Courtyard Defense Engineering of Traditional Dwellings in Henan

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ABSTRACT: Defense engineering in Henan area is mainly the local fortress, but some areas have not form a fortress, but emphasize courtyard defense. This paper will analyze the composition and characteristics of courtyard defense engineering of Henan traditional dwellings through the on-the-spot investigation, hoping to show the defense engineering of Henan traditional dwellings which is different from fortress system.

1 REVIEW

Henan is a key area to Zhongzhou, and suffers from the chaos of war since ancient times, dwellings' demand for defense is higher, in most parts of Henan, “a village is densely populated with more than hundreds of households; two places are very close to each other. Due to avoid soldier bandit, the villagers intended to build more dykes and stockades, defense is so severe that the village is like a city wall.” ① is fortress-based defense system. However, some parts of Henan have not built fortress, but put the defense focus on the yard, so how to consider defensive design in the traditional courtyards in Henan? This paper will discuss it from several aspects, such as the door and wall of courtyard's solid defense nodes, entrance space with clear defensive as well as the composition and terrain of the whole yard.

2 DOOR

We all usually analogize important areas of defense with the word "door", from this, it can be seen that door is very important in the defense system; a house's door is the limit to segment the inside and outside, and is the first barrier in the entire defense system.

2.1 The form of door

Most houses in Henan are equipped with gates, which are generally two layers, outlook holes and shooting holes are equipped above the top of most doors in many forms, which is not only beautiful but also have definite defensive function, the second floor can be used for storage at ordinary times, some have set stairs in the gate for convenient up and down, which can also be used to lookout predators and shoot in a dangerous situation; some even set window on both the inside and the outside, which can effectively cooperates with internal space and against the en-
emy that has entered the yard. In addition to the substantial design, they also pay attention on the decoration, everywhere embodies the defensive, such as the outlook holes with the design of tai chi, brick carvings with the moral of exorcism, the mirror hanging on the door, which has the same effect, and is the perfect combination of traditional culture and decorative art.

2.2 The setting of door

In order to consider defense factors, some residences will set double doors and multiple doors, like the entrance door of Shi Laojiu house in Linzhou, Yubei, namely the form of double doors is used in a gate, while in Xinyang region, the entrance space of the house is composed of narrow lanes and multiple doors, creating the effective defense space segmentation through the opening and closing of doors, and no matter inside and outside, the door is equipped with windows for shooting, which are used for defense.

2.3 The location of doors

In Dabieshan hinterland in the southern region in Henan province, many villages pay great attention to "oblique doors and crooked lanes", that is to make the door oblique, the locals all said that doors are set like this is based on the sake of feng shui when asking them, in fact, the direction of oblique doors is a kind of ideas that "pursue good fortune and avoid disaster", it has to say it's a psychological "defense design", at the same time, the analysis found that this way also really has its sciences, for example, a residence of Maopu village is located in the highlands, and on the most side of houses, his door is oblique to the road direction, this location is conducive for transparent version, and makes him to be the first one to find whether there is a strange on the road in the distance. (See Figure 1)

3 WALLS

The same as the dynasties' value on the building of walls, in house defense system, walls are equally important, which not only demands for strong, but also the carrier of many defensive detail designs as well as the constituent elements of space segmentation.
3.1 Wall structure

Most areas in Henan use the wall construction of “Brick outside, adobe inside”, the outer is packed with brick, the inside is packed with adobe, there are also houses which are all built with bricks, but very few, in the areas with prominent defense problems, both the economy and strong factors shall be considered, local materials shall be used to reinforce the wall according to local conditions. For example, Taihang mountain area in the north of Henan use stones to build walls, even the Stone Village in Linzhou uses flakes as tiles. Pingdingshan's surrounding are rich in red sandstone, local artisans will make red sandstone into red stone pieces to build, the lower parts and foundation of walls are all use red stone pieces, for the upper parts, red stone pieces are inserted into the wall of “Brick outside, adobe inside” to strengthen, which is both strong and beautiful.(See Figure 2)

3.2 The form of walls

Walls, as the elements of space limit, form various space after the clever combination of enclosing wall and exterior walls of houses, which can be used to organize the internal defense system, all sorts of details are often set on the wall for defense at some critical moments, for example, a residence from Maopu village in Xinyang paves stones on the wall of both sides of lanes, and
reserves holes to install roadblocks, Ma Piyao Mansion in Anyang leaves shooting holes on wing walls. ②

![Image of a house in Ding Liwan of Xinxian County](image1.png)

**Figure 3.** The entrance of a house in Ding Liwan of Xinxian County (taken by the author).

![Diagram of the entrance of Zhu-Zifeng house in Lin Feng Village of Xinxian County](image2.png)

**Figure 4.** A Spatial Analysis on the entrance of Zhu-Zifeng house in Lin Feng Village of Xinxian County (drawn by the author).

4 "BARBICAN" SPACE

In defense system of Chinese traditional cities, barbican is a very successful invention, which can effectively resist the invaders, and in order to have effect of protection, a similar space is also set in the traditional courtyard setting.

