



## **Analysis and Research on the Characteristics of Historical Villages Based on Spatial Syntax**

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**ABSTRACT:** This study takes Cuiwei village, located in Qianshan District of Zhuhai City, as an example. First, it analyzes the human flow activities and activity size of village road a, the visual agglomeration degree and the spatial characteristics of historical sections. Secondly, select the most representative traditional buildings in the village, namely Sanwang temple and Wechsler mansion. When  $r=n$  and radius  $r=3$ , observe the changes of two parameters of visual integration and visual depth of the two historical buildings. And with the help of Baidu time machine photos of different periods to observe and record the changes of stores and human behavior characteristics. The results show that at this stage, the coordination of villages is poor, people's recognition in the village space is weak, people can't use local perception to reflect the overall space, there is an obvious interface between the inside and outside of the village, the isolation state is obvious, the local intelligibility is good, but the global intelligibility is poor.

**Keywords:** Cuiwei Village, Business Type, Three Kings Temple, Webster Mansion, Spatial Characteristics

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## INTRODUCTION

### Distribution of road a business type

From the observation and analysis in Figure 1, it can be seen that the area of road a is easy to be perceived by people, and it is the best area for node space selection. The business functions near the street are relatively rich, and there are many residential areas. Outside the residential area, there are Mingzhu branch of industrial and Commercial Bank of China, important consulting rooms of traditional Chinese medicine, Cuiwei kindergarten and various types of fast food restaurants. The actual situation of the road is shown in Figure 2-5, standing anywhere in the area of road a, We can clearly see the effects of different formats and have different functions. Because the left side of this section is a two-way four lane highway of Mingzhu South Road, the road signs in this section are also relatively clear, and the observation range is wide. For the service object, it is more in line with the law of crowd gathering. Therefore, when updating, we should pay attention to this area, vigorously develop and transform the business functions near this area, attract developers to invest, develop the Tanzhou area in the west, and make effective linkage with the updated Cuiwei village. Secondly, the street space integration of the straight street of the street is also high. As an easily perceived street, when the street is upgraded, it can be used as an area that the main street function continues to focus on. In the renovation, we should not only pay attention to the integration of business forms and the shaping of characteristics near the streets and lanes, but also set up corresponding space guidance at the entrances and exits with a high degree of vision integration. Using a good degree of vision integration can attract more foreign tourists. Through the renovation of characteristics, business forms and the environment, we can better enhance the interest of the space. For the people outside the block, the width of the block is not clearly divided in the core block, the overall style of the streets and lanes is relatively simple, the ground is paved with plain soil and concrete, there is no reinforcement, and the buildings are also made of bricks and stones. Illegal construction is widespread. It is difficult for them to infer the functional attributes of the rest of the streets and lanes from the spatial scene they see at the intersection of the streets and lanes. Therefore, when building buildings, outsiders will choose plots with relatively less narrow vision and space, and ignore the relatively narrow street space, resulting in misjudgment in the direction of their travel. Some narrow lanes are more tortuous, resulting in increased visual depth and serious deterioration. Therefore, in the process of street reconstruction and organic renewal, we should pay attention to the application between street intersections, increase the commercial facilities and signs at intersections, so as to attract more people, clarify the direction of people and increase the identifiability of villages.



Figure 1. Distribution of Business Types in Road A Area  
Image Source: The Author Drew It After Intercepting It From Baidu Map



Figure 2-5. Distribution of Business Types in Road A  
Image Source: The Author Intercepted it on Baidu Map

