

A Study on the Rural Residence in the Northern Area of Zhejiang Province from the Perspective of Green Living Environment

J Wang, W J Gao and C Wang

The University of Kitakyushu1-1-1 Hibikino, Wakamatsu-ku, Kitakyushu-city

ZheJiang university architectural design institute co. LTD NO.148 Tian mushan Road

Email: 389190731@qq.com

Abstract At present, owing to the rapid development of rural construction, it lacks corresponding theories and practices and damages the features of rural area, ignoring the geography, suitability and green living environment factors. The research selects rural residence as the object, defining "courtyard" as the basic unit for rural residence and . It utilizes the principle of topology as the expanding media, by the method of principle of cellular structure and green living environment design strategy. The essay establishes the design and construction system of "rural basic unit", combining functions and structures, prototype menu, chamber space and compound interface, from the perspective of green living environment. It aims to guide rural construction and protect the ruralliving environment.

1 Background and Subject

Since the ancient time, the northern Zhejiang Province has been an important area for China's economics, society and culture. In short, it has consistent ecological, environmental, resources, social and cultural features, and is indeed a subject for research and construction integrating natural terrain unit, economic and social unit and rural housing unit [1].

Currently, the area manifests features of industrialized and commercialized development of industry, networking of human society, and modernization of construction technology. At the same time, rural settlement construction blindly uses the mode of urban development, with too many demands, rapid development, and large cost. It makes the "high carbon" feature and tendency much more obvious with the time passing by, which requires corresponding solutions as soon as possible [2].

Rural settlement is just like the structure of life system, from a cell to the biosphere. It can also be disintegrated into a system based on basic cells and many upper levels. "The rural courtyard" is the key component of the rural construction system, and also a basic vector for realizing a rural strategy of low carbon emissions. According to this, we can build a "basic unit" of rural area--"the rural courtyard", namely an independent living area combined with houses and their courtyard. We can learn about the essential relation of rural living by researching the "basic unit" of "rural courtyard", and study its composition and structure, gathering and growing, which are the foundation for analyzing and researching rural area.



Components	Functions	Examples	Cellular Structure
<i>terrain limit</i>	<i>limit, division and setting</i>	<i>homestead boundaries or terrain</i>	<i>cytoderma</i>
<i>function prototypes</i>	<i>respective indoor basic functions</i>	<i>modules of living room, bedroom, kitchen, bathroom and storeroom</i>	<i>organelle</i>
<i>additional cavity</i>	<i>bearing, adjusting and flowing</i>	<i>a chamber space enclosed by each subject and boundary, bearing light, air, wind and activities</i>	<i>cytoplasm</i>
<i>multi-layered skin</i>	<i>enclosing, protecting</i>	<i>roof, wall, floor, door and window</i>	<i>cytomembrane</i>
Courtyard--rural basic unit			Biological cell

Figure 2-1 Division for "Rural Basic Units" (self-made)

2 Theories and Framework

2.1 The cognition on rural living unit based on the perspective of low carbon emissions is a systematic research integrating many subjects. According to the principle of cytoarchitecture, the author analyzes the courtyard unit and establishes a design method and construction system for "basic rural unit" of function prototypes + additional cavity + multi-layered skin + terrain limit. (Figure 2-1)

2.2 Based on low carbon perspective and the previous analysis, the research applies a method of prototype theory, with the assistance of bioscience, and sticks to the strategy of passive energy conservation technology. It also uses the principle of topology as an expanding media to construct a menu for the living unit in the northern Zhejiang Province. (Figure 2-2)

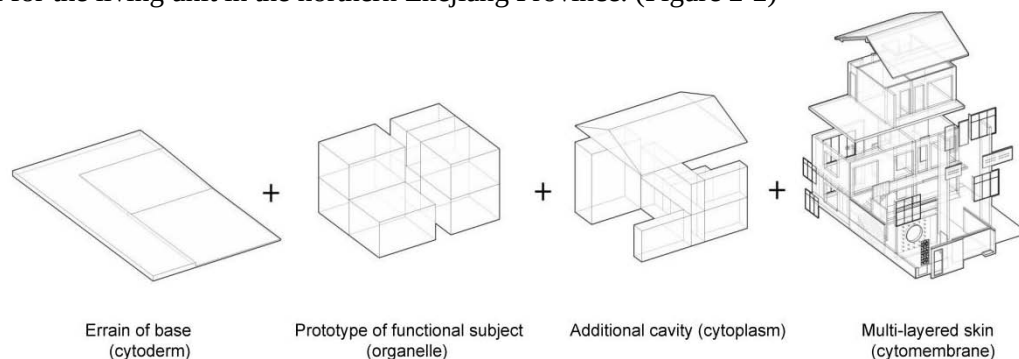


Figure 2-2 Diagram for Basic Courtyard Units(self-made)

