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RESEARCH ARTICLE

Characteristics and periodization of self-built houses in the Quanzhou coastal area based on archaeological typology method (late 19th century to early 21st century)

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Received 9 April 2025; accepted 21 May 2025

KEYWORDS

Quanzhou architecture;
Archaeological typology;
Residential evolution;
Overseas influences

Abstract This study examines the typological evolution and classification of self-built houses in the coastal region of Quanzhou from the late 19th century to the early 21st century. Using archaeological typology methods, the research classifies 225 residential buildings into two main categories—courtyard houses and freestanding houses—analyzing their story additions, entrance façades, spatial layouts, and material transitions. It questions previous binary classifications of traditional versus westernized styles, emphasizing a nuanced, non-linear historical development shaped by overseas connections, socio-economic contexts, and evolving construction techniques. This paper establishes a foundation for further research on residential evolution that incorporates broader social and historical analyses.

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1. Introduction**1.1. Background**

The region where Quanzhou and Zhangzhou are situated in southeastern China began establishing administrative centers as early as the 7th–8th centuries, transforming into regional political hubs. During the Song and Yuan dynasties, Quanzhou, in particular, gained prominence as a starting

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Peer review under the responsibility of Southeast University.

point of China's Maritime Silk Road, fueled by the growth of overseas trade. Then, from the Song and Yuan dynasties through the Qing Dynasty (10th century to the end of 19th century), the region around Quanzhou, Zhangzhou, and nowadays Xiamen, has progressively developed similarities in language, architecture, customs, and religious beliefs, primarily because of repeated cycles of migration and fluctuations in coastal trade. Consequently, modern scholarship has clearly defined "Minnan" (south of Min) as both a dialect region and a cultural sphere. The term "Minnan architecture" refers explicitly to the architectural traditions of this area. Geographically, the Minnan region is bordered by the Daiyun Mountains and Boping Ridge to the northwest and the plains of Zhangzhou and Quanzhou to the southeast. This creates a division between the mountainous hills in the northwest and the coastal plains in the southeast. These geographical features have historically made overland transportation to the central parts of China difficult, while maritime trade flourished. Although Minnan architecture exhibits considerable internal consistency, it is also shaped by local geography, climate, and transportation conditions. For example, subtle differences exist between Quanzhou and Zhangzhou, and distinct architectural characteristics and developmental paths are noticeable between the hilly inland areas and the coastal plains (Fig. 1).

In the Quanzhou area, notable differences are observed in architectural styles and construction materials between its coastal region and the northwestern hilly area.

Before the 19th century, traditional residential architecture in Quanzhou was mainly built using wood, brick, and stone. A timber post-and-beam structure—specifically the *chuandou* (lit. penetrating and interlocking framework) system—formed courtyard houses. The house's spatial organization focused on the main row (*dinluo*), with expansion through flanking rooms creating the basic courtyard layout and longitudinal extension producing multiple courtyards in depth.

Both the design scale and construction sequence adhered to principles centered on the *dinluo*. First, when the carpenter drew the *ceyang* (lit. side appearance), the primary focus was deciding the height of the building's ridge and its front and rear eaves. The dimensions and height of the first row (*xialuo*) and side buildings (*jutou*) were then determined in relation to the main row (Lin and Quanzhoushi Lichengqu Jiansheju, 1998, pp. 13–17). Then, component proportions were also regulated by *fengshui* principles to avoid violations between the main and first halls. Specifically, when standing in the main hall and looking toward the first one, the ridge of the first hall should not obstruct the line of sight, nor should interior structural elements be visible (Cao, 2006, 283). Regarding decoration, traditional techniques like *huisu* (stucco relief), *jiannian* (cut-and-paste ceramics), and color painting were commonly used on gatehouses and roof ridges. The fundamental layout and section of Minnan traditional residences, as exemplified by Quanzhou, are shown in Figs. 2 and 3.

Since the late 19th century, many Minnan emigrants have settled abroad, leading to the rise of overseas Chinese economies. Quanzhou has become known as a prominent hometown of overseas Chinese. Its southeastern coastal plain, benefiting from easier transportation and frequent interactions with the outside world, has received significant financial support from remittances. This support facilitated the adoption of various construction techniques and materials, particularly in self-built homes, which exhibited significant stylistic evolution: from traditional brick and wood courtyard residences during the late Qing and early Republic periods to *fanzailou*, which are named by local people to emphasize the sponsors' overseas background, as in the early 20th century, followed by the widespread construction of stone houses since the mid-20th century. By the early 21st century, the trend of self-built homes had significantly declined due to the rise of modern commercial housing and government land regulation. These various

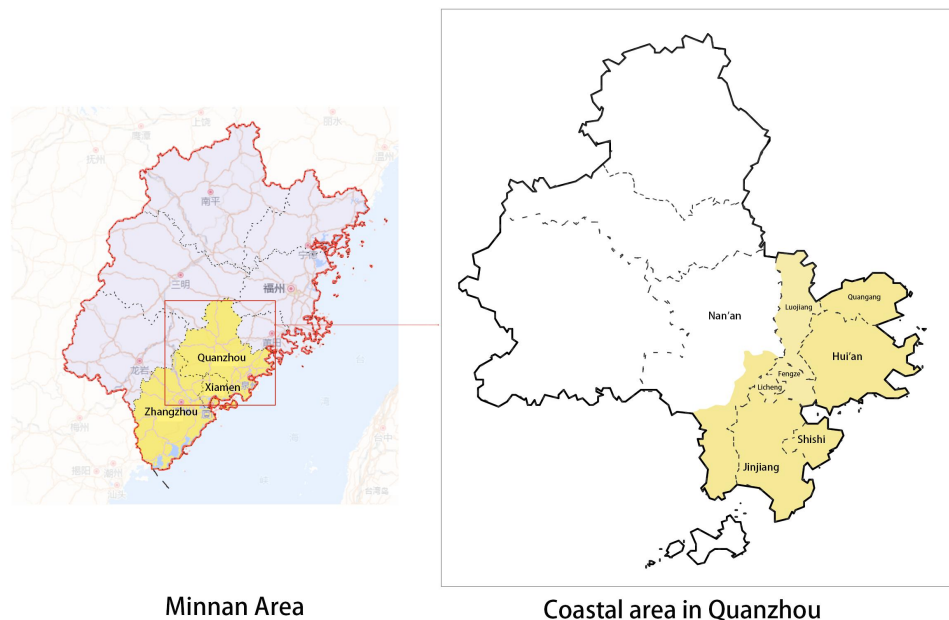


Fig. 1 Location of Quanzhou coastal area. Source: Standard Map Service of China, modified by the authors.

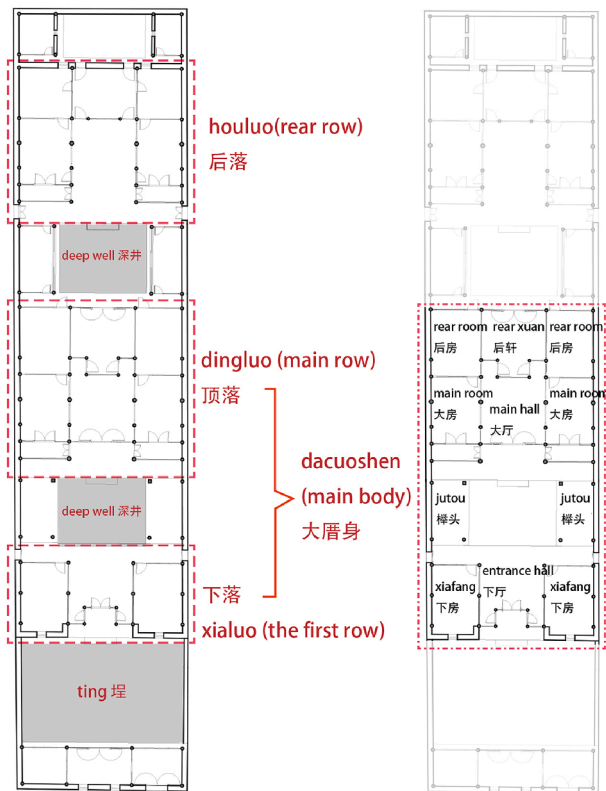


Fig. 2 Basic layout of a traditional residence (*dacuo*) in Quanzhou: main part.

stages of residential architecture did not replace each other. Instead, they coexisted in a complex and diverse manner, resembling a compact history that embodies cultural symbols and collective memory.

1.2. Literature review

Research on Minnan architecture, especially residential buildings in Quanzhou, dates back to the 1980s. Generally, scholars have focused on describing the architectural

characteristics of various building types and documenting representative examples, paying particular attention to the timber frameworks of traditional *dacuo* and related craft techniques. In recent years, local universities, particularly Huaqiao University, have produced increasing research centered on construction methods and formal characteristics as specialized topics (Lin, 1998; Cao, 2006; Xu, 2003; Zhang, 2010; Huang, 2019; Wu, 2018; Qiu, 2018; Gu, 2020; Li et al., 1996; Yao and Huang, 2016; Wu, 2016; Lin, 2017; Liang, 2018).

As for the self-built residences in Quanzhou since the late 19th century, which are the focus of this paper, related research has generally been conducted within the broader context of modern Chinese architectural history. Scholars generally examine Quanzhou’s self-built houses from the late 19th century to the mid-20th century from two main perspectives: one emphasizes variations derived from traditional courtyard residences, including changes in structure, materials, and increased stories; more notably, the other focuses on the so-called *yanglou* residences to emphasize their westernized appearance. Xie (1999) and Chen (2012)’s research are representative (Xie, 1999; Chen, 2012). Both scholars refer to these houses as *yanglou* residences, describing them as a blend of Chinese and Western architectural styles, preserving traditional courtyard layouts while integrating Western construction techniques and decorative elements (Xie, 1999, pp. 10, 12). The term *yang* (western or foreign) references the imported architectural features, while *lou* (multi-storied building) indicates that these residences were primarily multi-storied structures. Moreover, Guan (2002), in his study of traditional Quanzhou dwellings, dedicates a section specifically to discussing Quanzhou *yanglou* (Guan, 2002).

