development in the discipline.

Key words: Architectural Semiotics, Vernacular Architecture, Adaptive Reuse, Sign, Architectural Design

1. INTRODUCTION AND BACKGROUND

1.1 Research Background

1.1.1 Architectural Semiotics

With the rapid development of the construction industry and the swift expansion of urban areas, China has successfully joined the ranks of the world's developed nations. Its rich historical and cultural heritage is globally recognized for its significant research value and potential for exploration. However, under the current strategy where urban architecture is predominantly driven by modernization, Western societies continue to hold a dominant position within the global framework, particularly in areas such as residential construction, infrastructure development, and urban environmental planning. Against this backdrop, the importance of architectural style is becoming increasingly prominent, as individuals and societies alike strive to express their unique cultural identity and charm through distinctive architectural signs.

Architecture is deeply intertwined with science and philosophy, with aesthetic philosophy in particular often influencing architectural design and theory. Concepts from the history of science are also frequently employed to explain the evolution and development of architectural history (Yu, 2014). British philosopher and aesthete Beardsley (1915–1985) once noted: “In a broad sense, semiotics is undoubtedly one of the core theories in contemporary philosophy and numerous other fields of thought (Lipman, 1986).” Moreover, discussions surrounding “regionalism” have consistently been a key topic within architectural theory, from the development of regionalism in architecture to critical regionalism.

Semiotics was first introduced into architecture in the 1940s in Italy. At that time, influenced by the country’s deep historical and cultural background and under the political control of fascism, a new rationalist architectural ideology emerged. This

movement was both a reaction against orthodox modernism and a critique of classicism and postmodernism. In the midst of a "crisis of meaning", architects began to question the "International Style", advocating for a stronger emphasis on local expression. It was within this context that semiotics and the concept of the "Sound Image"—a scientific tool capable of directly conveying meaning—were introduced into the field of architecture. This was seen as a response to the intellectual crisis in architecture, fostering new forms of expression and integrating local culture into architectural development.

1.1.2 Chinese New Rural Construction

The New Rural Construction initiative is a key measure by the Chinese government aimed at accelerating the Rural Revitalization Strategy. Due to the long-standing urban-rural development gap in China, rural areas have experienced relatively slow growth, with underdeveloped infrastructure. The New Rural Construction focuses on reform and innovation across various aspects, including optimizing industrial structure, enhancing rural governance, promoting cultural heritage, protecting the ecological environment, and advancing the renovation of traditional rural architecture. These policies are instrumental in driving the upgrading and transformation of rural industries, fostering rural economic development, and improving the living standards of farmers.

The implementation of the New Rural Construction policy has brought both opportunities and challenges to the agricultural economy. While increasing farmers' income and promoting agricultural economic growth, it is equally important to preserve and promote valuable traditional culture, invigorating rural cultural vitality and advancing green ecological development. By improving infrastructure, public services, and living conditions in rural areas, including upgrading and renovating buildings, this policy ensures that farmers can live and work in secure environments. Ultimately, it aims to enhance the quality of life for rural populations, enabling them to share in the benefits of

modernization.

1.1.3 Vernacular Architecture

Due to the long-standing development gap between urban and rural areas in China, rural development has been relatively slow, and the current state of vernacular architecture can no longer meet the developmental needs of contemporary society. Large-scale "museum-style" preservation methods are neither realistic nor meaningful (Wang et al., 2016). The protection and utilization of vernacular architecture is a comprehensive project, and numerous problems exist in the processes of renovation and use.

Simultaneously, the extensive outmigration of rural populations has resulted in some villages becoming "hollow villages", and the cultural transmission of traditional vernacular architecture has been severely disrupted (Xu et al., 2024). The preservation of vernacular architecture is not only a continuation of tradition but also a necessary requirement for people's living needs in the new era. Currently, Chinese primary strategy for rural development involves positioning and classifying architectural heritage and ordinary vernacular architectures to varying degrees (Zhang, 2022). This method has led to the protection of classic architectural heritage while causing ordinary vernacular architectures to be neglected. However, these general vernacular structures, while maintaining rural characteristics, also possess cultural significance and, due to their more flexible renovation methods, can more readily adapt to current living needs.

1.2 Research Purpose

"All cultural phenomena are, in essence, systems of signs; in other words, culture can be understood as a form of communication (Broadbent, 1991)." In contemporary architectural theory, which emphasizes diversified development, semiotics stands out as the most appropriate tool for exploring the relationship between vernacular architecture

and regional culture. Architectural semiotics provides a fresh perspective, allowing for a deeper understanding of the intricate connections between architecture, its surrounding environment, and cultural context. It also opens avenues for investigating architectural signs, the transmission of architectural information, and the deeper meanings embedded within architectural language. However, while the semiotic method to architectural theory experienced significant growth in its early stages, it has since become somewhat stagnant, with its theoretical framework remaining incomplete (Hua, 2011).

Due to the inherent complexity and abstraction involved in semiotics, which touches upon human consciousness, many scholars initiating research in semiotics and architectural semiotics have proposed different theoretical classifications based on their own perspectives. As semiotic theory has evolved, later scholars often utilized partial theories from earlier research to explore the application of semiotics in architectural design. While these studies have yielded valuable results, they often fell short in fully meeting expectations in certain aspects or revealed limitations in practical application, resulting in somewhat insufficient outcomes.

Therefore, this study aims to provide an in-depth analysis of the renovation of vernacular architecture through a semiotic perspective, combined with adaptive reuse theory. By incorporating the design methodology employed in the author's project practices, the study seeks to develop a practical design approach. It is hoped that this research will inspire scholars and designers interested in architectural semiotics, contribute to the exploration of rural renovation, and support the advancement of contemporary architectural semiotic theory, thereby promoting sustained innovation and practice in this field.

1.3 Research Significance

This paper focuses on the theme of "The Application of Architectural Semiotics in

Adaptive Reuse of Chinese Vernacular Architecture", exploring the construction of regional architectural signs and the adaptive reuse of vernacular architecture in the context of new rural development. Drawing on semiotics theory, architectural semiotics theory, vernacular architecture theory, and adaptive reuse theory as the research foundation, the paper examines two related case studies and the author's project practice to investigate the design methodology of architectural semiotics in the adaptive reuse of vernacular architecture. The theoretical significance of this research can be summarized as follows:

(1) Using the classification of signs from Peirce's and Morris' semiotic theories, this study analyzes the formal characteristics and cultural significance of regional architectural signs. Semiotics examines systems of information transmission and their operational mechanisms, where information is communicated through signs, and people decode the embedded meanings based on their interpretative frameworks. Thus, applying a semiotic framework to investigate the cultural value of vernacular architecture offers a distinct academic advantage. From the perspective of architectural semiotics, this paper interprets the construction and preservation of vernacular architecture through the lens of cultural sign expression. Such a method holds significant value for understanding the evolution of regional ethnic societies.

(2) In the context of New Rural Construction, adaptive reuse theory is employed as a design strategy and guiding principle to explore the methodology of regional architectural signs in the transformation of vernacular architecture. By adopting a research method that integrates case analysis with project practice, this study verifies the perceptual characteristics of vernacular architecture as cultural signs during the reuse process. By analyzing exemplary renovation cases, the design approaches and concepts are summarized, and these experiences are then evaluated for feasibility in specific project practices. The aim is to provide theoretical support and practical

foundations for the renewal and transformation of vernacular architecture.

(3) The study of regional architectural signs plays a crucial role in preserving local historical and cultural heritage, aligning with the current Rural Revitalization Strategy. Chinese traditional villages are widespread, with unique organizational and operational methods in site selection, layout, and construction. These villages embody historical and cultural information, reflecting the social structure, ways of life, and construction techniques of various ethnic groups. Research on regional architectural signs offers a contemporary reinterpretation of China's traditional culture within modern academic frameworks, significantly contributing to the transmission and development of cultural heritage.

1.4 Research ideas and innovation point

This study is based on Morris' semiotic theory, categorizing signs into Syntactics, Semantics, and Pragmatics, and further explores the application of semiotic perspectives in architectural design, particularly in the adaptive reuse of vernacular architecture.

In the Syntactics section, the focus is on analyzing Signs Construction and discussing the representational techniques of architectural signs. In the Semantics section, Signs Classification Form is primarily explored, along with Peirce's semiotic theory. The author further refines the classification of architectural signs based on the foundational categories of icon sign, index sign, and symbol sign, offering a more detailed analysis of the different types of architectural signs. Lastly, in the Pragmatics section, this study focuses on the influence of Vernacular Architecture or design works, as cultural sign carriers, on users and society. The analysis examines the social functions of these buildings after renovation and their influence on people's daily lives, further exploring the psychological responses of individuals to these cultural signs in specific social contexts.

2. OVERVIEW OF RELEVANT THEORIES

2.1 Semiotics

Although the term “Sign” has a long history in both Eastern and Western cultures, a unified understanding has remained elusive. Numerous interpretations have been offered, reflecting a wealth of related thought, yet consensus has been difficult to achieve. In ancient Greece, Semiotic thought began to emerge, primarily focusing on natural signs not created for communication. The “Symptomatology” of Hippocrates (460–370 BC) (Fig. 1), a renowned Greek physician, serves as a typical example of early natural signs and laid the foundation for medical semiotics. In that era, signs were understood as symptoms or signs: a patient’s flushed face was considered by doctors as a signs of fever. Hippocrates’ understanding of signs was based on the core principle of symptoms exhibited by natural objects or living beings. By observing visually apparent potential signs, medical judgments were made, and thus he was later considered the founder of semiotics (Liang, 2019).

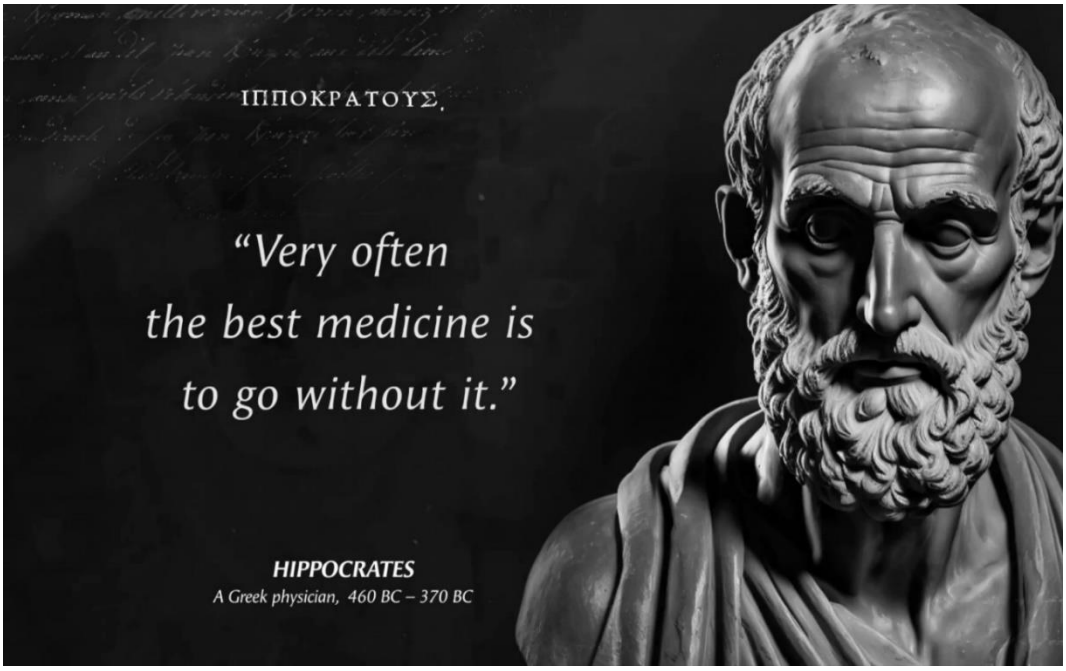

Fig. 1 Hippocrates (460 BC–370 BC) (www.bilibili.com)

In the 4th century BC, Semiotics was integrated and developed by Aristotle (384–322 BC), who built upon Socrates' (470–399 BC) research on moral vocabulary and Plato's (427–347 BC) exploration of "logos", to led the formation of the linguistic and logical semiotic systems of that era. By the 2nd century AD, during the ancient Roman period, semiotic thought originating from ancient Greece was gradually merged with Christian theology. "*Semiotics*", a work on symptomatology, was first authored by the Roman physician and philosopher Galen (130–200 AD).

The Christian thinker Augustine (354–430 AD) proposed a universal definition of a sign: "A sign is a thing which, over and above the impression it makes on the senses, causes something else to come into the mind as a consequence of itself" (Yu and Ye, 1988). In other words, a sign not only represents an object but also manifests psychological effects, possessing both material attributes and psychological significance. This viewpoint profoundly influenced the two founders of modern semiotics: Saussure (1857–1913) and Peirce (1839–1934).

At present, most people's understanding of semiotics remains superficial, limited to symbolic language—that is transmitting information and expressing ideas through various signs (Brier, 2017). However, specific cultural connotations are actually represented by semiotics, encompassing all aspects of daily life. Signs are used and transmitted in written and oral expressions, visual and auditory experiences, and in our environment, speech, attire, and behavior, constituting the extensive application of semiotics.

From the perspective of signs and by incorporating semiotic theory, the symbolic language in Chinese vernacular architecture is analyzed, and the relationship between architecture and cultural inheritance is further explored in this paper. Semiotics primarily investigates the nature of signs, the laws governing their development and change, and the connection between sign meanings and human activities. As modernization

accelerates and modern architectural technology rapidly develops, new developmental trends are exhibited by various art forms.

2.2 The Development of Semiotics

2.2.1 Saussure's Semiotics Theory

The foundation of modern semiotics is primarily derived from the binary relation theory of sign proposed by the renowned Swiss linguist Saussure. In his "*Course in General Linguistics*", Saussure asserted that the essence of a sign is a relationship manifested in the duality of the "Signifier" and the "Signified". The "Signifier" refers to the "sound image" of a linguistic sign, while the "Signified" denotes the "concept" it expresses. He compared this relationship to a sheet of paper: the front is Thought, the back is Sound, and the two are inseparably unified (Fig. 2) (Saussure, 1980).

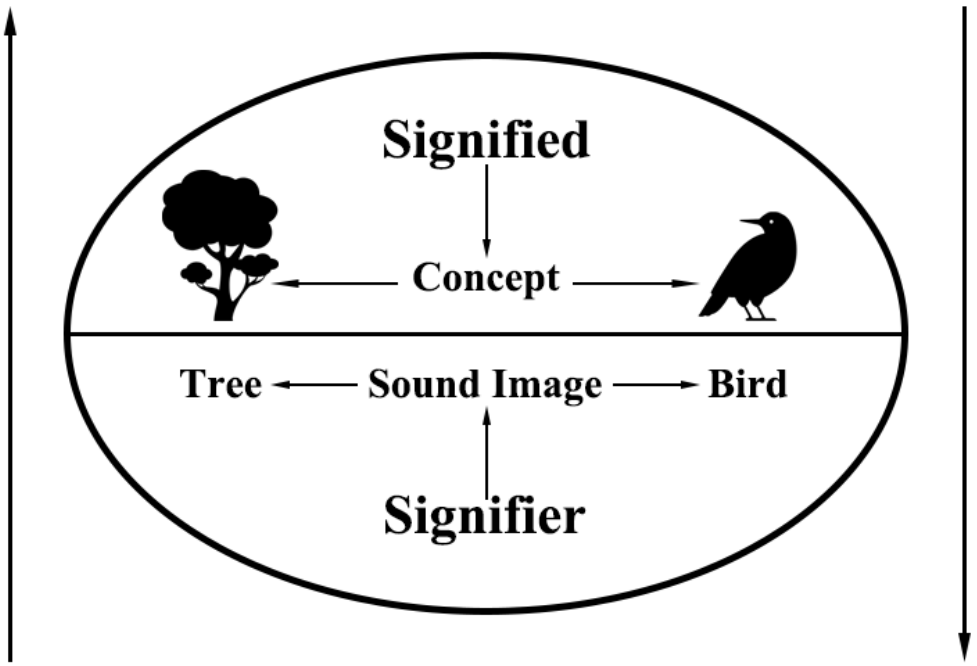

Fig. 2 Signifier and Signified (Drawn by the author)

Centuries of confusion surrounding the term "Sign" were clarified by Saussure's

theory, which gained widespread recognition in the academic community. The "Signifier" is defined as the form or external appearance of the sign, while the "Signified" refers to its content—that is the thought or meaning it conveys (Huang and Chen, 2004). This binary relationship can be applied to analyze certain phenomena. For example, the red and green colors indicating urban roads on Google Maps are also considered signs. The lengths of the red and green lines serve as the signifier, whereas the meanings of "severe congestion" or "smooth traffic flow" constitute the signified (Liang, 2019).

2.2.2 Peirce's Semiotics Theory

The triadic theory of signs was proposed by the American philosopher Peirce, positing that signs are composed of three parts: The Symbol (or Representamen), the Object, and the Interpretant. The Symbol is defined as "something that, in some aspect or capacity, represents something to someone"; the Object is the "something" to which the Symbol refers; and the Interpretant, also known as the explanation, is the user's understanding or information about the Object conveyed by the Symbol—that is the meaning of the sign (Huang and Chen, 2004). This theory conveniently facilitates the analysis of certain symbolic phenomena. For example, in the field of architectural design, the physical form of a design work is the Symbol, the area it represents is the Object, and the positive meanings symbolized by the design elements (such as color, material, space, etc.) constitute the Interpretant.

Therefore, the binary or ternary relationships of signs can be represented by a triangle, known as the famous "Semiotic Triangle" (Fig. 3). In the Semiotic Triangle, the relationship between the "Signifier" and the "Signified"—specifically, the connection between the form of the sign and the object it represents—needs to be clearly identified. The term "signification" refers to the way in which the signifier and the signified combine to form a sign. Since a sign can establish a connection with its referent only through the

interpretation of the interpreter, once this connection is formed, it points to a certain outcome, which can be understood as a deeper "meaning".

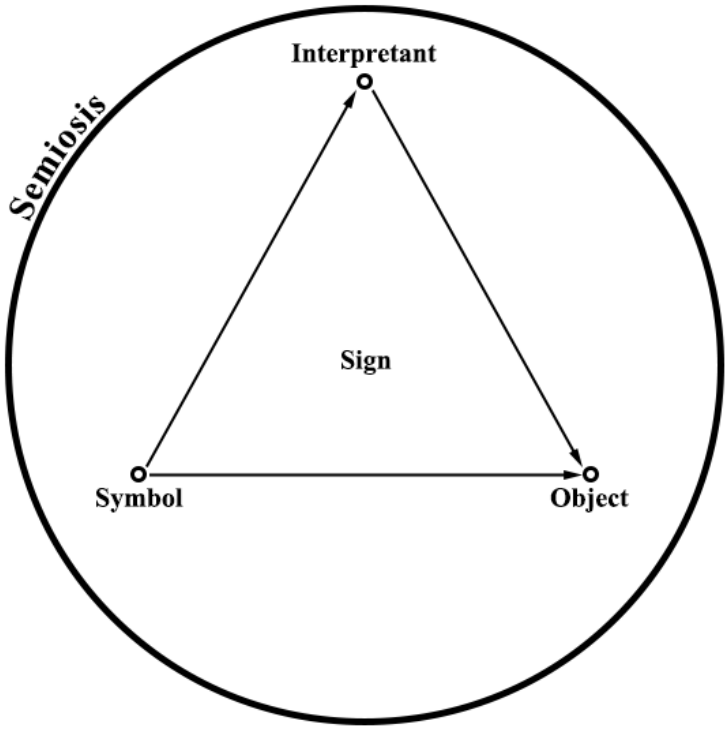

Fig. 3 Semiotic Triangle (Drawn by the author)

Overall, the core of Peirce's semiotic theory posits that the meanings expressed by signs can be understood by users through their own reasoning and judgment based on the information received, and the connotations of these signs can be transmitted through communication with others. He believes that individuals interpret the meanings of signs based on their own experiences, and by analyzing these experiences, knowledge about the connotation of sign and their referents is obtained (Broadbent, 1991). Based on his semiotic theory, the multiple relationships within semiotics were investigated by Peirce, and modes of sign representation were classified into three categories: Icon Sign, Index Sign, and Symbolic Sign (Fig. 4).

(1) Icon Sign are characterized by a resemblance between the sign and its content or

object. They are typically used to describe or imitate the images of objects.

(2) Index Sign have a fixed connection with their referent objects and establish links through abstract meanings and emotional memories, such as the relationship between an arrow and the concept of direction.

(3) Symbolic Sign express the subject's feelings toward things or phenomena through specific forms. These feelings, stemming from perceptions of the things themselves, are endowed with specific meanings, thereby triggering associations and forming an overall cognition.

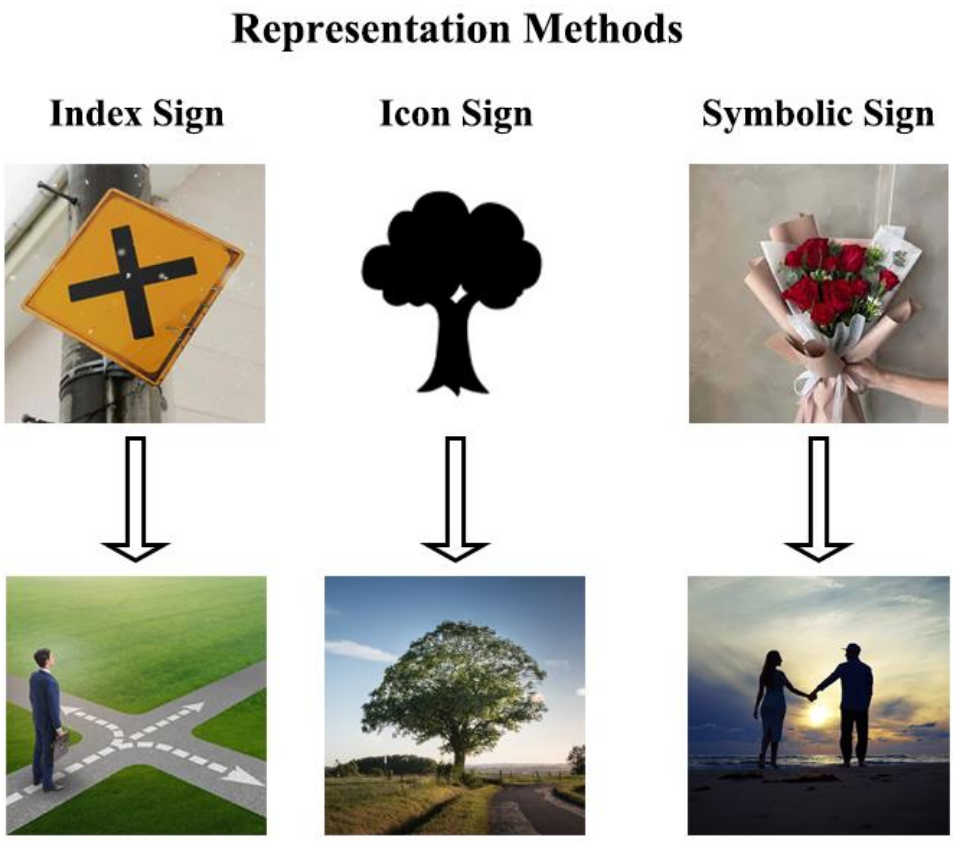

Fig. 4 Symbolic Representation Modes (Drawn by the author)

2.2.3 Morris' Semiotics Theory

Building upon Peirce's theory, the content of semiotics was further enriched by Morris

(1901–1979). He believes that signs are ubiquitous in daily life, exerting significant influence and uniquely impacting all its facets (Kumar, 2017). In 1938, the three concepts of Syntactics, Semantics, and Pragmatics were first introduced by Morris in his book "*Foundations of the Theory of Signs*" (Fig. 5).

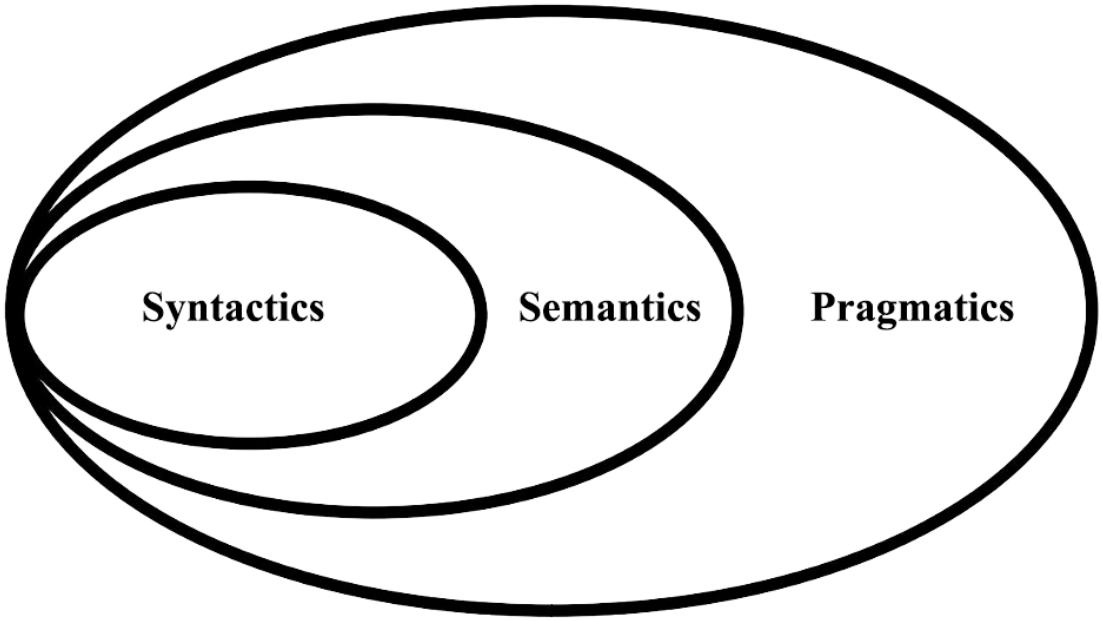

Fig. 5 The Relationship of Syntactics, Semantics and Pragmatics (Drawn by the author)

In 1946, Morris further refined these three terms in his book "*Signs, Language, and Behavior*" (Morris, 1946). Syntactics was defined as the study of the characteristics of signs and the relationships between signs; Semantics primarily explored the intrinsic connections between signs and humans; Pragmatics investigated how signs convey information and the association between this transmission and meaning. In his later writings, Morris' concept of "semiotic differentiation" became more specific and clear, though its essence remained unchanged. His "trichotomy" definition is considered his greatest contribution to modern semiotics. This theory, mainly embodied in his earlier work "*Foundations of the Theory of Signs*", laid a solid foundation for subsequent semiotic research (Table 1).

Morris' Semiotics Theory	Content
Syntactics	Research the relationship between signs.
Semantics	Research the relationship between signs and the Signified.
Pragmatics	Research the relationship between signs and users.

Table 1 The Definition of Syntactics, Semantics and Pragmatics (Drawn by the author)

2.2.4 Other Experts' Semiotics Ideas

(1) Lotman's Semiotics Ideas

Under the framework of logical categories, Lotman's (1922–1993) cultural semiotics combines Saussure's binary ontology with Peirce's ternary interactive epistemology, while also incorporating elements of Hegel's (1770–1831) ontological dialectics. He believes culture is viewed as a collective symbolic mechanism, tasked with the production, circulation, processing, and storage of information. It is not only the embodiment of collective memory but also a process of generating new information. Because the human behavior, our understanding and organization of the world is regulated by culture, culture may be considered the sum of non-genetic information and its methods of organization and preservation. Culture constitutes a complex and interdependent system, forming the overarching hierarchical structure of all symbolic systems, each possessing its internal structure and relative independence (Sonesson, 1994).

(2) Cassirer's Semiotics Ideas

Ernst Cassirer (1874–1945), a German philosopher, developed a semiotic theory rooted in philosophical explorations of human culture. It was his belief that humans are "Symbolic Animals", understanding and constructing the world through symbolic systems. Cassirer argued that human cultural activities including language, myth, art, religion, and science are expressions of symbolic forms. These symbolic forms are not merely tools but modes through which humans interact with the world.

It was emphasized by Cassirer that signs not only transmit information but also shape human thought patterns and experiential worlds. It is theorized that culture, through symbolic systems, enables humans to transition from biological existence to spiritual existence, thereby transcending animals' direct perception. His semiotic theory, regarded as a philosophical anthropology, is focused on exploring the central role of signs in cultural and human spiritual development, highlighting humanity's capacity to create meaning through signs and to impose order upon the world (Liu, 1990).

(3) **Roland's Semiotics Ideas**

Roland Barthes' (1915–1980) semiotic perspective emphasizes the multi-layered construction of meaning in signs within cultural and social contexts. The meanings of signs are divided into "Denotation" and "Connotation": denotation refers to the literal, surface meaning of the sign, while connotation encompasses the deeper meanings attached through cultural, social, and historical backgrounds. In "*Mythology"*, the concept of "myth" is introduced by Barthes, who points out that ideology is constructed through signs in everyday life, making specific ideas appear natural and indisputable.

Roland argued that culture transmits and maintains social power structures through symbolic systems, and signs are not neutral but serve specific ideologies. In addition, he also advocated the "death of the author", asserting that the meaning of a text is not determined by the author but is generated in the reader's interpretation. In summary, Roland's semiotics reveals the complex cultural and power relations behind signs and underscores the important role of the reader in constructing meaning (Roland, 2008).

2.3 Architectural Semiotics

2.3.1 The Origination of Architectural Semiotics

Since the 1950s, debates over the "Crisis of Meaning" have emerged within the architectural circles of Europe and the United States, epitomized the architectural trends

by the International Style have been subjected to scrutiny. Although architects have lauded International Style architectures as "new constructions with rational functions and novel forms that reflect the characteristics of the industrialized era", divergent conclusions have been drawn by those observing and evaluating these architectures from different perspectives. The pursuit of "meaning" in architecture is inevitable. Consequently, architectural issues began to be examined from various new angles, among which architectural semiotics is one (Li, 2007).

Architectural semiotics was introduced into the field in the late 1950s by the Italian linguist Umberto Eco (1932–2016). In the 1960s, significant research was conducted by Geoffrey Broadbent (1929–2020) and Charles Jencks (1939–2019). During the 1970s, Robert Venturi (1925–2018) and the New York Five (John Hejduk (1929–2000), Peter Eisenman, Michael Graves (1934–2015), Richard Meier, and Charles Gwathmey (1938–2009)) explored architectural semiotic theory and created outstanding works, establishing the basic framework of architectural semiotics (Xu et al., 2024). After the 1980s, architectural semiotics gradually became an important research direction for analyzing the design concepts and characteristics of postmodernist architecture (Table 2). The theory of architectural semiotics did not originate within architecture but was introduced by incorporating semiotic research achievements into the architectural domain, opening up a new perspective and research methodology. This injected new vitality into the creation and development of postmodern architecture (Jun, 2002).

Period	Characteristic
1950s to 1960s	Introducing the Semiotics Theory into the Field of Architecture.
1960s to 1970s	The rapid development of Architectural Semiotics.
1970s to 1980s	In depth exploration and application of Architectural Semiotics in practice.
From the 1950s to the present	Classify Architectural Semiotics into the category of Postmodern architecture.

Table 2 The Development of Architectural Semiotics (Drawn by the author)

2.3.2 The Overview of Architectural Semiotics

From a semiotic theoretical perspective, architecture is considered a complex sign system that readily captures attention. Saussure's linguistic signs produce feedback solely through auditory perception, whereas architectural signs stimulate individuals through multiple senses including touch, hearing, vision, and spatial perception (Eco, 1986). Given that architecture conveys information via various sensory modalities, it becomes necessary to examine how this information is "Received" and "Decoded" by people (Liu, 1984). The representational dimensions of architectural signs can be divided into three levels: expressive form, perceptual medium, and expressive characteristics. The expressive form comprising the facade design of architecture, spatial structure, and volumetric composition; the expressive characteristics refer to the architectural morphological features and the visual impressions they impart to observers; the perceptual medium pertains to the methods and channels through which the architecture is perceived by individuals (Munro, 1987).

Architectural signs are not merely forms of self-expression but also influenced by external factors such as social, economic, and cultural elements. The main aspects include:

(1) Mental Function: Social consciousness, aesthetic concepts, and religious beliefs of a group can be reflected through architectural signs.

(2) Functional Expression: The spatial functions undertaken by architecture, comprising commercial value and traditional customs, can be embodied by architectural signs.

(3) Technical Characteristics: The era-specific characteristics of architectural technology can be represented by architectural signs.

These factors are influenced to varying degrees by various elements of human culture, rendering the architectural sign system complex and difficult to interpret (Zhang, 1995). Semiotics was divided by Morris into Syntactics, Semantics, and Pragmatics—three basic units that closely correspond to architectural signs. His semiotic theory has been widely

recognized in the field of architecture (Fig. 6):

(1) **Syntactics—The Extraction of Architectural Signs**

In syntactics, not only are the expressive characteristics of architectural signs examined, but the interrelationships among signs and their governing principles are also explored. Syntactics serves as a design theory that utilizes combinations of signs as foundational elements to express architectural value. Basic architectural elements such as points, lines, and planes are regarded as signs, and the meaning of design is conveyed through their combinations (Somov, 2001). Based on semiotics, architectural signs are typically classified according to Peirce's semiotic theory into three categories: icon signs, index signs, and symbolic signs.

(2) **Semantics—The Expression of Architectural Signs**

Semantics investigates the relationship between signs and their referents, to pertain the relationship between the signifier and the signified in architecture. The signifier refers to the external appearance including an architectural form, space, and structure, while the signified denotes the spiritual connotation conveyed by the signifier (Zhang and Li, 2006). Architecture is considered by the Umberto Eco to be a carrier of meaning, grounded in traditional social structures. The study of the relationship between architectural function and form not only explores their connection but also involves how form directs function and how signs express the meaning of architectural entities (Greimas, 1986).

(3) **Pragmatics—The Application of Architectural Signs**

The most prominent feature of Morris' "trichotomy" is the introduction of the concept of pragmatics, which examines how signs enter human consciousness through their external representations and explores the mental feedback provided by individuals to signs within specific linguistic contexts (Ni, 2003). In practical applications, architecture, as a symbolic system, is among the most complex and profound. "Information" is continuously transmitted by these architectures through the influence of human senses

comprising vision and hearing, and different interpretations are made by observers based on their own perceptions. Design concepts are condensed into architectural expressions by architects through signs, and architecture, serving as a medium of information transmission, conveys this information to observers, thereby achieving spiritual communication between the architect and the observer (Morris, 1966).

