

Study on the Construction Techniques and Characteristics of Traditional Residences in Heilongjiang Province

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ABSTRACT

Based on the extensive in-depth research on the traditional residences in Heilongjiang Province, the construction techniques and characteristics of Han ethnic group's residences, Manchu ethnic minority's residences and Korean ethnic minority's residences, which are of literature value and application value, are stated. These traditional residences have gone through various degrees of damage, destruction and abandonment. Research and detailed description can provide valuable basic data that can be referred to for traditional residences' protection, inheritance and technology integration and innovation in the current situation of China.

INTRODUCTION

Heilongjiang is a frontier province where many ethnic groups live together and traditional residences in Heilongjiang mainly come in Han ethnic group's residences, Manchu ethnic minority's residences, Korean ethnic minority's

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residences and the residences of some of ethnic minorities. Currently, due to the urban economic development and modern lifestyle, the construction techniques of traditional residences are dribbling away and fading from people's memory more and more easily, facing various degrees of damage, destruction and abandonment. Therefore, protection and inheritance of the construction techniques and construction characteristics of traditional residences are beyond doubt, which is respect for and continuation of history and increases the senses of belonging and identity of residents living in them, of great significance for the construction of human settlement environment in the harmonious society.

Construction Techniques and Characteristics of Han Ethnic Group's Traditional Residences

In Heilongjiang Province, the plane types of individual buildings of the Han ethnic group mainly include two-bay, three-bay and multiple-bay buildings. Two-bay buildings are represented by alkaline earth bungalows and well railing-type residences and mainly distributed in the alkaline earth zones and near the forest farms with dense forests or in mountain valleys in forest areas, where economic conditions are poor. Three-bay buildings have a common layout mode, with the hall centered, the east room and the west room symmetrically arranged on both sides, where the hall is the room leading to each room and usually serves as a kitchen with a stove available. The west and east rooms are usually bedrooms, provided with south heat able brick beds (also known as “Kang”) or a south-north heat able brick beds, or "Swastika Kang" constructed by Han people by learning Manchu's Kang layout mode.

Local building materials are used as much as possible, contributing to low construction cost and transport costs, mainly due to the abundant natural resources and vast territory in Northeast China. The Northeast Plain is the largest one of the three largest plains in China, and on its northwestern, northeastern and southeastern sides are Daxing'anling, Xiaoxing'anling and Changbai Mountain respectively. Abundant wood and earth can be used to build houses due to their excellent thermal insulation performance, and have helped form diverse and local conditions-based morphological characteristics of residence buildings. As shown in fig.1 and Table I.



Figure 1. Picture of Thatched Roof and Adobe Walls of Certain Residence in Heilongjiang Province.

TABLE I. COMMON SIZES OF ADOBES FOR ADOBE WALLS IN THE THREE PROVINCES OF NORTHEAST CHINA.

Location	Adobe Size (cm)	Reinforced
Heilongjiang	37 * 18 * 7	Cleat Added
Jilin	24 * 18 * 15	Cleat Added
Liaoning	26 * 18 * 15	Cleat Added

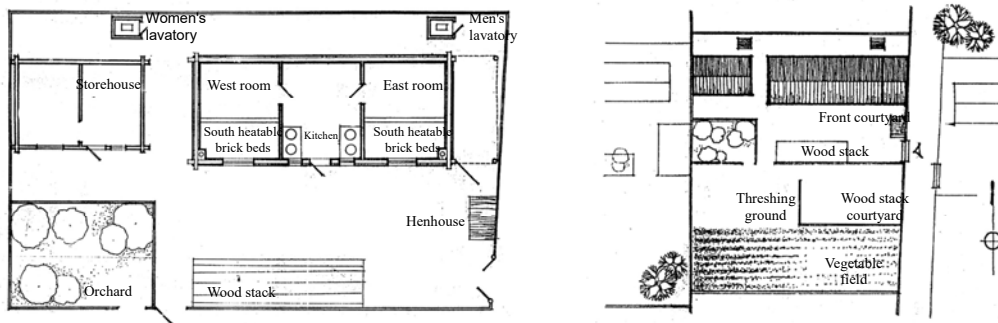


Figure 2. Residence of a Zhang Family in Baoshi Village, Yabuli Town, Shangzhi City.

The plane forms of courtyards mainly include courtyards with houses on one side, courtyards with houses on two sides, courtyards with houses on three sides and courtyards with houses on four sides. In order to meeting the sun lighting requirements in winter, such courtyards usually face south, with main entrance on the south side, which is not only due to the fact that it is hard for north-facing rooms to obtain adequate sunlight in winter, but also due to the fact that the cold air from the north has rather adverse impact on the thermal environment of

buildings in winter, and the faster the air velocity is, the smaller the external surface thermal resistance of building envelopes, the larger the heat dissipation amount at building openings. As shown in fig.2.

