On the structural elements features of ancestral temple in Huizhou

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Abstract. Huizhou ancestral temple is an agglomeration of Huizhou architectural culture, which has distinct local characteristics and times characteristics. This article from the Huizhou ancestral temple of the main structural members, Including: beam, column, dougong, roof and so on; By means of comparison, enumeration and statistics, the characteristics of structural members of Huizhou ancestral temples are analyzed. This paper summarizes the evolution of structural column from shuttle-shaped column to straight column in Huizhou ancestral temple; Changes in the ratio of length to width of benincasa hispida-shaped beam; The internal structure of the building adopts a combination of round ridge roofs and miter roofs; tiaowo (one form of dougong) and other structural characteristics of Huizhou ancestral temple.

1. Introduction
Influenced by the feudal clan system, Huizhou ancestors had a strong clan concept. From the secular marriages and funerals, to the internal evaluation, rewards and punishments, etc to the clan are inseparable from the huizhou traditional architecture - the ancestral temple. In huizhou, ancestral temple is the symbol of a clan cohesive force, is the materialization of social civilization, but also reflect the regional cultural characteristics of huizhou. The massive construction of Huizhou ancestral temples is inseparable from the rise of Huizhou merchants. Since the mid-Ming Dynasty, the wealth accumulation of Huizhou merchants gradually reached the peak. In order to honor their ancestors, Huizhou merchants who returned home in prosperity began to build ancestral temples on a large scale. Due to the mountainous area of ancient Huizhou and relatively closed traffic, some ancestral temple buildings are still preserved despite several wars, which gives us a chance to appreciate the wisdom of ancient Huizhou ancestors in building. There are 108¹ well-preserved ancestral temples in Huizhou, including 30 in Ming Dynasty and 78 in Qing Dynasty. Most of the research objects are the Ming Dynasty ancestral temples. The Ming Dynasty ancestral temples in Huizhou have the legacy of ¹Data came from Huangshan Municipal Bureau of Cultural Relics
Song and Yuan Dynasties ancient buildings, which are solemn and simple. The Qing Dynasty, bycontrast, are more delicate in scale and style.

The Tang and Song Dynasties are the mature period of the development of Chinese ancient architecture. During this period, the shape and structure of ancient architecture tend to be stable and a complete architectural construction system has been formed. In the Northern Song Dynasty, Yu Hao, a
native of eastern Zhejiang, wrote the "MuJing" after he participated in the construction of a large number of official buildings. Li Jie will be a supervisor on the basis of the compilation of the "Ying Zao Fa Shi", and issued as a monograph on the standard practices of ancient architecture. After the change of Jingkang, the Northern Song Dynasty was destroyed, and Lin 'an Prefecture (now Hangzhou City) was established as the capital of the Southern Song Dynasty. The architectural form and system of the Southern Song Dynasty continued to follow the Northern Song Dynasty, and the "Ying Zao Fa Shi" became the official architectural code of the Southern Song Dynasty official architecture. Chun 'an and Jiande of Hangzhou were part of the ancient Huizhou administrative region in history, with frequent cultural exchanges. Hui merchants were also very active in Jiangsu and Zhejiang. The geographical proximity and economic integration deeply influenced the traditional architecture of ancient Huizhou. Thus it can be seen that as an important type of Huizhou traditional architecture, the ancestral hall of Huizhou continues the legacy of the Song Dynasty, which has evidence to rely on. However, Huizhou ancient ancestral temple is not official architecture in the strict sense, but a large-scale folk hall architecture. Therefore, compared with the official architecture in the Song Dynasty, it has its own characteristics, specifically reflected in the following aspects:

2. Column

Column is the main load-bearing component of the building structure. For traditional architecture, the main function of the column is to transfer the load, and the secondary function is the need of aesthetic appreciation. With the change of times, the form of the column is also changing constantly. In the Song Dynasty's "Ying Zao Fa Shi", the shuttle-shaped column is adopted, and the specific method of the shuttle column is clearly stipulated (Fig. 1). The figure below shows that the upper 1/3 of the way of the shuttle column of the official style has obvious "shoufen", while the lower 1/3 has no "shoufen". Shuttle-shaped columns are mostly used in Huizhou Ming Dynasty ancestral temples (Fig.2-Fig.8). The buildings in the pictures are all Ming Dynasty ancestral temples; Luo Dongshu ancestral temple, Wu Ancestral temple Shulun Hall, Dabangbo ancestral temple, both of them were built in the Jiajing period of the Ming Dynasty; Fangshi clan temple, Wu Ancestral temple Chunhui Hall, Pingshan bodhisattva hall, both of them were built in the Qing Dynasty. Through comparison, we found that the ancestor-bearing columns of ancestral temples in Huizhou have "shoufen" above and below, and the "shoufen" is obvious. The ancestral temple columns in jiajing period of the Ming dynasty were similar in shape and structure to "Ying Zao Fa Shi", And the "shoufen" of upper part is bigger than the lower part; however, During the Wanli period of the Ming Dynasty,"shoufen" in the lower part of the ancestral temple column is larger and the upper part was gentle. From the end of Ming Dynasty to the beginning of Qing Dynasty, the "shoufen" of shuttle-shaped column gradually weakened, The diameter of the column changed from coarse to fine, and in the late Qing Dynasty the shuttle-shaped column evolved into a straight column with upward "shoufen".