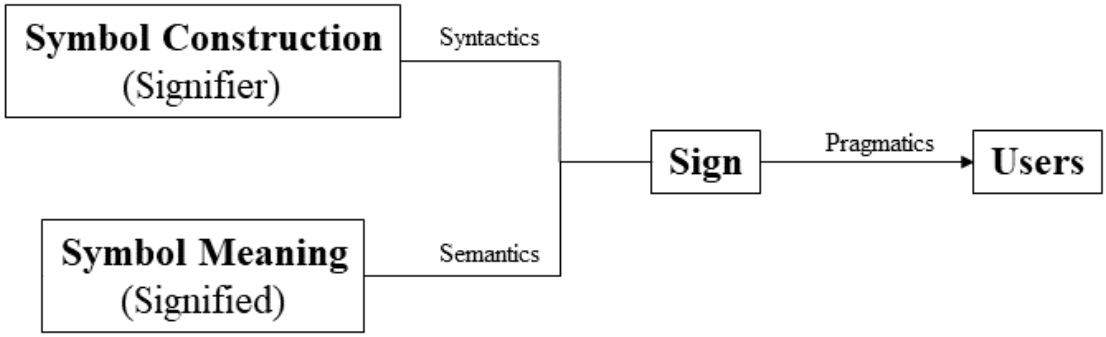

Fig. 6 The Trichotomy of Architectural Signs (Drawn by the author)

2.4 Adaptive Reuse

2.4.1 The Origination of Adaptive Reuse

The concept of "adaptation" was introduced by Darwin's (1809–1882) theory of evolution and is often viewed as synonymous with "survival of the fittest". In 1930, the term "adaptation" was first incorporated into the study of human-nature relationships by a British geographer, emphasizing humanity's ability to adapt within an ever-changing natural environment. This concept elucidates the interaction and adaptation processes between humans and the natural environment, serving as a significant theoretical foundation for understanding their relationship.

The publication of the 1979 "*Burra Charter*" marked the formal introduction of the concept of "adaptation" into the field of architecture. This term primarily refers to the practice of preserving the original structure or site while meeting new usage requirements

through functional conversion, internal restructuring, or design modifications. The core of adaptive reuse theory lies in “reuse”, which involves identifying the advantages and characteristics of an existing building or site and repurposing it to serve new functions. This methodology was successfully applied in the late 19th-century renovation of the Louvre in Paris. As time progressed, adaptive reuse has been increasingly adopted, with architects placing greater emphasis on the rational preservation and respect for historical architectural traces, recognizing the significance of their historical value and cultural heritage.

2.4.2 The Fundamental Principle of Adaptive Reuse

Adaptive reuse of buildings is a key guiding principle in the renovation and design of vernacular architecture in Chinese New Rural Construction (Mısırlısoy and Gunce, 2016). Unlike indiscriminate restoration or renovation, adaptive reuse emphasizes that designers must consider multiple factors throughout the design process. The update of vernacular buildings should retain the original architectural features while incorporating environmental, social, economic, and cultural factors to adapt to changing needs over time. The adaptive reuse of buildings should also be tailored to the specific needs of the occupants, with functional and structural adjustments made accordingly. For different types of existing buildings, renovation should be handled flexibly, following adaptive reuse principles to ensure that the renovation plans are both targeted and practical.

(1) **Functional Control**

Functional control in the renovation of vernacular architecture refers to the process of determining the primary functions and key control points of the renovation based on relevant local construction requirements, legal regulations, and the actual conditions of the building. This process involves clearly defining the goals and direction of the reuse, analyzing the spatial structure and architectural form of the original building, and

considering the local social needs, village planning, and the cultural value of the building. By conducting this comprehensive analysis and planning, a reasonable and complete design plan is developed to ensure that the adaptive reuse of vernacular architecture meets the practical needs of the area while preserving cultural heritage.

(2) **Compatibility**

The compatibility emphasizes that, in the context of new rural construction, the adaptive reuse of vernacular architecture should align closely with village planning, regional development, and societal needs, ensuring economic feasibility and structural integrity. The design of the building should take into account ease of maintenance in the future, facilitating a sustainable lifecycle during its use. In this process, new functions should be integrated with the original ones, respecting the historical value of the building while endowing it with new uses. This method achieves the goal of sustainable development and promotes the building effective utilization within a modern environment.

(3) **Regional Development**

Nowadays, many rural renovation projects tend to demolish old buildings and rebuild modern residential and commercial areas. While this method does promote regional economic development, it often overlooks the protection and inheritance of rural culture. In this context, by preserving and reconstructing the cultural signs of rural architecture and integrating modern functions and designs, we can inherit the historical heritage of the countryside to inject new vitality into rural areas, creating environments that combine contemporary appeal with cultural charm. This method explores an effective path for new rural construction that balances cultural preservation and sustainable development.

(4) **Economic Feasibility**

The key to a successful adaptive reuse design lies in minimizing renovation costs while maximizing economic and social benefits. In rural architecture renovation, economic feasibility must be prioritized. Whether the goal is to achieve financial returns

or social impact, the driving force behind both is rooted in economic incentives, which also apply to rural buildings that have lost their original functions. Through effective cost control and innovative design methods, these buildings can be preserved and repurposed for long-term use, breathing new life into them and ensuring their contribution to sustainable development in new rural construction.

(5) **Function and Technological Innovation**

Endowing old buildings with new functions not only provides them with new conditions for survival but also enhances their functional value, achieving sustainable preservation. In the preservation and renewal of rural architecture, it is crucial to move beyond symbolic concepts or simple facade renovations and instead focus on the essence of each building. This requires an in-depth study of each structure unique form to develop a functional system tailored to its potential. Throughout this process, the fundamental principles of architectural design must be adhered to, ensuring that form serves function. The goal is to ensure that the renovated building remains efficient, functional, and user-centric, ultimately evolving into a space that continuously serves people's needs.

3. THE DESIGN METHODOLOGY FOR VERNACULAR ARCHITECTURE

3.1 Syntactics—Signs Construction

Syntactics forms the foundational aspect of architectural semiotic theory, focusing on the formal relationships between signs and their combinatory rules, without addressing their specific meanings (semantics) or their relation to objects (pragmatics) (Guerri, 1987). It examines the structure of the sign system, exploring how signs are arranged and combined to create more complex sequences or systems, such as the organizational patterns of points, lines, planes, and volumes in architectural forms (Zhang, 2019).

In the renovation of vernacular architecture, diverse forms are presented due to varying construction locations, with noticeable shifts in characteristics across regions. These structures typically evolve over extended periods, influenced by natural climate, geographical features, historical and cultural factors, as well as local beliefs and customs, thereby forming unique signs (Jung, 1988).

Through a process of exploration and simplification, these signs representing local architectural culture are termed “motifs”. Designers can reinterpret these motifs using modern design techniques to study the formal relationships between the signs and their combination rules. In this study, four primary methods of motif reinterpretation are employed: Reappearance, Topology, Reconstitution, and Repetition.

3.1.1 Motif’s Reappearance

The reappearance of motifs primarily involves applying traditional signs to new architectural designs while preserving their fundamental characteristics. From a semiotic perspective, to accurately convey specific meanings, architectural forms must utilize signs that are widely understood by the public. Traditional signs are already well-known,

whereas understanding new forms of signs is akin to learning a language, requiring an adaptation process. Before new architectural forms become established, there is a tendency for people to favor familiar signs, which explains why certain architectural signs continue to be influential in the field, even after their historical context has faded (Fig. 9).

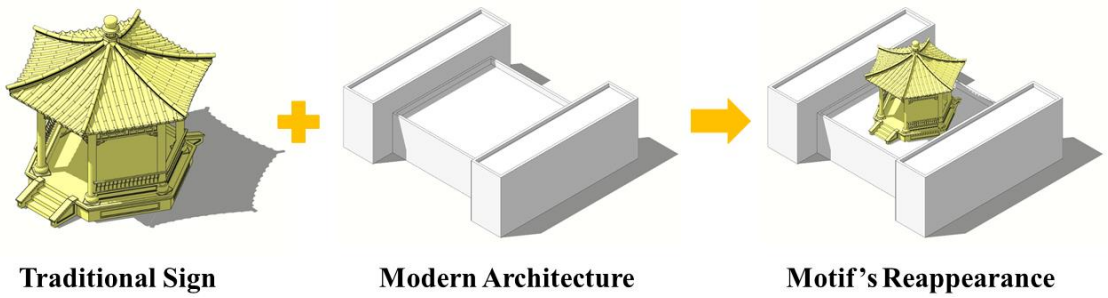

Fig. 9 The Motif's Reappearance (Drawn by the author)

For instance, the northern building of Beijing West Railway Station serves as the landmark architecture of the entire station (Fig. 10). Its main building employs a 45-meter span portal frame, symbolizing the "new gateway to the capital". This design allows the primary structure to avoid interference with the subway facilities below while improving lighting conditions in the front plaza and reducing any sense of oppression. At the center and four corners of the roof, traditional Chinese-style square pavilions and glazed tile eaves are incorporated, though constructed using modern steel frameworks (Kai, 1993).

Fig. 10 The Northern Building of Beijing West Railway Station (stuchong.com)

These elements retain traditional aesthetics while integrating modern construction techniques. The steel pavilion with three-tiered eaves is positioned prominently in the center of building, assuming a commanding presence. The building heights on both sides gradually decrease, transitioning from traditional ethnic styles to modern architectural forms, thereby achieving a harmonious modern aesthetic.

3.1.2 Motif's Topology

In the study of the development of architectural signs, while change and innovation are certainly present, the evolution of architectural signs often demonstrates an inertia that maintains certain fixed patterns of the original signs. Topology examines the properties of geometric shapes that remain unchanged under continuous one-to-one transformations. In architecture, this involves modifying the proportions, scale, and shapes of various components of a new sign based on the original prototype (Fig. 11). This method often results in novel and unexpected outcomes. Although these transformed signs do not exactly replicate traditional ones, they establish an extended relationship, conveying elements of the traditional signs while adding new "signified" content.

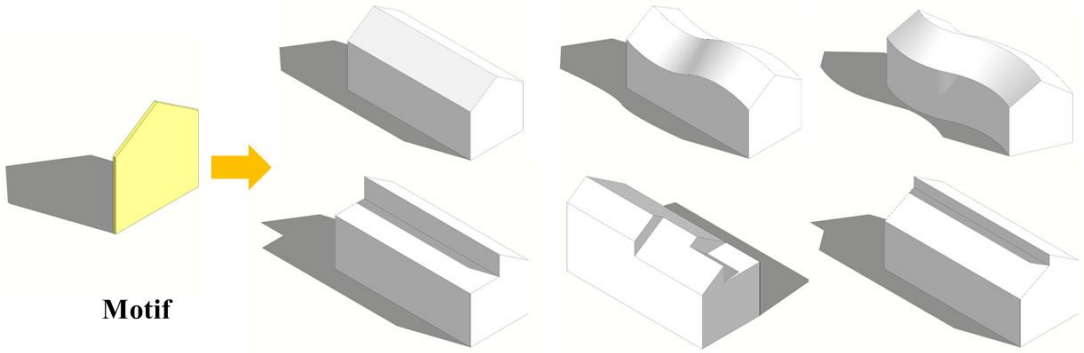

Fig. 11 The Motif's Topology (Drawn by the author)

For example, in the renovation project of Wencun Village in Hangzhou, China, architect Wang Shu employed extensive use of topology and variation in his design method. He took the basic form of the traditional courtyard as the "motif"—a fundamental

spatial organization in Chinese vernacular architecture, characterized by enclosed housing layouts, interconnected front and back doors, and axial symmetry (Zhang, 2022). By transforming 24 buildings within the village, eight distinct architectural types were developed through variations in form (Fig. 12). Each type featured different treatments in terms of volume, spatial organization, and facade design.

Fig. 12 Wencun Village in Hangzhou, China (36kr.com)

More importantly, these types were not mere mechanical reproductions; instead, variations were derived based on specific factors such as the architrctural environment, orientation, and materials. This allowed each building to develop a unique form while retaining the essential characteristics of the original "motif". The extraction of traditional signs here reflects the integration of morphological changes with the spirit of the place, expressing the interaction between the texture of architectural components, their form, spatial environment, and the observer's perception. This relationship can be seen as an interactive dialogue between the spirit of the place and the observer, rooted in the designer's deep understanding and appreciation of both the place essence and artistic

aesthetics (Zhang et al., 2023).

3.1.3 Motif's Reconstitution

Reconstitution involves abstracting and simplifying culturally significant and familiar forms, components, or spatial configurations to establish a connection with traditional signs. By refining traditional architectural signs, these newly derived forms in contemporary architecture take on the role of visual association, suggesting a continuity with traditional signs and aligning with the public psychological expectations. During this process, the signs, once modified, are typically reorganized into new spatial logic systems and functions upon reuse, resulting in varying degrees of transformation and extension in their meaning. Consequently, they often acquire a richer connotation than the original signs (Fig. 13).

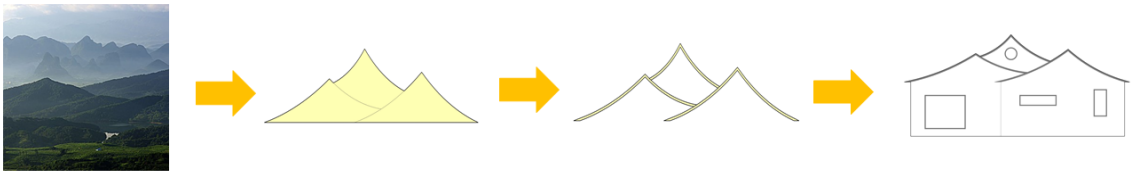

Fig. 13 The Motif's Reconstitution (Drawn by the author)

Take I. M. Pei's (1917–2019) Suzhou Museum as an example, this architectural exterior features geometric forms, showcasing a strong modern character (Fig. 14). However, its ingenuity lies in the fact that, from any window of the new museum, one can observe that the roof slope aligns almost perfectly with the roofs of traditional Suzhou residences in the distance. This visual consistency initially creates a sense of recognition through geometric composition, which then deepens into an appreciation of traditional culture.

In the structure of the new museum, I. M. Pei used the traditional sloped roofs of Suzhou ancient architecture as a "motif". By continually expanding and reconstructing

triangles and squares, he skillfully merged the rational aesthetics of Cubism and Minimalism. These geometric forms intertwine with the triangular elements, flowing wall lines, and square spatial layouts found in traditional Suzhou architecture, to result in a geometric sloped roof that subtly embodies the essence of Suzhou traditional sloped roofs (Zhu and Song, 2009). These forms naturally transition within the design, achieving simplicity and abstraction while exuding strength, seamlessly integrating tradition with modernity.

Fig. 14 Suzhou Museum in Suzhou, China (www.archdaily.cncn)

3.1.4 Motif's Repetition

Repetition refers to the continuous presentation of a particular architectural sign as a "motif" to the audience. When these repeated elements repeatedly engage the senses, they create a profound and lasting impression. Repetition generates a strong sense of rhythm, which can involve the arrangement of identical or similar shapes. In architecture, this includes the use of both completely identical details and similar ones, such as variations in size, shape, and material. The method of stacking motifs can impart a strong sense of form to the building, increasing the frequency of the sign appearance in the most direct

manner. This, in turn, reinforces the observer's impression of the motif, making the architectural intent more impactful.

Japanese architect Kengo Kuma frequently employs the design method of motif repetition in his works, and the Zhi Art Museum in Chengdu, China, serves as a prime example (Fig. 15). The entire building features the use of tiles, merging water elements with the tile motifs found in traditional Chinese architecture. These tiles, sourced entirely from local villages, are strung together with specially crafted ropes, creating the impression of floating in mid-air. This design imparts a sense of transparency and a unique, "breathing" quality to the museum. Kuma's design philosophy of "making architecture disappear" is achieved through deep integration with nature, and the Zhi Art Museum stands as a testament to this concept.

Fig. 15 Zhi Art Museum in Chengdu, China (www.archdaily.cncn)

The aged tiles themselves lack the rigidity of steel and concrete, embodying instead a natural product of the countryside. The gaps between the tiles create "breathing" spaces within the structure, allowing glimpses of the surrounding natural environment without being fully obscured by the building. Additionally, Kengo Kuma's incorporation of water elements connects the sky and earth, seamlessly blending the architecture with nature.

This method effectively diminishes the “presence” of building, achieving harmonious coexistence with its environment.

3.2 Semantics—Signs Classification

Semantics primarily explores the relationship between signs and their referents or meanings, to focus on the meaning of signs and how they are interpreted and understood within specific contexts (Carlson, 1989). In simple terms, semantics examines how signs (such as language, images, symbols, etc.) convey meaning in communication and how individuals interpret these signs (Stojiljkovic, 2018).

Signs serve as carriers of meaning, and the significance and function of architectural signs are closely linked to semantics (Curtin, 2009). The semantics of architectural signs exist within their structural framework, which includes their composition and organization. A thorough interpretation involves not only understanding an architectural function but also its connotations and all related cultural meanings. The structure of architectural signs comprises three levels: form, style, and cultural spirit. Form and style constitute the external aspects of the sign, while at its core lies the cultural spirit—the essence of architectural cultural semantics.

In line with the semiotic theories of Peirce and Morris, architectural signs can be categorized into three types: Icon Sign, Index sign, and Symbolic Sign, each carrying distinct meanings for architecture (Saidi, 2019). The relationship between the form and content of architectural signs is dynamic, evolving gradually from icon signs to index signs, and finally to symbolic signs. This progression reflects the relationship between the sign itself, the signifier and the signified, and ultimately, the sign meaning.

3.2.1 Icon Sign—The Sign Itself—Form and Concretization

The form of architecture often bears a resemblance to its meaning, which

characterizes architectural icon signs, to emphasize the similarity between an architectural form and the object it imitates (Holt, 2017). As a product of social practice, architectural design typically relies on a certain "prototype" as its foundation for expression. This prototype can be drawn from natural elements, historical cultural signs, or the replication of other architectural forms.

In architectural semiotics, form and concretization (Fig. 16), as icon signs, play a significant role in conveying architectural information and influencing perception. They constitute a visual sign system that enables individuals to instantly perceive and understand the designer's intended information. Through concrete shapes, patterns, and decorative sculptures, icon signs directly reflect the architectural theme and style, guiding observers toward an understanding of its design concept and cultural background. By interacting with the environment and users, these signs enrich the visual experience of the architecture and strengthen the emotional connection between people and architecture. They not only fulfill aesthetic visual needs but also imbue the architecture with greater meaning and value on a spiritual level, thereby enhancing the effectiveness and depth of information conveyed by architectural signs (Wang, 2020).

Fig. 16 Form and Concretization in Icon Sign (Photographed by author)

In numerous classic architectural works, traces of architectural icon signs can be observed. For example, Zaha Hadid's (1950–2016) design of the Galaxy SOHO in China,

known as the “Crop Circles” architecture, draws its prototype from Chinese terraced fields (Fig. 17). Modern architectural technology has modeled the irregular curves of the terraces, endowing them with a natural geometric beauty. Through the continuous extension of planes, a layered, stepped effect is created, with each level of the architecture offering a distinct scenic view.

Additionally, Zaha drew inspiration from the concept of the traditional Chinese courtyard to create a unique internal space. By sculpting the architectural volumes with smooth, rounded forms, she employed aggregation, fusion, and separation, reconnecting various parts through elongated sky bridges. This method established a continuous, interrelated form while creating a coherent flow within the building, and the large-scale facade offers a panoramic view stretching hundreds of meters, allowing visitors to appreciate the beauty of the architectural structure through these visual corridors.

Fig. 17 Galaxy SOHO and Chinese Terraced Fields

(Left: archestudy.com, right: photographed by author)

3.2.2 Index Sign—The sign Signifier and Signified—Space and Structure

A substantive causal relationship exists between architectural form and its meaning, typically expressed through the close integration of functionality and form in architectural structure and space (Ghafari, 2015). Index signs play a guiding, suggestive, and connective role in architecture, primarily functioning by linking with space and the

environment to guide people's understanding of an architectural function, spatial relationships, and environmental features. These signs do not convey their meaning directly; instead, they prompt association and perception through spatial relationships, direction, and characteristic cues. This method enhances spatial experience, clarifies paths and locations, and adds functionality and interactivity to the architecture. The formal beauty advocated by the modern architectural movement serves as a classic example of index signs, where the signifier aligns with the architectural inherent function and structure, embodying the fusion of functionalism and formalism.

Fig. 18 Space and Structure in Index Sign (uao-design.com)

In architecture, space and structure serve as the most prominent index signs (Fig. 18), representing the architectural core essence and forming a complete sign system, to convey function, purpose, and meaning through their physical forms. Features including shape, location, scale, and orientation directly reflect and reveal the architectural organizational method, guiding the understanding of spatial layout. Relying on interaction with the environment and users, an architectural structure and space function not merely as static entities but as dynamic communication mediums. Architectural elements such as columns, beams, staircases, and openings indicate the flow of space and the division of functional areas, directing the user's movement path. Through layout and form, structure and space directly influence behavior and perception, creating specific spatial experiences and atmospheres.

A quintessential example is the Centre Pompidou (Fig. 19) in Paris, designed by Renzo Piano and Richard Rogers (1933–2021). The building exposes its structural and functional elements comprising pipes, support structures, and passageways—on the exterior, directly showcasing its functions and purposes in a physical form, thereby creating a unique sign system. The pipes are color-coded: blue for air conditioning, green for water, yellow for electricity, and red for traffic flow. This clear visual representation reveals the architectural internal organization, guiding the understanding of its spatial layout.

The exposed elevators and staircases further guide visitors' movement, providing a direct sense of spatial flow and the division of functional areas. The transparent glass curtain walls and open interior spaces foster an atmosphere of participation and interaction, encouraging exploration and engagement with the building. By breaking the traditional boundaries between interior and exterior, the Centre Pompidou creates a unique spatial experience and atmosphere, establishing itself as a public space and cultural landmark within the city.

Fig. 19 Centre Pompidou in Paris, France (www.centrepompidou.frfr)

3.2.3 Symbolic Sign—The Sign Meaning—Geometry, Color and Material

In human symbolic activities, the use and discussion of symbolic signs are the most

prevalent, and they are defined as those that have a conventional relationship with their referent but lack resemblance (Ulug, 2022). Understanding and interpreting these signs require the audience's own social and cultural experiences, leading to a shared social consensus and aesthetic preference (Ashwin, 1984). For example, in contemporary architectural design, glass curtain walls have become a representative element of office and commercial buildings, serving as a symbolic sign.

The relationship between the form and content of architectural signs is dynamic, evolving from icon signs to index signs, and finally to symbolic signs. In Peirce's semiotic framework, this hierarchy of signs reflects their interrelation and development. Index sign, known as "second sign", often inherit characteristics from icon sign, or "first sign". For example, a sign indicating danger (such as a skull) serves as an indexical sign by conveying the concept of danger, and it retains the qualities of an icon sign, allowing for a direct association with a real skull. The skull is not only a concrete icon sign that evokes the image of an actual skull, but more importantly, it explicitly points to concepts related to death, poison, or danger through its form.

Fig. 20 Angel Murals and Statues in Church (Photographed by author)

Symbolic signs, as the "third sign" in Peirce's semiotic framework, inherit the intuitive imagery of icon signs and the directional function of index signs. On this foundation, they further imbue the sign with deeper cultural and spiritual connotations.

For instance, angel murals and statues (Fig. 20) in church directly present the appearance of angels (icon sign) while pointing to religious beliefs and sanctity (index sign). More importantly, they symbolize humanity pursuit of the divine and purity (symbolic sign). This layering of sign levels allows architectural signs to convey rich and complex information.

In the symbolic signs of architectural semiotics, geometric signs, color signs, and material signs are commonly used to convey specific meanings and cultural connotations. These signs employ abstract forms and symbolic elements to endow a building with particular identity and values. Geometric signs use specific shapes and proportions to represent ideas, beliefs, or historical traditions; color signs convey emotions, ambiance, or cultural background through the selection and combination of colors; material signs, on the other hand, reflect regional characteristics and craftsmanship through the texture and properties of materials (Allahham, 2019).

The use of geometric signs can bring dynamism to an architecture, allowing it to shed the rigid image of a simple box. Through innovative combinations of forms, designers can break away from traditional architectural styles, creating unique and intriguing exteriors. Additionally, geometric signs that emphasize lines and contours can highlight the structural features of a building, producing dynamic and fluid visual effects (Rapoport, 1974). Furthermore, incorporating geometric patterns as decorative elements can enhance the façade, adding a distinct visual appeal.

In traditional Chinese architecture, window lattices serve as a typical and symbolic geometric sign (Fig. 21). The designs of window lattices often feature various geometric patterns comprising squares, circles, diamonds, flowers, animals, and auspicious signs. These patterns not only serve a decorative purpose but also embody people's aspirations and hopes for a prosperous life. For instance, the ice cracks pattern represents the melting of ice and the end of winter, heralding the arrival of spring and the revival of all things,

to convey a sense of vitality and symbolizes that difficulties are passing, with good fortune and wishes soon to come. The ice cracks pattern irregular shape contrasts sharply with more orderly designs, reflecting a natural harmony and beauty.

Another common pattern is the pinwheel design, representing the circular form of a pinwheel and symbolizing the movement of air in nature. Pinwheels convert wind into power for human use, thus becoming a tangible sign of acquiring wealth. This design signifies the power bestowed by heaven, implying an endless, inexhaustible source of prosperity.

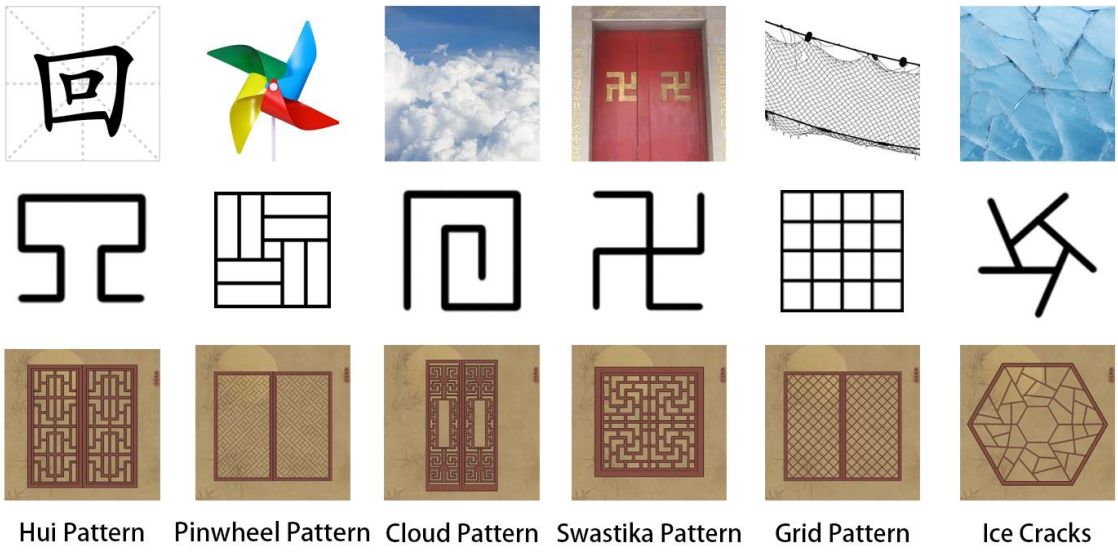

Fig. 21 Chinese Traditional Window Lattices (Drawn by the author)

Color plays a crucial role in architectural design, serving as the most sensitive and direct sign for conveying information and visual perception. Skillful and bold use of various colors is a common method in architecture, where designers must carefully consider factors such as brightness, saturation, and harmony with the surrounding environment. By recognizing color signs, individuals can gain specific cultural impressions or psychological experiences, leading to a deeper understanding of the architectural spatial meaning.

For example, the black-and-white style of Traditional Huizhou Architecture (Fig. 22)

is not merely an architectural sign but also a sign of the region unique culture, and it primarily features white walls and black tiles, creating a stark contrast that emphasizes the architectural clean and brisk contours. This monochromatic combination evokes a sense of elegance and tranquility, reflecting the Huizhou region appreciation for simplicity and modest living. The minimalist color scheme harmonizes with the natural landscape while highlighting the distinct style of Traditional Huizhou Architecture. This enriches the viewer's understanding and experience of the architecture, inspiring further exploration and contemplation.

Fig. 22 Traditional Huizhou Architecture (699pic.com)

In architectural semiotics, material signs convey specific meanings and information through the selection and use of building materials. Different types of materials possess unique appearances, textures, and properties, serving symbolic, expressive, and communicative roles in architectural design, making them a crucial part of architectural signs. For example, in contemporary architecture, glass curtain walls have become representative elements of office and commercial architecture, functioning as a typical symbolic sign. The transparency and reflective qualities of glass imbue the architecture with a sense of modernity and technological sophistication while symbolizing openness, transparency, and communication, to reflect contemporary social emphasis on information sharing and interaction. Glass curtain walls blur the boundaries between interior and exterior spaces, enhancing the interaction between the architecture and its

urban environment, integrating the structure into the cityscape and drawing public attention.

Additionally, other materials comprising stone, wood, and metal also convey different symbolic meanings through their unique textures and properties (Fig. 23). Stone is often used in monumental architectures or government institutions, symbolizing stability, permanence, and authority; wood, with its natural and warm texture, is commonly employed in residential and recreational spaces, creating an atmosphere of closeness to nature, comfort, and relaxation; metal, due to its luster and malleability, is widely utilized in modern and high-tech architecture, symbolizing innovation, avant-garde aesthetics, and strength. These material signs influence the visual impact and tactile quality of an architecture, serving as a crucial medium of communication between the structure and its occupants.

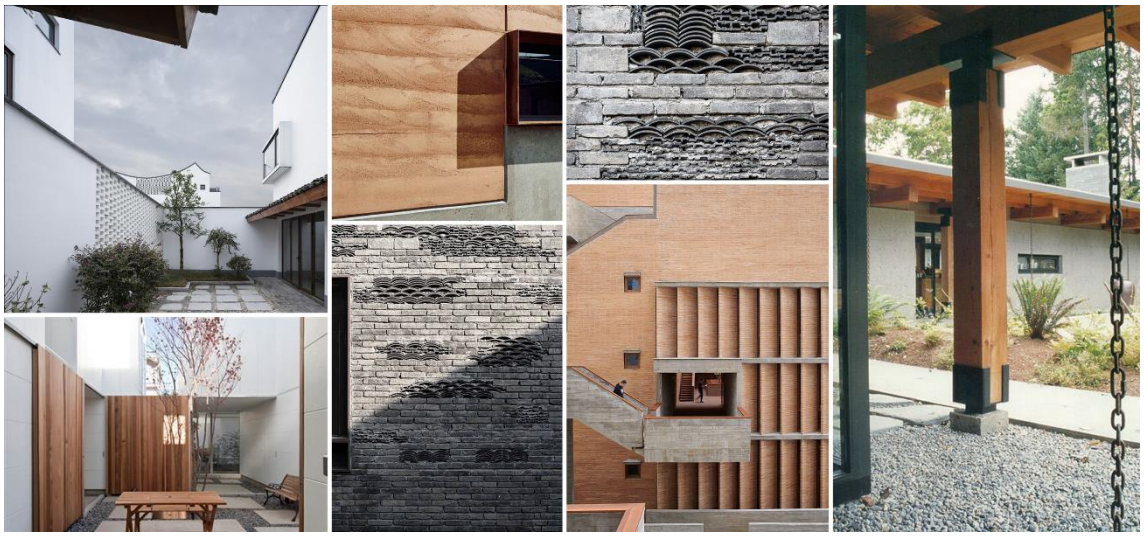

Fig. 23 Material Sign in Architectures (www.archdaily.cncn)

3.3 Pragmatics in Vernacular Architecture

3.3.1 The Influence of Vernacular Architecture on Users

With urban development, the increasing demands on both material and spiritual levels

have led cities to occupy more and more space to meet these needs. As living environments become increasingly crowded, people seek spaces that can alleviate stress. Alongside changes in urban structure and improved transportation, many peoples have turned their attention to the countryside, and the harmonious development between vernacular architecture and the natural environment forms the basis of this ideal refuge. Since the origins of villages, vernacular buildings have maintained a close relationship with their surroundings, and even today, the principles of their synergy with nature can still be discerned in these structures.

In this background, adjusting the layout of villages and their surrounding physical environments to extract vernacular architecture from traditional settings and endow it with modern functionality has become an inevitable trend. However, traditional forms of vernacular architecture can no longer meet the needs of modern life. Amid the significant population outflow from Chinese rural areas, enhancing the material functionality of vernacular architectures to ensure the quality of life for residents is crucial for retaining population and revitalizing rural vitality.

Vernacular architecture provides spaces and environments for both the material and spiritual lives of people. Given the diverse demands for various lifestyles, the presentation of spatial forms and environments is inherently complex. Thus, balancing the practicality and richness of space has become key in the renovation and redesign of vernacular architectures. Practicality ensures the material well-being of residents, while richness supports their spiritual lives.

However, due to various constraints, the expression of architectural space cannot be entirely unrestricted, often conflicting with the designer's idealized vision in design. While the spatial form and environment of an architecture impose certain limitations on the design, they can also exert a positive influence. To unify the overall spatial environment, architects must carefully select and coordinate different usage

characteristics and interior space requirements. Through skillful and complex design principles, seemingly contradictory elements can be integrated into a harmonious whole.

3.3.2 The Influence of Vernacular Architecture on Society

The development of Chinese vernacular architecture embodies the wisdom of ancestors. In the background of Chinese new rural revitalization, years of exploration and practice have revealed designers' precise control over aspects comprising architecture volume, form, and structure to optimize the living environment. Although Chinese vernacular architecture differs significantly from Western and modern urban architecture, their core objective remains the same: to provide the best possible living environment. Consequently, many traditional Chinese architectures still hold rich value and significance, warranting in-depth exploration and study by contemporary society.

With the progression of time, the demand for architectural functionality has continually increased, and different the simple lifestyles of the past, modern residents have higher material expectations and a broader understanding of the world. Take Chinese rural area as an example: in the past, water was mostly supplied by wells, and toilets were typically dry latrines, lacking proper sewage systems and independent facilities. Today, with societal progress and the gradual improvement of rural water and drainage systems, most households are equipped with more advanced sanitation facilities, significantly improving living conditions. The bathroom, though a small yet essential unit of architectural space, has become an indispensable element in modern vernacular architecture.

Therefore, as a traditional architectural form, vernacular architecture must maintain its adaptability and development within the context of the new era. Technological innovation plays a crucial role in driving architectural design. In contemporary vernacular architecture, it is not only important to respect local history and culture but also to explore

a design language that better meets the needs of modern living.

3.4 Adaptive Reuse—Design Strategies For Vernacular Architecture

Architectural Adaptive Reuse is a key guiding principle in the renovation and design of vernacular architecture in Chinese New Rural Construction. The renewal of vernacular architecture should be carried out while preserving the original architectural characteristics, integrating environmental, social, economic, and cultural to adapt to the changing usage demands over different periods (Zhang and Zhang, 2001).