Construction Techniques and Characteristics of Manchu Ethnic Minority's Traditional Residences

Manchu's settlement buildings are mostly rectangular. In order to resist the northerly winds, more residences are sited on the south slopes of mountains and form a courtyard type, characterized by three to five main rooms, principle rooms mainly facing the south to fully absorb the sun's radiant heat, no convexes or concaves on the wall surface, large room depth, relatively small size of external envelope structure and wing rooms not blocking principal rooms as much as possible. In order to adapt to the extremely cold climate in the north and withstand the wind and snow in winter, the wall thickness is 450~500 mm for north walls, 400~420 mm for south walls, 370~380mm for gables and 80~200mm partitions[1]. Meanwhile, in order to obtain more lighting indoors, the south-facing windows of buildings are wide and large and the north-facing windows of buildings are narrow and seldom open or even remain closed. The windows are opened and closed vertically, and window paper is pasted outside the window, which can not only increase the lighting area and resist the impact of strong winds and heavy snow but also prevent falling off caused by alternate cold and heat of window paper. The heat able brick beds used by Manchu are called "Swastika Kang", with the following characteristics: first, an entire Kang is construction on the south, north and west sides of the room, forming a “Π” shape, with excellent cold-resistance and thermal insulation effects; second, the Kang is as wide as over 5 chi and can be used for sleeping, sitting and lying purposes. A "Swastika Kang" is heated up by a cooking range used for cooking, and the heat generated from the cooking range when it is being used for cooking or boiling water goes through the heat able Kang, so such Kang is always hot. Besides, chimneys, connected with the Kang through a flue, are arranged on the ground on east and west sides of buildings, which is also a feature of Manchu ethnic minority's residences. As shown in fig.3.

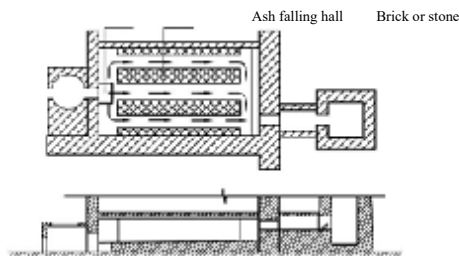


Figure 3. Diagram of Manchu's Swastika Kang and Chimney Practice.



Figure 4. Diagrams of Korean Ethnic Minority's Residences Adapting to Special Climatic Conditions.

Construction Techniques and Characteristics of Korean Ethnic Minority's Traditional Residences

The buildings of the Korean ethnic minority are mainly distributed in the Yanbian region and Heilongjiang Province of China. A residential building usually has a "田"-shaped plane, with six or eight rooms, connected through doors. In order to adapt to the cold climate in winter, such inner spaces as a kitchen and Kang are connected to form an integral open space for family life, assignment, meals and entertainment activities. As shown in fig.4.

In terms of village site selection and construction, the traditions on the Korean Peninsula have been retained. Villages are mostly constructed at the flat foot of a hill, in a valley or by the river, which reflects the concept of natural landscape cities. Residences are dominated by individual buildings and arranged along the sunny slopes in rows. Sunny slopes are about 10°C higher than shady slopes. Building materials are determined based on local conditions, with sorghum stalk bundles, wickers or pine boards mainly used for roofs, covered with loess and straw as roofing thermal insulation material, with tiles used as roofing waterproof material. Each living room is provided with suspended ceiling, with the thickness of plastering over the suspended ceiling being up to 50cm to improve the thermal insulation performance[2]. Building walls have a double-wall structure, i.e. enclosing walls built of such common materials as clay or cornstalk outside the back walls of buildings, which not only form a storage space but also have cold resistance and thermal insulation function. In terms of heat able Kang layout, different from the "straight" Kangs of the Han ethnic group and the "[]"-shaped Kangs of the Manchu ethnic minority, the Kangs of the Korean ethnic minority feature a large size a low height, which is bound up with the sedentary lifestyle of the Korean ethnic minority. As shown in fig.5.

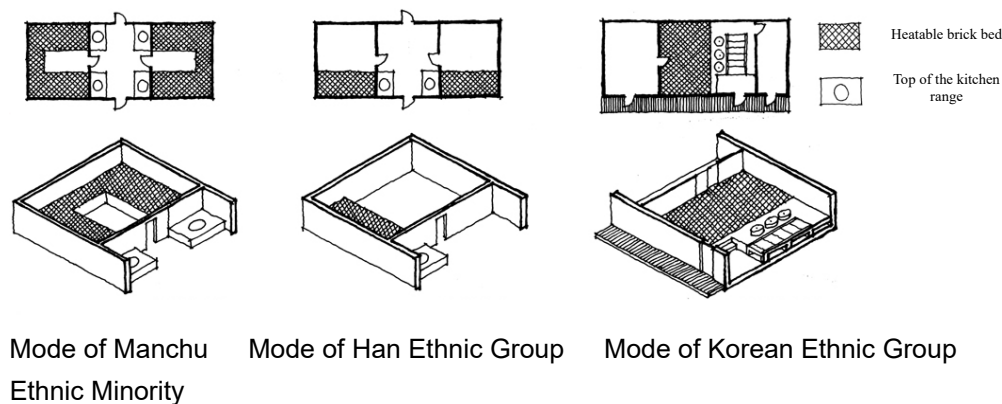


Figure 5. Different Kangs of the Han Ethnic Group, Manchu Ethnic Minority and Korean Ethnic Group.

CONCLUSION

Heilongjiang is a frontier province where many ethnic groups live together and different ethnic groups have their own unique features in terms of construction techniques of residences, which not only adds richness to the historical civilization in the Heilongjiang River Valley, but also provided China with valuable humanistic and cultural tourism resources. The rich cultural value of Heilongjiang Province in terms of building material selection and the characteristics of construction techniques is worth research and inheritance in the aspects of ecological features and sustainable development of modern architecture.

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