Fig.1 "Ying Zao Fa Shi" shuttle-shaped column
Fig.2 Ming Wanli 21—Hushi hall
The use of crescent beams in Huizhou's traditional architecture is similar to that in the Song Dynasty's "Ying Zao Fa Shi" (Fig. 9-12). Different from the straight beams in ancient buildings in northern China, the crescent beams in ancestral temples in Huizhou are often called the benincasa hispida-shaped beams. They are simple and sturdy, with few camber arches at the bottom of the beam, usually 2-5cm. The beam width is similar to the beam height, and even the beam width exceeds the beam height in early Ming Dynasty. Beam eyebrow gentle, single line intaglio, beam body without carving. Guangyu Hall in Pingshan Village is composed of Qingyu Hall in the Wanli Period of the Ming Dynasty and Shu Guangyu Hall in the Qianlong Period of the Qing Dynasty. It took more than 70 years to build, which well reflects the transition and evolution of ancestral halls in the Ming and Qing Dynasties. The beam and column members are connected with each other through secret dovetail and closed with mortise and tenon in the shape of a plum blossom (Fig. 13-14). This practice was commonly seen in Sijiandi and Cao's Hall in the Ming Dynasty's ancestral temples, such as Qiankou's folk houses.
Figs. 9-12: "Ying Zao Fa Shi" crescent beam and its usage in different historical periods of China. Mortise and tenon in the shape of a plum blossom.

Fig. 9: "Ying Zao Fa Shi" crescent beam.
Fig. 10: The crescent beam of Shu Guangyu Tang.
Fig. 11: The crescent beam of Shu Guangyu Tang during the transition period of Ming and Qing Dynasties.
Fig. 12: Shu Guangyu crescent beam during the transition period of Ming and Qing Dynasties.

(Figures depicting architectural details and historical contexts)
4. Dougong
The building beam and tiebeam of Huizhou ancestral temple are made of bracket sets between columns, T-shaped bucket set; Insert Gong are often used in Bracket set on column and Bracket set on corner, Bracket sets have obvious entasi. After Wanli in Ming Dynasty, T-shaped bracket sets are set in the form of sparrow brace which is wooden carvings. In Huizhou ancestral temple, there is a special form of bracket set, namely Tiaowo dougong (Fig.15), which is directly connected with one tiao dougong at the end of ang, and Tiaowo dougong supports the upper tie-beams. The practice of Tiaowo dougong is similar to Liujin dougong in the north. This structural form is relatively rare in Huizhou ancestral temple relics, only existed in the Ming Dynasty Huizhou ancestral temple structures, such as Qiankou Civil Residence SiJiandi main hall front porch, Hu's hall, Xucun Dabangbo Temple, etc.

5. Roof
Huizhou Ming Ancestral Hall generally has a large space, and its roof structure has a large span in terms of scale and structure. In order to solve the problem of structural stability, the ancestral temple buildings in Huizhou usually adopt the form of double roof, In the ancestral temple buildings of Huizhou, the eaves of the hall mostly adopted the round ridge roof, In the ancestral temple buildings of Ming Dynasty, many front porches also adopted the rolling shape of herringbone porch. For example, the Sanhuai Hall in Xiuning, the Hu's Ancestral Hall in Wancun, Yixian County, the vestibule of the Dabangbo Temple in Xucun, the front and back corridors of the Xiangtang Hall, Taihu Temple, and the Luodong Shu Temple in Chengkan, etc(Fig. 16-19).
6. Conclusion.
Ancestral temple of Huizhou is the concentrated embodiment of Huizhou culture and the wisdom of Huizhou ancestors, with distinct regional characteristics. Through the comparison and summary of Huizhou ancestral temples, the qualitative analysis of the basic characteristics of Huizhou ancestral temples will play a certain guiding role in the dating of Huizhou ancestral temple architecture. Huizhou has elegant architectural quality and excellent construction technology. Qualitative and quantitative research on Huizhou traditional architecture and in-depth excavation of the cultural connotation of architecture are of great significance for carrying forward traditional architectural culture, extracting traditional architectural elements and creating modern architecture with local symbols!

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