3 Prototype and Menu

3.1 Main Function Prototype

3.1.1 The Cube Model

According to the instruction of low carbon emissions, we take the cube as the basic model, with the length of 9.9 meters. Both the first and second floor are 3.3 meters high, and the rest is a 3.3-meter-high roof. This model meets the requirements of various factors. (Figure 3-1)

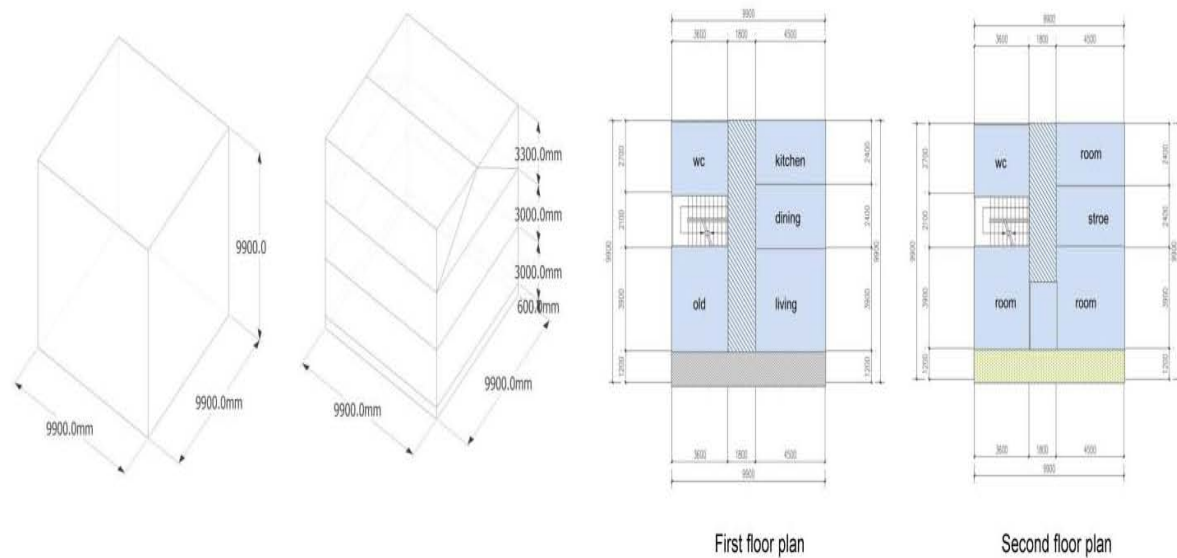


Figure 3-1 9.9-meter-length Cube Model (self-made)

- Optimum building shape coefficient ——A cube as a building model has the smallest building shape coefficient and the smallest energy consumption. Taking the cube as the prototype, and making small changes according to the , is the most energy efficient way.
- Suitable width and depth——9.9-meter-depth helps to ventilation and sunshine .(The depth of the building will not affect the sunshine requirement when it is less than 14 meters.)
- Meet the reality——Based on data analysis of many villages, The site area of rural residence is about $150\text{ m}^2 \sim 300\text{ m}^2$ and the total areas about $200\text{ m}^2 \sim 300\text{ m}^2$. As the factors of the yard, we make the site area to be $9.9\text{m} \times 9.9\text{m}$, the total areas about 200 m^2 with 2 floors.
- Increasing Conversions——The plane of residence changes with base form, sunshine condition and so on. But a square provides the most convenient possibility for change.

3.1.2 Functions and Structures

Locate the plans according to lighting, ventilation, forthcoming district and so on .(Figure 3-2)

- 1.2-meter-Lobby——For Staying and storage ,regulating the sunshine and air
- 4.5mx9.9m Kitchen- Dining room- Living room combinations for different needs.
- Bedrooms——Different types for hosts, children, old people according to their different habits .



Figure 3-2 The first and second floor plan (self-made)

3.1.3 The chamber space

The chamber space in building is a dynamic regulation system, regulating wind, air and sunshine and energy.(Figure 3-3)

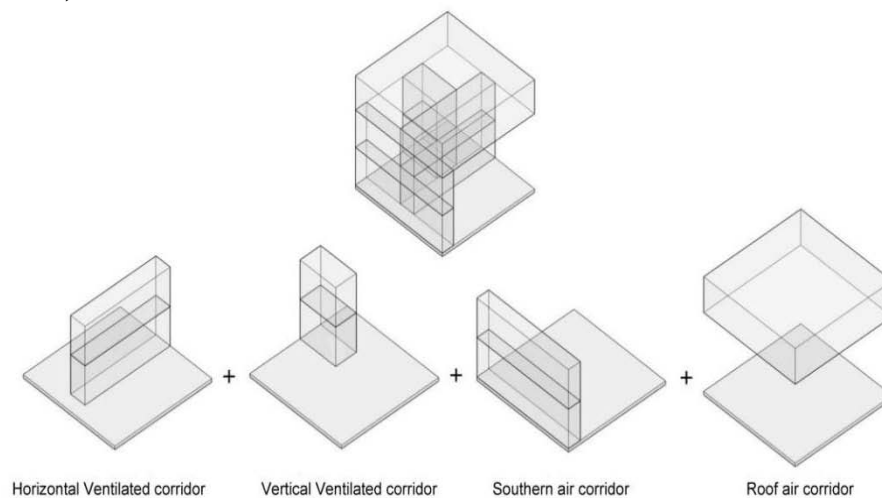


Figure 3-3 Cavity space schematic diagram (self-made)