This study systematically classifies the design strategies for the adaptive reuse of vernacular architecture, based on the functional characteristics of buildings and case analysis. Specifically, it categorizes into four aspects: Architectural Functional Replacement, The Space Reuse, Architectural Facade Update, and External Environment Update, providing clear guidance for design pathways in the renovation of vernacular architecture under different conditions.

3.4.1 Architectural Functional Replacement

Since the rise of the modernist architecture movement in the early 20th century, the slogan “Form Follows Function” has increasingly positioned functionality as a central focus of architectural design. Consequently, architectural design has come to represent a dialectical unity between form and function. However, architectural space and its intended function do not always exhibit a strict one-to-one correspondence. A given spatial form can accommodate multiple functional needs, and each function can be realized through various spatial arrangements. This complex interplay between space and function forms the material foundation for adaptive reuse in architecture (Greer, 1998).

In the adaptive reuse of older buildings, functional replacement is a core requirement. During the design process, it is crucial to determine how existing spaces can be converted

for new uses. This process necessitates consideration of the client's needs, and requires a comprehensive assessment of the building characteristics and its surrounding context to ensure compatibility between the new functions and the existing spatial conditions.

(1) Local Function

In many Chinese rural buildings, there are often underutilized or neglected areas, such as stairwells, corridors, doorways, or small courtyards. These spaces, commonly overlooked, often have limited functionality despite the owner's need for more usable space. By fully leveraging the adaptive reuse potential of these ancillary areas, not only can usable area be increased, but the overall efficiency of space utilization can also be significantly improved.

Stairwells, in particular, offer considerable potential for adaptive reuse. Traditional Chinese vernacular buildings are generally two to three stories high, and stairwells are often viewed merely as vertical circulation nodes, resulting in very low utilization. However, with the introduction of adaptive reuse and functional transformation strategies, stairwells can be repurposed for a variety of uses. For instance, in larger stairwell areas, open bookshelves and seating can be added to create a small reading nook, providing family members with a comfortable space for relaxation and study. In narrower stairwell areas, built-in storage cabinets can be installed to create a functional storage space, enhancing overall utility (Fig. 24).

Furthermore, during the renovation of stairwells, materials embodying regional architectural signs can be utilized. Traditional wooden elements can be incorporated to align with the overall style, transforming the stairwell into a design feature within the building. If the stairwell is located near an exterior window, a vertical planting system can be introduced to create a vertical garden, effectively improving the surrounding environment and adding a rural-inspired green feature.

Fig. 24 Space Utilization in Stairwells (it.pinterest.com)

(2) Global Function

The adapted functions of existing buildings often differ significantly from their original purposes. In many practices of adaptive reuse, architects tend to limit new functions to narrow categories, such as office buildings or commercial facilities, which typically have less specific spatial requirements. However, by thoroughly understanding and utilizing the unique spatial characteristics of the original structure, it is possible to introduce new functions that align harmoniously with the building, thereby revitalizing it.

In the process of transforming older structures, it is crucial to deeply explore the inherent qualities of the space and avoid standardized, one-size-fits-all methods. For instance, an old warehouse with a large-span structure could be converted not merely into a typical commercial space but, through thoughtful design, into an art gallery, creative studio, or community cultural center. Such transformations make full use of the expansive spatial features of the warehouse while enhancing its social value and cultural impact through the integration of diverse functions (Fig. 25).

Fig. 25 Global Functional Replacement in Liangyou Red Town Art Design Center (uao-design.com)

3.4.2 The Space Reuse

The reuse of interior spaces in older buildings is the most common and prevalent type of adaptive reuse project. Over time, the original functions of these interior spaces often lose their relevance, and the materials and equipment gradually deteriorate, failing to meet the demands of modern society. Therefore, the renewal of interior spaces in older buildings can generally be categorized into three types: Interior Restoration, Equipment Upgrading, and Comprehensive Renovation (Dong, 1995).

Interior restoration involves repairing and updating interior elements such as walls, ceilings, floors, and decorative features while retaining the building original function and spatial layout. This type of renewal does not typically involve adaptive reuse, as it primarily aims to extend the building's lifespan by improving its physical condition. Equipment upgrading, similarly, does not fall under adaptive reuse in a strict sense, as it does not alter the original spatial structure or intended function of the building. Instead, it involves repairing or adding modern equipment, such as elevators, air conditioning, heating systems, and communication facilities, to enhance the building's convenience and comfort.

Comprehensive renovation, on the other hand, focuses on changing the building function. This type of interior transformation usually involves significant modifications, including changes to the spatial structure, materials, and style. As a true form of adaptive

reuse, comprehensive renovation aims to inject new functions and vitality into the older building, allowing it to meet modern living needs and reintegrate into contemporary society.

(1) Local Space Addition

In its complete sense, expansion does not fall under the scope of adaptive reuse of older buildings, as it often involves new construction that respects or even disregards the original structure, focusing primarily on achieving harmony between the new and existing elements. In contrast, the partial addition discussed in this paper refers to small-scale modifications based on the original building, aiming for organic integration so that the new part becomes an inseparable component. Partial additions can be categorized into three types: Equipment Additions, Area Additions, and Transportation System Additions.

Equipment additions are typically used to install new functional equipment, such as elevators, escalators, or piping systems, to enhance the building modernization. Area additions involve increasing usable space, either externally or internally, to meet the need for more functions or larger usage areas. Transportation system additions address situations where the internal space is limited or circulation pathways are insufficient. This is achieved by redesigning circulation through the addition of external staircases or modifications to internal passages, thereby enhancing the accessibility of the building.

Transportation system additions are a common strategy in adaptive reuse, particularly when existing staircases, corridors, and circulation pathways do not meet modern requirements. Due to the constraints of the original interior space, external staircases are often required to redesign the flow of movement, ensuring the proper functioning of the building. These external staircases serve not only a functional purpose but also provide a visual contrast between old and new elements, adding modern design features while preserving the original characteristics of the building, thus creating an aesthetic that reflects the fusion of old and new (Fig. 26).

Fig. 26 Local Space Addition in ANNSO Hill Hotel, China (www.gooood.cn)

(2) Courtyard Space Renovation

Courtyard spaces, due to their larger scale, diverse forms, and complex functions, offer greater flexibility during renovation. In the adaptive reuse of such spaces, three primary methods are generally employed: converting outdoor courtyards into indoor spaces, enclosing open courtyards, and expanding courtyards (Jacobs, 1961).

For older buildings with simple spatial forms and smaller room sizes, converting an outdoor courtyard into an indoor space is often used when larger spaces are required. This method provides several advantages: it alleviates the limited usable area by repurposing unused or deteriorated courtyards, thereby enhancing land use efficiency; it integrates larger new spaces without compromising the original structure, reducing the complexity of renovations; and it significantly lowers costs and shortens construction timelines

compared to new expansions, while achieving the same spatial area. Typically, steel structures are used to cover courtyards during the conversion, and for larger courtyards, partial greenery or selective enclosure is retained to create varied spatial effects.

Another common method of courtyard reuse involves enclosing open or semi-open courtyards to create quieter or more private spaces. Open courtyards usually possess semi-public attributes, with activities that can be complex. When not utilized effectively, such courtyards often become neglected outdoor spaces. Enclosing these courtyards can transform them into private areas, facilitating further development and adaptive reuse, and providing quieter, more controlled spaces for occupants or users (Li, 1995).

Expansion is an inevitable aspect of the adaptive reuse of older buildings, which also introduces challenges in integrating new and existing structures. Expanding courtyards offers an effective means of addressing the relationship between the new and old structures. By leveraging the adaptable characteristics of courtyard spaces, an organic combination of new and old elements can be achieved. Courtyards are often introduced at the junction between the new and existing structures, with public and circulation spaces strategically arranged to resolve functional and visual conflicts, ultimately resulting in a cohesive architectural ensemble in terms of both form and function.

(3) Structure Space Reuse

Many older buildings possess significant floor heights due to their original functions and construction requirements, which can serve as valuable elements when adapting these buildings for new uses. For instance, efficient utilization of mezzanine spaces can both increase usable area and reduce operational costs. The advantages are evident in several aspects: first, the original high ceilings can be effectively used to expand the overall usable space; second, reducing the height of individual floors can help lower air conditioning and lighting costs, thereby improving energy efficiency.

In older buildings with orderly and consistent structures, completely covering the

mezzanine solely to increase area may result in rigid and monotonous spaces that are unable to accommodate new functional requirements. Therefore, many mezzanine renovation projects favor partial mezzanine installations, which introduce variations in interior height, create visual focal points, and establish centers for interaction in taller sections of the space. This method adds vitality and depth to the overall environment.

For older buildings with lower ceiling heights, partial removal of floor sections can be employed to create a mezzanine effect, resulting in a spacious and open interior. This method not only introduces visual variation and dynamic tension but also enhances spatial fluidity and comfort, leading to a more pleasant user experience. Through such thoughtful renovations, originally monotonous spaces can be revitalized, better meeting modern functional requirements (Fig. 27).

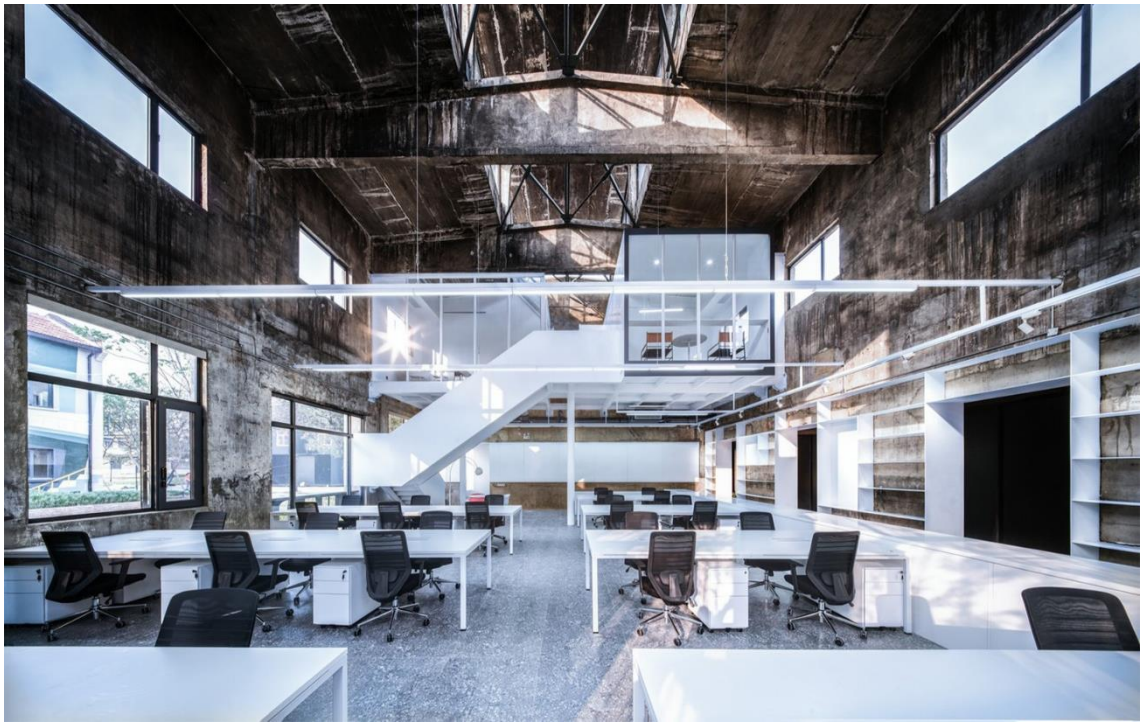

Fig. 27 Structure Space Reuse in UAO Office Design (uao-design.com)

3.4.3 Architectural Facade Update

In the adaptive reuse of older buildings, the replacement of spatial functions is often accompanied by an inevitable update of the building exterior appearance. Due to the effects of time, the facades of many older buildings often appear worn, and original architectural decorations and components suffer varying degrees of damage. Therefore, the restoration or transformation of the building facade can significantly enhance its overall appeal, breathing new life into the structure. Compared to the adjustment of internal functions, the update of the external appearance is more direct in terms of design techniques and aesthetic concepts, serving as the most immediate expression of the building.

(1) Restoration

Older buildings constructed before the rise of modernist architecture, in addition to their historical value, often feature intricate decorations, refined craftsmanship, and facade designs emphasizing proportional harmony, owing to the flourishing craftsmanship and architectural aesthetics of the time. These buildings, regardless of their original functions, exhibit distinct historical and aesthetic values. However, over time, and due to inevitable human damage from prolonged use, the quality of the exterior materials of such buildings has generally deteriorated.

For these landmark buildings, particularly those embodying regional cultural traditions, the original facade has often become deeply ingrained in public memory. Renovations should therefore be approached with caution, typically prioritizing restoration that adheres to the original appearance, preserving and enhancing the building original features, and presenting its historical character as faithfully as possible. When undertaking interior modifications, additions, or mezzanine installations, new elements should harmonize with the original facade, avoiding significant alterations to maintain the building historical integrity and aesthetic value.

(2) Renovation

For the numerous older buildings found in both urban and rural areas that lack significant historical or architectural aesthetic value, such as industrial buildings, public buildings, and vernacular buildings, their primary value lies in favorable locations and structural conditions. These buildings are characterized by a lack of historical and aesthetic significance, and their exterior form lacks iconic features. However, they are structurally sound, in good condition, and equipped with adequate infrastructure, making them highly versatile and practical. As such, they offer greater freedom in reuse, allowing modifications that capitalize on their structural potential to transform otherwise ordinary or unattractive appearances into ones that harmonize with the surrounding environment, meet new functional requirements, and establish a unique identity.

The renovation of such buildings often involves updating the facade, discarding the original exterior appearance in favor of a new facade design that revitalizes the structure. The new facade must not only meet modern functional needs but also visually integrate with the surrounding environment while reflecting a unique architectural style, thereby endowing the previously unremarkable building with renewed attractiveness and utility.

3.4.4 External Environment Update

The adaptive reuse of older buildings is a complex, systemic endeavor that involves not only the updating of interior spaces and external appearance but also the reorganization and optimization of the surrounding environment. The decline and abandonment of older buildings are often accompanied by the deterioration of their surrounding environments, with a reciprocal relationship between the two: the degradation of the building leads to a decline in the quality of the external environment, which in turn accelerates the building's decay. This negative cycle is a common phenomenon. Therefore, in the process of updating and renovating older buildings, it is essential to prioritize improvements to the surrounding environment. By comprehensively

optimizing external spaces, the overall quality of the environment can be enhanced, supporting the building long-term sustainability and revitalization (Robert, 1991).

(1) Traffic Organization

In the process of updating the external environment of older buildings, redesigning the original road and parking systems according to the needs of the building new use is crucial. However, due to a historical lack of focus on the overall environment, such redesigns have often not been conducted in tandem with the adaptive reuse of buildings. In Europe and North America, adaptive reuse projects, particularly those involving older building complexes, have widely employed covered pedestrian streets, creating car-free, aesthetically pleasing, and relaxed commercial leisure spaces, with significant success.

Adequate parking is also essential in the renovation of older buildings, especially in office and commercial properties. In contrast, parking facilities are notably insufficient in Chinese cities due to historical factors. Therefore, during the renovation of older buildings, opportunities to improve the external environment should be used to provide well-located parking spaces whenever possible. This can not only alleviate urban parking challenges but also enhance the attractiveness of the renovation project, increasing its competitiveness in leasing and sales—a factor that has been well demonstrated in many successful adaptive reuse projects.

(2) Public Facilities Redesign

Outdoor public facilities comprising benches, steps, railings, streetlights, signposts, and trash bins, are essential components of external space design. They have a significant visual impact on both urban and rural landscapes and determine the convenience, comfort, and appeal of the external environment. Currently, outdoor public facilities in China are managed by various government departments, commercial entities, and private enterprises. However, this fragmented method to installation and design often leads to a visually chaotic environment, contributing to visual fatigue.

In the adaptive reuse of older buildings, it is essential to consider the overall redesign of the outdoor public environment. Thoughtful planning of public facilities can enhance the quality of the building's external environment. Careful design of outdoor public facilities for older buildings can not only significantly increase the building attractiveness but also create a more harmonious and convenient outdoor environment for users, thereby improving the overall success of the renovation and enhancing the spatial experience.

(3) Landscape Update

Compared to traditional architecture and landscape studies, landscape architecture is an emerging discipline. However, the influence of landscapes has been steadily increasing alongside architectural development since ancient times. The surrounding landscape of any building directly impacts its vitality and value—an attractive landscape draws attention, while a poor one evokes aversion. Generally, improving the quality of the surrounding landscape alone can rejuvenate an older building. Therefore, in the practice of adaptive reuse of older buildings, redesigning and reorganizing the outdoor landscape serves as an important complement to the building reuse, often resulting in significant external improvements (Fig. 28).

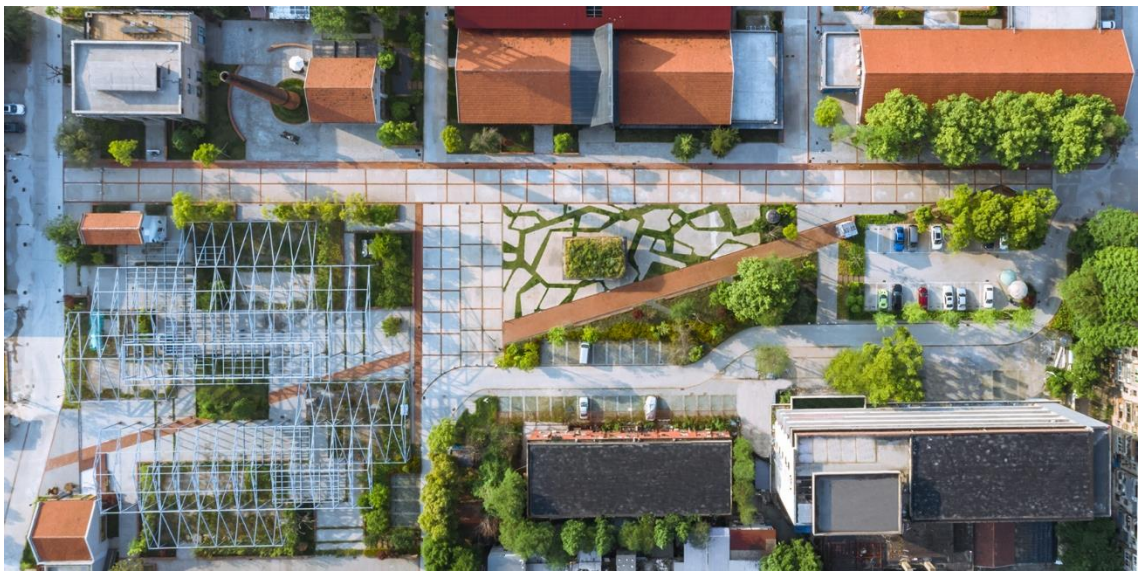

Fig. 28 Landscape Reconstruction of Liangyou Red Town Culture and Art Community (uao-design.com)

In the adaptive reuse of older buildings, landscape redesign should emphasize the harmony and integration between the new landscape and the existing structure. The new landscape should meet aesthetic requirements while providing additional convenience, addressing the functional and environmental shortcomings of the older building and enhancing the overall user experience.

3.5 Case Study

3.5.1 Renovation Design in Wencun Village, Hangzhou, China—Wang Shu

Wencun village (Fig. 29) is located in Hangzhou, China, comprising 13 natural villages, with a total of 559 households and a population of 1,863. Since 2012, Wang Shu, the only Chinese architect to have won the Pritzker Prize, along with his architect wife, Lu Wenyu, has visited this obscure village multiple times, aiming to create their vision of an ideal, beautiful, and livable rural community (Fig. 29).

Fig. 29 Architectural Facades in Wencun Village (36kr.com)

After several years of effort, the first phase of the project was completed in early 2016, resulting in the construction of 14 architectures on the original 15 residential plots, successfully accommodating 24 households. All architectures were constructed using local materials and traditional techniques, with each one being uniquely designed. Over the past 12 years since the Wencun village renovation project began, villagers have been living in their new homes for more than nine years. Wencun village has transformed from

a “semi-deserted village” struggling with traditional preservation into a unique model for rural construction in China

Wencun village is built along a creek, nestled against a backdrop of rolling mountains, and is arranged in a linear layout. The eastern part of the village consists of the old settlement, divided into the upper and lower villages along the creek. To the west lies the newly planned village, designed by Wang Shu, which accommodates 24 households, each architecture distinct in character. Wang Shu employed a color palette of gray, yellow, and white, incorporating rammed earth walls, plastered mud walls, Hangzhou gray-stone walls, and artificial stone facades, to integrate the new village with the old seamlessly (Fig. 30). The architect not only reused local materials and traditional aesthetics but also meticulously preserved unique spatial pattern, weaving these elements into the new rural dwellings. The result is a “new village that resembles the old village even more than the original”, creating a harmonious new home.

Fig. 30 Wencun Village in Hangzhou, China (www.archaic-studio.com)

From the perspective of architectural semiotics, specifically Syntactics, Wang Shu employed three design methods in this project: reappearance, topology, and reconstitution of the "motif" (Fig. 31):

Fig. 31 Motif's Reappearance, Topology and Reconstitution in Wencun Village (Drawn by the author)

(1) Reappearance: Wang Shu based his design on the materials and craftsmanship of local architecture, extensively using native architecture materials and traditional techniques. For example, traditional signs were fully reproduced in the architectural roofs, certain structural elements, and facade materials (Zhang et al., 2023).

(2) Topology: As previously discussed, Wang Shu used the forms of local traditional architecture as a motif, evolving eight distinct architecture types through variations in form, and each type features unique treatments in terms of volume, spatial organization, and facade design. Additionally, various adaptations were made based on specific environmental factors, orientation, and material usage, resulting in 24 architectures that, while preserving the original "motif", each exhibit their own unique form.

(3) Reconstitution: Drawing from the color schemes and structural styles of local traditional architectures, Wang Shu used modern design methods and techniques for

reconstitution. Furthermore, he transformed some purely functional structural elements into structures that combine functionality, decoration, and aesthetic value.

From the perspective of Semantics within architectural semiotics, Wang Shu utilized traditional signs extensively in this project to express deeper cultural meanings. The analysis can be conducted on three levels: Icon Signs, Index Signs, and Symbolic Signs (Fig. 32):

(1) Icon Signs: Unlike other designers who often directly reuse sculptures and murals as symbolic signs in the renovation of traditional villages, Wang Shu rarely adopts such a method. Instead, he prefers to blend traditional and modern design styles through reconstruction. For example, in this project, Wang Shu employed continuous and smooth sloping roofs to express the undulating forms of mountain ranges. Additionally, he incorporated elements of the stone imagery found in Chinese traditional gardens into the design of doorways, creating a visual connection to cultural motifs.

(2) Index Signs: The old village of Wencun village is oriented south-to-north, with each house featuring both a northern entrance and a southern opening, forming a symmetrical layout of south and north halls. In the new village, Wang Shu preserved this spatial arrangement. Inside the architectures, he and his team adhered to the traditional courtyard architectural type, ensuring that each house includes at least a $10m^2$ courtyard. In terms of spatial layout and visual effect, most architectures in the new village adopt an open design, with partitions created using wooden screens. Upon entry, storage spaces for farming tools are immediately visible, making the new architectural forms closely resemble traditional dwellings. Structurally, Wang Shu designed some of the structures to combine functionality, decoration, and aesthetic value, transforming them into unique architectural signs.

(3) Symbolic Signs: In terms of geometric signs, Wang Shu employed modernist design

techniques extensively in this project, reconstructing the form of local traditional architecture, to achieved a harmonious blend of traditional architectural shapes with modern design. In terms of color signs, he used a base palette of gray, yellow, and white for the architectural walls, with black tiles on the roofs. These choices represent the distinct styles of Huizhou Traditional Architectural black-and-white color scheme, the earthen tones of traditional vernacular architecture with rammed earth walls, and the concrete hues of modern architecture. In terms of material signs, Wang Shu utilized local materials and traditional craftsmanship comprising rammed earth walls, plastered mud walls, Hangzhou gray-stone bricks, and artificial stones. Modern design techniques were then applied to shape the architectural facades, allowing the color and texture of the materials to preserve the traditional style while seamlessly integrating with contemporary design. This method symbolically connects the past with the present, embodying cultural continuity and transformation.

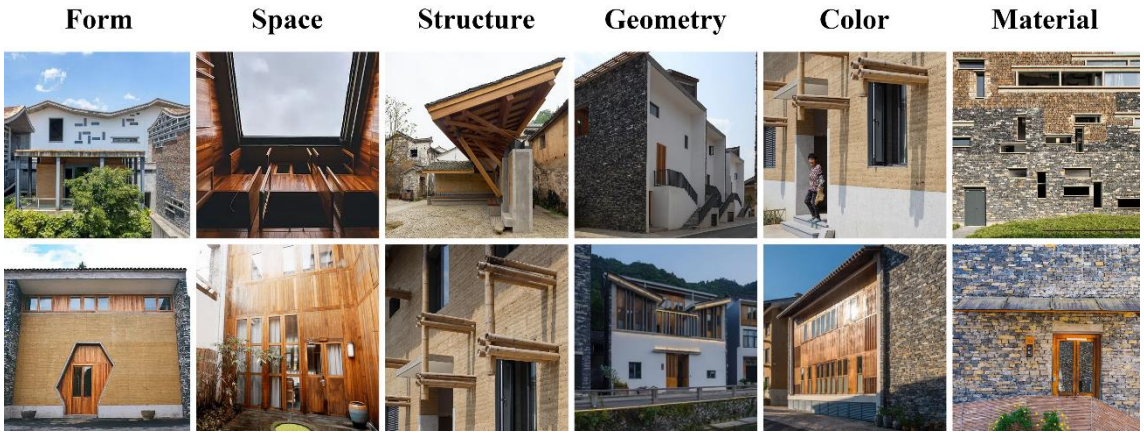

Fig. 32 Icon Signs, Index Signs and Symbolic Signs in Wencun Village (Drawn by the author)

From the perspective of Pragmatics, the Wencun village renovation project has had a profound impact on both individuals and society. Wang Shu sought to reinterpret the relationship between architecture and contemporary life through a new lens, reintroducing the power of traditional culture into rural settings. This practice fulfills individuals' needs for cultural identity and a sense of belonging, allowing residents to re-

experience and appreciate their deep-rooted cultural heritage within a modern lifestyle. Additionally, Wang Shu proposed that future rural areas should exist in a state of “invisible urbanization”, integrating ecological environments, historical traditions, and modern living. This model provides individuals with more diverse lifestyle choices, to lays the foundation for the diversified development of society.

Finally, Wang Shu believes that harmony between the environment and architecture requires a combination of national aesthetics and innovative expression, as the two are not in conflict. In the renovation of Wencun village, he successfully preserved numerous ancient dwellings while integrating new creations that embody cultural heritage. This method offers significant research and demonstration value for the revitalization of architectural culture in Zhejiang, China, and explores new pathways for urbanization that maintain regional characteristics (Fig. 33).

Fig. 33 Wencun Village in Hangzhou, China (zhuanlan.zhihu.com)

3.5.2 Relocation Houses Design in Dongziguan Village, Hangzhou, China—gad Design

The project located in Dongziguan Village, Hangzhou, China, with the entire village arranged linearly along the banks of the Fuchun River. The site features unique geographical characteristics: existing residences to the north, a river directly to the east, a pond to the west, and farmland to the south. The designer's initial intent was to modernize and reinterpret traditional architectural signs without disrupting the original village fabric, creating new buildings that better meet the residents' needs while preserving the authenticity of rural life (Fig. 34).

In the village site plan, the designer identified a recurring spatial motif underlying the diverse forms of traditional settlements. The project seeks to abstract these common characteristics from a typological perspective, recreating the spatial archetype. By combining four basic units, the design reintroduces the richness and diversity of traditional villages.

Fig. 34 Regional Planning and Architectural Forms in Dongziguan Village (zhuanlan.zhihu.com)

In terms of architectural form, the architect extracted signs from the curved roofs of Jiangnan residences and modernized them through reinterpretation. By reconstituting the traditional sloped roof, a continuous yet asymmetrical roof structure was created (Fig. 35). Although the roof appears continuous, each architecture remains independent, with carefully managed spacing that achieves both harmony and individuality within the entire architectural complex.

In the floor plan design, the architect began with two basic units: small width with large depth (11m × 21m) and large width with small depth (16m × 14m), using them as the "motifs". Different from the traditional parallel relationship between residential plots and courtyards, the base boundary of the architectures intersects with the courtyard boundaries, creating an interwoven layout. By applying topological variations to these two "motifs", four architectural types were developed. Through staggered front-back arrangements and east-west mirroring, the motifs were combined to form complexes with shared courtyards.

Compared to the traditional linear layout, this design significantly improves land efficiency and enhances the layering and privacy of courtyard spaces. Each complex features a semi-public, semi-open space, facilitating neighborly interaction and fostering a sense of community cohesion and belonging (Fig. 35).

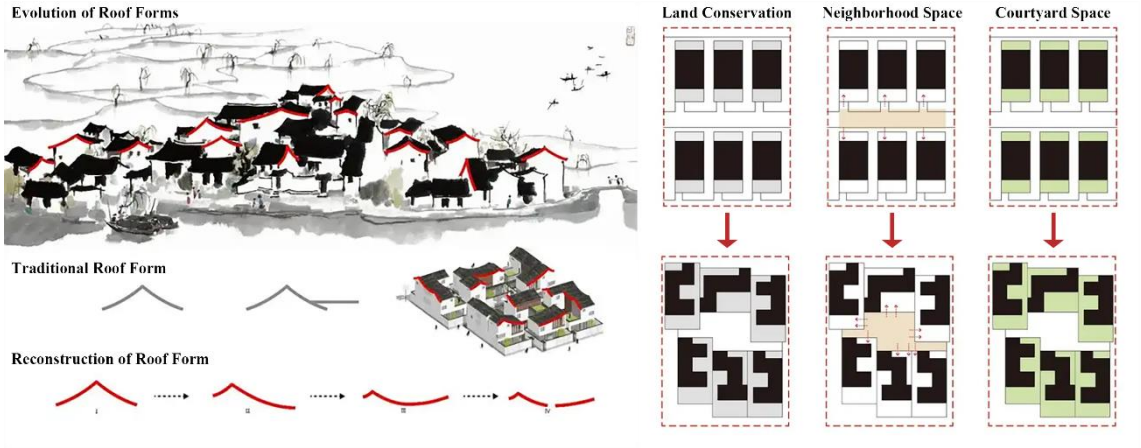

Fig. 35 The Reconstruction of Roof Form and Architectures Form Variation (zhuanlan.zhihu.com)

In the facade design, the architect did not adhere strictly to the architectural signs of Huizhou traditional architectures but instead reinterpreted the rooflines using modern design language. The black capping stones contrast sharply with the white walls, creating a striking black-and-white interplay and a balanced relationship between lines and planes in both color and composition.

To craft the interplay between solid and void, the external walls are primarily solid,

while the surfaces facing the courtyards employ semi-transparent materials and glass. This method fulfills lighting requirements to creates an inward-looking atmosphere. Square windows on the solid walls and wooden grilles extending to each household embody a modern reinterpretation of the traditional architectural characteristic of "solid exterior, void interior".

In terms of material selection, the design principle focused on the modern reinterpretation of traditional language and the vernacular expression of industrial construction. Materials comprising brick-concrete structures, insulated rigid roof slabs, insulated waterproof exterior walls, and double-layered insulated glass were chosen. Additionally, modern materials like white paint, gray facing bricks, and faux-wood metal were used to replace traditional materials such as wood, rammed earth, and stone (Fig. 36). This method allowed the architecture to retain traditional stylistic elements while seamlessly integrating with modern design.

Fig. 36 Relocation Houses in Dongziguan Village, Hangzhou, China (www.archiposition.com)

From the perspective of architectural semiotics, in Syntactics, the designer employed three methods of motif translation: Topology, Reconstitution, and Repetition, including the design of sloped roofs, variations in architectural plan forms, and the design of curtain walls. In Semantics, the designer did not rigidly adhere to the signs of Huizhou traditional architecture but instead reconstructed them using modern design language. By expressing

traditional signs through contemporary formal vocabulary and using modern construction techniques, the design successfully embodies regional characteristics (Fig. 37).

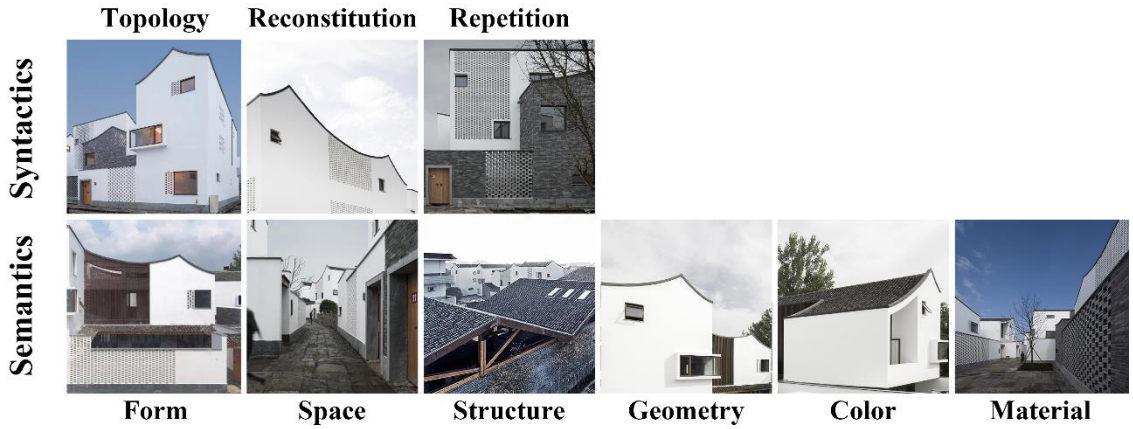

Fig. 37 Application of Syntactics and Semantics in Dongziguan Village (Drawn by the author)

From the perspective of Pragmatics, this project serves as a social experiment in the rural environment, offering a pathway for the revitalization of Dongziguan Village. After the project completion, the influx of tourists, media visits, and a series of professional awards transformed the local villagers' sense of identity and value judgment regarding their village. The return of a large number of former residents, the introduction of diverse business ventures, and strong government support have further amplified the village's economic clustering effect. From this perspective, the social significance of vernacular architecture extends far beyond the architectures themselves (Fig. 38).