Xie (1999) provides a thorough analysis of *yanglou* residences by focusing on architectural elements, offering a broad description that covers aspects such as appearance (external corridors, multi-story structures, roofs, openings, façade decorations), spatial layout (of both compounds and individual buildings, including multi-story features in traditional courtyard residences), and decorative details. He systematically categorizes the types of styles and construction methods for each component. In his conclusion,

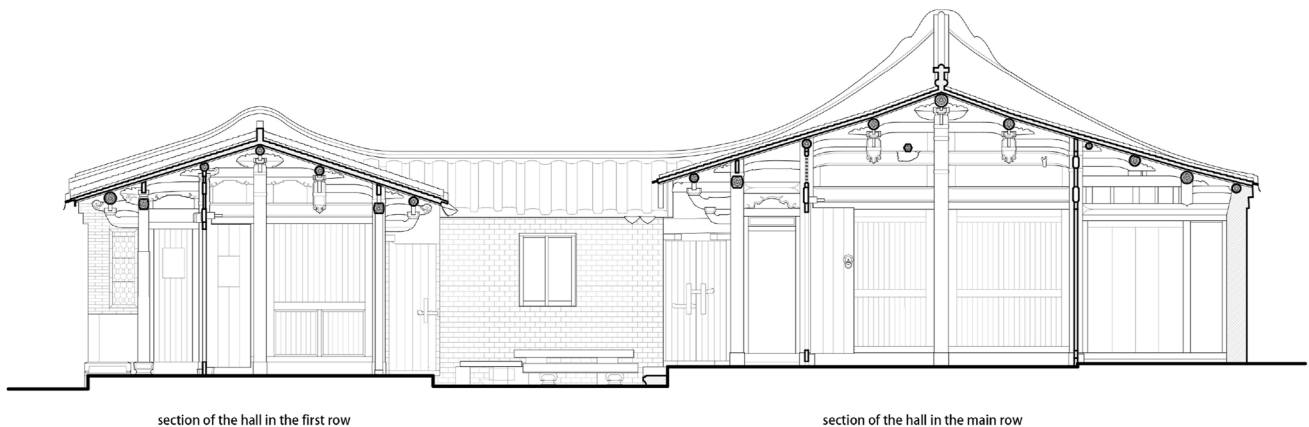


Fig. 3 Courtyard section of a traditional residence in Quanzhou. Source: measured and drawn by Zhijing Wu, Sixiang Peng, and Yifan Guo, supervised by Jing Zhuge.

he suggests a classification of *yanglou* based on the organization and style of external corridors in conjunction with the spatial arrangement of traditional residences. He provides basic information about 14 representative examples. Guan (2002) further differentiates the floor-plan types into symmetrical layouts (incorporating traditional and foreign-influenced styles) and free-plan layouts. Chen (2012) classifies *yanglou* residences into detached *yanglou*, *yanglou* within traditional courtyard compounds, and conventional residences with westernized façades only (also referred to as *fanzaicuo*). Chen (2012) primarily focuses on summarizing the characteristics of *yanglou* and illustrating them with representative examples. He highlights the distinguishing features of *yanglou* as vertical development based on traditional layouts, along with westernized facades expressed through the external corridor styles and decorative vocabulary. In contrast, he depicts the evolution of traditional courtyard residences (known as *dacuo* in dialects) as partially multiplied stories and westernization. He notes that this trend arose later than freestanding *yanglou* and exemplifies the transplantation of foreign architectural styles (Chen, 2012, pp. 63–77). Building upon Xie Hongquan's research, Chen delves deeper into the connection between *yanglou* and overseas Chinese communities and the modern changes in residential construction methods. Overall, existing studies have explored the formal and spatial characteristics of *yanglou* residences, addressed their social origins, traced broader trends in modern residential development, and identified key factors influencing housing forms since the end of the 19th century, particularly the rise of multi-story structures, external corridors, spatial layouts, and changes in construction materials and techniques.

However, on the other hand, existing research predominantly employs a binary conceptual framework,

distinguishing between traditional courtyard residences and *yanglou*, treating *yanglou* residences as if they all share common characteristics. The terms traditional versus foreign or westernization (*yang*) and single-story houses (*cuo*) versus multi-story buildings (*lou*), imply an inherent oppositional dichotomy. Viewing *yanglou* residences as a cohesive group has led scholars to broadly agree that their essential trait lies in the combination of a conventional courtyard plan (the Chinese core) with multi-story construction and Western-style external decoration (the Western skin). However, existing examples are varied and complex, and thus frequently display mixed characteristics of both *traditional* and *Western*. Moreover, the concept of *lou* itself encompasses varying extents of story addition—partial or complete—which challenges the universal applicability of this binary classification. For instance, the author's fieldwork in the Wanggong community, Licheng District, Quanzhou, documents a residence reconstructed using reused components from traditional courtyard residences, yet whose roof structure, entrance space, and floor plan deviate from traditional norms, appearing somewhat foreign, yet not multi-storied (Fig. 4). Similarly, to address the varying extents and modes of multi-story construction within courtyard houses, Xie Hongquan introduces complex concepts and descriptive methods that can easily confuse readers (Xie, 1999). Other scholars argue that residences maintaining the traditional courtyard plan but incorporating Westernized features (such as Ta-siu with two non-structural columns) and story additions should still be categorized as traditional houses, specifically referring to them as "overseas Chinese-style courtyard residences (*qiaoshi dacuo*)". Yet, based on the established definition of *yanglou* as residences characterized by traditional layouts combined with foreign elements, such examples would technically qualify as *yanglou*. This complexity raises

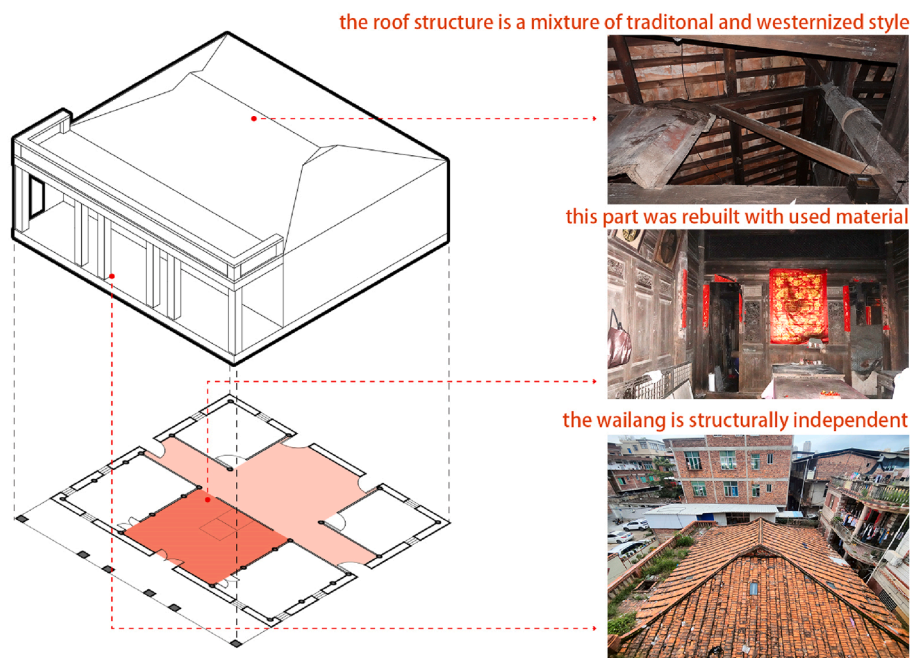


Fig. 4 Illustrates a house built in 1962 in Wanggong community, Licheng District, Quanzhou. The house is not known as *fanzailou* among locals, although its structure, layout, and main entrance façade differ from those of a traditional house.

significant questions: during the socially, politically, and internationally dynamic period from the late 19th to mid-20th centuries, was residential transformation in Quanzhou's coastal plains indeed a linear progression from traditional to westernized, from single-story to multi-story? Is the key feature of *yanglou* merely the combination of a traditional layout with a foreign-style façade? Or should we devise more refined descriptions capable of addressing the rich diversity of cases, providing a stronger foundation for exploring historical transformations and related influencing factors?

In response to this issue, this paper aims to build on existing scholarship by enhancing research methods to comprehensively understand the transformations in self-built residential architecture along Quanzhou's coastal region from the late 19th century onward. Additionally, the study will critically examine the prevailing views.

This paper is also the first in a series of research articles. Building on the phenomena identified herein, subsequent studies will further analyze the evolution of residential architecture across different periods by incorporating historical and social contexts, including perspectives such as overseas prototypes and family structures.

2. Method

Firstly, the number of research samples will be expanded. Existing studies typically select only representative cases for analysis, making it challenging to fully capture the diversity of residential architectures. Furthermore, preliminary investigations conducted by the authors have indicated that certain stylistic and spatial layout characteristics of self-built residences from the mid-20th century

persisted into the stone-based houses constructed after the 1960s. Therefore, this research does not limit its timeframe to the mid-20th century but extends it to the early 21st century, when the trend of self-built residences gradually declined, aiming to portray a more comprehensive picture of residential transformations over an extended period. This study focuses explicitly on self-built residences and excludes mixed-use shophouses (*qilou*), narrow row houses (*shoujinliao*), and government-planned and constructed collective housing or residential neighborhoods.