In Dabie mountain area in the southern region of Henan province, the handling mode of traditional courtyards' entrance space is similar to the handling mode of "barbican", the houses here are obviously different from common northern courtyard homes, whose main performance is that the entrance is set between two courtyards, which is like that barbican gates are usually not directly facing to the gate of main cities, people are led into the narrow roadway after entering the compound, the principal rooms of the main courtyard are on two sides, a narrow space like that is very unfavorable to attack, while the multiple doors and the shooting holes set on them can be effectively organized for defense. (See Figure 3)

In addition to the form of Dabie mountain area, for Zhu Zifeng house in Linfeng village, Jiaxian, at the beginning of its design, the designer also managed to set up a "barbican" space at the entrance, there is a narrow and small square space after entering the gate, which is conducive to block the enemies by that advantage of a commanding position at the gate of the second
floor, for the left and right sides, one side is for the living room, the other side is the rooms for foreign guests, partition is clear, for the place behind the gate which is opposite the entrance is a long and narrow corridor, space sag is left at the end of corridor, which can be used to attack the enemies in the aisles and has the effect that "if one man guards the pass, ten thousand are unable to get through." The enemy who broke into the house are easy to be led into the narrow alley and be ambushed. (See Figure 4)

Figure 5. The Comparison chart of Courtyard Structure (drawn by the author).

Figure 6: The former site of E-Yu-Wan Bureau of the Chinese Communist center in Xinxian County (drawn by the author).

5 COURTYARD LAYOUT

For the well-known northern typical courtyards, the vertical deep space formed by various courtyard combinations is its basic characteristic; most plains in Henan also adopt the form of courtyards, such as Liu Qingxia's former residence in Kaifeng, Ma Piyao mansion in Anyang. But for coteau and highland areas, it is difficult to set up this kind of layout, so the designer has to flexibly consider the topography and security defense, as a result, the typical courtyard layout form with local characteristics in the southern region of Henan province are formed, in the above-mentioned "barbican" space is the most distinctive part in this kind of layout, and the practice that central rooms will not pass the "hall" further deepens the safety performance of courtyard layout, and form the layout that "one yard in one house", front courtyard cannot directly connected with the backyard, this kind of layout is conducive to divide households, but
does not affect the cohesion within the family, its most obvious function lies in its defensive, even though there are enemies capturing a courtyard, other yards will not be lost, but can still be effectively organized for defense. Even some big rich families cannot directly go through the central room when using the combination in layers and series, but set the export on the apprentice of both sides. (See Figure 5)

E-Yu-Wan Bureau of the Chinese Communist center located in Xinxiang County is typical house in the southern region of Henan province in late Qing Dynasty, and then is requisitioned by the red army, so it can get a better protection, courtyard layout is very clear, is a rare instance in analyzing courtyards in the southern region of Henan province(see Figure 6), it can be seen from the floor plan that there is a narrow roadway between the courtyards on both sides, another gate compartments are set in the roadway, another door shall be passed when entering each courtyard, there is a total of five independent courtyards in front and at the back of the house, four of these courtyards are distributed on both sides of roadway in the front, the last courtyard is the largest, at the same time its private degree is the highest. The front and rear of the courtyards on both sides of the roadway cannot directly be connected; you must enter from the middle roadway. Such layout makes each courtyard have certain privacy, and several yards connect with each other in the whole, so that their family cohesions will not be lost, and facilitate the expansion and household dividing, this kind of parallel with the interspersed form is very typical in the southern region of Henan province.

6 TERRAIN

There is very little flat land in coteau and highland areas, most houses are combined with mountain, and there is usually stream in front of the house, the author found that during the investigation period in the southern region of Henan province, there are many villages consisting of several "bays" distributing around, the villagers live by the water; the villages are built around the mountain; the villagers live there freely; a row of gates along the water is erected irregularly, the front is open, the back is next to the mountains, there are mountains around them, it has to say that these places is really the "land of treasure". The cultivated land's radius of natural villages in mountains is small, the average of each village is 6.5; the village with more than 10 households is few, which are all scatteredly distributed in dots. Under this kind of terrain condition, houses are built around the mountain, the corridor between courtyards is ascend step by step, while the house becomes the place to transit height difference, houses are built on platform, the aisles between house yards also conform to the lie of mountain, instead of pursuing upright, foursquare, straight, which has a unique lingering charm, and this kind of difference treatment is uneven, the created space further strengthens the defense function, which is conducive to occupy the favorable terrain to block enemies.
7 THE SPECIAL FORM OF COURTYARD

The courtyard underground in the western region of Henan province is a very special form of courtyards, and be found only in Sanmenxia area, Henan, its special geographical environment provides a possibility for its construction, and this form also reflects its unique defense function.

The courtyard underground is a kind of "invisible" courtyard homes," no houses can be seen when entering the village, no one can be seen when hearing the sound" is its true portrayal, no village can be seen here at all without going to side of the courtyard underground, this form is conducive to escape the enemy in the war years.

The entrance of courtyard underground also has strong defensive, there is only one entrance, which is flush with the floor and is very discreet, the narrow gentle slope of tunnels lead to the underground, which is conducive for defense, in general, there will be turning space before entering the yard, tunnels will be not directly led to the courtyard, some tunnels are set with double doors here to increase the defensive.

8 SUMMARY

Henan province is located in the boundary between the north and the south zone, there are great differences in natural environment, so are the differences in courtyard form, but in general, the courtyard form in plain areas in eastern Henan is straight and narrow, is a typical northern courtyard home, defense effect can be achieved by wall's enclosure and gate; while for the coteau and highland areas in the southern region of Henan province, the defensive reflects the most obviously, every detail reflects the consideration of defense from the courtyard layout to the detail processing; the courtyard underground in the western region of Henan Province reflects a defense way which is different from other areas in its special form; the mountainous areas in north Henan province are rich in stones, whose most obvious defense reflects the solid walls mainly built with stones, courtyard form is also mainly the traditional courtyard.

REFERENCES

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