Fig. 38 Relocation Houses in Dongziguan Village, Hangzhou, China (www.archiposition.com)

4. THE APPLICATION OF ARCHITECTURAL SEMIOTICS IN ADAPTIVE REUSE OF VERNACULAR ARCHITECTURE

4.1 Environmental Renovation Design in Huashan Community, Wuhan, China

4.1.1 General Introduction

Huashan Community located within the Dahua Mountain Scenic Area in Jiangxia District, Wuhan City, Hubei Province, serving as the Wulijie Road entrance on the south side of the Dahua Mountain Cultural and Creative Industry Park planning project (Fig. 39). Currently, 24 vernacular buildings are still preserved within the community. These structures are mostly brick-and-concrete, generally appearing outdated and urgently requiring improvement and renovation (Fig. 40). The buildings are arranged in an east-west orientation, facing Wulijie Road at the front and adjoining an unnamed reservoir at the back (Fig. 41).

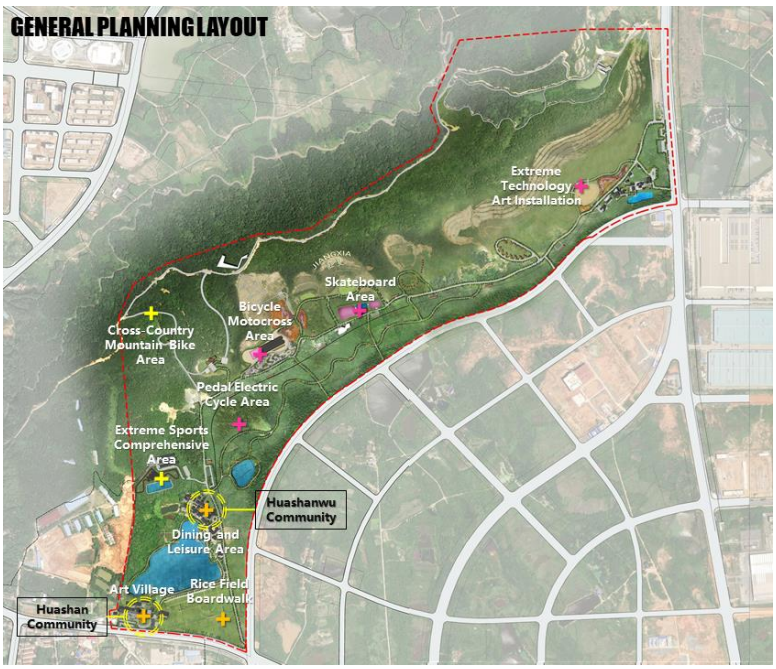

Fig. 39 General Planning Layout (Drawn by the author)

Fig. 40 UAV Aerial Images (Photographed by author)

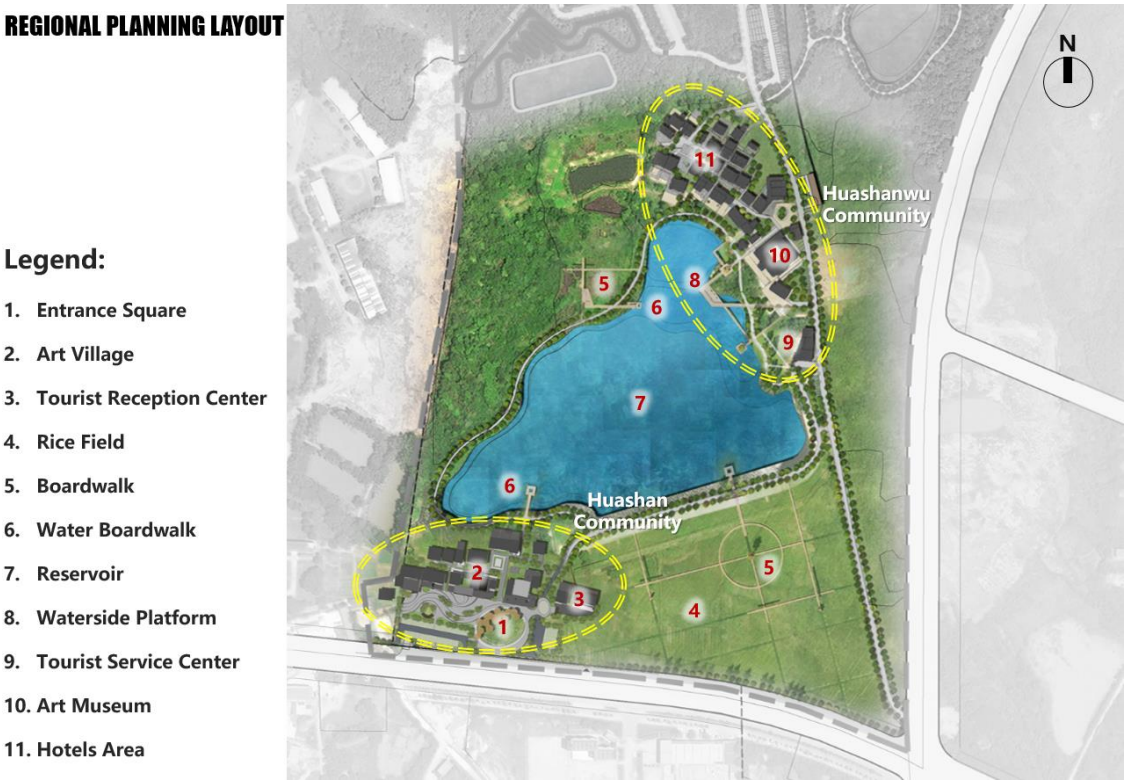

Fig. 41 Regional Planning Layout (Drawn by the author)

The Dahua Mountain Cultural and Creative Industry Park planning project was

encountered by the author during employment at Wuhan Ruituo Architectural Design Consulting Company (UAO Architectural Design) from 2022 to 2023. In the renovation of Huashan Community, the author was primarily responsible for redesigning the building facades within the community, while also assisting colleagues in designing the entrance and plaza of the scenic area. Two design plans were developed for the project, and the first plan was rejected due to inconsistencies with the client's preferences regarding traditional Huizhou architecture aesthetics. Based on the client's feedback and requested revisions, the author and colleagues adjusted the first plan, resulting in a second design that ultimately received the client's approval. This paper will detail the design processes and outcomes of both plans.

Currently, the scenic area project is in the construction phase, with the client hope the renovation of the community to ensure a suitable living space for local residents before the official opening of the scenic area. Once the area is operational, the client plans to transform the community into an artists' village, serving as the functional area for the southern entrance of the scenic area (Fig. 42).

Fig. 42 Regional Transportation Planning (Drawn by the author)

Additionally, the client emphasized that the environmental design and architectural renovation style should draw inspiration from local traditional culture while incorporating modern design concepts. Therefore, the renovation plan should meet the residential needs of the local population, to align with the aesthetic requirements of an artists' village and adapt to the expected tourism development of the scenic area over the next three to four years. The artists' village is currently under construction (Fig. 43).

Fig. 43 Construction Site (Photographed by author)

4.1.2 Cultural Background

Jiangxia District located south of the Yangtze River in Wuhan, Hubei Province, in the southeastern part of Hubei. During the Chinese Ming and Qing dynasties (1368-1644), migrants from Jiangxi Province and Anhui Province settled in Jiangxia, bringing with

them the architectural styles of traditional Huizhou architecture and traditional Gan-style residence. Over time, these styles merged to create a unique architectural form specific to Jiangxia, becoming a regional branch and continuation of traditional Huizhou architecture and traditional Gan-style architecture in Hubei. While Jiangxia residences inherited the typical features of Huizhou and Gan architecture, they gradually evolved into a distinctive style influenced by local geography, culture, and climate. Despite changes in architectural details and cultural nuances, Jiangxia residences have largely retained traditional characteristics in terms of clan structure, family culture, and lineage organization, showcasing a regional landscape and cultural identity distinct from other areas of Hubei.

Traditional Huizhou architecture is an important branch of Chinese traditional architecture, originating in the Anhui region during the Ming and Qing dynasties, and is renowned for its distinctive style. The primary building materials include bluestone, black bricks, wood, and tiles, with walls typically coated in white plaster, creating a striking contrast with black glazed tiles—forming the classic white walls and black tiles aesthetic (Cen et al., 2023). Additionally, traditional Huizhou architecture is known for its intricate details and decorations, featuring finely carved elements on doors, windows, brick decorations, and wooden beams and pillars. Beyond its unique architectural forms and ornamentation, traditional Huizhou architecture is deeply intertwined with rich cultural significance, serving as a prime example of the seamless integration between Chinese traditional architecture and regional culture. It exemplifies the fusion of traditional Chinese architectural principles with local cultural characteristics.

4.1.3 Architectural Sign Extraction for Traditional Huizhou Architecture

In this project, the author extracted and applied classic architectural signs from traditional Huizhou architecture comprising white walls, black tiles, grey bricks, horse-head walls, lattice windows, and wooden materials (X)—using the semiotic principles of

morphological, geometric, color, and material signs. These signs were incorporated into the adaptive reuse design of the vernacular architecture within the community. By preserving the cultural and stylistic heritage of traditional Huizhou architecture, and employing semiotic extraction and morphological design methods, the vernacular architecture was revitalized to meet modern functional needs while retaining its historical and regional cultural characteristics (Fig. 44).

(1) **White Walls:** In traditional Huizhou architecture, white walls carry cultural and symbolic significance, reflecting the pursuit of a certain spiritual and lifestyle ethos. The exterior walls are typically coated with carefully selected white lime and plaster to ensure smoothness and brightness. These white walls complement other design elements of Huizhou architecture, such as creating a striking contrast with black glazed tiles for the classic black-and-white aesthetic, and enhancing texture and layering when paired with grey bricks and wood. In this project, the building facades will extensively use environmentally friendly white paint, known for its eco-friendly properties, weather resistance, and color stability. The use of this paint will better showcase the characteristic white walls of Huizhou architecture, giving the buildings a brighter, cleaner appearance while maintaining the aesthetic continuity of traditional Huizhou design.

(2) **Black Tiles:** Black tiles are a defining feature of traditional Huizhou architecture, creating a sharp contrast with white walls to form the classic black-and-white aesthetic. In addition to their practical functions of waterproofing and insulation, black tiles also lend a sense of dignity and solidity to the architecture. In this project, due to the need to modify the roof structure and address the weight of traditional black tiles, black titanium-zinc panels will be used as a substitute. This choice not only meets the aesthetic requirements of the design but also ensures the structural safety and stability of the roof. The new roofing material will harmonize with the overall

style of traditional Huizhou architecture, maintaining the classic black roof feature while offering greater practicality and structural efficiency.

(3) **Grey Bricks:** Grey bricks are one of the common building materials in traditional Huizhou architecture, contributing to the unique texture of the structures. Typically made from kaolin and other materials, grey bricks have a blue-gray or blue-green appearance. They form part of the classic tricolor palette of Huizhou architecture, alongside white walls and black tiles. Grey bricks are often used for the building plinth and wall decorations, providing a solid and textured feel that adds a sense of ruggedness and stability to the architecture.

(4) **Horse-Head Walls:** Horse-head walls are a distinctive decorative element in traditional Huizhou architecture, commonly found on gatehouses, archways, and perimeter walls. Named for their resemblance to a horse's head, these features are typically made of grey bricks or stone and serve both decorative and symbolic purposes. They symbolize the homeowner's status and aspirations for family honor. In this project, given that the buildings in the community predominantly feature gable roofs, the decision was made to integrate the horse-head wall elements into the original roof design without altering the structure. This method maintains the architectural integrity and stability while incorporating decorative elements from Huizhou architecture.

(5) **Lattice Windows:** Lattice windows are a common design element in Jiangnan architecture, typically made of wood or stone, featuring intricate and detailed carvings and inlays to create complex and elegant lattice patterns. These windows not only serve a decorative purpose but also ensure ample lighting and ventilation while maintaining privacy, showcasing the craftsmanship and unique aesthetics of traditional Huizhou architecture. In this project, since the roof will use new materials to replace the traditional black tiles, a large quantity of roof tiles will become

construction waste during the renovation process. To fully utilize these resources, the tiles can be repainted and incorporated into the lattice patterns of the windows. This method both retains the black tile symbolism and recycles construction waste. By repurposing the tiles, the lattice window patterns will feature unique textures and colors, harmonizing with the style of traditional Huizhou architecture.

(6) **Wood Materials:** Wooden structures play a crucial role in traditional Chinese architecture. Traditional Huizhou architecture emphasizes both strength and aesthetics, with wood widely used in beams, columns, overhanging gables, and bracket set brackets. These wooden structures are built using precise mortise-and-tenon joints, ensuring stability and durability. Additionally, the texture of the wood adds a natural warmth to the buildings. In this project, since the original buildings are constructed with brick and concrete, some of the new structural elements will use steel to ensure safety. To enhance the aesthetic appeal, wood will be used as a decorative material on the facades. As a natural material, wood brings unique textures and warmth, enriching the color palette and adding a natural ambiance to the buildings.

Fig. 44 Six Architectural Signs from Traditional Huizhou Architecture (Drawn by the author)

4.1.4 General Plan

Huashan Community located at the entrance of the Dahua Mountain Cultural and Creative Industry Park planning project, adjacent to Wulijie Road. To create a striking entrance to the scenic area, the existing entrance of the community was selected as the location for the main gate and plaza. Vegetation in this area will be appropriately cleared to provide sufficient space for the plaza and gate design. During the planning process, the

need for vehicle access was carefully considered, with a roadway reserved that connects to the waterfront road behind the site. This layout ensures convenient transportation access while enhancing the overall functionality, meeting the operational needs of the scenic area in terms of traffic efficiency.

In the public areas of the community, the plan is to pave the walkways with plaza bricks to achieve the goal of separating pedestrians from vehicles, thereby enhancing overall safety and the pedestrian experience. To further improve the walking experience, a pathway will be planned on the northern side of the community, leading to the rear reservoir area and connecting to the waterside path, allowing visitors to enjoy the natural scenery along their walk. Additionally, since the original design of the community lacked public spaces, a small green plaza will be created in the central vegetated area to provide a communal space for both residents and visitors to relax and enjoy recreational activities. Through thoughtful planning and careful design, the goal is to create a pleasant, multifunctional, and comfortable community space that caters to the needs of various groups (Fig. 45).

Fig. 45 The Main Renovation Areas in This Chapter (Drawn by the author)

4.1.5 Sample Building No. 1 Adaptive Reuse

The community currently consists of 24 buildings, with brick-concrete structures as

the main form of construction. The exterior walls are primarily decorated with paint and wall tiles, while the roofs are mainly covered with red clay tiles and blue-colored steel sheets. In this section, the focus will be on the renovation design of Building 1, Building 2, and the building complex formed by Buildings 3, 4, and 5. These selected buildings will serve as the core subjects of the discussion. Guided by the theory of architectural semiotics, this chapter will explore how to carry out adaptive reuse of these vernacular buildings and incorporate signs of traditional Huizhou architecture through modern design techniques, aligning with the functional role of the community within the broader scenic area project (Fig. 46).

Fig. 46 UAV Aerial Images (Photographed by author)

Building 1 has a total floor area of 326.44 square meters, with three stories and a total height of 11.55 meters. On-site observations revealed that the blue-colored steel sheet roofs on the front and rear sides of the first floor were later additions by the residents. In the design process, the author decided to remove these added structures to optimize space utilization. By removing these extensions, the front area will be redesigned as a pedestrian walkway and driveway, facilitating the movement of both pedestrians and vehicles in the village and improving traffic convenience (Fig. 47). The rear area of the building will be integrated with the surrounding walls to create a private courtyard, providing residents with a functional and secluded outdoor space.

Fig. 47 The Rendering of Sample Building No. 1 (Drawn by the author)

For the roof design, black titanium-zinc panels were chosen as the primary material. This material offers excellent weather resistance and corrosion resistance, along with high strength and rigidity, while also being relatively easy to install. To maintain the continuity of the overall roof form, the author decided to remove the flat roof on the north side of the third floor and extend the main roof, incorporating a balcony function. To further emphasize the structural form of gable roof and align with the characteristic of traditional Huizhou architecture, where the horse-head wall extends beyond the roofline, the gable walls on both sides were extended by 350 millimeters. Black aluminum panels were used to cover the top, enhancing both the aesthetic appeal and durability of the roof (Fig. 48, 49).

Fig. 48 The Main Renovation Areas in Roof (Drawn by the author)

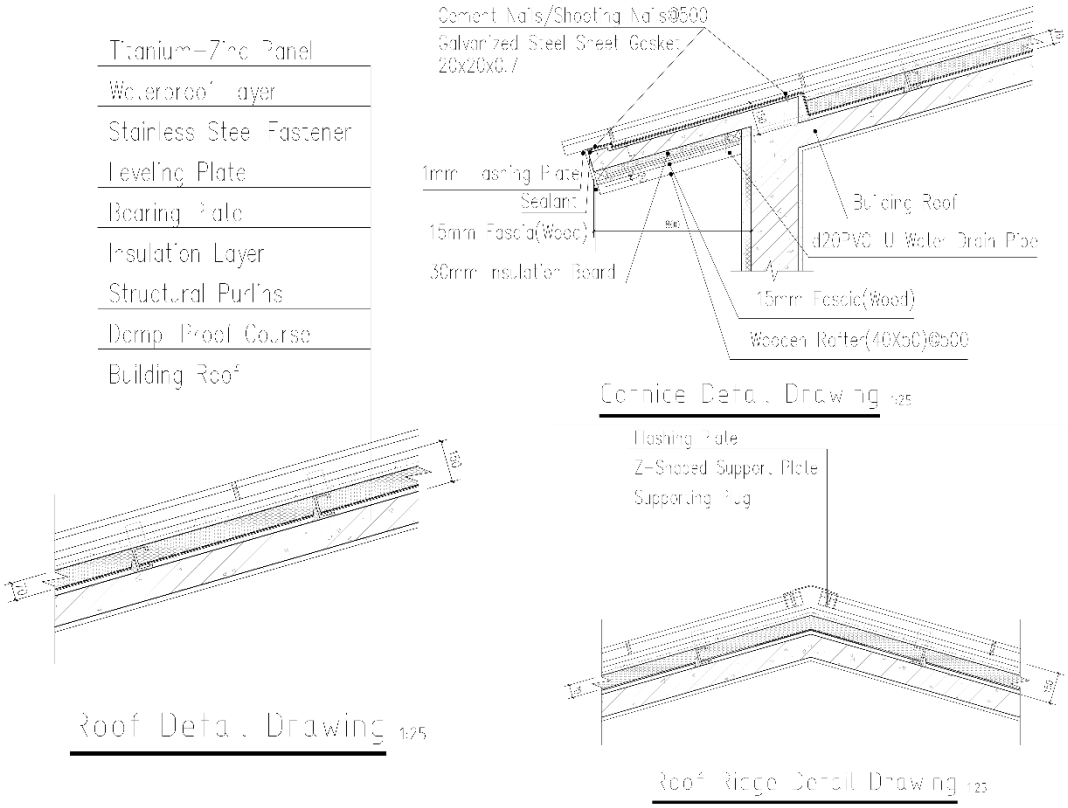

Fig. 49 Roof Detail Drawing (Drawn by the author)

Fig. 50 The Front Elevation and Back Elevation of Sample Building No. 1 (Drawn by the author)

In the design of the building facade, white elastic paint was extensively used as the primary exterior wall material, highlighting the symbolic feature of white walls and creating a sharp contrast with the dark roof. The plinth of the exterior walls was decorated with bluestone bricks, ensuring waterproofing for the ground level while also enhancing the wall resistance to staining. To enrich the color layering of the facade, warm-toned anti-corrosion wood was applied to the back facade, adding a warm and visually appealing element to the black, white, and grey color scheme. This also emphasized the presence of wood as a symbolic material, giving the building a greater sense of texture and depth (Fig. 50).

In the window design, it was decided to retain most of the original window openings and use them as the "motif". Through topological variation and repetition, the dimensions and shapes of the windows were adjusted. The window frames are made of black thermal-break aluminum, and the window casings are 3mm-thick steel plates, extending 450mm outward to create a clean geometric form, providing a striking contrast with the white walls while enhancing the visual impact of the building facade. For the sections facing the courtyard, large floor-to-ceiling windows were designed to ensure ample natural light while maintaining privacy through the screening provided by the exterior walls of courtyard (Fig. 51, 52).

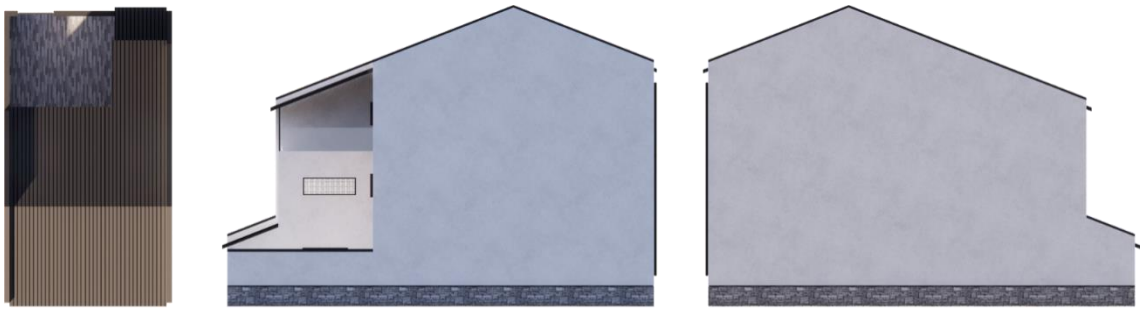

Fig. 51 The Top View, Left Elevation and Right Elevation of Sample Building No. 1 (Drawn by the author)

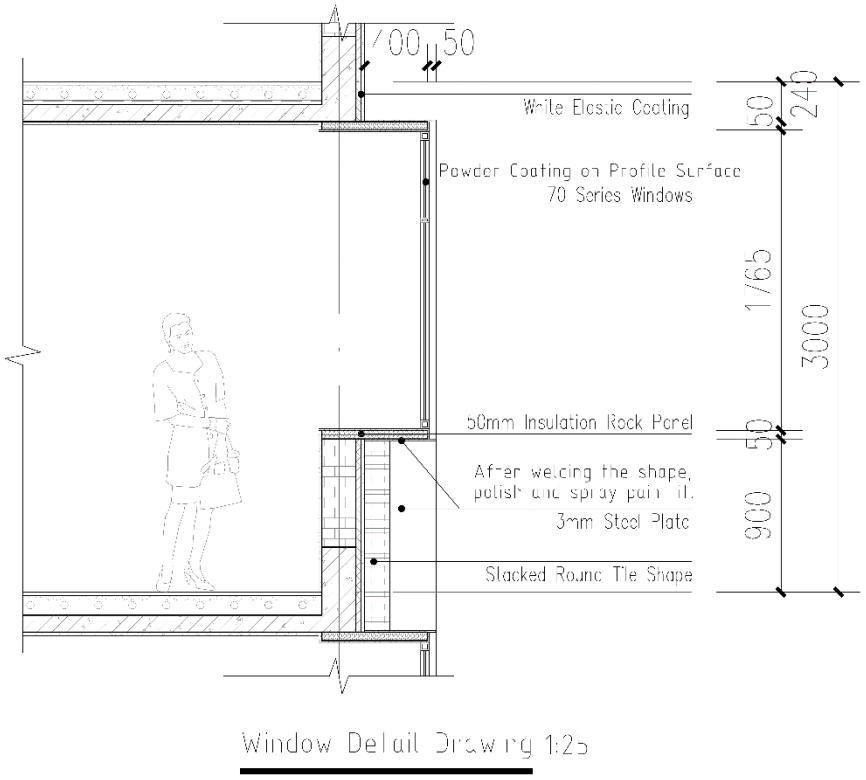

Fig. 52 Window Detail Drawing (Drawn by the author)

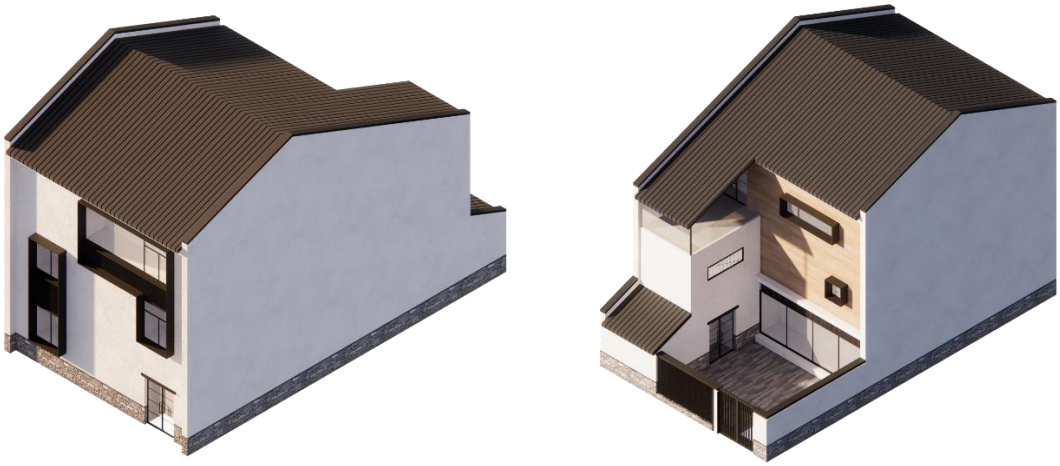

Fig. 53 The Axonometric Drawing of Sample Building No. 1 (Drawn by the author)

Additionally, in certain sections of the building facade and courtyard walls, the tiles removed during the roof renovation were repainted and integrated into the lattice window design using the "motif" repetition method. This method decorates the building facade

while emphasizing the traditional architectural signs of lattice windows and black tiles. This not only highlights the distinct characteristics of these two traditional elements but also adds a unique cultural flavor and design sensibility to the entire building (Fig. 53).

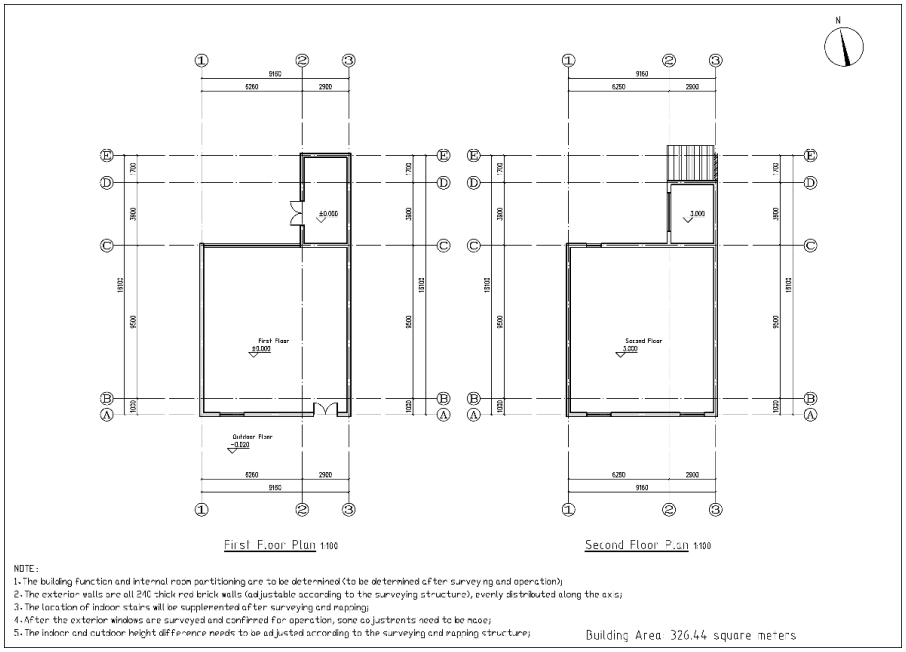

Fig. 54 The First Floor Plan and Second Floor Plan of Sample Building No. 1 (Drawn by the author)

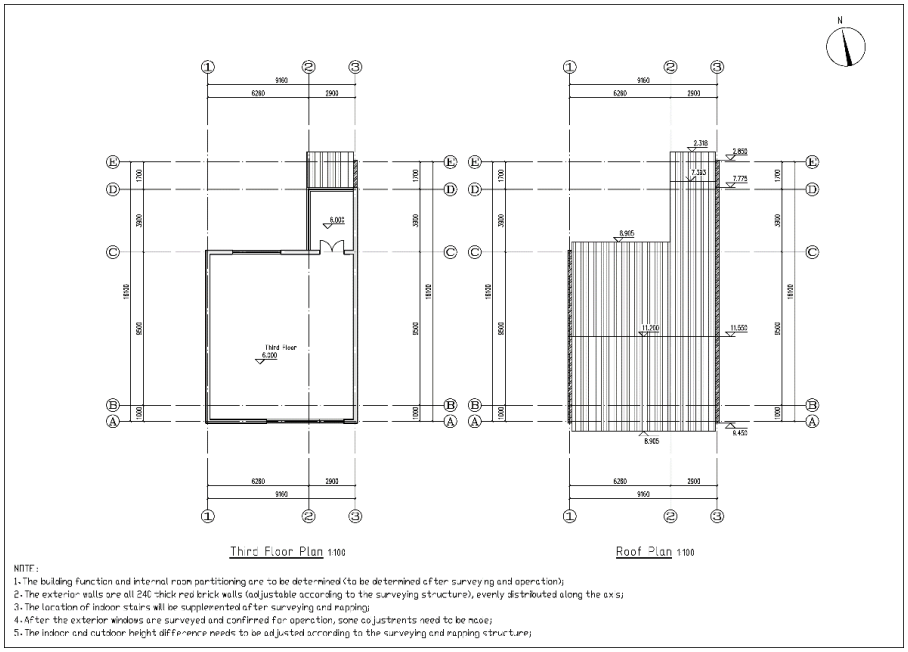

Fig. 55 The Third Floor Plan and Roof Plan of Sample Building No. 1 (Drawn by the author)

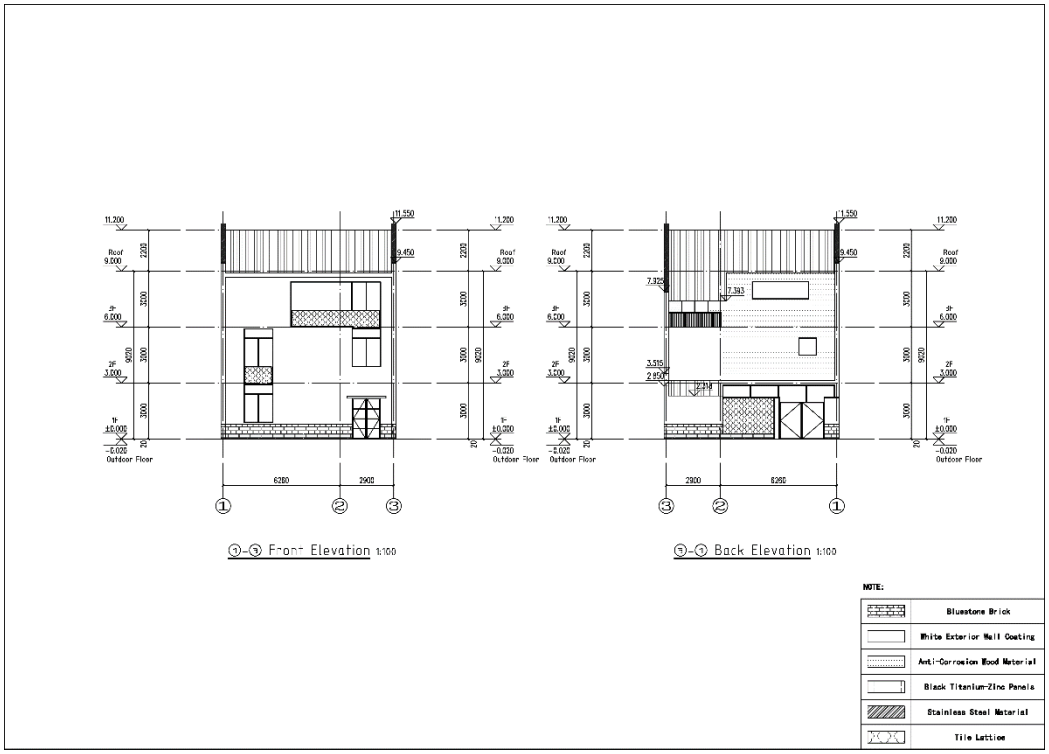

Fig. 56 The Front Elevation and Back Elevation of Sample Building No. 1 (Drawn by the author)

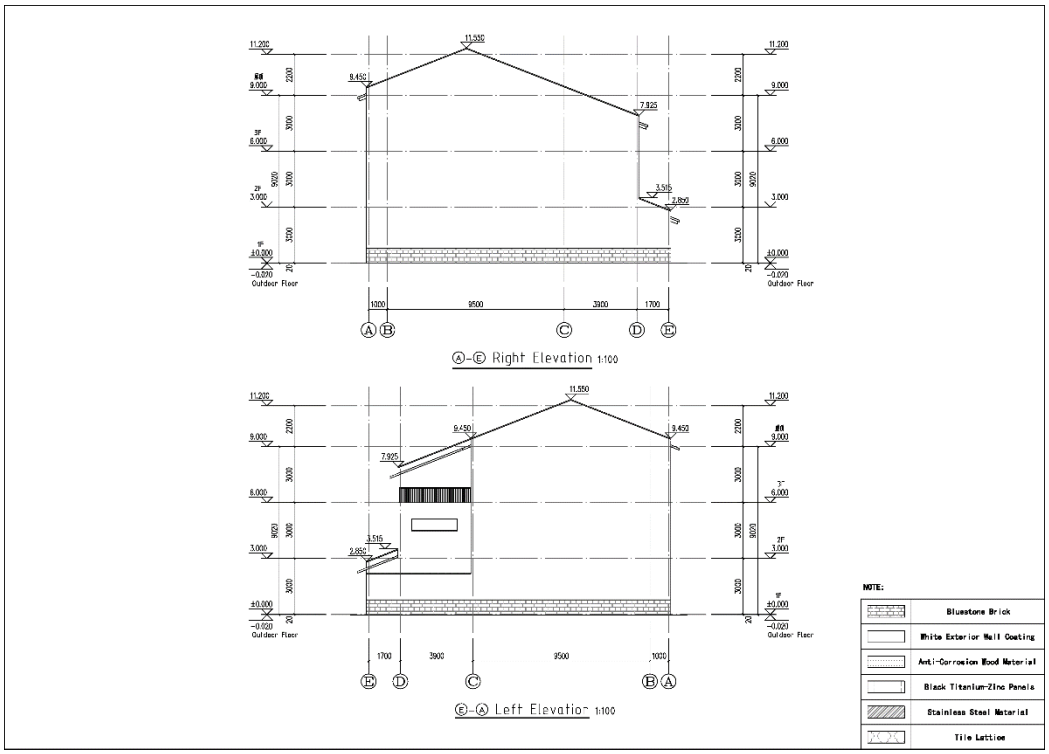

Fig. 57 The Right Elevation and Left Elevation of Sample Building No. 1 (Drawn by the author)

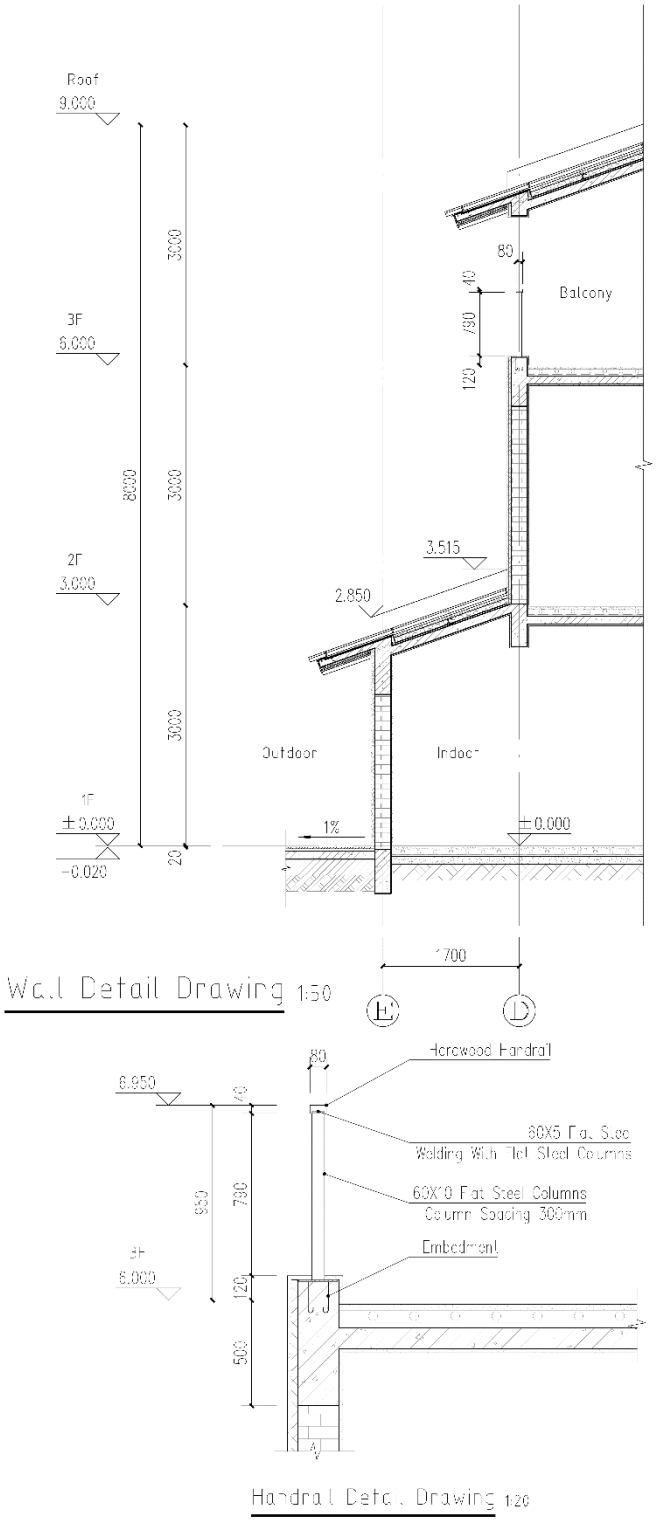

Fig. 58 Wall Detail Drawing (Drawn by the author)

4.1.6 Sample Building No. 2 Adaptive Reuse

Building 2 has a total floor area of 238.19 square meters, with three stories and a height of 11.55 meters. The design method for the facade and roof renovation largely follows the plan used for Building 1, and thus will not be reiterated here. However, from a functional perspective, on-site observations revealed that the front facade features a semi-open recessed space running from the first to the third floor, which creates a geometric form that appears overly monotonous and lacking in depth. To address this, it was decided to enclose the second-floor balcony and part of the first-floor space, creating a continuous wall surface that enhances the overall cohesiveness and depth of the façade (Fig. 59).