The authors conducted field investigations in 70 towns and villages along the Quanzhou coastal region, including the historical urban area of Quanzhou city. The survey encompassed Quanzhou's Licheng District, Fengze District, and Luoyang Town in Luojiang District; Jinjiang City; Shishi; the southern part of Nan'an City, including Fengzhou Town, Guanqiao Town, Shuitou Town, Shijing Town; and the southwestern part of Hui'an County, including Dongyuan Town, Zhangban Town, Chongwu Town, Luoyang Town, Dazuo Town, etc. In total, 261 cases were collected (Fig. 5). Among these cases, construction dates could be identified for 225 buildings through on-site observations, architectural inscriptions, and documentary records. The earliest was built in 1811, and the most recent in 2006. For each case, photographs documenting exterior and interior features were taken, along with a preliminary survey of floor plans and partial cross-sections. In some instances, an iPad Pro was used to scan and capture three-dimensional spatial information. For typical cases previously studied, publicly available architectural survey drawings were also gathered whenever possible. Data processing involved drawing floor plans and creating SU (SketchUp) models to document building exteriors. The earliest cases and statistical data referenced in the following discussion are all drawn from this dataset.

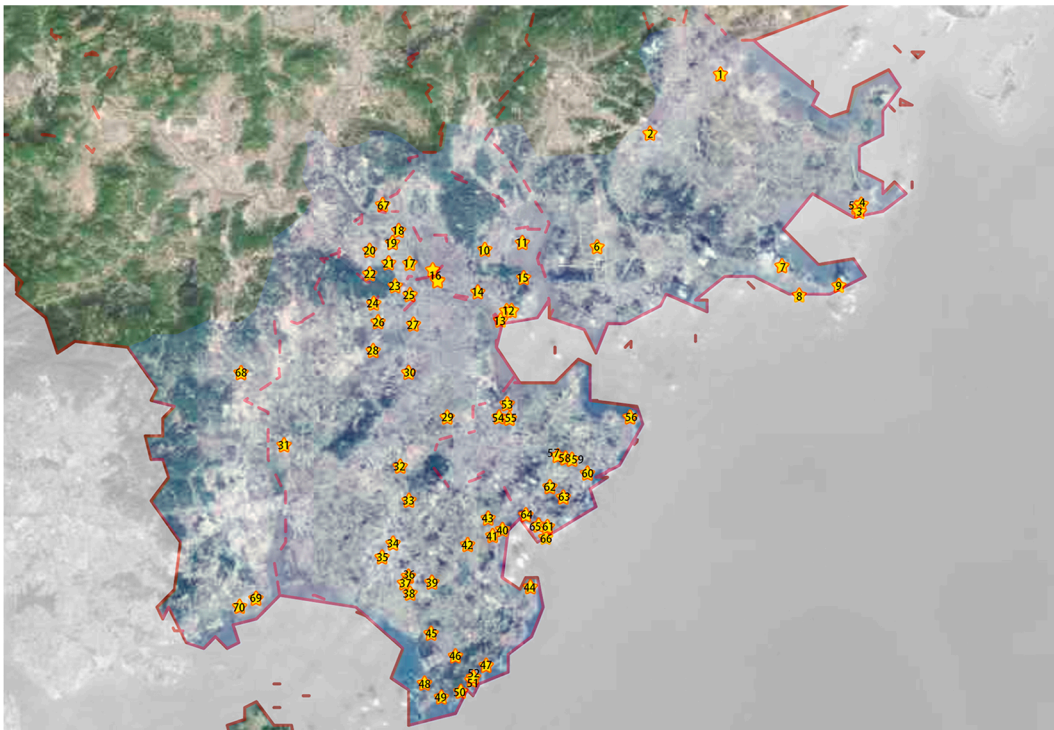


Fig. 5 Locations of field investigation and examples. Source: drawn by the authors, based on the map from [Tianditu](#).

The second methodological issue is handling the diverse variables characterizing residential space and form. Xie (1999) has offered the most comprehensive enumeration of relevant architectural elements among existing studies. However, since a residence represents a holistic combination of multiple factors, describing individual elements separately complicates the task of clarifying the exact position of a specific house within the broader trajectory of architectural transformation. Consequently, it also becomes challenging to outline a clear evolution of residential architecture as a subject of study.

The methodology of archaeological typology provides a valuable solution to this issue. In simple terms, archaeological typology classifies and organizes characteristic artifacts from archaeological sites, encompassing their overall shapes and detailed features, to establish a typological sequence of artifacts, thus creating a chronological framework for the site being studied. Typically, archaeological typology is applied to sites that lack historical documentation or precise dating. This methodology is underpinned by the theoretical assumption about the laws regulating the transformation of human-made artifacts. For example, Oscar Montelius, the pioneer of archaeological typology, explicitly grounded his approach in Darwin's theory of evolution, using evolutionary logic to determine the chronological sequence among artifacts of varying types of forms (Tang, 2006).

On the one hand, the typological method of classification and arrangement, from overall form down to specific features, clearly benefits this study by providing a systematic approach to analyzing the chronological sequence of architectural transformations as comprehensive entities made up of multiple elements. On the other hand, this research differs from archaeological typology in its objective: the construction dates of the studied objects are already known. Thus, instead of determining their chronological order, the aim here is to use the sequencing of architectural characteristics to describe and understand the broader picture of transformation, constructing a temporal framework that serves as a foundation for further interpreting the causes behind these changes. Therefore, drawing inspiration from archaeological typology, this study categorizes and labels 225 buildings of known construction dates according to their characteristic elements—each building representing a unique combination of these features—and establishes a chronological sequence of these characteristic elements based on their known dates. Subsequently, buildings are ranked by specific features individually and comprehensively, and the sorted results are then analyzed.

The third methodological issue concerns selecting representative architectural elements that align with the research objectives. Architectural transformations involve multiple variables, ranging from overall building forms and appearances to detailed components and decorative patterns, as comprehensively listed by Xie (1999). For residential architecture within the time frame addressed in this study, exterior appearance and spatial layout should be considered the most significant aspects. Existing studies employ concepts such as traditional courtyard residence, *yanglou*, and stone houses (which were prevalent after the

mid-20th century), terms derived primarily from intuitive descriptions of exterior characteristics. However, these concepts may become ambiguous and overlapping when closely examined regarding their scope and definitions for practical classification within this research. Therefore, this study first adopts a relatively neutral descriptive method focusing on overall exterior characteristics, categorizing the studied residences into two primary groups: **courtyard houses** and **freestanding houses**. For convenience, this characteristic is termed **spatial configuration** and serves as the first-level criterion for classification.

Existing research consistently emphasizes the significance of story addition in residential architecture and recognizes the direct influence of *wailang* (literally external corridor) as an imported element impacting building facades. The incorporation of upper floors represents changes in spatial configurations, with various forms of story addition corresponding to distinctive structural and layout variations. Therefore, this study chooses **story addition** as the second characteristic for analysis.

During field research, the author observed that the *wailang* primarily influences the main entrance area of residences. Yet, the concept alone is insufficient for describing the diverse entrance styles. Hence, this study employs the idea of **main entrance façade form** to emphasize the frontal features of the buildings, further subdividing this characteristic accordingly.

Layout plays a crucial role in residential architecture, as it fundamentally reflects the nature of human relationships. Elements such as gender dynamics, intergenerational interactions, host-guest relationships, and the connections between humans and deities significantly influence residential design, shaping the spatial arrangements within a home. Consequently, this analysis identifies **layout** as the third key characteristic. However, our approach does not prioritize the formal aspects of the plan, such as symmetry or flexibility in arrangement; instead, it focuses on the relational dynamics between individual rooms.

Finally, construction materials and structural techniques are also incorporated as variables when mapping changes along the timeline.

Additionally, in this paper, the term *traditional courtyard residence* specifically refers to the well-known two-row quadrangle called the traditional *dacuo* as described in the introduction (see Fig. 2), which serves as the baseline for assessing new elements like story addition.

It should also be noted that, unlike the hierarchical categorization of class, type, and style commonly used in contemporary Chinese archaeological typology, the four characteristics proposed in this study—spatial configuration, story addition, main entrance façade form, and layout—do not indicate a hierarchical relationship. Instead, they are listed as parallel and independent variables.

3. Typological construction

In this section, the study builds on existing research and draws methodological inspiration from archaeological typology to categorize the research objects into two main groups based on spatial configuration: courtyard residences

and freestanding houses. It further subdivides each group according to the extent of story addition, the form of the main entrance façade, and the layout as representative features. These subdivisions are described in detail as follows.

3.1. Spatial configuration

Group 1: A **courtyard residence** refers to a residential compound in which multiple structurally independent building units enclose a central sunken courtyard. The ground of the central courtyard should be lower than that of the surrounding area and equipped with drainage, distinguishing it from enclosed spaces covered by roofs that lack elevation differences and effectively function as interior spaces.

Group 2: A **freestanding house** refers to a residence composed primarily of a single building unit.

This research collected a total of 134 courtyard residences and 127 freestanding houses as samples.

3.2. Extent of story addition

Group 1, the courtyard residences are divided into 6 based on the extent of story addition, while Group 2 is divided into 2. See [Table 1](#).

3.3. Form of main entrance façade

Following the form of main entrance façade, all houses concerned here can be categorized into five groups. See [Table 2](#).