3.2 Extension menu

According to the factors of yard, sunshine, ventilation, corridor, roof layer ,terrain of base , chamber space and compound interface , we construct a menu for the living unit in the northern Zhejiang Province.(Figure 3-4)

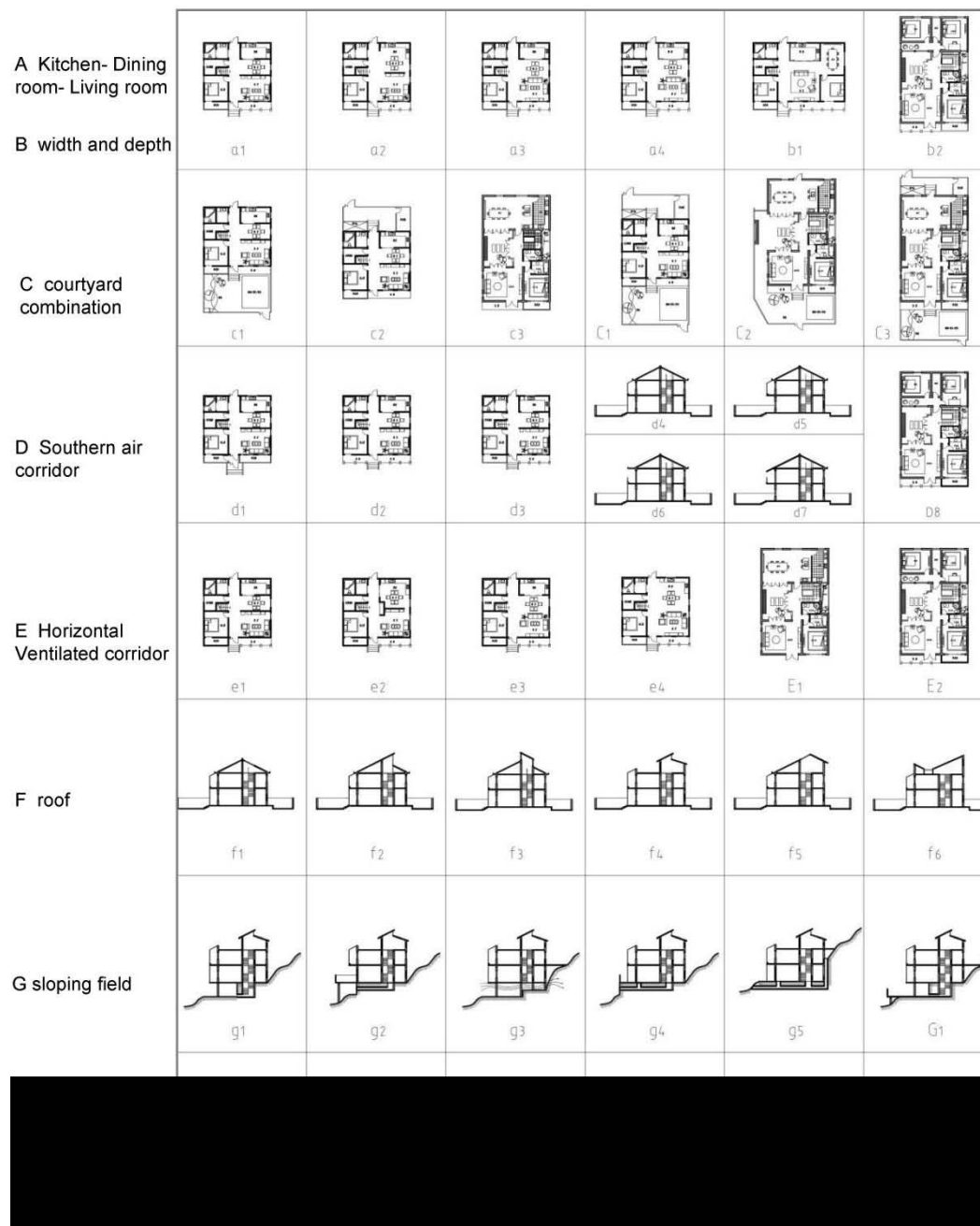


Figure 3-4 Extension menu (self-made)

References

- [1]ZhuWei .Study of Village Settlement Space in Northern Zhejiang Basis on Geography[D].Zhejiang University,2009: 60-61.
- [2] LinTao .Research on Rural Agglomeration and Settlement Space Evolution Mode of North Zhejiang.Zhejiang University,2012: 1-7.