Fig. 59 The Main Renovation Areas in Facade (Drawn by the author)

For the newly constructed first-floor wall, glass bricks were chosen as the window material to maintain privacy while providing ample natural light, replacing the original window function. At the building entrance, warm-toned anti-corrosion wood was used as the wall decoration material, further emphasizing the presence of wood as a key architectural sign and adding a warm, natural touch to the building facade.

On the right side of the main building facade, there is a staircase window on each floor from the first to the third. Similar to the recessed space on the left, the overly regular structure makes the building facade appear monotonous and lacking in depth. To address this, it was decided to replace the staircase windows with two rectangular windows,

staggered in placement to enrich the geometric composition of the building facade and add visual interest (Fig. 60).

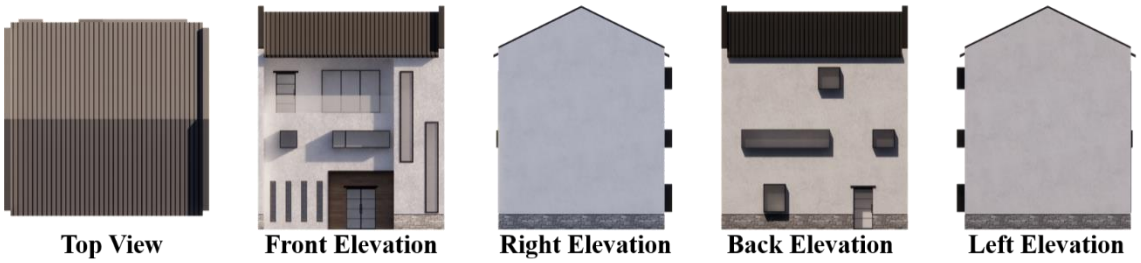

Fig. 60 The Top View and Four Elevations of Sample Building No. 2 (Drawn by the author)

On the rear facade of the original building, there are six evenly distributed windows and one door, creating the same uniform appearance as the front. To improve this, some of the window openings were consolidated or removed during the design process, and more geometrically windows were installed to enhance the visual effect of the facade. The size and materials of the windows are consistent with those of Building 1, utilizing black thermal-break aluminum window frames and 3mm-thick steel for the casings, extending 450mm outward. This ensures that the building facade maintains overall aesthetic appeal and a unified style (Fig. 61).

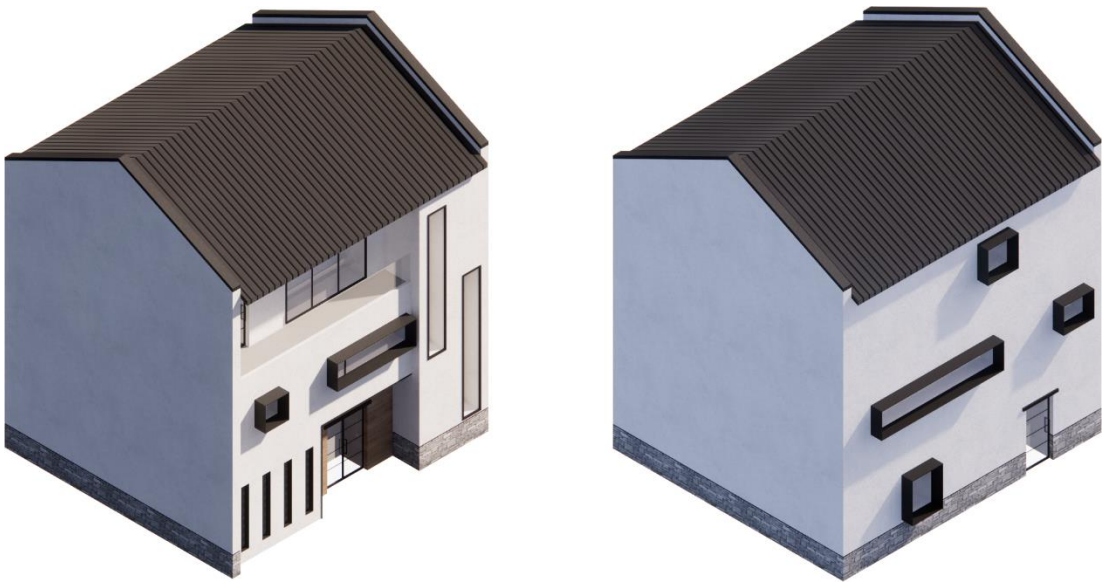

Fig. 61 The Axonometric Drawing of Sample Building No. 2 (Drawn by the author)

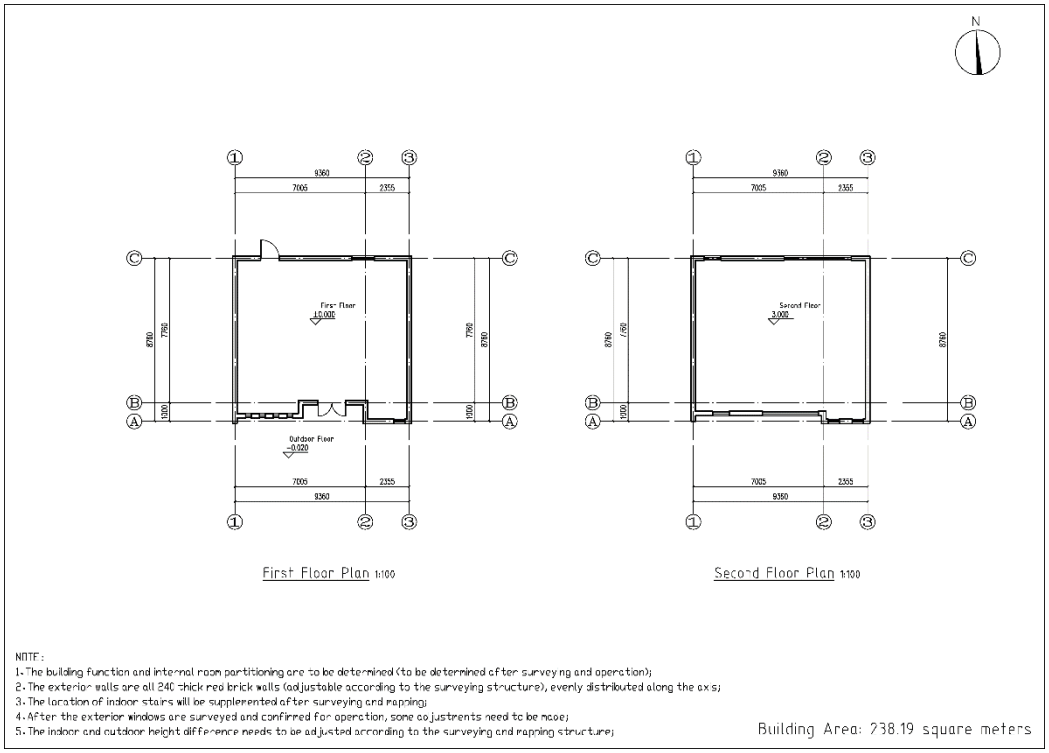

Fig. 62 The First Floor Plan and Second Floor Plan of Sample Building No. 2 (Drawn by the author)

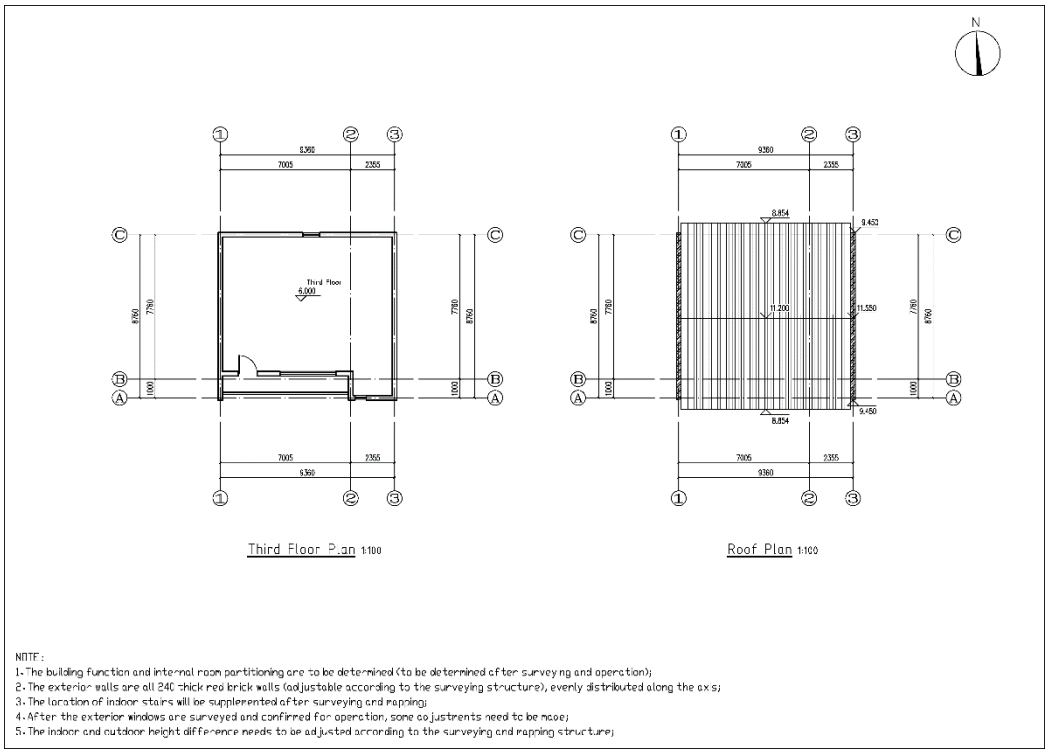

Fig. 63 The Third Floor Plan and Roof Plan of Sample Building No. 2 (Drawn by the author)

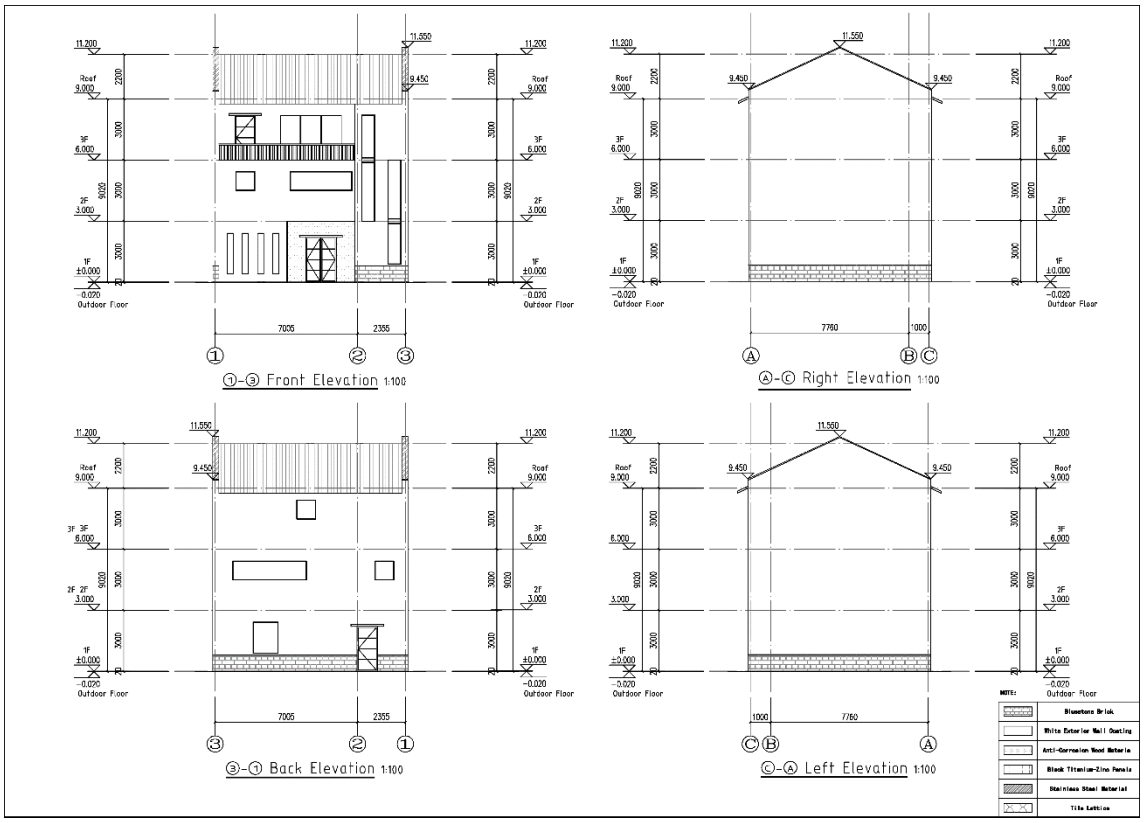

Fig. 64 The Four Elevations of Sample Building No. 2 (Drawn by the author)

4.1.7 Building Complex Adaptive Reuse

Buildings 3, 4, and 5 have floor areas of 341 square meters, 353.1 square meters, and 150 square meters, respectively, and all are three-story structures. On the northern side of these residences, some small brick buildings were constructed by the residents. Satellite images reveal that there was once a building between Buildings 3 and 4, which has since been demolished. On-site surveys show that blue steel-sheet roofs were added between these buildings and the small brick structures behind them, which were later additions by the residents.

At the early stages of the project, the client requested that these buildings continue to serve as residences for the villagers until the scenic area project officially opens. Once construction is completed and the scenic area becomes operational, these buildings will

be converted into a visitor reception center. Therefore, the design plan must balance the current living needs of the residents while providing enough flexibility and adaptability to accommodate future tourist reception functions (Fig. 65, 66).

Fig. 65 The Rendering of Building Complex (Drawn by the author)

Fig. 66 The Rendering of Building Complex (Drawn by the author)

Based on these factors, it was decided to integrate the buildings and the small brick structures on their northern side to form a "1+2" building configuration. This method ensures that each building maintains independent space and functionality as a residence while creating effective connections between the structures. In the overall design, all areas with blue steel-sheet roofs that were later additions will be removed. A platform will be built on the small brick structures, utilizing the space between Buildings 3 and 4 and the area freed by the removal of the steel-sheet roofs as a passageway beneath the platform. This design decision not only creates a continuous and integrated building complex for the entire area but also preserves the original structure of each building, ensuring both architectural cohesion and functional integrity.

Observations from site photos reveal that the original Building 3 had blue steel-sheet roofs illegally added by the villagers on the front, back, and sides. The front facade of the building features three doors on the ground floor and three windows on the second floor. In the back facade, it was noted that the building lacks semi-open spaces such as balconies or corridors. Therefore, the first step in the design plan is to remove the steel-sheet roofing around Building 3. The areas in front and on the sides where the steel sheets were previously located will be repurposed as public spaces for the community, while the rear section will be converted into a passageway beneath the platform for the building complex (Fig. 67).

Fig. 67 The Main Renovation Areas in Building 3 (Drawn by the author)

Next, adjustments will be made to the doors and windows on the front facade of the

building. The original doors and windows will be replaced with long horizontal glass windows and glass bricks to enhance the modern feel of the building facade. As Building 3 is a two-story structure with a relatively wide frontage, its overall appearance seems too flat. To address this, the shape of the roof from traditional Huizhou architecture was chosen as the "motif", and through the method of reconstruction, this form was incorporated into the design of the building entrance. The walls at the entrance will be clad in anti-corrosion wood, enriching the facade design and adding a natural warmth to the building.

On the rear facade of the building, given the lack of semi-open spaces such as balconies or corridors, a recessed semi-open balcony was designed to improve the functionality and visual depth of the space. Some windows will also be consolidated, and the area below the windows will be adorned with roof tiles recovered from the demolition and repainted, using these as geometric signs incorporated into the design to further enrich the rear facade form. For the second-floor platform, openings were created near the building to allow natural light to enter the first-floor passageway, improving brightness. This design also prevents the platform structure from disrupting the continuous window design on the first and second floors, preserving the facades overall integrity.

In the adaptive reuse of Building 4, on-site photos revealed two prominent features on the front facade: symmetry and balconies. These characteristics were selected as "motifs", and through reconstruction, they were emphasized in the design. The roof structure was first modified by converting the original semi-open corridor into a fully open space. The "primary-subordinate relationship" form from traditional Chinese architectural roof designs was used as a template to adjust the roofs on both sides, creating a more harmonious and layered appearance (Fig. 68). For the front facade, the symmetrical structural layout was maintained, but the windows on the left and right sides were designed asymmetrically. This method preserved the overall balance while adding

visual interest, making the building facade more dynamic and visually appealing.

Fig. 68 The Main Renovation Areas in Building 4 (Drawn by the author)

For the rear facade design of Building 4, the design concept used for Building 3 was similarly applied. An opening was created near the second-floor platform to allow light into the first and second-floor windows, ensuring that the continuous window design remains uninterrupted by the platform structure and maintaining the overall integrity of the facade. As mentioned earlier, once the scenic area project is completed, this building complex will be used as a visitor reception center (Fig. 69).

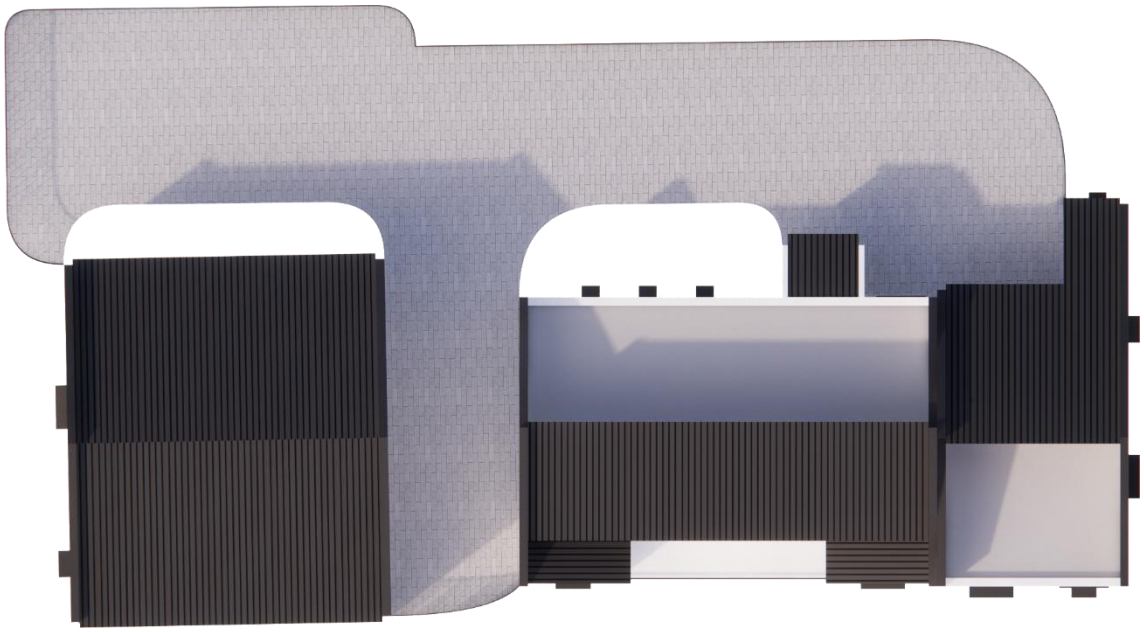

Fig. 69 The Top View of Building Complex (Drawn by the author)

However, apart from the outdoor platforms, each building lacks a sufficiently large open public space for future visitor use. Given the sufficient floor height, it was decided

to remove the roof on the rear facade of the third floor and create a terrace overlooking the green plaza in community. This terrace will provide visitors with a space for relaxation and viewing, while also enhancing the interaction between the building and its surrounding environment, making it more open (Fig. 70).

Fig. 70 The Front Elevation and Back Elevation of Building Complex (Drawn by the author)

Observations from site photos show that Building 5, like Building 4, features "symmetrical structure" and "corridor" characteristics. However, since Buildings 4 and 5 are closely connected, they can be viewed as either two independent structures or as a cohesive whole. To avoid monotony in the design, the adaptive renovation of Building 5 involves removing these two symmetrical features. Instead, asymmetrical door and window arrangements will be used to enrich the geometric form of the front facade, enhancing the building depth and visual appeal. This creates a contrast with Building 4, while maintaining the overall design uniqueness and diversity (Fig. 71).

Similarly, the Building 5, like Building 4, lacks a large open public space to meet the needs of future visitors. Therefore, an open terrace was also designed for Building 5. However, since these buildings will continue to be used independently by residents until

the scenic area becomes operational, having adjacent terraces would significantly reduce privacy. To address this issue, it was decided to remove the roof on the front facade of the third floor of Building 5 and design a terrace facing the nearby fields. Additionally, the small brick structures behind the building complex will undergo facade renovation, featuring large floor-to-ceiling glass windows to increase natural lighting. This area could be repurposed as a café or a small exhibition space in the future, further enhancing the functionality of the buildings and increasing their appeal to visitors (Fig. 72).

Fig. 71 The Left Elevation and Right Elevation of Building Complex (Drawn by the author)

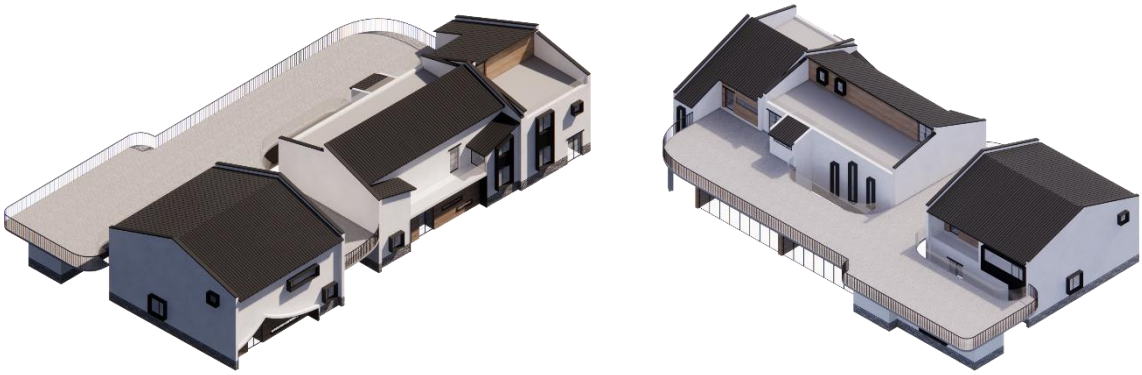

Fig. 72 The Axonometric Drawing of Building Complex (Drawn by the author)

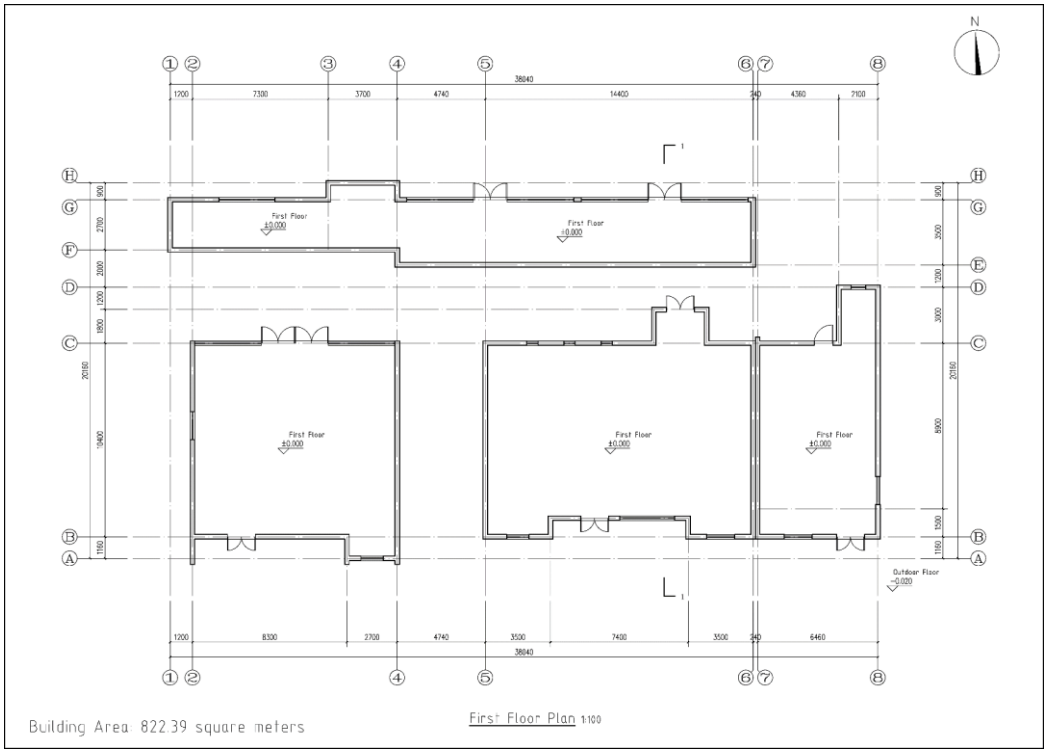

Fig. 73 The First Floor Plan of Building Complex (Drawn by the author)

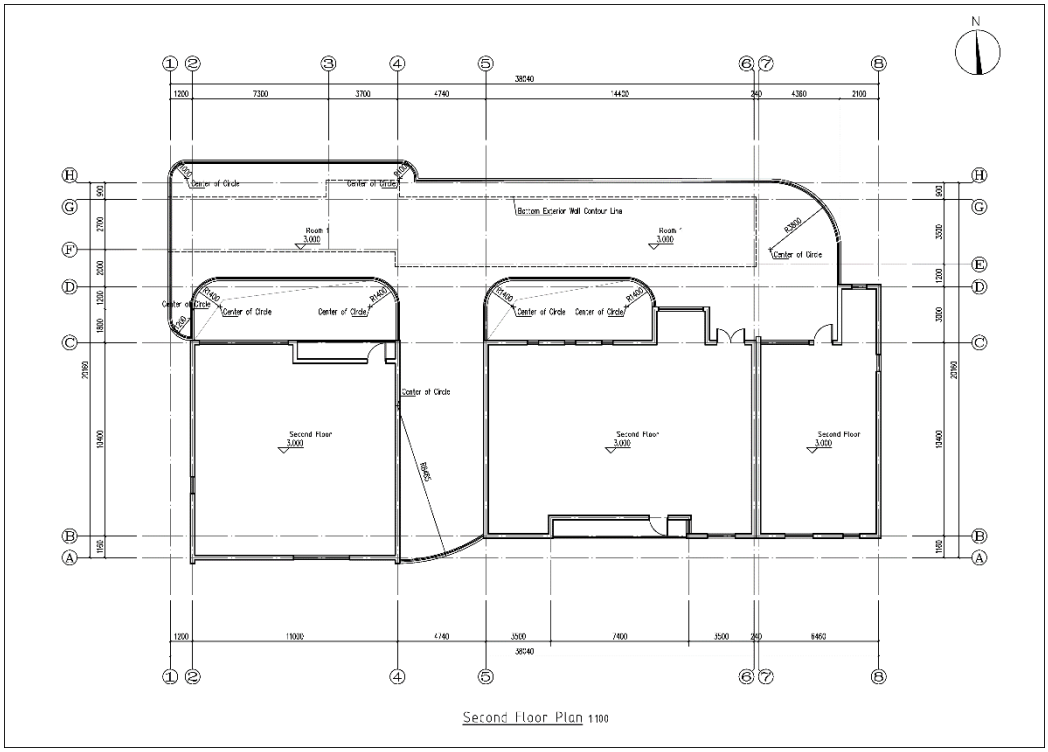

Fig. 74 The Second Floor Plan of Building Complex (Drawn by the author)

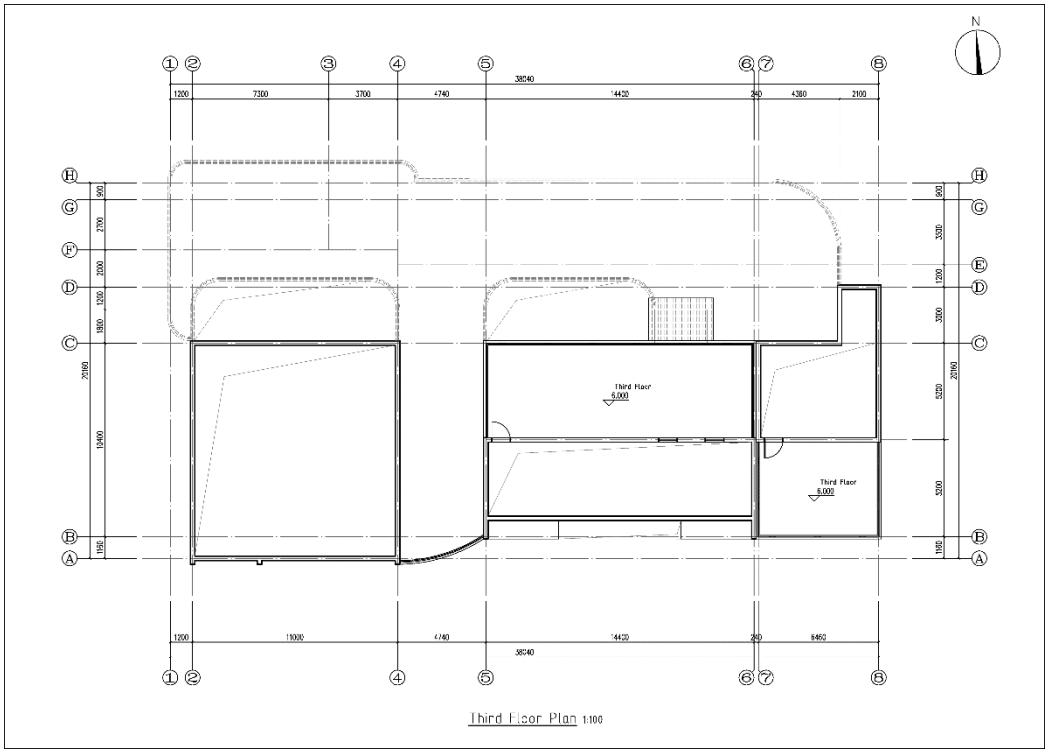

Fig. 75 The Third Floor Plan of Building Complex (Drawn by the author)