3.4. Spatial layout

The main clues for the classification of residential layouts are:

- (1) The locations of rooms that serve as halls, including ancestral halls, halls for deities and Buddhas, living rooms, and large multi-functional halls.
- (2) The relationships between spaces indicated by the doors and corridors in the residence's main section, including the central area in courtyard houses or the primary space in freestanding houses, exclude any auxiliary buildings.

Following these clues, Group 1 and Group 2 are divided as follows. See [Table 3](#).

3.5. Results of categorization

Then, using this system, all 225 residential architectures can be categorized. For example, G1-Ecl refers to a courtyard house (G1) featuring a story addition of the annexed building (E), an exterior corridor (e), and a traditional layout (l) ([Fig. 6](#)). G2-Fbl refers to a freestanding house (G2) with multiple stories (F) featuring a Ta-siu with non-structural double columns (b) and a traditional style layout (l) ([Fig. 7](#)).

4. Periodization analysis

Organizing residential cases gathered in this research by their known construction dates according to the above characteristics provides a clear visualization of the transformation process from the late 19th century to the early 21st century. The following sections provide detailed explanations.

4.1. Chronological features of story addition

4.1.1. Courtyard residences

[Figure 8](#) illustrates the chronological progression of story addition in courtyard residences. When sorted by the earliest known case of each type, the sequence roughly follows this order: traditional wooden annex buildings (G1-Ea) → partial story addition of the rear row in courtyard houses (G1-Ba) → fully multi-story courtyard residences (G1-F) → external corridor-type annex buildings (G1-Ec), story addition of single buildings within courtyard houses (G1-Cc) → combined story addition in courtyard residences (G1-D). However, this does not imply that the story addition of courtyard houses follows a strictly linear developmental path.

From a broad trend perspective, approximately 1920 acts as a rough dividing point, with the process of story addition taking place in two main phases:

- (1) Before 1920: The story addition of courtyard residences began to emerge in the 19th century but was confined to specific areas of the residence. Based on currently known examples, the story addition of auxiliary buildings in traditional courtyard residence (the first case of G1-E being the Dafu Di at No. 18-3, Yuzhu Alley, Dongcun, Fengli Street, Shishi, dated 1840, [Fig. 9](#)) seems to have preceded the partial story addition of the main courtyard structure (the first case of G1-B being the Cai Jiajiao Former Residence, located at No. 58, Beili, Xixiliao Village, Anhai Town, Jinjiang, dated 1851).
- (2) After 1920: The earliest known example of a fully multi-story courtyard residence (G1-F) is the Cai Residence in Tangdong, Jinjiang, built in 1922. This residence represents the first instance of a multi-story courtyard house. Marking a significant turning point, this period featured a more pronounced trend toward story addition in courtyard residences. In courtyard houses with auxiliary building expansions (G1-E), the auxiliary buildings transitioned into fully multi-story structures. In partially verticalized courtyard houses (G1-B), the height of the upper floors began to exceed the main ridge of the rear hall. By the late 1930s, combined story addition (G1-D) surfaced, where *jiaojiaolou* (corner buildings), *jutou* (side buildings), and rear rooms were all elevated into multi-story structures, resulting in elongated or U-shaped two-story residences. This architectural form continued to be prevalent well into the 1980s.

In short, although partial and auxiliary story additions had already appeared in courtyard houses by the mid-19th century, the evolution of story addition in courtyard

Table 1 Illustrations and descriptions of classification criteria: Extent of story addition.

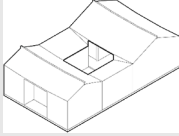
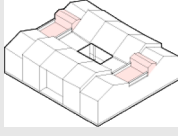
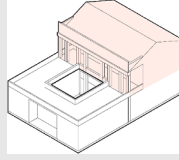
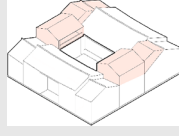
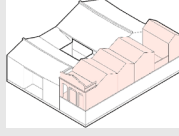
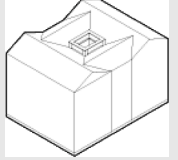
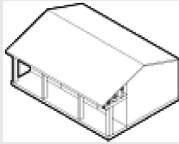
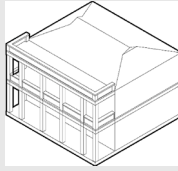
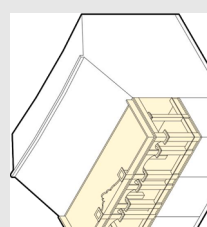
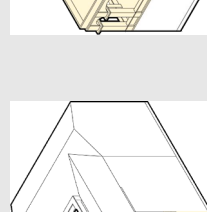
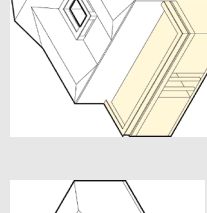
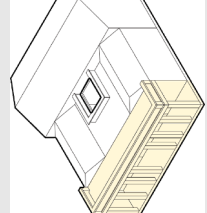
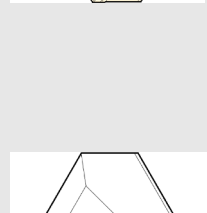
	A	B	C	D	E	F
Group 1 Courtyard residences	No story addition	Partial story addition	Individual story addition	Combined story addition	Story addition of the annexed building known as hucuo	All buildings enclosing the courtyard have a second floor
	—	Partial story addition of the side rooms in a courtyard residence's main row forms small-scale mezzanines.	Adding story on an individual building in a courtyard residence.	Adding a story to several buildings, excluding the main hall, in a courtyard residence.	—	—
						
Group 2 Freestanding houses	No story addition	—	—	—	—	The main part of the house has at least two stories
		—	—	—	—	

Table 2 Illustrations and descriptions of classification criteria: Form of main entrance façade.

a	b	c	d	e
Traditional type	Ta-siu with two non-structural columns	Type of external corridor	Type of terrace	One floor exterior corridor
				
Traditional ta-siu, typically characterized by a recessed area created by positioning the central doorway inward from the façade. This type also includes a simple opening on a wall. If the residence has a second floor, the façade of the upper floor matches that of the first.	A recessed entrance with double columns, when the residence has a second floor, the façade of the upper floor matches the first.	There is an outward corridor in front of the residential complex or individual buildings inside.	The second floor is recessed from the first floor, creating a terrace area at the front of the residence.	Only one floor has an external corridor in a multi-storied residence.

residences did not follow a linear path from partial to single-unit, then to combined, and finally to fully multi-story structures.

On the one hand, cases of auxiliary building verticalization (G1-E) and partial verticalization (G1-B) appeared much earlier than fully multistory courtyard houses (G1-F). The former involved auxiliary buildings or rear rows, typically used as study rooms or women’s quarters. In contrast, the vertically expanded side sections of the main building featured low ceilings and were primarily intended for storage rather than living spaces, differing in function from the fully multistory courtyard houses, where the second floor was designed for residential use.

On the other hand, as fully multi-story courtyard houses emerged, the trend toward story addition within courtyard residences became more pronounced. This indicates that the presence of fully multi-story courtyard houses (G1-F) was likely not a direct result of the gradual verticalization of courtyard houses but rather originated from different sources. Nevertheless, these fully multi-story cases further accelerated the growth of vertical space within courtyard residences. This topic will be examined in greater detail in a separate study.

It is also worth noting that traditional single-story courtyard houses remained the dominant residential form despite the trend toward story addition. Completely non-verticalized courtyard residences continued to be constructed even into the 1980s, with 134 courtyard house cases, of which 53 were entirely without story addition. In contrast, regarding the number of surviving examples, fully multi-story courtyard houses (G1-F type, with only 24 cases) were not mainstream in residential construction.

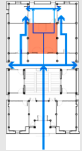
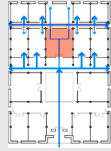
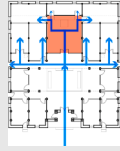
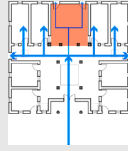
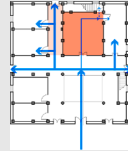
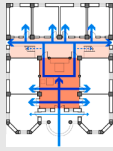
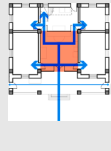
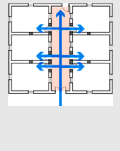
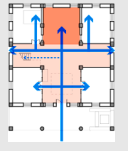
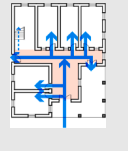
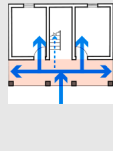
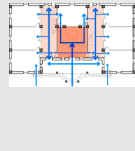
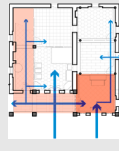
4.1.2. Freestanding houses

The development of freestanding houses is more uncomplicated and straightforward compared to courtyard residences. The mid-20th century, particularly at the end of World War II, marks a clear dividing line, primarily seen in the number of single-story houses versus multi-story buildings and differences in construction materials and structural techniques. Another significant change in building materials and structural methods occurred in the 1960s for freestanding multi-story houses (Fig. 9).

- (1) Before the mid-20th century, freestanding multi-story houses were the predominant type, with 21 known examples constructed between 1910 and 1937. Regarding materials and structural systems, these houses mainly showcased a combination of brick, stone, and wood, some of which included partially reinforced concrete frames.
- (2) After World War II, the construction of freestanding single-story houses rose significantly. Between 1947 and 1969, 17 single-story houses were built, comparable to the 20 freestanding multi-story houses constructed during the same period.

Regarding materials and structural systems, freestanding multi-story houses primarily use a mixed brick, stone, and wood structure, while freestanding single-story houses are predominantly built of stone. A new trend emerged in the 1960s: single-story and multi-story houses began to be

Table 3 Illustrations and descriptions of classification criteria: Spatial layout.