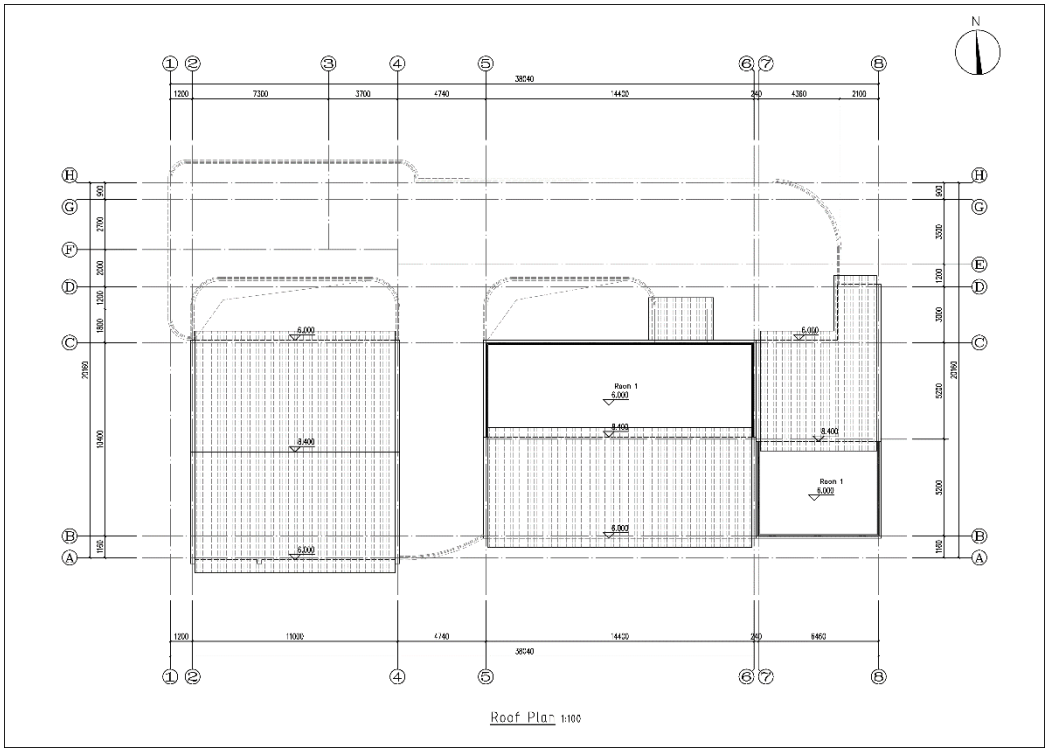

Fig. 76 The Roof Plan of Building Complex (Drawn by the author)

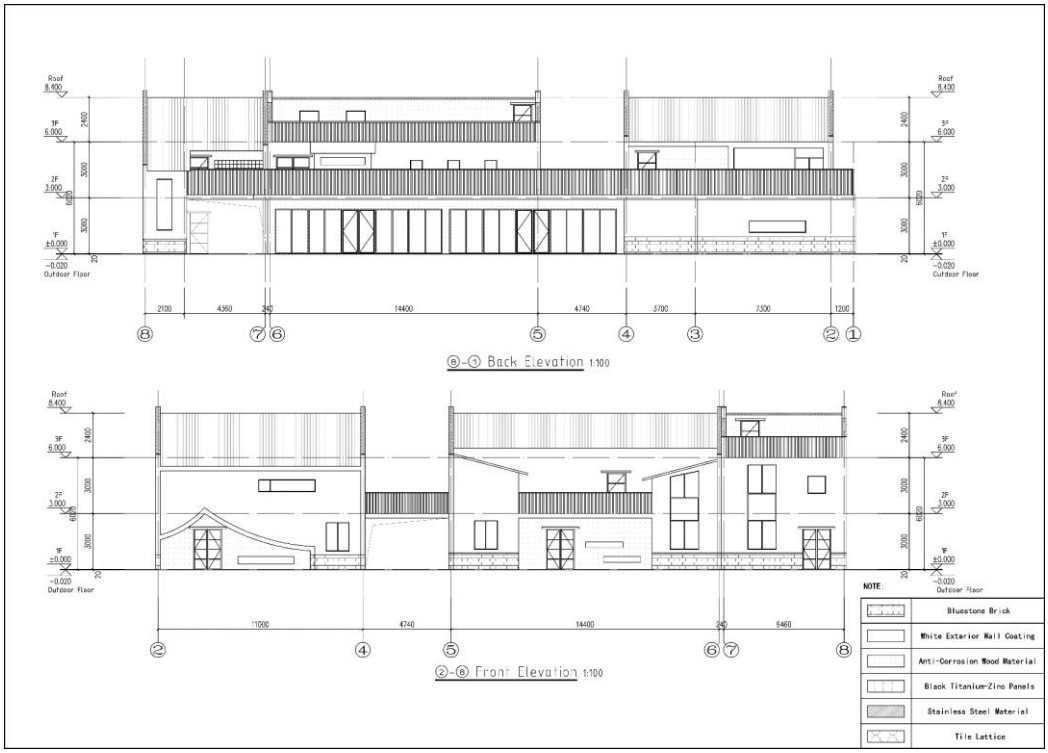

Fig. 77 The Back Elevation and Front Elevation of Building Complex (Drawn by the author)

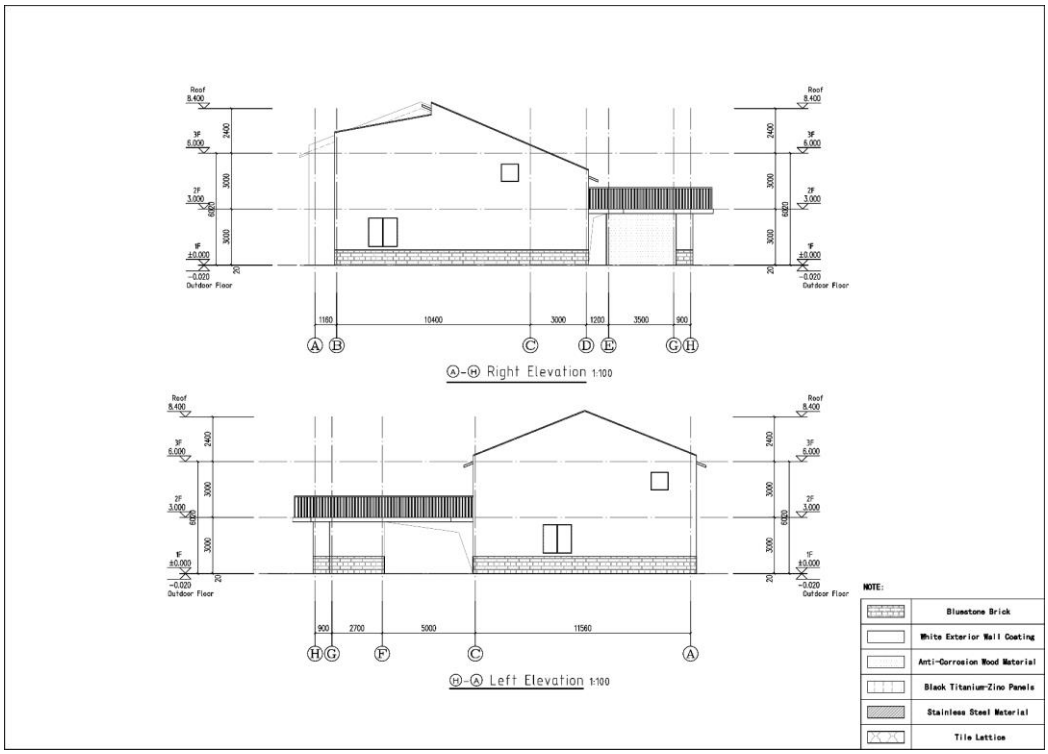

Fig. 78 The Right Elevation and Left Elevation of Building Complex (Drawn by the author)

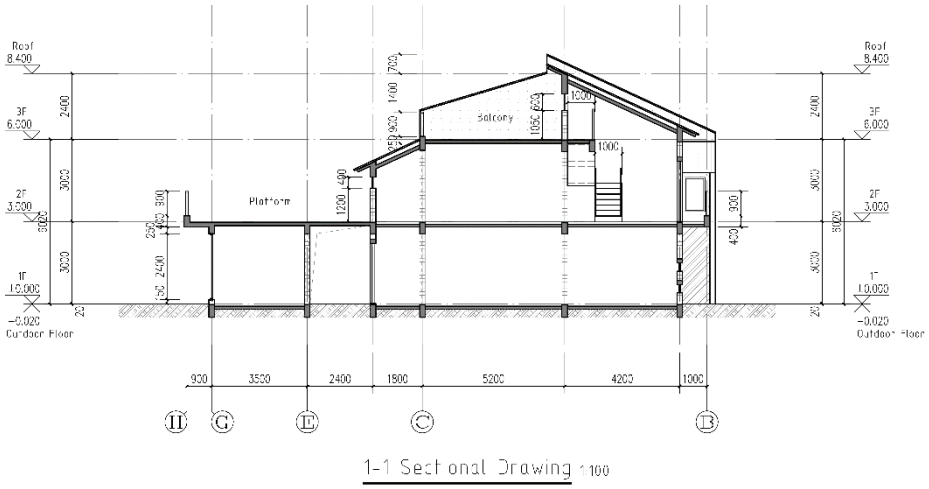

Fig. 79 1-1 Sectional Drawing (Drawn by the author)

4.1.8 Landscape Plaza Design

Fig. 80 The Rendering of Landscape Plaza (Drawn by the author)

In the landscape design of the community, a combination of light grey plaza bricks and dark grey bricks was chosen to clearly distinguish the main road from the areas in

front of the buildings. This ensures a clear functional division of the public spaces while enhancing the directional flow for pedestrians. To improve the functionality of the community green spaces, it was decided to preserve as many of the existing trees as possible and relocate or replant those that do not align with the design, maintaining continuity in the greenery and ecological balance (Fig. 80, 81).

Fig. 81 The Rendering of Landscape Plaza (Drawn by the author)

Fig. 82 The Aerial View of Artist's Village (Drawn by the author)

Additionally, landscape walls will be introduced in some green areas to add depth and

visual interest to the scenery, creating a more pleasant living environment. In the central vegetated area of the community, a small green plaza has been planned as a space for both residents and visitors to relax and engage in recreational activities. This plaza is intended to foster social interaction, strengthen community cohesion, and provide a vibrant public space for the community (Fig. 82, 83).

Fig. 83 The General Plan of Artist's Village (Drawn by the author)

4.1.9 Client's Revisions and Suggestions

After completing the first version of the design plan and presenting it to the client, client provided many revision suggestions. The key revision regarding the architectural design include the following:

(1) Traditional Huizhou architecture, as one of the most representative styles in Chinese architecture, has been widely applied across various projects. However, due to the abundance of such projects and the varying quality of their design, visitors often experience aesthetic fatigue. In light of this, the client expressed a clear desire not to continue using the traditional Huizhou architectural style in this project. Instead, they

requested that the design team draw inspiration from other regional traditional architectural styles, exploring new design directions to present a more unique and innovative architectural form.

(2) The client requested the design of a courtyard-style public space in front of some buildings within the artist village, intended for future artists' use. This courtyard would serve not only as a space for daily creation and art exhibition but also as an area where artists can relax, engage, and interact. The aim is to create an open, inspiring environment that fosters the exchange of ideas and collaborative interaction among the artists, promoting creativity and collaboration.

(3) For the building complex formed by Buildings 3, 4, and 5, the client clarified that they have acquired full ownership of the land, meaning there is no need to consider residential occupancy after construction is completed. The client requested that the building complex be designed directly as a visitor reception center to fully optimize its functionality. The design will focus on functions related to visitor reception, relaxation, and exhibition, ensuring that the buildings meet the needs of tourists once the scenic area is operational.

(4) The client expressed a desire for the building complex formed by Buildings 3, 4, and 5 to have a design style that stands apart from the other buildings in the community, showcasing a more modern architectural style. The design should not only meet the functional requirements of a visitor reception center but also emphasize simplicity and a sense of modernity through the use of contemporary architectural elements. This will differentiate the complex from the more traditional styles used in the community, creating a distinct visual and experiential contrast while enhancing the overall modern atmosphere of the area.

(5) The client noted that, according to relevant Chinese regulations, the buildings within the community can be demolished and rebuilt on the original site. Therefore, after

assessment, the design team may proceed with the demolition and reconstruction of certain buildings if needed, ensuring that the new design is not constrained by the original building structures. However, the footprint of the buildings must remain unchanged.

(6) The client expressed a desire for the design of the visitor reception center to interact functionally with the adjacent rice field landscape. The design team is expected to explore how to integrate the building with the natural scenery in a way that creates interactive and experiential spaces.

4.1.10 The Cultural Background of Traditional Gan-Style Architecture

Fig. 84 The Traditional Gan-Style Architecture (kknews.cc/zh-my/culture/)

As previously mentioned, during the Chinese Ming and Qing dynasties, the Jiangxia District saw an influx of immigrants from Jiangxi province and Anhui Province, bringing with them the architectural styles of traditional Huizhou and Gan-Style architecture. After extensive discussions with the client and the team, it was decided to focus on the traditional Gan-Style architecture for the adaptive reuse of the community buildings. Typical architectural signs from Gan-Style architecture, such as grey bricks, grey tiles, and horse-head walls, will be incorporated into the design. These elements will be combined with modern design techniques to retain the region cultural characteristics

while revitalizing the buildings and enhancing their functionality (Fig. 84).

Traditional Gan-Style architecture is a quintessential representation of Jiangxi's residential buildings, characterized by its simple layouts and understated, elegant style. The architectural form typically features a rectangular plan enclosed by hollow brick walls, with the facade uniformly composed of grey bricks and tiles. The double-pitched roof, partially concealed behind tiered horse-head walls, is another distinctive feature of this style.

From a historical and cultural perspective, traditional Gan-Style architecture began to take shape during the Chinese Song Dynasty (960–1279), and it is believed that the origins of traditional Huizhou architecture were influenced by it. As history progressed, particularly during the Chinese Ming and Qing dynasties (1368–1912), Huizhou architecture flourished, developing its own unique style, which in turn had a profound influence on the cultural evolution of Gan-Style architecture.

4.1.11 Architectural Signs Extraction for Traditional Gan-Style Architecture

In this project, the traditional Gan-Style architecture signs were extracted and practically applied through the use of architectural form, spatial, geometric, color, and material signs as part of the semiotics framework. These signs include architectural forms, grey brick walls, black tiles, granite plinths, and horse-head walls, all of which were incorporated into the renovation design of the community vernacular building facades (Fig. 85).

(1) **Architectural Form:** The form of traditional Gan-Style architecture is simple, primarily using locally abundant natural resources such as wood and stone as building materials. Traditional elements like horse-head walls and upturned eaves are often used for the roof, combining practicality with aesthetic appeal. The internal layout follows the traditional Chinese courtyard design, commonly referred to as "四水归堂

(Si Shui Gui Tang)" (nourishing water merges into the hall from all directions), symbolizing ancient aspirations for prosperity and harmony in life.

(2) **Grey Brick Walls:** Grey brick walls are a key element in traditional Gan-Style architecture, reflecting the local architectural style and material characteristics. The facades of Gan-Style buildings often use grey bricks made from locally fired clay, presenting a greyish-blue or greyish-green tone. These bricks are hard, durable, and offer excellent moisture resistance and insulation. The grey brick walls are typically constructed with neatly arranged bricks, resulting in smooth wall surfaces, and the simplicity of the wall lines complements the overall building form. The color of the grey bricks, in combination with black tiles and a granite plinth, creates a harmonious color scheme, adding a sense of solidity and historical depth to the architecture.

(3) **Black Tiles:** Black tiles are a characteristic material used in the roofs of traditional Gan-Style architecture, complementing the grey brick walls. Typically made from fired clay and subjected to high-temperature treatment, black tiles exhibit a dark grey or black color. These tiles provide excellent waterproofing, sun protection, and insulation, safeguarding the wooden roof structure from natural erosion and extending the building lifespan. Additionally, the texture and color of black tiles impart a dignified and steady visual effect to the architecture.

(4) **Granite Plinth:** Granite plinths are widely used in traditional Gan-Style architecture, primarily for foundations, steps, and column bases. Known for their hardness, natural texture, and solid color, granite plinths are typically finely polished and carved, resulting in smooth surfaces and crisp lines. They are often used to elevate the main structure of the building, preventing moisture and rainwater from damaging the walls and providing a sturdy foundation that supports the weight of the upper structure and prevents subsidence. The natural texture and color of granite also add a tactile richness to the building, enhancing its overall aesthetic appeal.

(5) **Horse-head Wall:** The horse-head wall is a signature decorative element of traditional Gan-Style architecture, located on both sides of the building gable walls, rising above the roofline and resembling the shape of a horse's head—hence the name. The top of the wall is often stepped or curved, with flowing lines and staggered heights. This elevated wall helps prevent the spread of fire and shields the roof from strong winds while also enriching the facade design and enhancing the overall aesthetic appeal and visual impact of the building. Unlike the horse-head walls in traditional Huizhou architecture, those in Gan-Style feature a distinct white "Architrave" between the wall and the roofline, which, combined with the geometric lines of the grey brickwork, gives the building a striking sense of geometric beauty.

Fig. 85 Building Form, Black Tiles, Grey Brick Walls, Horse-Head Wall, Granite Plinth (kknews.cc/zh-my/culture/)

4.1.12 Final Design Plan—Sample Building Adaptive Reuse

After multiple discussions and plan revisions by the design team, the final design plan has successfully gained the client's approval. Given the diverse building forms within the community, this section will focus on showcasing the design of a sample house as the primary subject for discussion. This sample house represents the overall design method of the project and serves as a concrete example of how traditional Gan-Style architectural signs are integrated with modern design concepts to meet both the functional needs and aesthetic requirements of the building.

The total height of the sample building is 11.2 meters, with a floor height of 9 meters

and a roof structure height of 2.2 meters. In the design of the sample building, black titanium-zinc panels, grey brick walls, and granite were used as the primary materials for the facade and roof. These three dark materials impart a sense of solidity to the building; however, they also create a somewhat heavy and visually dense appearance. To balance this visual weight, the design method from the first version of the plan was carried forward. Since traditional Gan-Style architecture often features a white "architrave" on the horse-head walls, this element was emphasized and expanded in the design. By using different white materials to create an outline effect on the building facade, the form was enhanced, adding depth and visual layers to the building. This also contributed to a lighter, more vibrant aesthetic, making the building more visually dynamic and attractive.

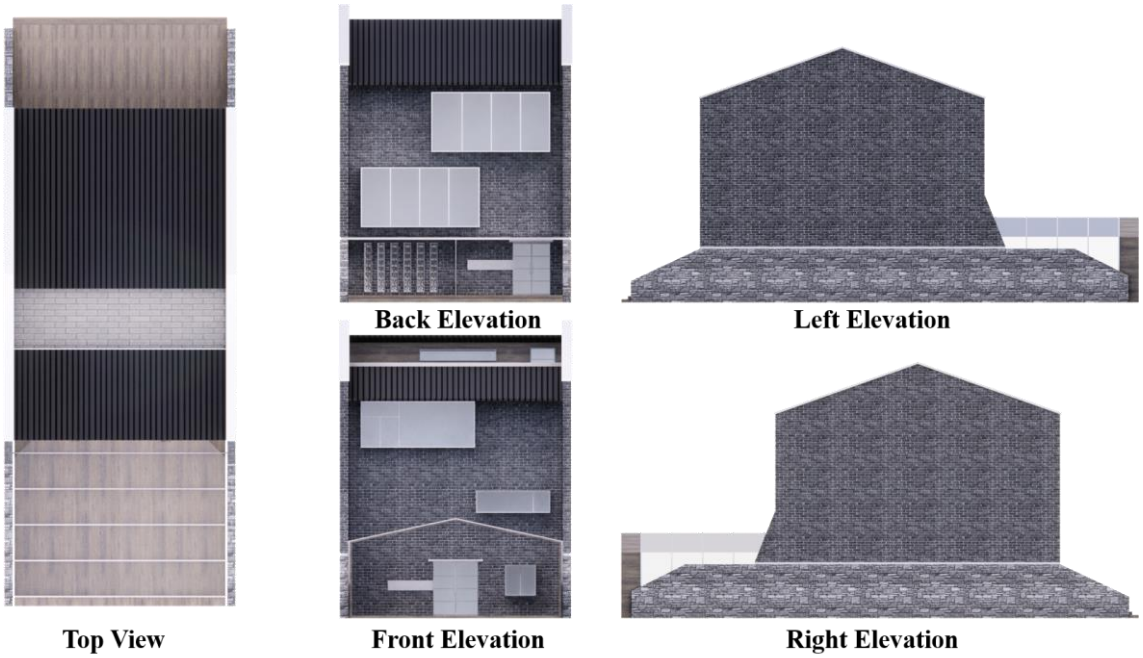

Fig. 86 The Top View and Four Elevations of Sample Building (Drawn by the author)

In the roof design, to emphasize the architectural structure of the hard gable roof and reflect the unique characteristic of the horse-head wall rising above the roof, the gable walls on both sides were extended, raising them by 500 millimeters. White aluminum panels were used to cover the top of the gable walls, further highlighting the visual impact

of the horse-head wall sign. Given that the roof structure of the sample building has a height of 2.2 meters, a viewing terrace was incorporated into the design. By raising the gable walls, they naturally function as railings for the terrace, enhancing the usability of the roof space and providing an observation area that interacts with the surrounding environment (Fig. 86).

On the left and right facades, granite materials with a height of 2.4 meters were used to enhance the waterproof performance of the exterior walls. To maintain the overall architectural consistency and considering the presence of courtyard space, the granite material was extended to the front and rear of the building, forming the exterior wall of courtyard. At the junctions between the grey stone bricks and granite, white filler was applied to create a seamless and smooth transition, ensuring connection between the materials.

In the design of the front and rear facades, the method from the first plan was maintained by using white, thermally insulated aluminum window frames. The window casings were crafted from 3 mm thick steel plates, extending 450 mm outward to create clean geometric forms. These shapes contrast sharply with the dark walls, enhancing the visual appeal of the facades (Fig. 87, 88, 89).

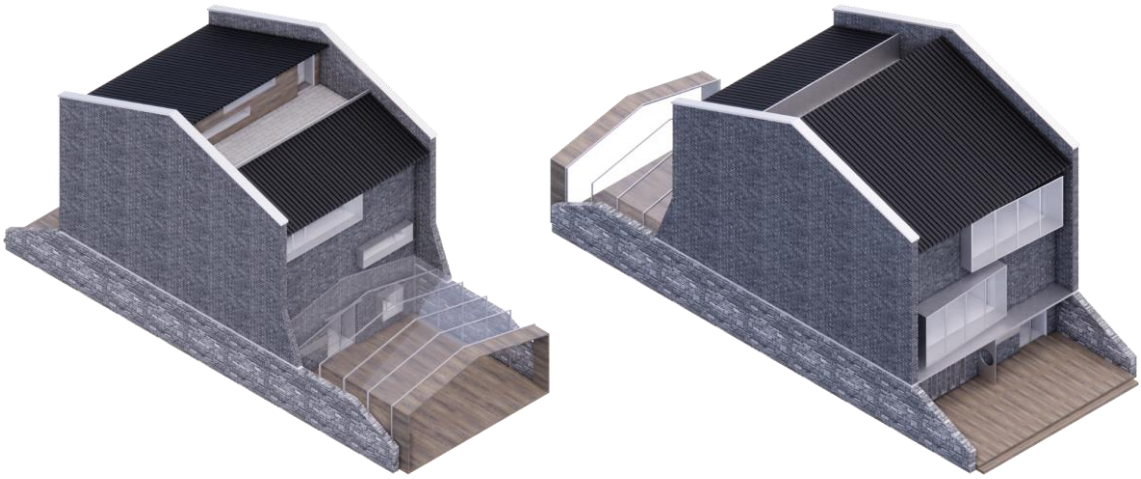

Fig. 87 The Axonometric Drawing of Sample Building (Drawn by the author)

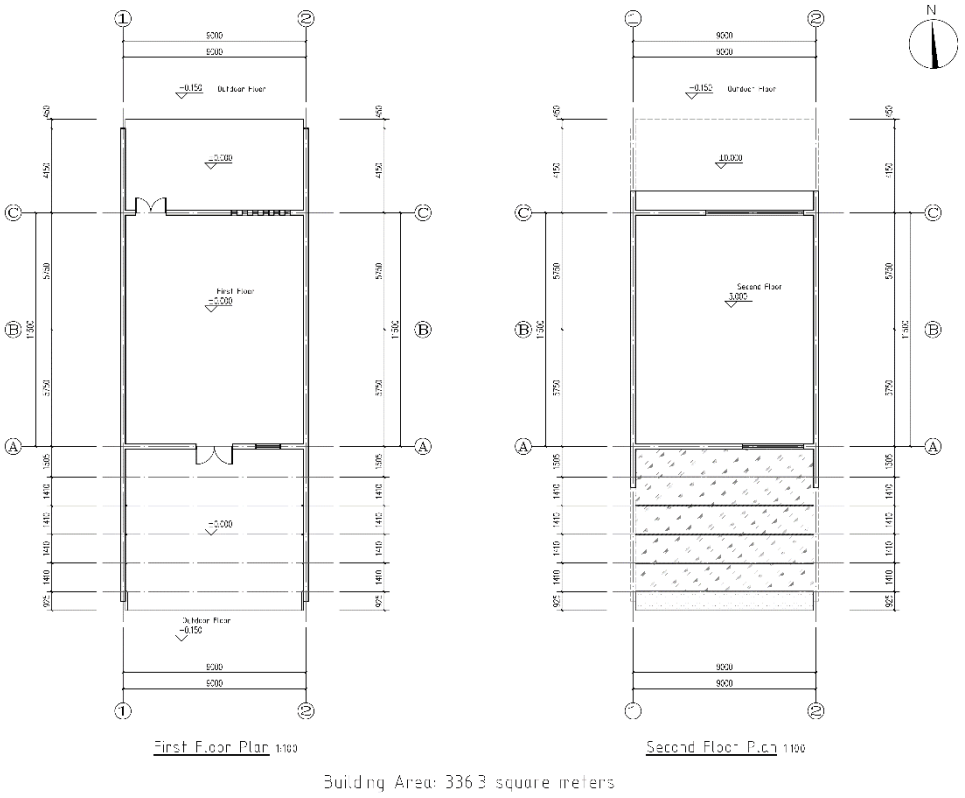

Fig. 88 The First Floor Plan and Second Floor Plan of Building (Drawn by the author)

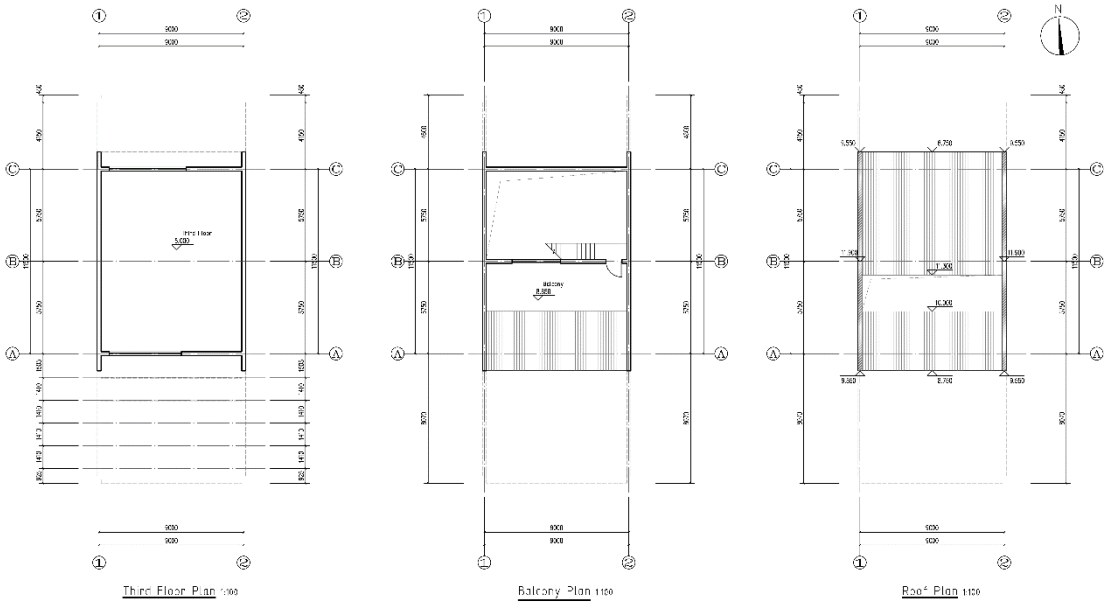

Fig. 89 The Third Floor Plan, Balcony Plan and Roof Plan of Building (Drawn by the author)

For the courtyard design, a departure from the traditional courtyard form was taken by incorporating a combination of wood, white steel structures, and glass to create a semi-open space. The white steel structure and glass echo the other white elements in the building, contrasting with the dark exterior walls and contributing to a sense of lightness in the architecture. The use of wooden materials adds a warm texture to the overall design, balancing the dark and white tones, and enriching the building color layers.

4.1.13 Final Design Plan—Tourist Reception Center Design

During the design process for the visitor reception center, it was determined that the original building complex, being of brick-concrete structure, would require extensive structural reinforcement prior to any renovation. Additionally, in the arts village planning proposal by a colleague, a staircase leading to the rice field landscape was designed in this area. Given the 3.62-meter height difference between the community ground level and the rice field, any ground excavation could potentially compromise the building foundation.

Fig. 90 On-site photo of Tourist Reception Center (Photographed by author)

Taking these technical factors into account, and after extensive discussions with the client, the decision was made to demolish the original structures and reconstruct them using a reinforced concrete frame system on the same site. The construction phase of this building has now been completed (Fig. 90).

In the architectural design of the visitor reception center, the overall method from the first version of the plan was largely retained. For instance, the "1+2" building form was adopted, allowing the three buildings to maintain their independent functions while also being interconnected to form a cohesive whole. A terrace was designed on the third floor, providing visitors with a space for relaxation and scenic views, thus enhancing the interaction between the building and its natural surroundings.

The color scheme of white walls and black tiles, commonly seen in modern design, was chosen to satisfy the client's preference for a modern architectural style while also referencing the color signs found in traditional Huizhou architecture. Additionally, the use of the "motif" topological variations method allowed for the creation of clean geometric shapes, enriching the visual effect of the building facades and contributing to a more dynamic and layered appearance.

In terms of the building structure, given that it was rebuilt on the original site using a reinforced concrete frame system and considering the height difference between the building and the rice field landscape, the decision was made to design an elevated ground floor beneath the original building 4 and 5. This ground floor creates a seamless connection with the planned pathways and the rice field landscape, offering spaces for viewing, dining, or exhibition purposes, thereby enhancing the interaction between the building and its natural surroundings (Fig. 91).

On the right facade, large glass windows were incorporated into the design to ensure ample natural light and improve the interior openness and transparency. This design not only enhances the indoor environment but also allows visitors to enjoy the beautiful rice

field views from inside, further enriching the overall user experience of the building.

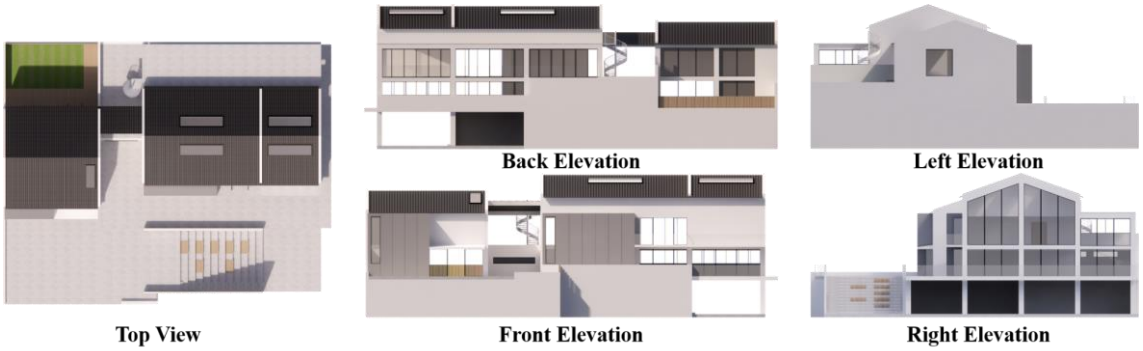

Fig. 91 The Top View and Four Elevations of Tourist Reception Center (Drawn by the author)

In the roof design, the method from the first plan was maintained, with white exterior wall coatings paired with dark-tiled roofing. The gable walls on both sides were extended to echo the classic signs of traditional Huizhou architecture comprising white walls, black tiles, and horse-head walls. Additionally, skylights were integrated into the roof to enhance natural lighting, creating a brighter indoor environment. The overall building form continues to follow the "1+2" structure, consistent with the first design plan.

In the original building 3 area, an independent courtyard was also designed. Unlike the viewing platform on the third floor, this courtyard offers a quieter and more private space, providing visitors with a comfortable area for relaxation. This creates a serene retreat, complementing the more open and interactive areas of the building (Fig. 92).

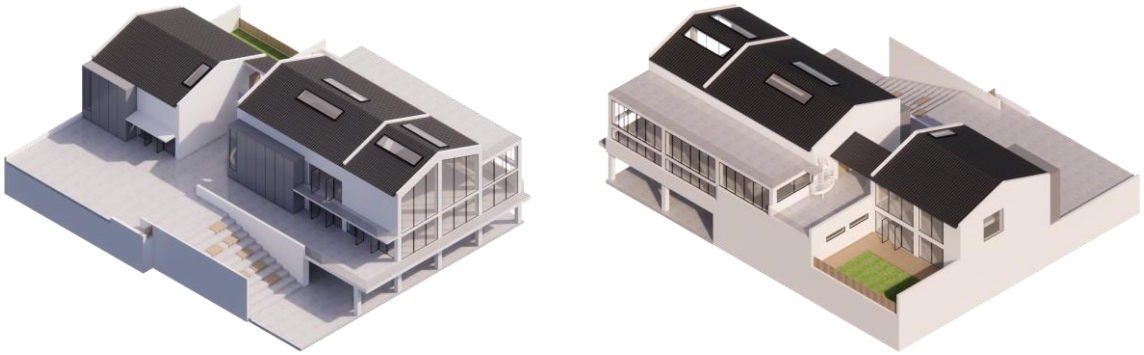

Fig. 92 The Axonometric Drawing of Tourist Reception Center (Drawn by the author)

Finally, in the design of the front facade, the structural sign of the original balconies

from the building 4 and 5 were retained and modernized using the “reappearance” method. Additionally, two grey rectangular boxes were incorporated into the facade design, blending with the classic modernist color scheme of black, white, and grey. Vertical glass windows and striped patterns were added to the grey boxes, further enhancing the geometric aesthetics and visual appeal of the building façade (Fig. 93).