	I	II	III	IV	V	VI	VII	VIII
Group 1	Traditional layout 	Rear corridor type 	The back room leads to the hall 	One bay deep room 	Corridor beside the main hall 	—	—	—
	<p>The main hall connects to the rear area known as <i>houxuan</i>, while the back rooms connect to both the front rooms and the <i>houxuan</i>.</p>	<p>A rear corridor known as <i>houhuoxiang</i> is set behind the <i>jinpings</i> (a kind of screen) of the main hall, separating the front and rear rooms into relatively independent units.</p>	<p>The back room in the main row opens into the hall, and the <i>houxuan</i> no longer functions as a passage.</p>	<p>The rooms in the main building (main row) are only one bay deep, no longer divided into front and back sections, typically accompanied by the narrowing or disappearance of the <i>houxuan</i>.</p>	<p>In the main row, a corridor is set on one or both sides of the main hall, with all rooms opening towards the central bay.</p>	—	—	—
Group 2	A front hall with a rear corridor 	Corridor-less layout 	Central corridor 	A rear hall with a front corridor 	A T-shape corridor without a hall 	Single corridor 	The corridors beside the hall 	Asymmetrical layout 
	<p>Upon entering the residence, one directly arrives at the main hall, with side rooms mainly opening into it. A single corridor connects the rooms behind the hall.</p>	<p>There is no corridor; the main hall is at the front of the residence, and rooms open toward the central bay or the hall, meaning access to the rooms must be through the hall. This layout typically features a six-room configuration on the first floor.</p>	<p>The central bay of the residence is somewhat narrow, creating a longitudinal corridor layout. In this design, no main hall is dedicated to the space, or the hall is located to one side of the corridor.</p>	<p>The main hall is located at the end of the central axis of the residence, with a corridor in front of it, forming a cross-shaped layout between the hall and the corridor.</p>	<p>This layout is similar to the rear corridor layout of group 1, but without a <i>jinpings</i> in front of the corridor and no dedicated main hall space.</p>	<p>The corridor is located at the front of the house, with rooms and the main hall opening towards it (meaning all rooms are accessed via the corridor).</p>	<p>Corridors are placed on both sides of the main hall.</p>	<p>The design is asymmetrical and lacks a discernible pattern, often resulting from an older residence's complete or partial renovation.</p>

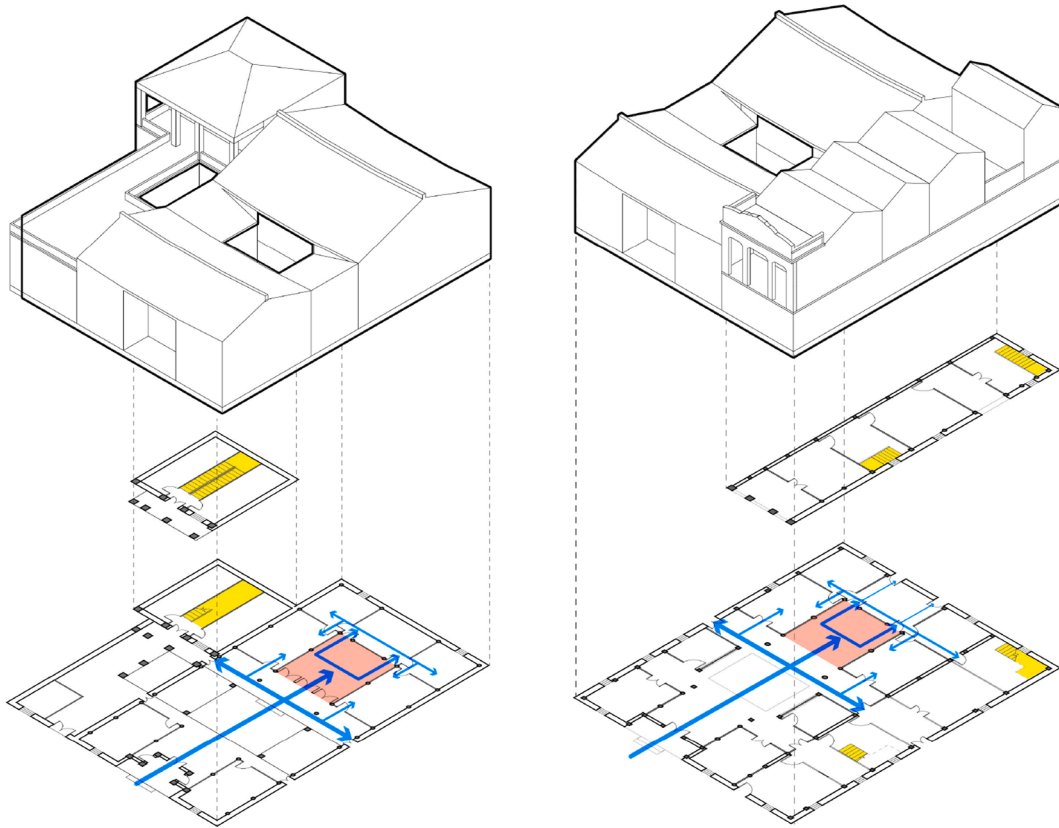


Fig. 6 Illustration of the G1-Ecl.

constructed entirely from stone, with stone slab roofing becoming the dominant building method. Additionally, instances of single-story stone houses being expanded vertically into multi-story buildings appeared. This construction activity persisted into the early 21st century.

Overall, the development of story addition in coastal Quanzhou residences did not progress linearly from partial to fully multi-story structures. The interaction between courtyard house verticalization, fully multi-story courtyard houses, and freestanding multi-story houses requires further investigation.

The earliest examples of story addition in courtyard houses occurred before freestanding multi-story houses influenced by overseas architecture, which first appeared in 1912. Following the emergence of fully multi-story courtyard houses in 1922, various forms of story addition emerged in coastal residences in Quanzhou until the mid-20th century.

However, in terms of sheer numbers, single-story houses remained the predominant residential form. It was not until the 1960s that multi-story house construction became widespread, marked by the emergence of strip-stone-built houses with external corridors (G2-Fc) and partially reconstructed or expanded freestanding multi-story houses (G2-Fa).

4.2. Chronological features of the main entrance façade

Concerning the main entrance façade, the two most notable types are external corridors and Ta-siu with two non-

structural columns. These features enable an integrated analysis of courtyard and freestanding houses to investigate their chronological distribution patterns (Fig. 10).

External corridors were first used in freestanding multi-story houses and became the most common design choice. The earliest known example is the Chen Guangchun Residence in Tongzheng Alley, Quanzhou, built in 1912. In courtyard houses, the first external corridor appears in the Cai Residence in Tangdong, Jinjiang, constructed in 1922. It is also the earliest recognized fully multi-story courtyard house (G1-F).

Since courtyard residences comprise several independent building units organized around a central space, the use of external corridors extended beyond just the main entrance façade to include specific sections of the complex, resulting in a wider variety of architectural applications.

Ta-siu with two non-structural columns type also first appeared in freestanding multi-story houses and was not seen in verticalized courtyard houses until the mid-20th century.

Both the external corridor and Ta-siu with two non-structural columns have been widely recognized in academic research as “foreign” (*yang*) elements. Chronologically, these features appeared earlier in freestanding houses than in courtyard residences, further supporting the established understanding that the *yanglou* style of external corridors and freestanding houses was introduced by Chinese emigrants living overseas, transmitted from Southeast Asia, and gradually adopted and imitated locally (Guan, 2002).

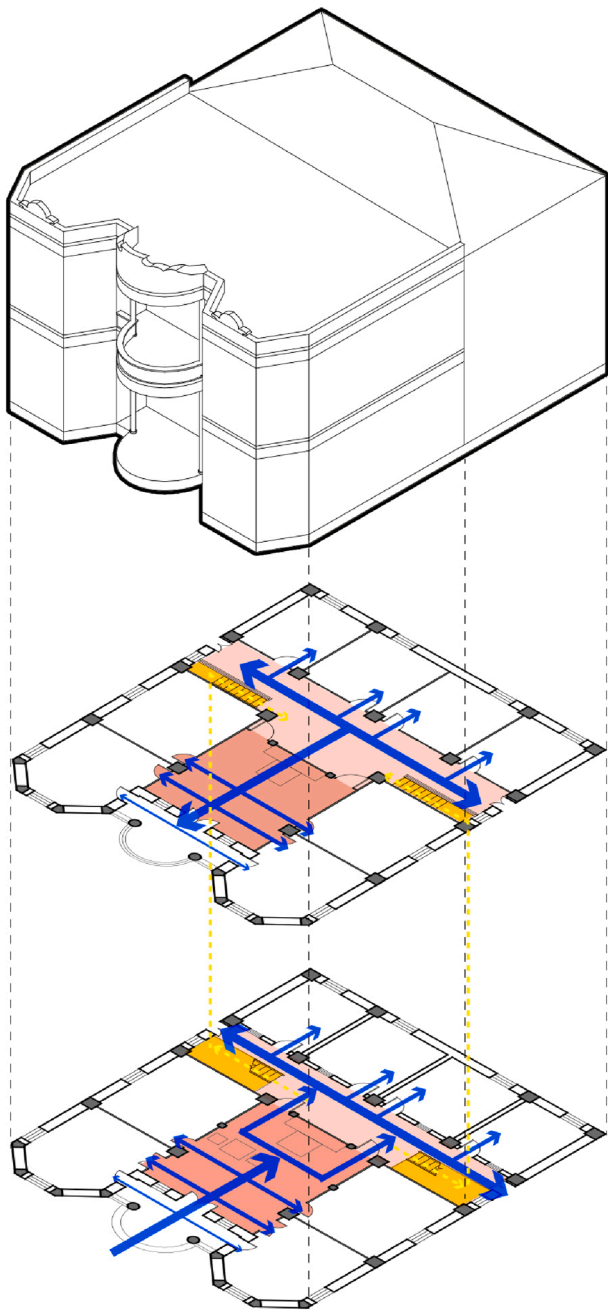


Fig. 7 Illustration of the G2-Fbl.