Fig. 93 On-Site Photo of Tourist Reception Center (Photographed by author)

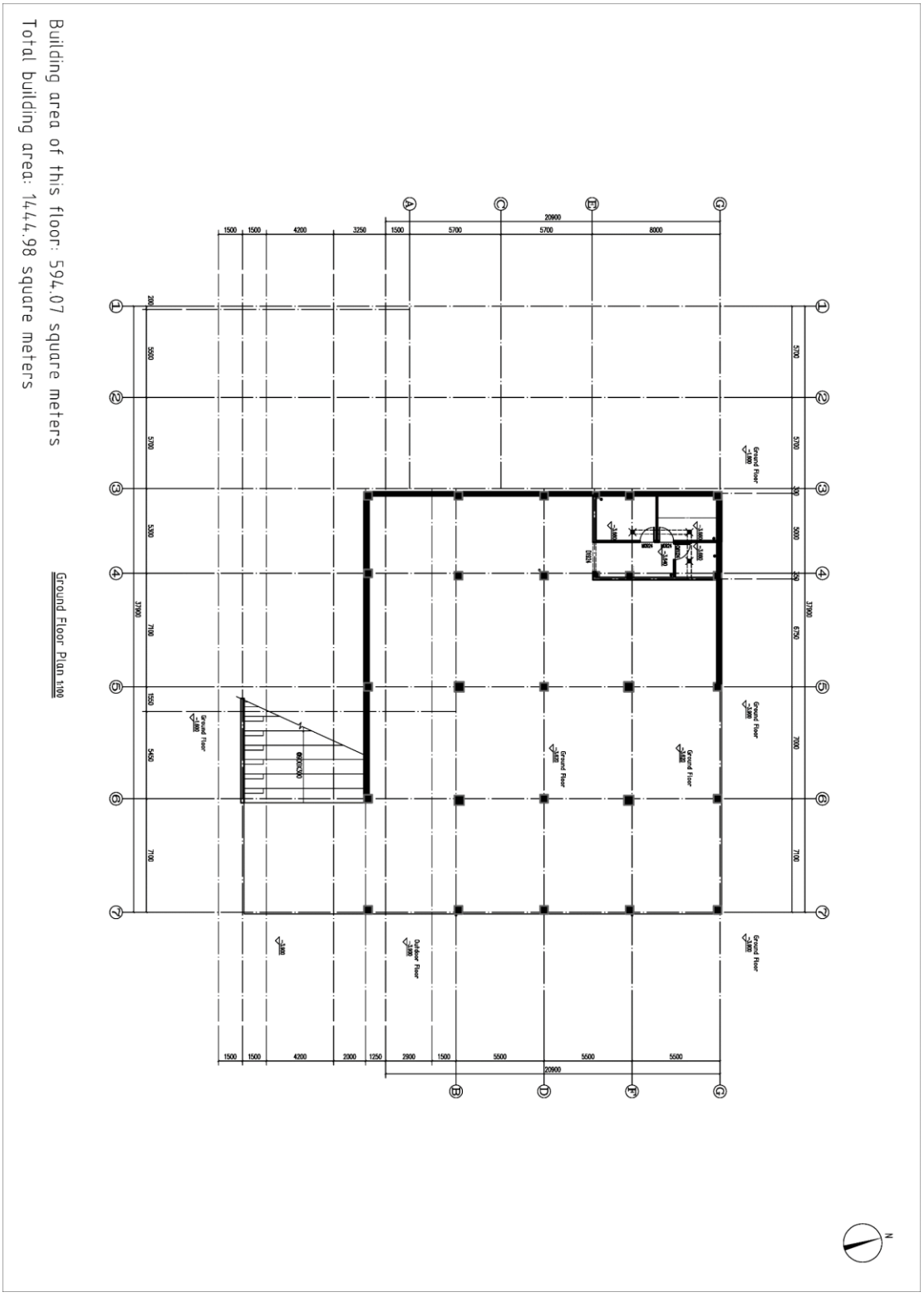

Fig. 94 Ground Floor Plan of Tourist Reception Center (Drawn by the author)

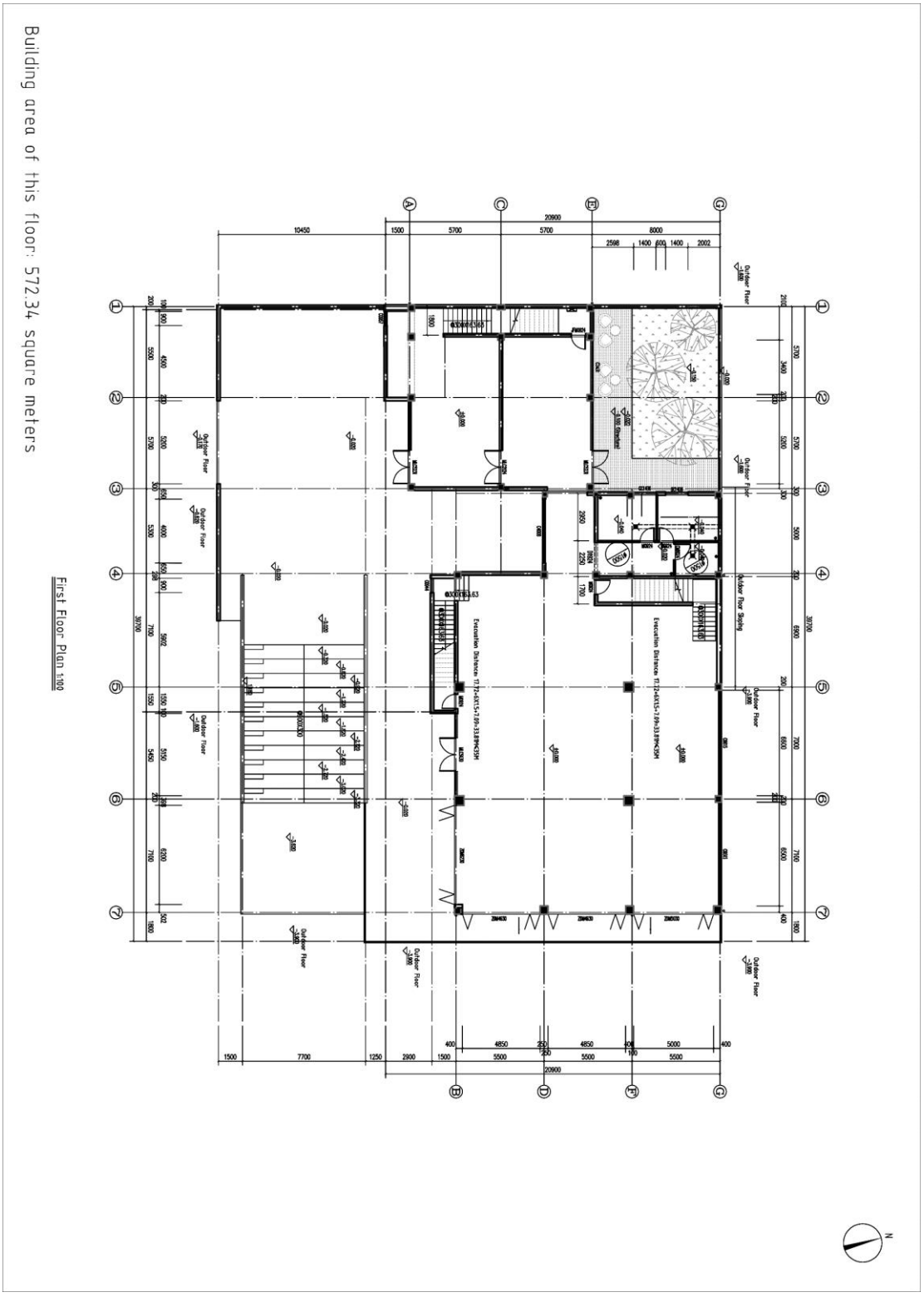

Fig. 95 First Floor Plan of Tourist Reception Center (Drawn by the author)

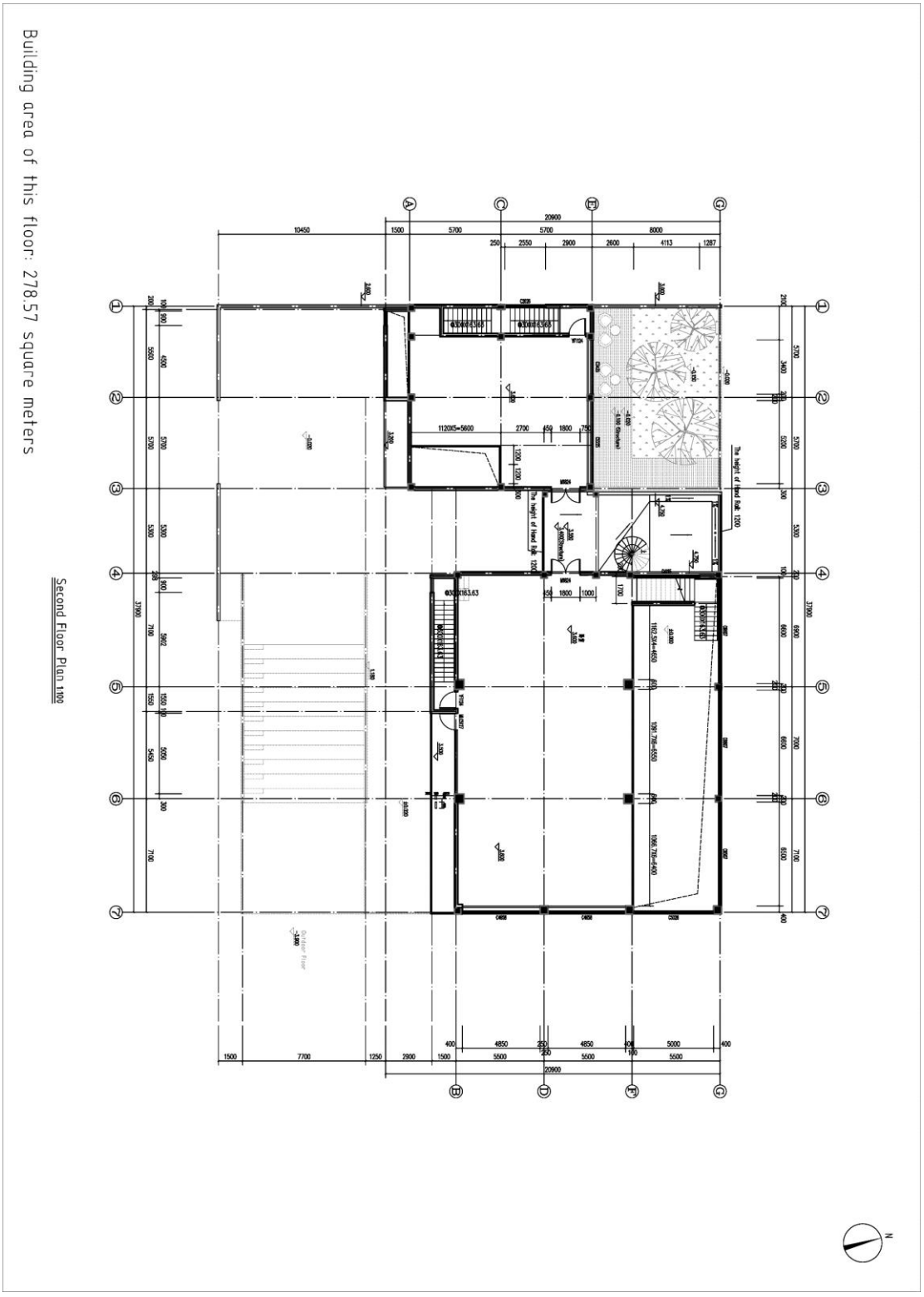

Fig. 96 Second Floor Plan of Tourist Reception Center (Drawn by the author)

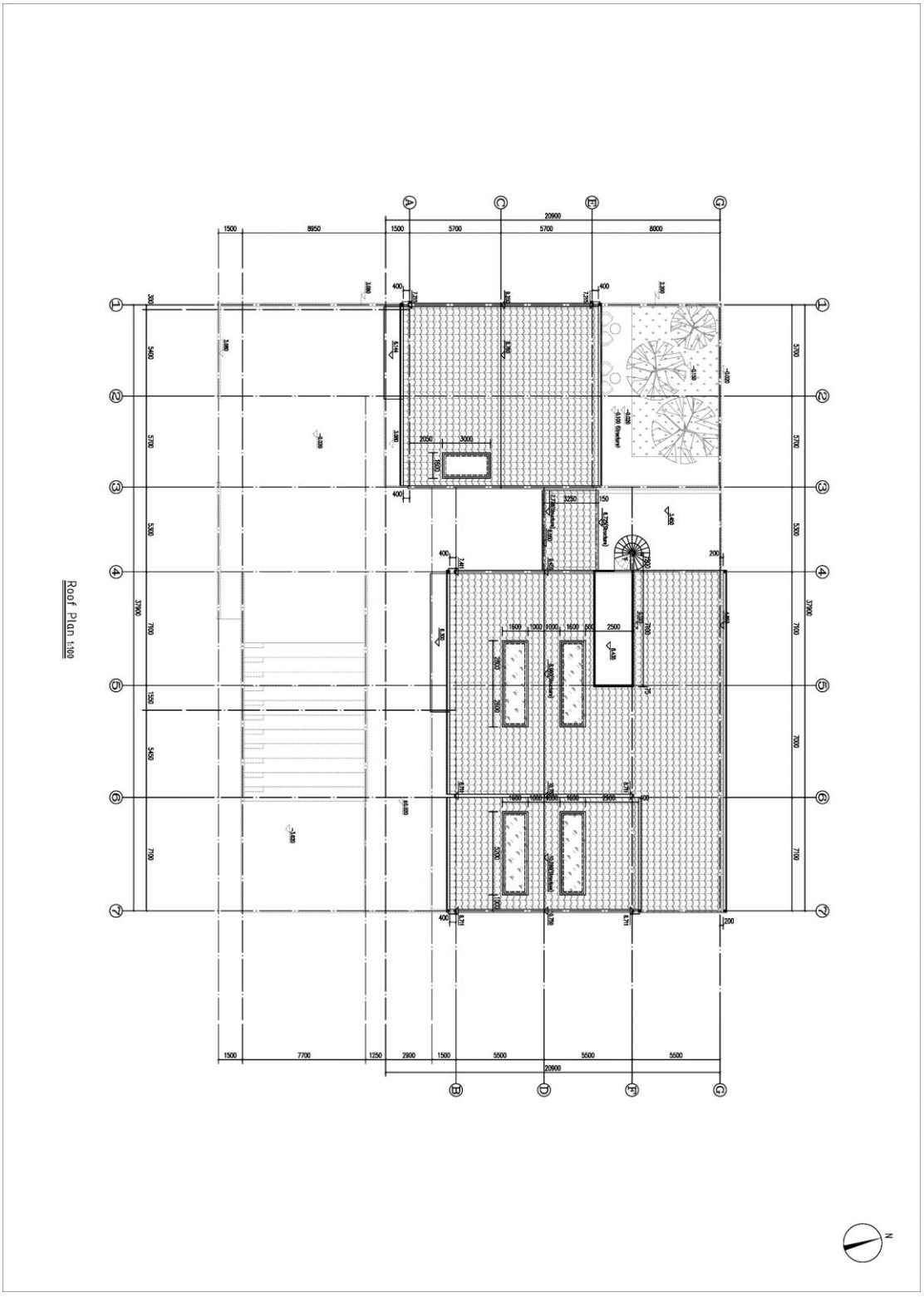

Fig. 97 Roof Plan of Tourist Reception Center (Drawn by the author)

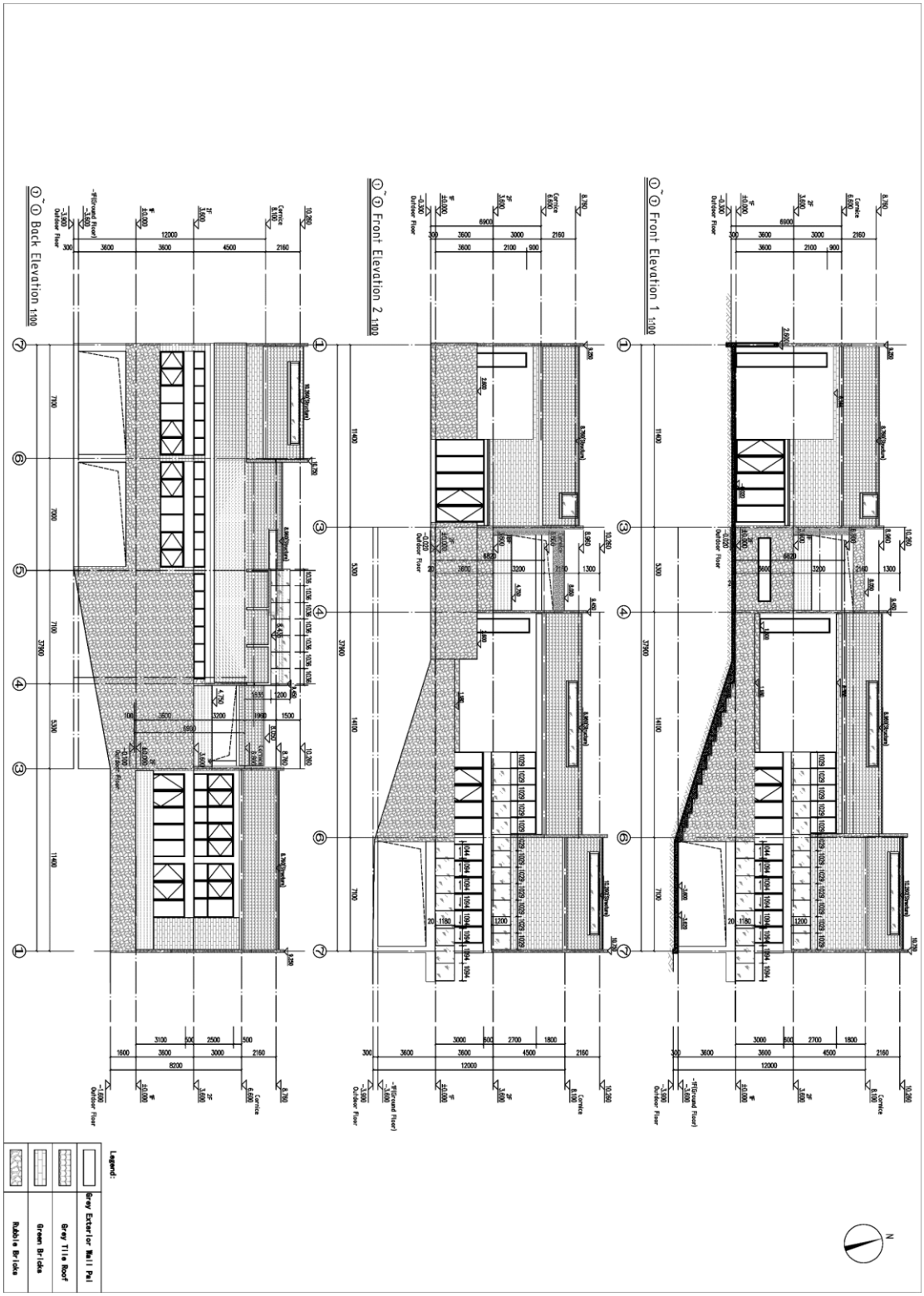

Fig. 98 Two Front Elevations and Back Elevation of Tourist Reception Center (Drawn by the author)

4.1.14 Summary

In this project, architectural semiotics theory was applied to blend the design styles of traditional Huizhou architecture and traditional Gan-Style architecture with modern design. In the first design plan, six architectural signs from traditional Huizhou architecture—white walls, black tiles, grey brick, horse-head walls, lattice windows, and wooden materials—were prominently featured. These signs were adapted through topological variations and reconstruction of the "motif" to carry out the adaptive reuse of the local architecture in Huashan Community.

In the final design plan, the focus shifted to the sign elements of traditional Gan-Style architecture, such as building form, grey brick walls, black tiles, granite plinths, and horse-head walls with an "architrave". These signs were used to redesign the community buildings. Additionally, for the original buildings 3, 4, and 5, the client requested demolition and reconstruction on the same site. These buildings were re-planned as a visitor reception center for the artist village within the scenic area, ensuring the project met both modern functional requirements and cultural expression (Fig. 99).

Fig. 99 The Rendering of Artist's Village (Drawn by the author)

4.2 "Deep in the Cloud" B&B Design, Huanggang, China

4.2.1 General Introduction

This project located in Huangnitang Village, Luotian County, Huanggang City, Hubei Province, China, and is led by Wuhan Zall Smart Commerce Group. It represents the first phase of the planning for the Huangnitang Resort Area, primarily focused on the construction of waterscape vacation residences. The project was developed within the context of the New Rural Reconstruction initiative, combining commercial development with the adaptive reuse of local buildings. Through the acquisition and adaptive renovation of villagers' houses, the entire village is being transformed into a tourist destination. Meanwhile, resettlement housing is being built near the scenic area to ensure that the villagers' residential needs are met (Fig. 100).

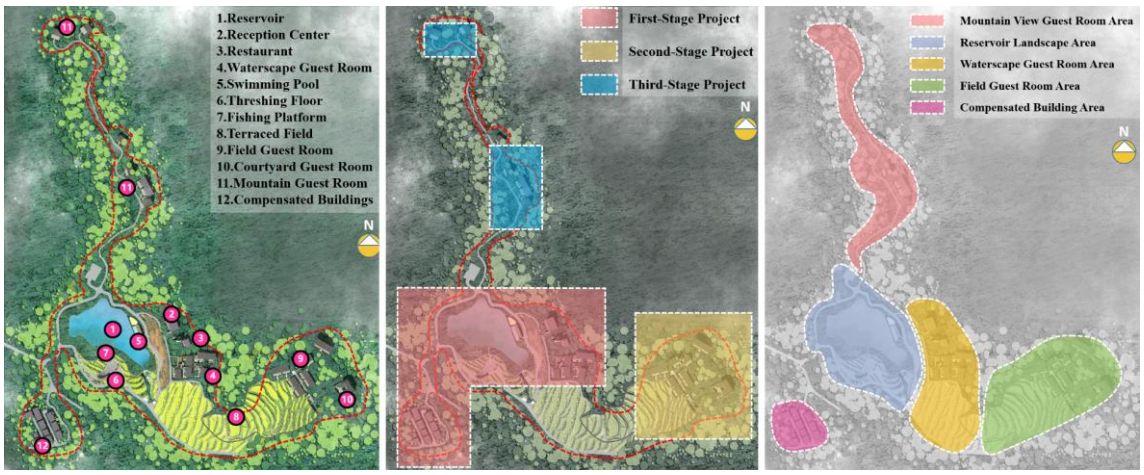

Fig. 100 Functional Layout, Project Stages and Distribution of Room Types (Drawn by the author)

The total planned area for the scenic project is 83,909.25 square meters, with a total building area of 4,568.72 square meters and a building footprint of 3,293.93 square meters. The project includes 49 guest rooms in total, with 11 rooms located in the first phase of development, covering a building area of 616.23 square meters. Additionally, the resettlement housing consists of 9 units, with a total area of 1,498.49 square meters.

The "Deep in the Cloud" I B&B design was a project that author participated in during

2020 to 2021 while working at UAO Architectural Design Company. In this project, my primary responsibility was the facade design of two sample guestroom buildings, while also assisting colleagues with the interior design. As part of the first phase of the planning project, construction officially began at the end of 2021, and the project was successfully completed in 2022. It is now fully operational. This paper will provide a detailed overview of the design process and the key features of these two sample buildings (Fig. 101).

Fig. 101 On-Site Photo (Photographed by UAO Design Company)

4.2.2 Client's Demands

At the beginning of the project, the client expressed several key requirements regarding the overall planning of the scenic area, particularly for the design of the guest rooms:

(1) The guest rooms should include a courtyard space to provide a private and comfortable outdoor relaxation area, allowing guests to connect with nature and experience the tranquility of the countryside.

(2) The architectural style should reflect local characteristics, incorporating rural elements and traditional architectural forms and materials to create a unique cultural atmosphere.

(3) The interior design should balance traditional style with modern comfort. The interior decor should blend traditional and modern elements, creating a space rich in cultural heritage while ensuring modern comfort, with the necessary modern facilities and services to enhance the guest experience.

(4) The layout of the guest rooms should maximize the use of scenic resources, ensuring that the windows, balconies, and courtyards face the best views, allowing every room to enjoy the beauty of the natural surroundings.

(5) The exterior facade design should harmonize with the surrounding natural environment, making full use of the terrain to create a unified landscape effect. The choice of materials, color schemes, and design forms should follow the overall planning style, avoiding any discordant or jarring elements.

Fig. 102 Construction Site (Photographed by author)

4.2.3 Cultural Background

After understanding the client's multiple requirements for the guest room design, the author and colleagues held discussions, aiming to further enhance the overall style of the project by drawing from the essence of Chinese historical culture to elevate the scenic area uniqueness and aesthetic appeal. Song Dynasty aesthetics, as one of the pinnacles of classical Chinese aesthetics, is characterized by simplicity, elegance, and a sense of tranquility, aligning perfectly with the project design philosophy. Therefore, during the design process, the author decided to incorporate Song Dynasty aesthetic principles into various aspects of the architectural design, striving to achieve a balance between modern comfort and the expression of traditional culture (Fig. 103).

Fig. 103 Artworks of the Song Dynasty (digicol.dpm.org.cn)

The Song Dynasty was a highly significant period in Chinese history and one of the golden ages of Chinese art and culture. Song Dynasty aesthetics are renowned for their simplicity, elegance, and restraint, emphasizing the harmonious coexistence of humans and nature. The key characteristics of Song Dynasty design can be summarized as "refined", "light", "silent", "soft", "simple", and "harmonious". In architectural design, the Song Dynasty favored a clean and understated style, with a focus on proportion and

scale, as well as symmetry and balance in layout. The architectural forms often featured low eaves, delicate overhanging eaves, and simple lines, evoking a sense of tranquility and solemnity.

In terms of material selection, Song Dynasty architecture favored the use of natural materials comprising wood, stone, and brick, showcasing the authentic texture and color of these materials. Decoration was characterized by delicate carvings and subtle, elegant colors, avoiding excessive ornamentation and complexity. The interior spaces emphasized a balance between functionality and aesthetics, with simple, practical furnishings that conveyed deep cultural significance. By incorporating Song Dynasty aesthetics into the architectural design of this project, the overall quality can be enhanced across five dimensions: architectural form, spatial layout, material use, color coordination, and decorative details. These elements will elevate the aesthetic appeal of both the exterior and interior spaces.

4.2.4 *Architectural Signs Extraction*

Building on the design principles of Song Dynasty aesthetics, the author and the team further considered the rich architectural signs found in the original village where the project is located, such as rammed earth walls, wooden structures, bamboo materials, and fieldstone (Fig. 104). These signs are core characteristics of traditional Chinese vernacular architecture, and it can be found in rural areas throughout China, representing a direct reflection of local culture. To ensure the design resonates more closely with the regional character and cultural context, the author decided to extract these architectural signs and integrate them with Song Dynasty aesthetics, thereby endowing the project with a distinctive aesthetic value.

(1) **Rammed Earth Walls:** As an ancient building form, rammed earth walls possess a heavy and rustic visual appeal that reflects harmony between humans and nature,

aligning with the Song Dynasty's aesthetic of valuing nature and emphasizing texture. In the design, the material characteristics of rammed earth can be utilized, while use the modern techniques to address its limitations.

(2) **Wooden Structure:** Wooden structure is a widely used structural form in Chinese traditional architecture, with the texture and grain of wood adding a natural and warm atmosphere to buildings. In this project, since the buildings are being demolished and reconstructed with reinforced concrete frames, the author decided to incorporate timber materials in the interior design as geometric lines.

(3) **Bamboo Materials:** Bamboo materials, known for their lightweight, flexibility, and renewable qualities, have been widely used in both architecture and decoration. In this project, bamboo can be applied to roofing, partitions, and decorative elements, creating a transparent and dynamic spatial effect.

(4) **Stone:** Stone, with its natural texture and feel, adds a rustic beauty to architecture. In Song Dynasty buildings, stone was often used in the plinth and walls to enhance the stability and sense of solidity in structures. For this project, the author decided to incorporate rubble stone materials in the courtyard areas and use cultural stone bricks in the building plinth.

Fig. 104 Rammed Earth Wall, Wooden Structure, Bamboo Material and Stone (Drawn by the author)

4.2.5 Sample Guest Room Architecture Design

Based on the site photographs, it was observed that the original buildings within the

project area were all old earth-wood structures, which would require structural reinforcement and rammed earth wall reconstruction if renovated, leading to high economic costs. After multiple discussions with the client, the team ultimately decided to proceed with the on-site demolition of the original buildings in the project area and rebuild them using reinforced concrete frame structures. This method significantly reduces renovation costs while better accommodating the subsequent design needs in terms of building structure and functionality (Fig. 105).

Fig. 105 Original Building Photos and Construction Site Photos (Photographed by author)

The design of the first guest room, with a floor area of 103.02 square meters, features a single-story standard layout consisting of two rooms, catering to two groups of guests. In the design of the building facade, local rural architectural signs were incorporated, using earthy textured paint to simulate the appearance of traditional rammed earth walls, reflecting the characteristics of traditional rural architecture. Additionally, the original roof tiles were repainted and re-laid to enhance both the aesthetics and durability of the roof. For the doors and windows, black metal frames were used, giving the building a modern and minimalist style, which contrasts sharply with the traditional signs, further enhancing the geometric beauty of the facade (Fig. 106).

Cultural stone bricks were used to decorate the building plinth, with their texture echoing that of the rammed earth walls, adding a sense of solidity to the structure. The

cultural stone bricks also complement the rubble stone landscape walls in the courtyard, creating visual continuity and blending with the surrounding environment. In the entrance hall, bamboo blinds were used as a partition, maintaining privacy while adding visual interest. Wood materials were used as structural decorations for the roof, complementing the gray tiles, rammed earth walls, and cultural stone plinth. This method aligns the building with the materials of traditional rural architecture while introducing innovations in detail and form, giving the building a renewed sense of vitality (Fig. 107).

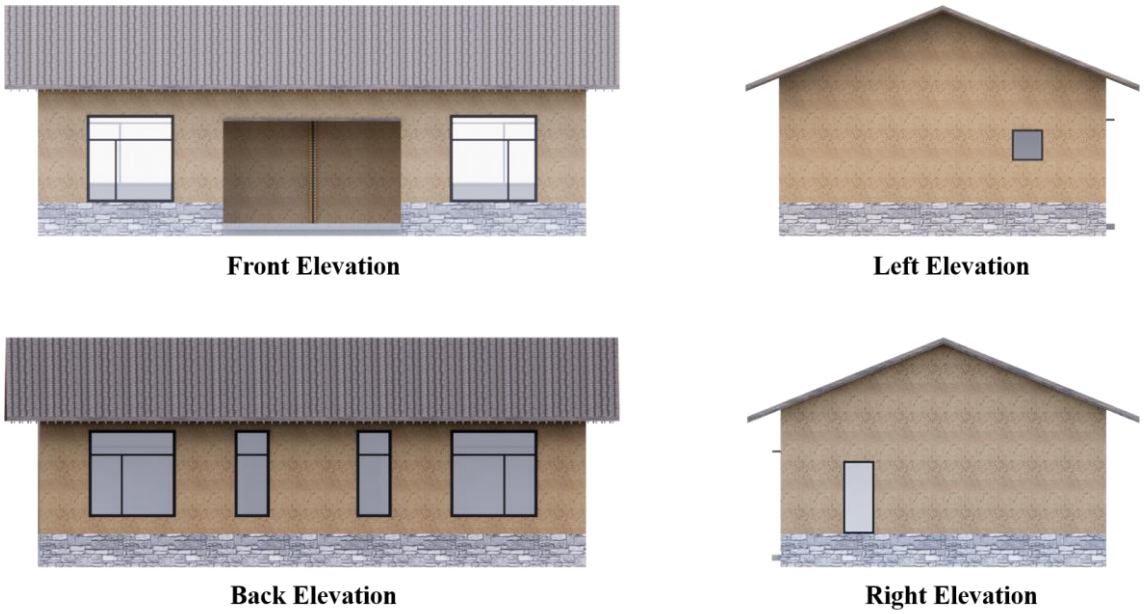

Fig. 106 Four Elevations of Sample Guest Room No. 1 (Drawn by the author)

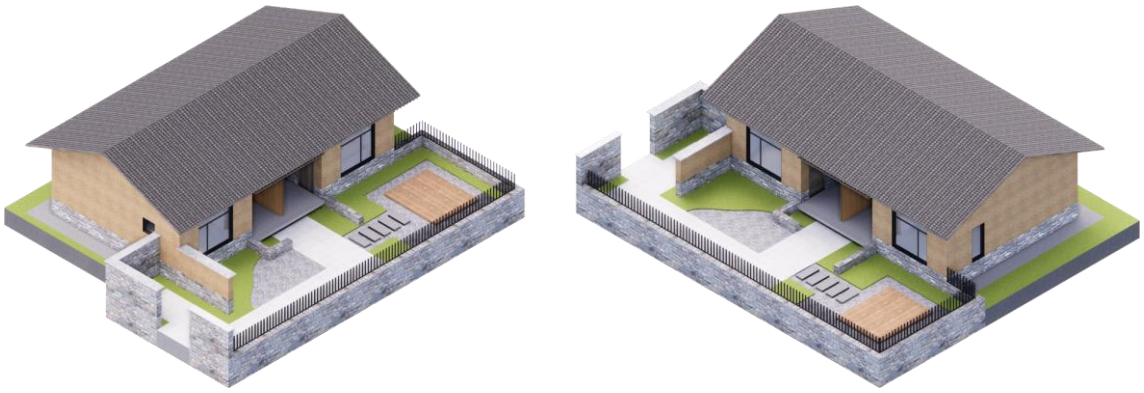

Fig. 107 The Axonometric Drawing of Sample Guest Room No. 1 (Drawn by the author)

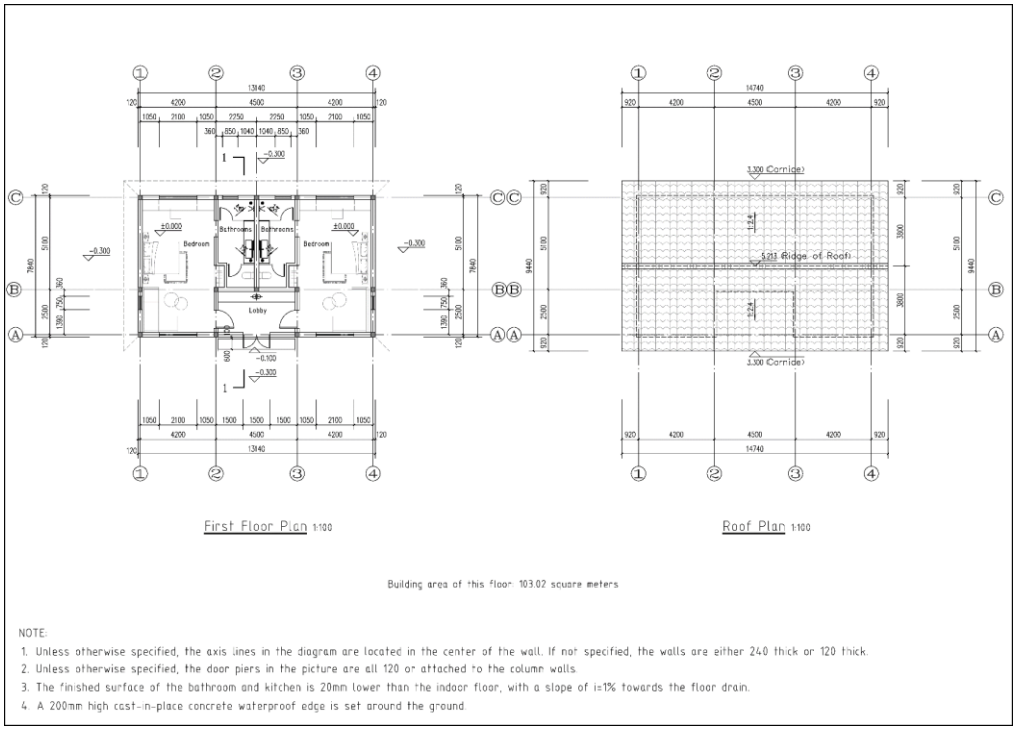

Fig. 108 The First Floor Plan and Roof Plan of Sample Guest Room No. 1 (Drawn by the author)

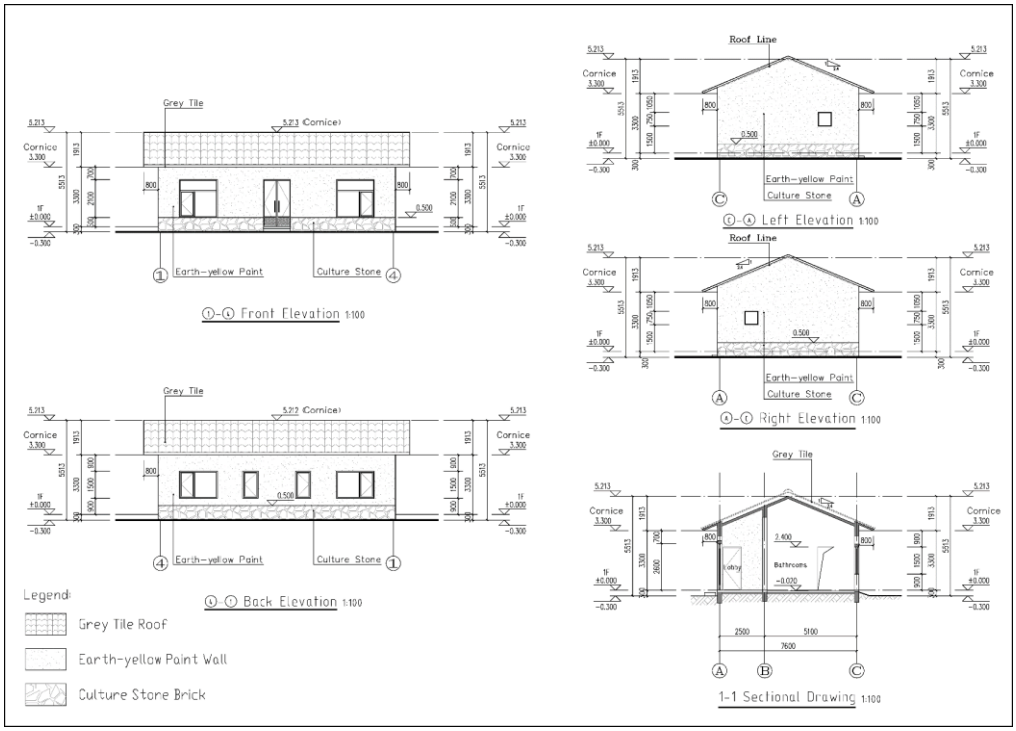

Fig. 109 Four Elevations and Sectional Drawing of Sample Guest Room No. 1 (Drawn by the author)

The second guest room model has a total floor area of 204.15 square meters and features a combined guest room layout with four rooms, accommodating four groups of guests. Building upon the design concept of the first guest room, this structure integrates a larger footprint, with the courtyard area segmented by rubble stone landscape walls (Fig. 110).