4.3. Chronological features of the layout

4.3.1. Courtyard residences

In courtyard residences, Table 4 displays the distribution of various spatial layout types among courtyard residences. Figure 11 illustrates the chronological distribution of these types.

Statistical data (Table 4) indicate that traditional spatial layouts were the most commonly used, regardless of the extent of story addition or the design of the main entrance façade. Even as construction materials and structural methods evolved, houses with traditional layouts continued to be built, extending into the 1950s.

A notable number of rear corridor type layouts emerged from the late 19th century to the mid-20th century. Compared to traditional layouts, adding a rear corridor provided independence for the rear rooms, breaking the interconnected matrix-like arrangement of rooms surrounding the main hall.

A somewhat similar layout is the type where the back room leads to the hall. In this configuration, because of the recessed *jinping* partition in the hall, the rear rooms open directly to the hall, while the front and rear rooms are no longer connected, further enhancing each room's independence. Additionally, access to the rear rooms is solely through the hall, which somewhat diminishes the hall's ceremonial function. However, this layout type remained relatively rare despite its long chronological distribution.

The earliest known case of the one-bay deep room layout dates to the 1930s, but it was primarily concentrated between the late 1940s and the 1970s. With the removal of rear rooms, this layout reduced the total number of living spaces, regardless of whether the house was single-story or multi-story. However, the spatial relationship between the hall, rooms, and corridors remained unchanged, with living quarters accessed through the corridor and maintaining their independence from one another.

Overall, three important observations can be noted about the chronological distribution of spatial layouts in courtyard residences:

- (1) Regardless of layout variations, the main hall always remained at the back of the residence, accessible only through the central courtyard.
- (2) The first major trend, emerging in the late 19th century, was the increased independence of rooms, leading to the introduction or greater prominence of circulation corridors.
- (3) The second major trend, beginning primarily in the 1940s, was the reduction in the number of residential rooms within the house.

4.3.2. Freestanding houses

In freestanding houses, Table 5 displays the distribution of various spatial layout types among freestanding residences. Figure 12 illustrates the chronological distribution of these types.

In terms of quantity, the rear hall with a front corridor layout was the most common and notable, with a construction period extending from the late 1920s to the 1990s. During this time, building materials gradually transitioned from concrete to stone.

The second most common type was the front hall with a rear corridor layout, which emerged as early as the 1910s and continued to be built into the 1990s. During this time, freestanding houses without corridors were also constructed.

A more detailed breakdown indicates that World War II acted as a clear dividing line: after the war, the rear hall with a front corridor layout became the prevailing form.

These three spatial layouts closely resemble the layout of a traditional courtyard residence's main building (the main row, *dingluo*), accounting for nearly half of all freestanding houses. This is likely the primary reason scholars

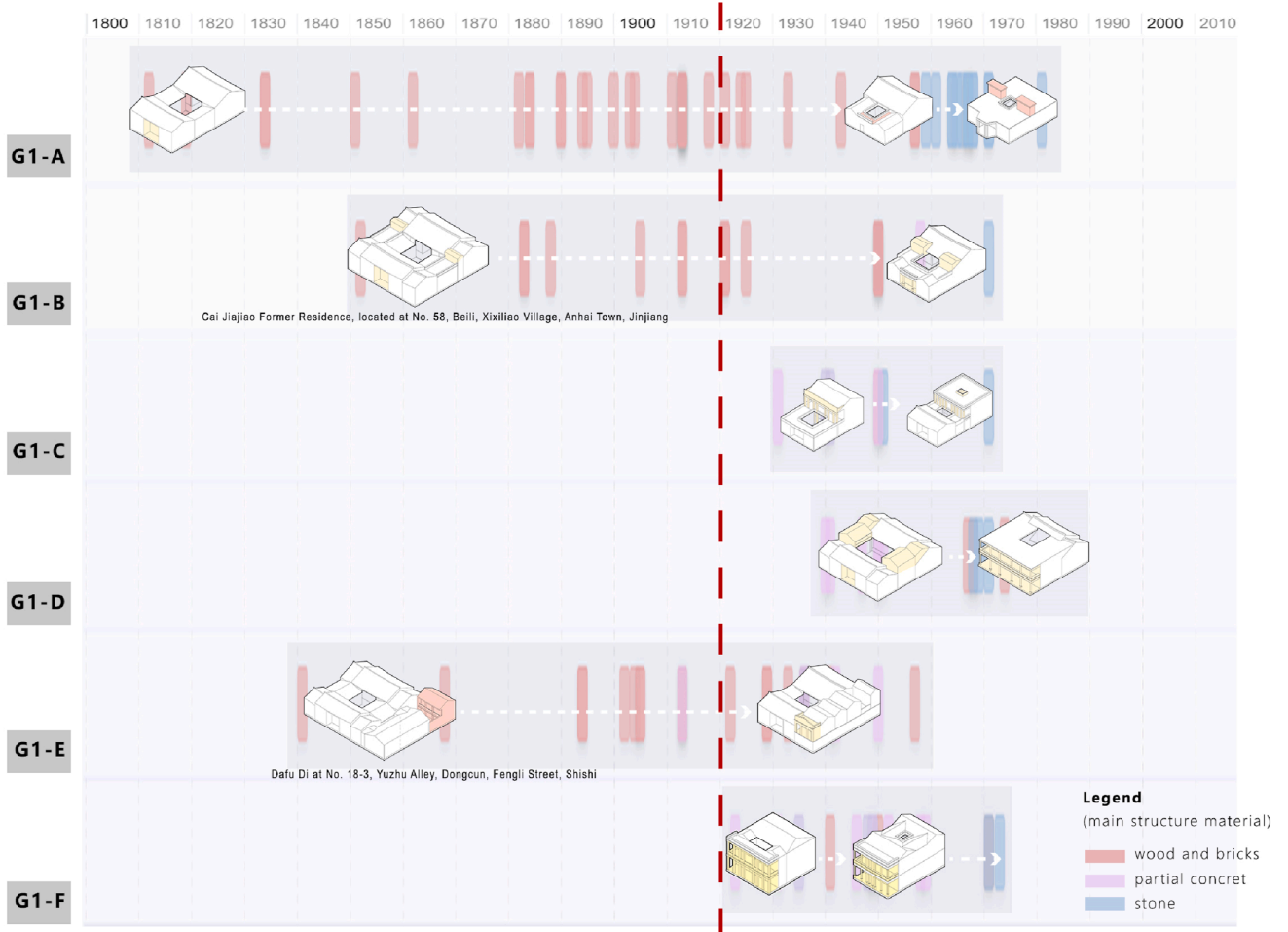


Fig. 8 Timeline of courtyard residences.

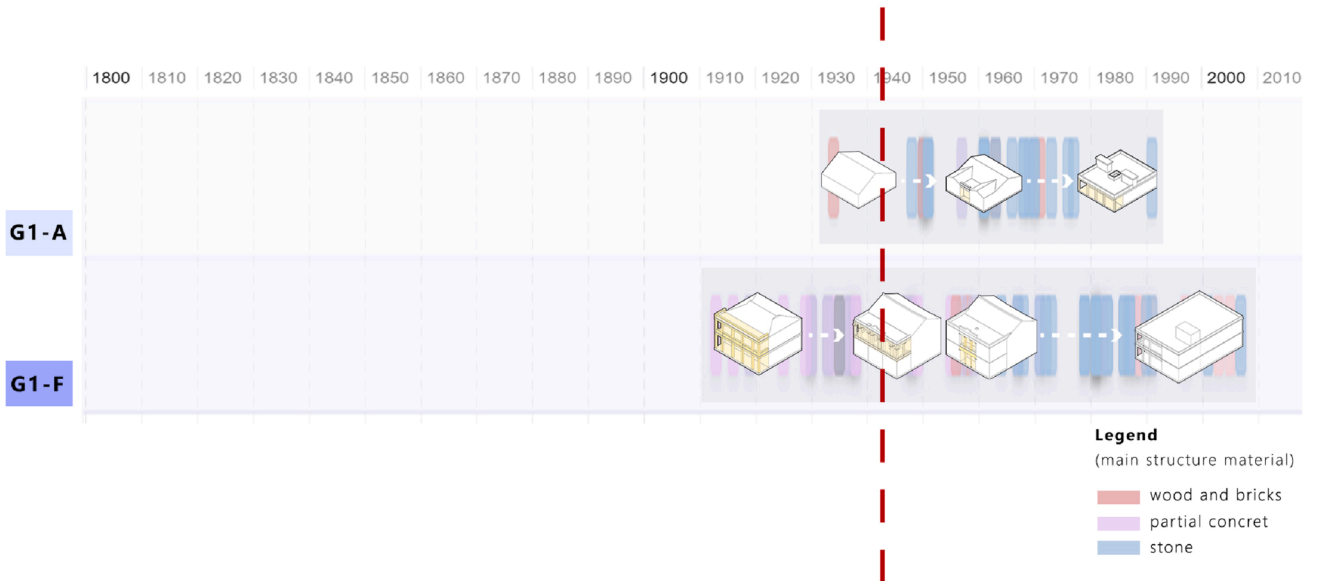


Fig. 9 Timeline of freestanding houses.

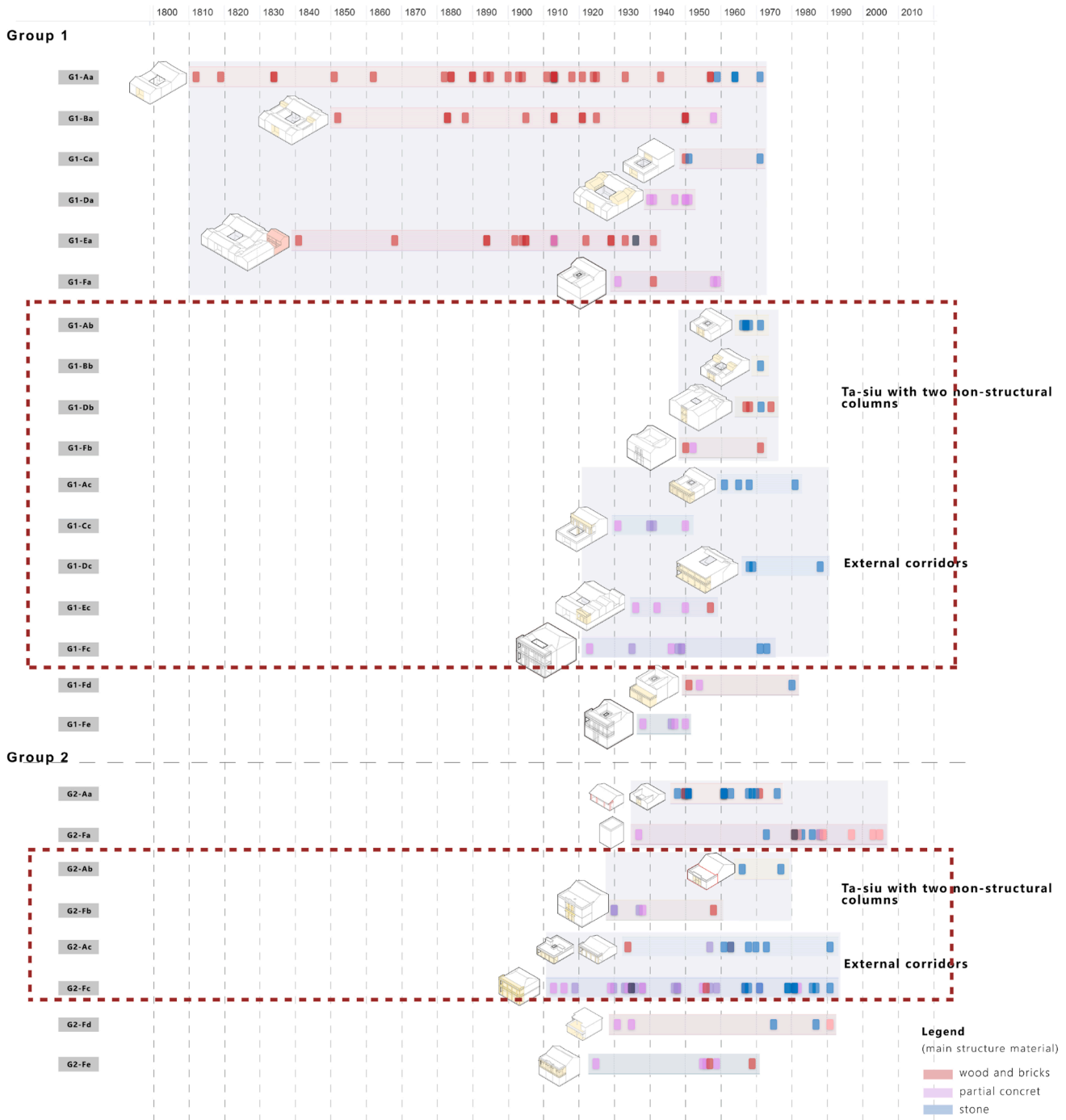


Fig. 10 Timeline of two groups of residences according to the form of main entrance façade.

typically define *yanglou* as traditional layouts combined with Westernized exteriors.

However, when examining the relationships between rooms, the front hall with a rear corridor layout and the corridor-less layout significantly differs from the rear hall with a front corridor layout, which became dominant after the mid-1940s. These two earlier layouts also fundamentally contrast with the traditional courtyard residence layout.

In the first two layouts, the hall is essentially integrated into the primary circulation space, meaning one must pass

through the hall to enter any room or access the staircase. Furthermore, since these layouts lack a courtyard, the hall connects directly to the main entrance.

As a result, although these layouts appear symmetrical and offering tables were often positioned against the rear wall of the hall, this type of hall functionally resembles the hall in Western-style houses. This aligns with Sheng Chengyan’s argument in his article Residential Improvement (*Zhuzhai Gailiang*), in which he advocated that a house should be designed “with the hall as the central organizing space for all rooms.” (Sheng 1921).

Table 4 The distribution of various spatial layout types among courtyard residences.

Traditional	Rear corridor	The back room leads to the hall	One bay deep room	Corridor beside the main hall	others
48	18	3	38	2	2

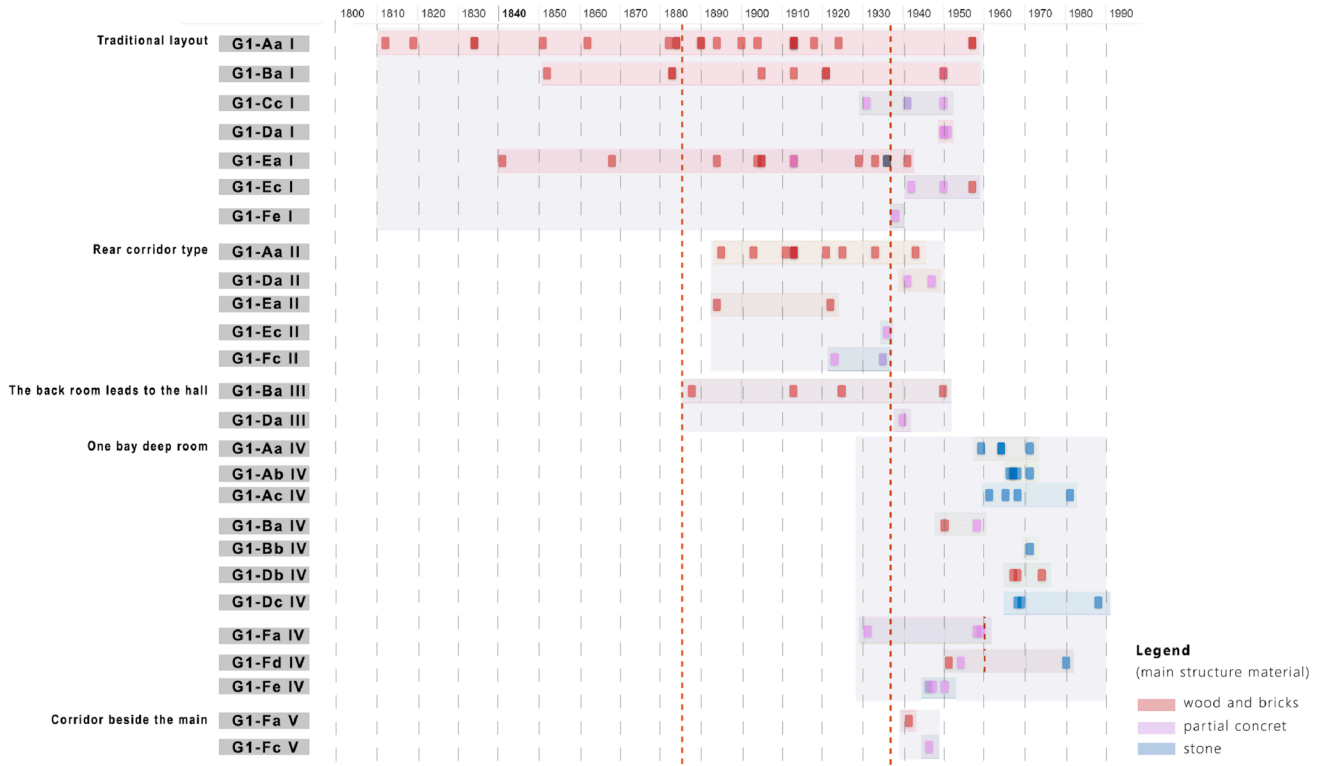


Fig. 11 Timeline of courtyard residences according to layout.

Indeed, the layout of *yanglou* in the Quanzhou region adhered to its unique transmission pathways. A separate study will examine in detail the specific origins of the front hall with a rear corridor layout and the corridor-less layout, which appear traditional but integrate Western influences.

The rear hall with a front corridor layout, which became dominant after the mid-1940s, featured a clear separation between the circulation space and the hall, with the hall positioned at the end of the central axis. This layout closely resembles the front-rear room arrangement in courtyard residences, with the key difference being that in freestanding houses, the circulation space was enclosed indoors rather than an open courtyard. Additionally, the primary period of popularity for both layouts was almost identical.

This spatial arrangement is more aligned with traditional courtyard residences and their evolutionary trends since the late 19th century. In other words, the floor plan of freestanding multi-story houses before and after the mid-1940s probably came from different origins.

The T-shaped corridor, single corridor, and asymmetrical layouts were primarily introduced between the 1960s and the early 21st century. As previously mentioned, coastal Quanzhou residences had already begun to transition to stone as the primary building material during this time, indicating that these new spatial layouts were likely directly linked to changes in construction materials and structural systems.

Regarding the six cases of longitudinal central corridor layouts, additional discussion may be necessary based on the specific characteristics of each case.

Table 5 The distribution of various spatial layout types among freestanding houses.