As with the first guest room, the building incorporates repainted original roof tiles, a wooden roof structure, textured earth-toned plaster resembling rammed earth, and a cultural stone plinth. These signs align the materials with those of traditional rural architecture, while modernizing the details and functionality to meet the accommodation needs of guests (Fig. 111).

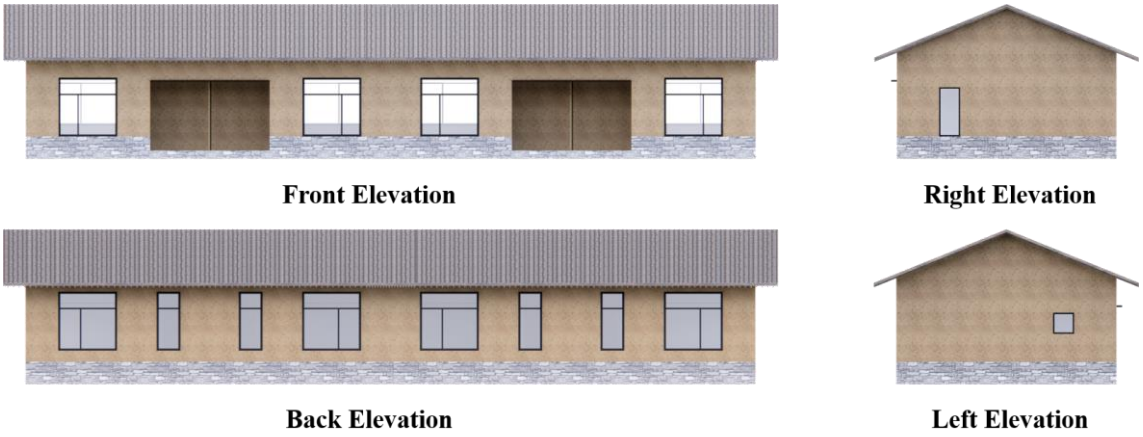

Fig. 110 Four Elevations of Sample Guest Room No. 2 (Drawn by the author)

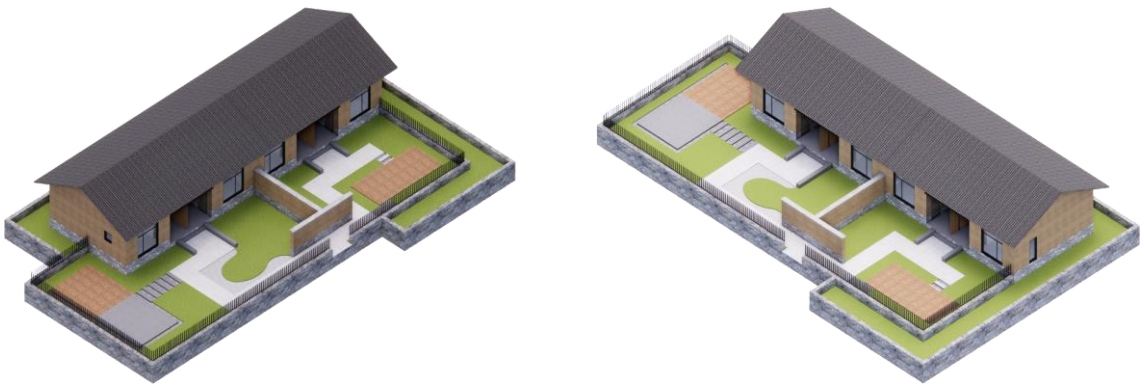

Fig. 111 The Axonometric Drawing of Sample Guest Room No. 2 (Drawn by the author)

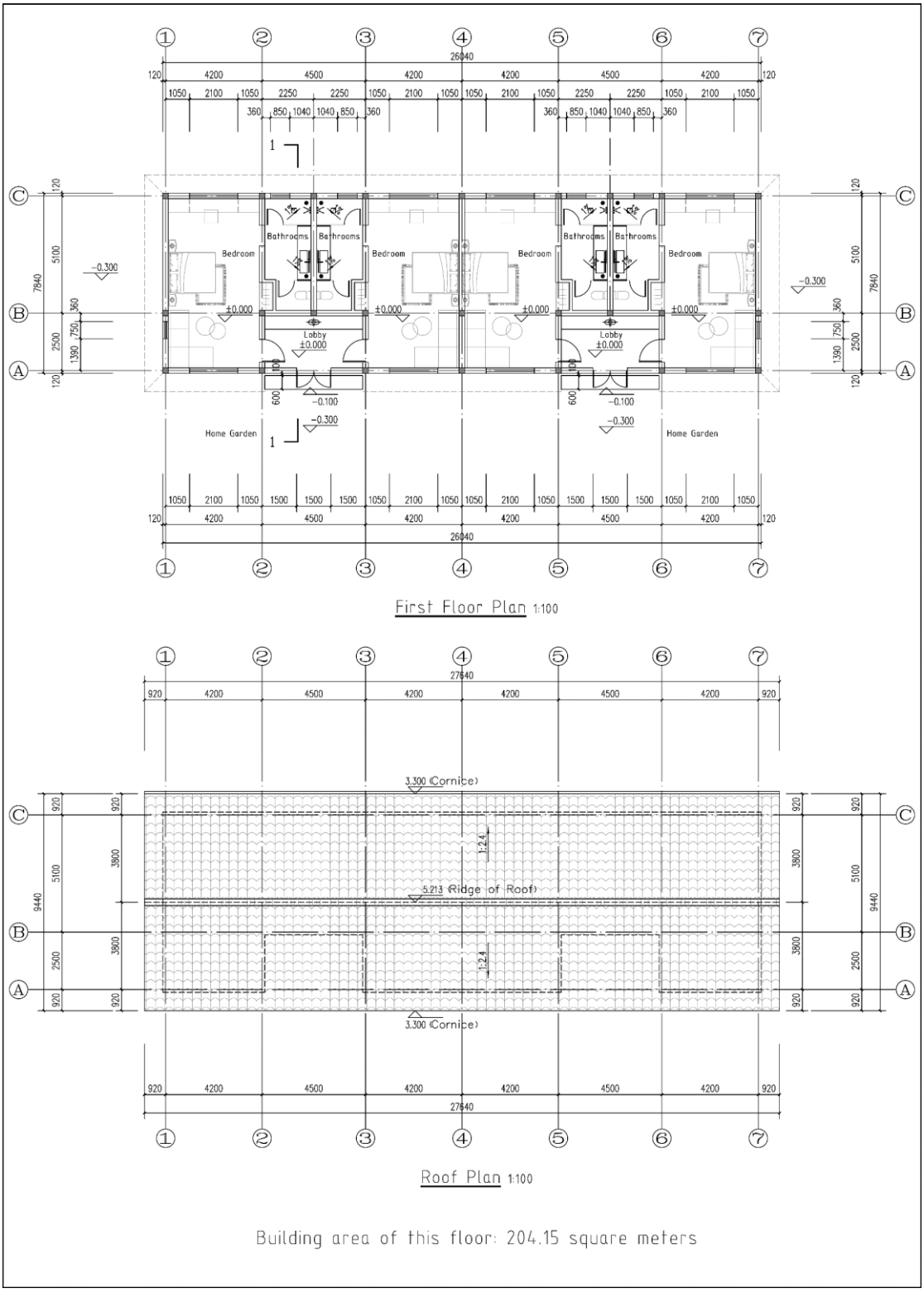

Fig. 112 The First Floor Plan and Roof Plan of Sample Guest Room No. 2 (Drawn by the author)

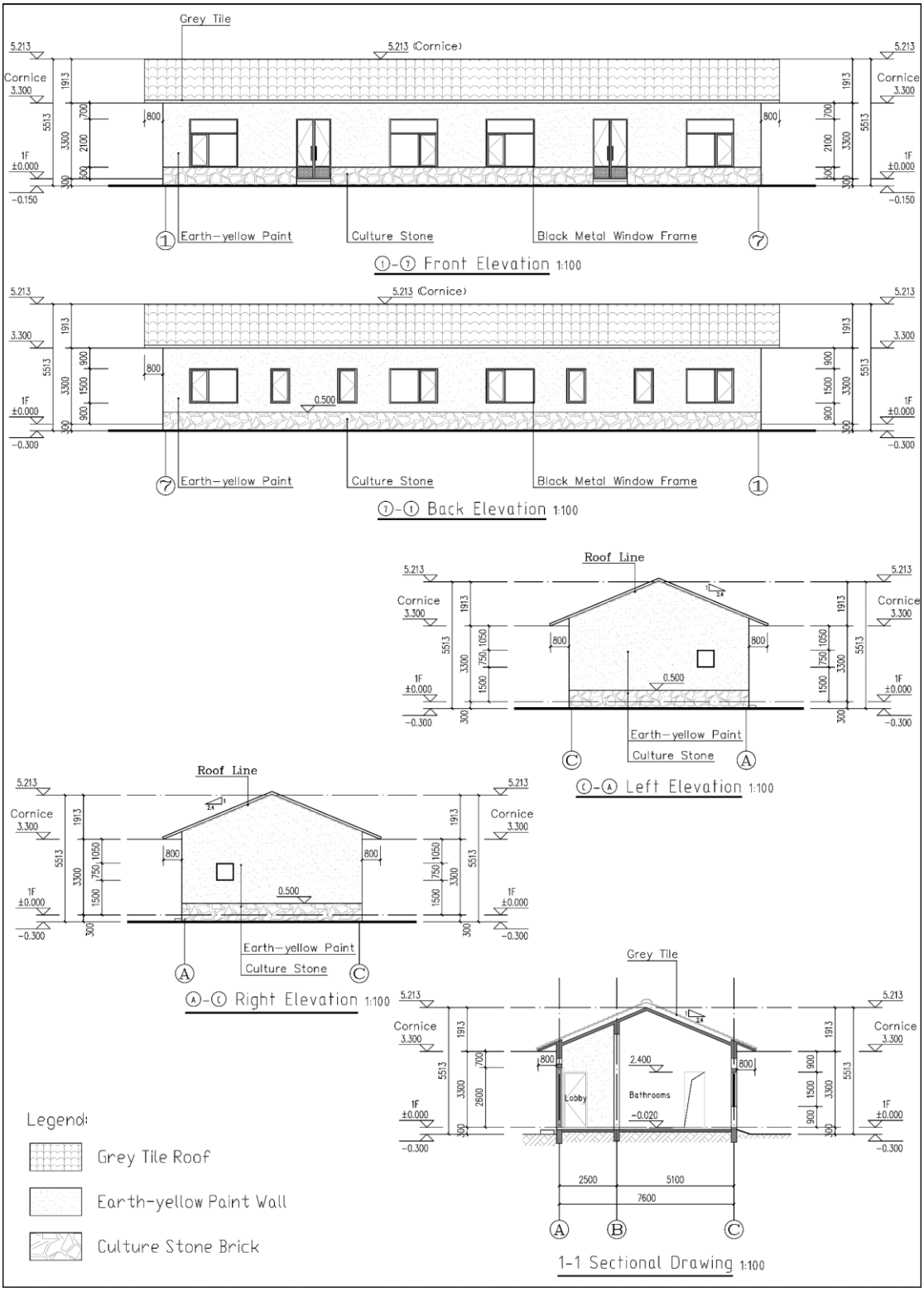

Fig. 113 Four Elevations and Sectional Drawing of Sample Guest Room No. 2 (Drawn by the author)

Fig. 114 On-Site Photo (Photographed by UAO Design Company)

4.2.6 Sample Guest Room Interior Design

For the interior design, the author's primary task was to assist colleagues in ensuring unity and coordination between the interior and exterior design styles. In the interior, white paint was extensively applied to the walls, creating a clean and bright visual effect. Wooden materials were used to form structural shapes (since the building utilized a reinforced concrete frame, the wooden materials were decorative), creating simple geometric lines that enhanced the spatial sense of depth. This method aligned with the

minimalist and elegant aesthetic of Song Dynasty design. The use of wooden materials reflected the fusion of nature and humanity, resonating with the Song Dynasty's design principles, which emphasized a connection to nature and the pursuit of subtle, understated elegance (Fig. 115).

Fig. 115 Guest Room Interior Photo (Photographed by UAO Design Company)

Additionally, bamboo materials were used for the interior ceiling, creating a distinctive spatial atmosphere. The furniture selected was simple yet functional, featuring smooth lines and elegant shapes, complementing the wooden structural decorations. A small number of bamboo weavings and ceramic elements were incorporated into the decor and soft furnishings, with traditional Chinese art pieces and displays, such as ceramics, adding depth to the cultural ambiance. These design methods merged the interior and exterior styles, meeting the guests' living needs while showcasing cultural richness.

4.2.7 Summary

This project is a commercial development initiative carried out under the framework of Chinese new rural reconstruction efforts. By acquiring villagers' homes and implementing adaptive reuse, the entire village was transformed into a tourist destination. After thoroughly understanding the client's requirements, the author and the team decided to incorporate Song Dynasty aesthetics into the design, merging it with the architectural signs of the original village, including rammed earth walls, wooden structures, bamboo materials, and stone. This method tries to ensure a balanced integration of traditional and modern design elements. The overall architecture preserves the essence of vernacular buildings while incorporating modern design concepts, offering visitors a unique accommodation experience (Fig. 116).

Fig. 116 On-Site Photo (Photographed by UAO Design Company)

4.3 Environmental Renovation Design in Huashanwu Community,

Wuhan, China

4.3.1 General Introduction

Huashanwu Community located within the Dahuashan Scenic Area in Jiangxia District, Wuhan, Hubei Province, and serves as the dining and leisure area of the Dahua Mountain Cultural and Creative Industry Park project, situated across the reservoir from Huashan Community. This community consists of 30 vernacular buildings, all of brick-concrete structures. Compared to Huashan Community, Huashanwu Community covers a larger area, with the building complex arranged around the reservoir. In 2018, the community underwent a renovation project, which modernized and enhanced the overall cleanliness of the buildings (Fig. 117).

Fig. 117 Regional Planning Layout and UAV Aerial Images (Drawn and photographed by the author)

Similar to the Huashan Community project, this project is one that the author was involved with during the 2022–2023 period while working at Wuhan UAO Architectural Design Company. In this project, the author's role primarily involved assisting colleagues in the adaptive reuse of the community's buildings based on the client's requirements and the general plan for the Cultural and Creative Industry Park. While the overall style of the community buildings was not determined by the author, given the role of supporting design, the author independently completed the facade renovation of Building No. 3,

ensuring consistency with the style set by colleagues for the entire community. This paper will focus on the adaptive reuse design for Building No. 3. Unlike the Huashan Community, which is currently under construction, as of September 2024, the Huashanwu Community project has not yet commenced and is still in negotiations with residents regarding demolition compensation.

4.3.2 Building No. 3 Adaptive Reuse

Upon observing Building No. 3 (Fig. 118), it is evident that its rear facade features eight evenly aligned windows, with two centrally positioned windows located in the staircase area. On the left facade, a vertical window is installed on each floor to ensure natural lighting for the rooms. The front facade reveals a height difference of approximately 500 millimeters between the building and the adjacent road. Based on on-site measurements, a set of three steps is required to reach the recessed entrance of the building. The design of the second-floor front facade includes one standard-sized window and a wider window, while the third floor features a balcony space that provides additional outdoor recreational space for the residents.

Fig. 118 On-site photo (Photographed by author)

Based on these architectural features, the author initiated a renovation design for Building No. 3. Firstly, for the front facade, the recessed space at the entrance on the first floor was enclosed with a railing to distinguish it from the small platform at the entrance, enhancing both spatial definition and safety. Next, the wider window on the second floor

was retained, while the standard-sized windows on the first and second floors were replaced with three vertical windows to enhance the geometric aesthetics of the facade. Finally, the third-floor balcony space was preserved, but the balcony wall was pushed inward by 1000 millimeters, expanding the usable area and improving both the functionality and the spatial expression of the balcony, thus enriching the overall spatial layering of the building.

In the design of the building left facade, the existing three vertical windows were retained. To enhance interior lighting and improve the overall visual effect, the left gable wall was replaced with a combination of wood-grain steel structures and glass. This modification not only adds modernity to the building but also strengthens the introduction of natural light (Fig. 119).

Fig. 119 The Main Renovation Areas in Facade (Drawn by the author)

In the rear facade design, all windows were preserved but optimized in terms of dimensions and form. First, consistent with the design method of the front facade, the two original staircase windows were replaced with three vertical windows. Subsequently, a small balcony was created in the area of the second-floor right-side windows by extending the space with an external steel structure, adding outdoor functionality. The remaining five windows were adjusted to optimize their sizes and shapes, further enhancing the geometric aesthetics of the rear facade. Finally, the greenery flanking the rear entrance

was removed, and the entrance platform was expanded to improve functionality and spatial perception.

In terms of material usage, although the building style needed to align with the designs created by the author's colleague for other buildings, the design timing for this project building began after the completion of the vernacular architecture adaptive reuse in Huashan community. As a result, the colleague largely drew inspiration from the author's design style for Huashan project. Therefore, similar to the buildings in the Huashan area, this building facade primarily employs blue bricks as the main wall material, with rubble stone used for the plinth. Additionally, to create a refined transition between the blue bricks and rubble stone, white filler was applied at the junctions to enhance the detailing of the building overall appearance.

Unlike the gable-style roof design used in the Huashan project, the buildings in the Huashanwu Area feature the more commonly seen suspension roof. For this building, the author decided to use wood-grain steel structural materials to replace the original wood structure, ensuring structural stability while retaining the symbolic characteristics of wooden architecture. In terms of windows and doors, the author continued the design method from the Huashan project, utilizing white aluminum window frames with thermal breaks and 3mm-thick steel plates for the window casings. These casings extend outward by 450mm, creating a simple geometric form that enriches the facade visual depth and contrasts sharply with the dark blue brick walls (Fig. 120).

Fig. 120 Four Elevations of Building No. 3 (Drawn by the author)

For the third-floor balcony, the author selected anti-corrosion wood as the wall cladding material, paired with white metal handrails and tempered glass panels to form the railing structure, defining the boundary of the space. The white railing structure and glass panels visually correspond with the other white materials of building, creating a striking contrast with the dark blue brick walls, further enhancing the building sense of lightness. Additionally, the use of wooden materials softens the contrast between the dark and white colors, adding depth to the overall color palette and creating a more harmonious appearance for the building (Fig. 121).

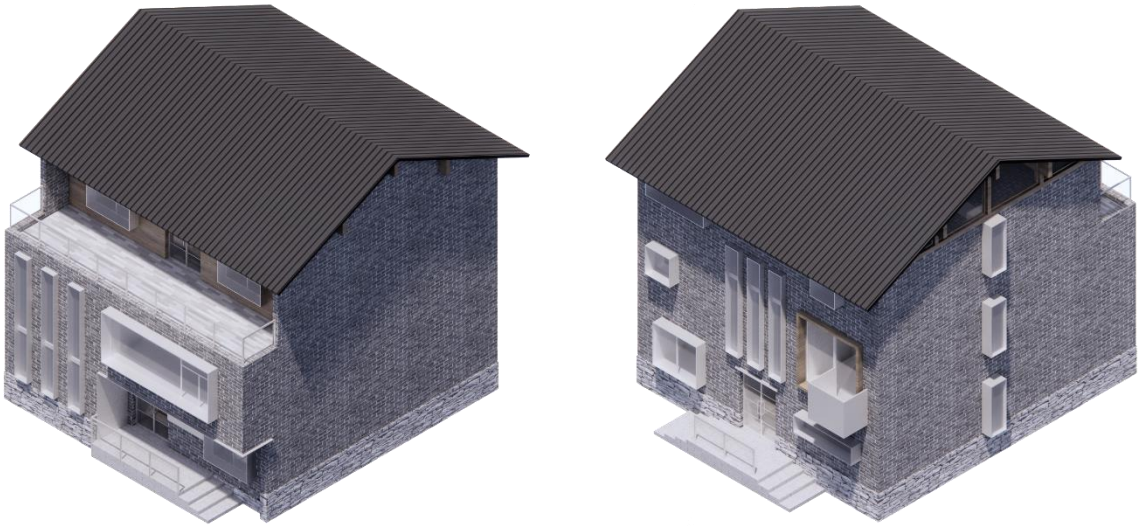

Fig. 121 The Axonometric Drawing of Building No. 3 (Drawn by the author)

4.3.3 Summary

Huashanwu Community, like Huashan Community, is part of the Dahua Mountain Cultural and Creative Industrial Park project, designated as a dining and leisure area. In this project, the author's main responsibility was to collaborate with colleagues to carry out adaptive reuse of the community buildings based on the client's requires and the overall functional plan of the cultural and creative park, while independently completing the renovation design for Building No. 3.

Overall, the design method for this building aligns closely with the final design plan

for Huashan Community (Fig. 122). The design incorporated elements from traditional Gan-Style architecture while integrating modern materials and techniques, achieving a balance between tradition and modernity. The use of simple white materials to create shapes on the dark building facade added visual layering and geometric aesthetics. Additionally, the use of glass and wood softened the contrast between the light and dark colors, enriching the building overall color palette.

Fig. 122 The Rendering of Huashanwu Community (Drawn by the author)

4.4 Summary

Through the author's project practice, it becomes evident that the application of architectural semiotics plays a crucial role in the adaptive reuse of vernacular architecture, effectively bridging the gap between traditional and modern design. By extracting and reinterpreting traditional architectural signs, these projects demonstrate how to integrate the functional demands of modern life while preserving regional culture and historical

heritage. This method successfully achieves the coexistence and innovation of historical culture and contemporary development.

In all the projects, the design methods primarily focused on extracting sign elements from traditional architectural styles, such as traditional Huizhou, traditional Gan-Style architecture, and other regional vernacular architecture. These elements, including geometric forms, materials, and color, were reinterpreted through techniques such as reappearance, topology, and reconstruction. For example, in the first design plan for the Huashan project, classic signs from traditional Huizhou architecture, like white walls, black tiles, and horse-head walls, were skillfully extracted and combined with modern residential needs and the functional requirements of future art spaces. Similarly, in the "Deep in the Cloud" B&B project, vernacular material signs like rammed earth, wood, bamboo, and stone were integrated with modern technology to achieve harmonious coexistence between architecture and the natural environment while preserving the regional cultural imagery.

The methodology employed in these projects emphasize the significance of sign translation. Each plan utilized the principles of architectural semiotics, preserving regional characteristics while integrating them with modern design. Traditional architectural structures were revitalized through the application of modern materials and techniques, allowing distinct architectural signs to be retained and further developed within contemporary design contexts. In the use of color signs, the author enhanced the visual layering of the buildings by contrasting light and dark tones and selecting regionally appropriate materials. This method enriched the aesthetic of the architecture, to reinforce the cultural and geographical context, imbuing the buildings with a strong sense of local identity and cultural resonance.

The application of architectural semiotics in the adaptive reuse of vernacular architecture offers promising prospects for the sustainable development of Chinese rural

areas. By translating traditional Chinese architectural signs and integrating modern functional design strategies, vernacular architecture can find an optimal balance between cultural preservation and economic development. Architectural semiotics establishes a profound connection between architecture and its cultural landscape, providing methods and strategies to enhance the aesthetic, social, and functional value of Chinese rural architecture. This methodology contributes to the coordinated development of rural revitalization and cultural heritage preservation.

5. CONCLUSION

In Morris' semiotic theory, which categorizes semiotics into Syntactics, Semantics, and Pragmatics, forms the foundation of this study. By integrating adaptive reuse theory, this research analyzes exemplary cases of vernacular architecture renovation and project practices, focusing on the design methodology of architectural semiotics in the adaptive reuse of vernacular architectures.

In the Syntactics section, the author focuses on the construction methods of architectural signs in design. Through literature review and case analysis, the author classifies the representation techniques of architectural signs into four types: Reappearance, Topology, Reconstitution, and Repetition. These methods provide diverse forms of expression for constructing architectural signs, enabling traditional architectural signs to gain new interpretations and applications in modern design.

In the Semantics section, based on Peirce's semiotic theory, the author primarily explores the classification of signs. Building on the basic categories of icon sign, index sign, and symbol sign, these signs are further subdivided into Form, Concretization, Space, Structure, Geometry, Color, and Material. This classification aims to reveal the cultural connotations behind architectural signs and their translation in contemporary architectural design.

In the Pragmatics section, an in-depth analysis of two exemplary cases of vernacular architecture renovation is conducted to explore the specific application of regional architectural symbols from Wencun, Zhejiang, and Huizhou architecture. The study examines the design techniques used, the social functions of these renovated buildings, and their impact on daily life. Furthermore, the psychological responses of individuals to these cultural symbols within a specific social context are also investigated.

The author further integrates practical experience from three projects, applying the proposed methodology to real project designs. This demonstrates the innovative use of

Huizhou architectural signs, traditional Gan-Style architectural signs, Song dynasty aesthetics, and Hubei regional architectural signs. Throughout this process, the author explores the practical application of architectural semiotics in the adaptive reuse of Chinese vernacular architecture within the context of new rural construction, as well as its socio-cultural impact. Pragmatics emphasizes the function and application of signs in specific social contexts, leading the author to focus particularly on how architectural signs integrate with the culture, history, and social needs of local villages, thereby achieving a balance between functionality and cultural expression in the renovated architecture.

With the acceleration of Chinese urban-rural integration, the renovation and renewal of rural architecture have increasingly become a focus of social attention. In rural architectural design, semiotics offers an alternative perspective, enabling designers to incorporate regional cultural elements into modern architecture through the processes of sign extraction, translation, and reconstruction. This research, through theoretical exploration of semiotics and architectural semiotics, as well as analysis of practical cases and project practices, aims to provide a feasible design methodology for the adaptive reuse of vernacular architecture. The study seeks to offer new insights to scholars and designers interested in architectural semiotics, inspiring further exploration in this field. Additionally, it aims to provide useful references for rural renovation practices, inject new vitality into the development of contemporary architectural semiotics, and promote continuous innovation and deeper application in this area.

6. THESIS

1

The Trichotomy of Morris' Semiotics

Based on Morris' semiotic theory, this study employs Syntactics, Semantics, and Pragmatics to explore the adaptive reuse of vernacular architecture.

In the Syntactics section, the focus is on Signs Construction, specifically examining the formal relationships and combinatorial rules among Regional Architectural Signs, without addressing their specific meanings (Semantics) or the relationships between signs and objects (Pragmatics).

In the Semantics section, through Signs Classification, the focus is on the relationship between Regional Architectural Signs and their referents or meanings, emphasizing the interpretation and understanding of signs within specific contexts.

In the Pragmatics section, this study focuses on the influence of Vernacular Architecture or design works, as cultural sign carriers, on users and society. The analysis examines the social functions of these buildings after renovation and their influence on people's daily lives, further exploring the psychological responses of individuals to these cultural signs in specific social contexts.

2

Syntactics—Signs Construction

Syntactics examines the structure of the sign system, exploring how signs are arranged and combined to create more complex sequences or systems, such as the organizational patterns of points, lines, planes, and volumes in architectural forms.

In this study, these signs representing Regional Architectural Culture are termed "motifs". Four primary methods of motif reinterpretation are employed: Reappearance, Topology, Reconstitution, and Repetition.

3

Semantics—Signs Classification

Semantics primarily examines the relationship between signs and the objects or meanings they represent. It focuses on the meaning of signs and how they are interpreted and understood in specific contexts.

This study is based on the Signs Classification in Peirce's semiotics and further subdivide architectural signs from three dimensions: form, style, and cultural spirit. The classifications include Form Sign, Concretization Sign, Space Sign, Structure Sign, Geometry Sign, Color Sign and Material Sign. These signs are used to explore how meaning can be conveyed in design and how people interpret these signs.

4

Adaptive Reuse

Architectural Adaptive Reuse is a key guiding principle in the renovation and design of vernacular architecture in Chinese New Rural Construction. The renewal of vernacular architecture should be carried out while preserving the original architectural characteristics, integrating environmental, social, economic, and cultural to adapt to the changing usage demands over different periods.

This study systematically classifies the design strategies for the adaptive reuse of vernacular architecture, based on the functional characteristics of buildings and case analysis. Specifically, it categorizes into four aspects: Architectural Functional Replacement, The Space Reuse, Architectural Facade Update, and External Environment Update, providing clear guidance for design pathways in the renovation of vernacular architecture under different conditions.

5

Design Methodology

This study, set against the background of New Rural Construction, integrates architectural semiotics theory and adaptive reuse theory, it explores the design methodology of applying architectural semiotics to the adaptive reuse process of vernacular architecture.

Within this methodological framework, Adaptive Reuse theory serves as the design strategy, guiding the renovation of vernacular architecture to identify which areas require modification, reconstruction, or preservation to better meet new usage demands. Meanwhile, Architectural Semiotics theory serves as the design method, utilizing the extraction, translation, and recreation of architectural signs to achieve a balance between cultural heritage and modern functionality in Regional Vernacular Architecture, showcasing its unique regional characteristics and aesthetic value.

6

Pragmatics—The Influence of Vernacular Architecture on Users and Society

As cities develop, people's material and spiritual needs are increasing, leading many to look towards rural areas in search of a lifestyle that alleviates stress. The harmonious development of vernacular architecture with the natural environment forms the foundation for such an ideal space.

However, traditional architectural forms struggle to meet modern needs, making modernization and technological innovation essential trends to enhance living quality, retain population, and revitalize rural areas. The key lies in balancing functionality and cultural heritage, allowing vernacular architecture to find a point of coexistence between modernization and traditional culture. Moreover, with the advancement of the times, rural infrastructure continues to improve, and technological innovation is driving the modernization of vernacular architecture, exploring rural design languages that better align with the needs of modern life.

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9. ANNEX

DECLARATION

I, Tao Li, the lead architect and founder of **Wuhan Ruituo Architectural Design Consulting Co., Ltd** (UAO Architectural Design), hereby authorizes and agrees that former employee Lai Xu to present our design projects for his dissertation and defense at Breuer Marcel Doctoral School of University of Pecs since he was involved as a designer, and he contributed to the success of all these projects.

In the "*Environmental Renovation Design in Huashan Community, Wuhan, China*" project, his main duty was to complete the **Facade Renovation Design** of all 24 buildings in the community and assisted colleagues completing the **Gate Design**, **Landscape Design**, and **Public Space Design** of the community.

In the "*Deep in the Cloud B&B Design, Huanggang, China*" project, his main duty was to complete the Facade **Renovation Design** of two sample B&B buildings and assist colleagues completing the **Courtyard Design** and **Interior Design**.

In the "*Environmental Renovation Design in Huashanwu Community, Wuhan, China*" project, his main task was to assist colleagues completing the **Facade Renovation Design** of all buildings (30 buildings) in the community.

Hereby authorized,

Tao. Li

Signature
Tao Li
Lead Architect, UAO
Wuhan Ruituo Architectural Design Consulting Co., Ltd

Date: 20/12/2024