The front hall with a rear corridor	Corridor-less layout	Central corridor	The rear hall with a front corridor	T-shape corridor without a hall	Single corridor	The corridor besides the hall	Asymmetrical
20	10	6	38	4	9	1	25

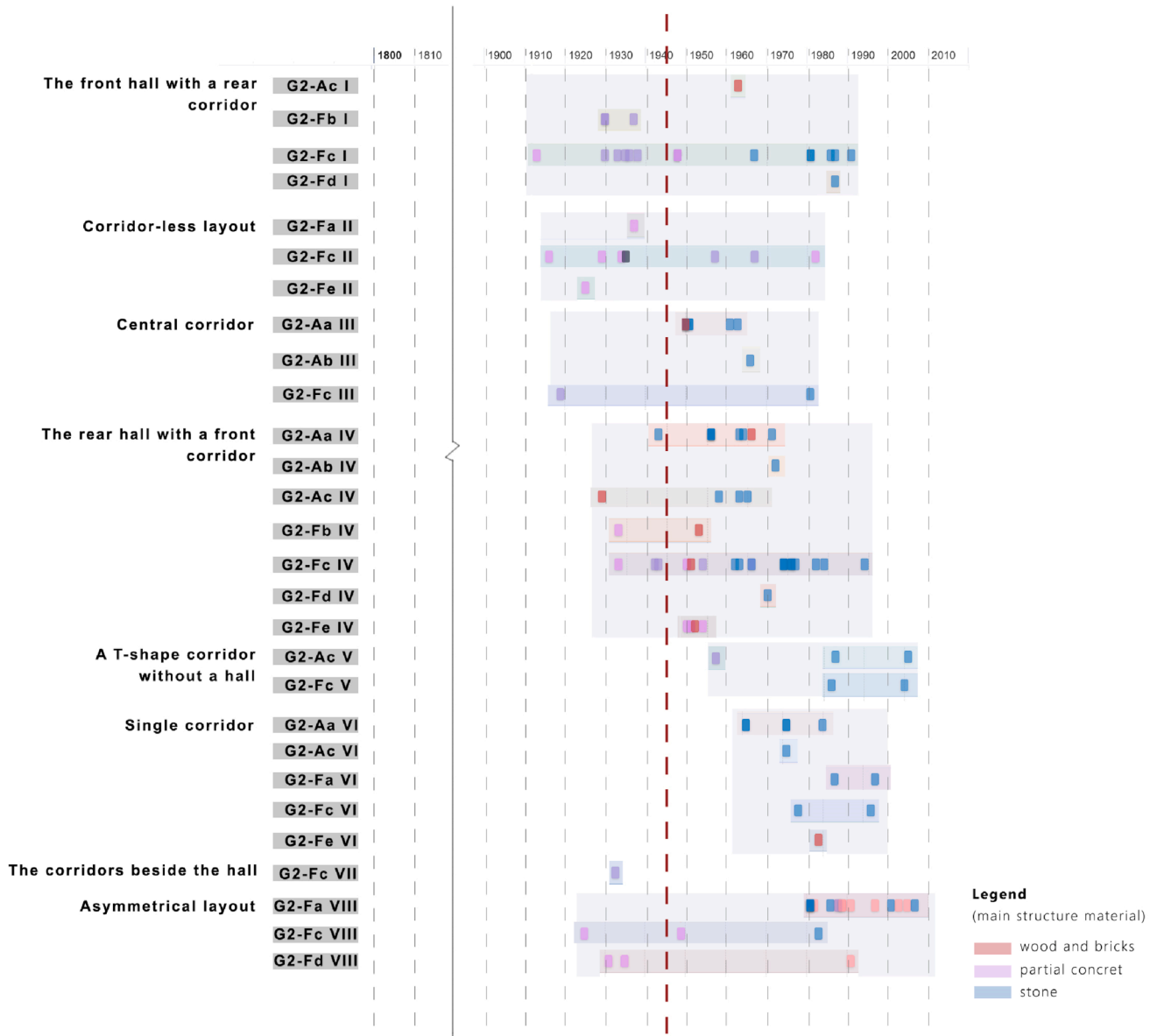


Fig. 12 Timeline of freestanding residences according to layout.

5. Discussion

In summary, when analyzed separately in terms of spatial configuration, extent of story addition, main entrance façade design, and spatial layout, the rate of change for each factor was not uniform. Freestanding, multi-story houses featuring external corridors and Ta-siu with two non-structural columns—key indicators of Western-style façades—first emerged in the 1910s and 1920s. As noted in contemporary research, this timeframe coincides with the widely accepted beginning period of *yanglou* in Quanzhou. External corridors and recessed double-column entrances were adopted later in courtyard residences than in freestanding houses, further supporting the general view on the transmission of foreign architectural styles—specifically, that Western forms were initially introduced and then gradually imitated and integrated into traditional architectural frameworks.

However, the distribution of various forms of story addition and spatial layouts offers new insights and raises new questions.

Regarding story addition, as discussed earlier, the available evidence indicates that the multi-story transformation of courtyard residences was not merely a linear process where traditional courtyard residences passively absorbed influences from *yanglou*, transitioning from partial to complete story addition. Instead, it was at least a process influenced by both internal and external factors that interacted with one another.

While Xie (1999) noted that “the multi-story construction of *yanglou* cannot simply be attributed to the influence of Western architectural culture,” he did not conduct a thorough and systematic analysis of this phenomenon. The patterns described and the clues outlined in this study create an opportunity to enrich the discussion and investigation of this issue further.

Regarding spatial layout, as previously discussed, the phenomenon observed around the mid-1940s, where residential floor plans appeared similar in form but varied in room relationships, provides an opportunity to re-evaluate the widely accepted conclusion that “freestanding *yanglou* are the result of traditional courtyard residences undergoing story addition, combined with colonial-style external corridors and decorative elements” (Chen, 2012).

The evolution of spatial layouts in courtyard residences and freestanding houses needs to be further examined within the broader contexts of social environment, family structure, lifestyle changes, and advancements in building materials and construction technologies.

After considering various factors, a previously overlooked time marker emerges—the late 1930s to the mid-1940s. During the final years of World War II, the war’s impact severely restricted access to remittance funds from overseas Chinese and construction materials, nearly halting residential construction in the Quanzhou region. It was not until 1946 that building activity began to recover gradually.

Before this period, beginning with the earliest known case, the 1912 Chen Residence, the years from 1912 to 1937 represented the first peak in constructing freestanding multi-story houses. The arrival of freestanding houses featuring overseas architectural styles (1912) and fully multi-story courtyard residences (1922) further sped up the story addition of traditional courtyard residences and aided the spread of external corridor designs and recessed double-column entrances.

The spatial logic of courtyard houses and freestanding houses differs. Since the late 19th century, courtyard houses have gradually increased room independence while evolving from the traditional form. In contrast, overseas architectural styles have influenced freestanding houses more directly.

From the mid-1940s to the mid-1960s, after World War II, as construction materials shifted mainly to stone, the story additions of courtyard houses became more varied, and the designs of the main entrance façades also showed greater diversity. Notably, courtyard houses incorporated Ta-siu with two non-structural columns, a feature that first appeared in freestanding houses.

The dominant spatial layouts of freestanding houses started to resemble those of courtyard houses, showing traits that evolved more directly from traditional courtyard residences than in the pre-war period. Simultaneously, both house types followed a common trend of decreasing the number of residential rooms.

After the 1960s, construction entered a phase where stone became the primary building material. During this time, multi-story houses emerged as the dominant type of new construction, and the layouts became more diverse. However, the various façade styles for main entrances from the previous phase continued to be utilized in stone-built houses.

This analysis highlights two key points.

First, the late 1930s to the mid-1940s emerge as a crucial time marker, suggesting that we should reevaluate the prevailing approach in existing research, which has often treated Quanzhou’s *yanglou* from the early to mid-20th century as a cohesive and unified phenomenon. The

distinct patterns of story addition and spatial layout before and after this period further highlight the need to reconsider the interweaving of multiple influences during this time. That is, the development of *yanglou* was neither a simple superimposition of foreign and traditional elements as independent factors nor a linear progression in which traditional forms gradually became Westernized. Instead, the transformation of modern residential architecture in coastal Quanzhou was a continuous adaptation and integration between initially distinct influences, resulting in a diverse and coexisting architectural landscape.

Second, after the 1960s, the simultaneous changes in construction materials and spatial layouts and the continuation of previous entrance façade styles further highlight the complexity of residential studies and the various factors influencing architectural transformation.

Building on the periodization and characteristics identified in this study, further research on self-built residences in coastal Quanzhou from the late 19th century to the early 21st century will proceed along two parallel lines of inquiry—courtyard residences and freestanding houses, each of which will be explored in detail in separate studies.

This study employs an approach inspired by archaeological typology, where a sufficiently large sample size allows for the sequential breakdown and integrated analysis of key architectural features. This method offers a framework for describing the complexity of residential transformations and aids in establishing a more precise historical trajectory, thus laying the groundwork for further interpretation of these phenomena.

Moreover, the residential classification system established in this study serves as a valuable reference for preserving architectural heritage in the Quanzhou region. This paper’s typological approach effectively challenges the binary framework of traditional versus Western in architectural historiography, emphasizing the complex social interactions underlying architectural types’ development. This perspective contributes to methodological innovation in architectural history research. Given the close economic and cultural ties between self-built housing in Quanzhou and overseas Chinese communities, this study aims to provide a detailed portrayal of residential typologies and their evolution, thereby fostering a deeper understanding of the diversity of Chinese diasporic housing within the context of globalization, particularly concerning cultural exchange and identity expression.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgment

This was supported by the National Natural Science Foundation of China (Grant No. 52178006).

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