### **Analysis of pedestrian flow activity and activity size of ancient village road A**

According to the agent robot analysis of the village road a space, red represents the number of passes, and blue represents the least. As can be seen from figure 3-5, the areas with high human flow activities in the block are concentrated in the outer areas of Wu Gongci, Wu's great ancestral temple and Jie Weng Wu Gongci in Huishan, the outer areas of Jinhua temple, Guandi temple, Caibo temple and road a. The second is Sanwang temple, jieshezhi street, Cuiwei street, Dafang street, Changshui street, shengtangli, the external public space of Webster mansion, and the area at the end of dunmu lane, which shows that the flow of people in these areas is relatively high (the space utilization rate is the highest). The areas with high pedestrian flow activities are concentrated near the temple, as shown in Figure 6-10, that is, the streets together with the public space, as well as the main traffic roads inside the block. In the area near the main roads outside the block, there are often more intersections of pedestrian flow. In the rest of the block, except for their own residents, there are less pedestrian flow or even will not go inside, so the activity intensity is small and the scope is narrow, On the one hand, it is

conducive to the formation of a living space atmosphere with strong privacy. On the other hand, it is not conducive to the implementation of mutual supervision mechanism between the masses and functional departments in the block, and it is prone to blind spots and blind spots. From the observation in the figure, we can see that there are more "back" shaped motion grids in the block. At the same time, the internal "back" shaped motion network is also easy to act as a "middle form" spatial transition unit, which plays a role in connecting the energy flow inside and outside the block.



Figure 3-5. The External Area of Wu Gongci, Wu's Great Ancestral Hall and Jie Weng Wu Gongci in Huishan Mountain; Jinhua Temple, Guandi Temple, Caibo Temple; Area A of Road (With The Highest Flow Of People)

Figure 6-10. External Streets of Webster Mansion: Changshui Street, Shengtangli, Dunmuli, External Space of Sanwang Temple, Cuiwei Street, Street Market Straight street, Dafang Street (with high flow of people)

Image source: self drawn by the author

Analysis on the spatial characteristics of visual agglomeration and historical areas

Analysis of village vision agglomeration

The agglomeration coefficient of the visual field is to judge the visual limitation effect of the spatial boundary. The agglomeration coefficient is to judge and distinguish by analyzing the temperature of the color of the graph. The warmer the color, the higher the agglomeration coefficient, indicating that the less the visual limitation of its interface with the surrounding space, the weaker the masking in the system. The colder the color is, the lower the value is, the lower the agglomeration coefficient is, and the more obscured it is in the system, that is, the stronger the line of sight is compressed in the space. The places with low visual agglomeration coefficient are evenly distributed, mostly concentrated in the folk houses in the regional scope of renheli, zhongheli, dunmuli, yangzixiang, shengtangli, yiguli, Nanming Li and chazixiang. Because each household has a certain number of people, the outdoor roads are relatively narrow, and there is no enough place for villagers to stay, so fewer people will gather outdoors.

Places with high sight agglomeration coefficient gather in the external public space of road a, Sanwang temple, Wu Gongci in Huishan, Wu's great ancestral temple, Jie Weng Wu Gongci, Jinhua temple, Guandi temple, Caibo temple, No. 24, 31, 47 folk houses in yiguli, xinlunguo Gongci, yangmeinan's former residence and the public space in the northeast of the village. On the left

side of road a is Mingzhu South Road, which is the main traffic trunk road in Qianshan area, with dense residential and prosperous businesses. On the west side is Zhongshan Tanzhou area, where more people gather every day, more night markets are opened at night, and more stalls are set up on the road. Night markets can not only attract a large number of people, but also have enough space for people to stay. There are many shops on both sides of road a, and the business function just meets the needs of villagers in Cuiwei village for life, diet and study. A large flow of people will gather in the morning and evening, which will increase the vitality of streets and lanes of road a.

Traditional architectural types, including temples, ancestral halls, ancestral halls and social altars, are important material carriers of folk beliefs in the region, providing necessary souvenirs and activity venues for local intangible culture such as folk beliefs, myths, religious customs and so on. In the heyday of Cuiwei village, a large number of villagers and outsiders came to the temple to worship and pay tribute to incense during the Spring Festival. The temple also regularly holds temple fairs to attract people inside and outside the village to make pilgrimages and pay tribute. When the villagers of Cuiwei get married or their children are full moon, they will also put wine outside the temple and ancestral hall, and invite the villagers, relatives and friends in the village to come and have a drink. There are dozens of surrounding platforms in one place. The increase in the flow of people will enhance the agglomeration effect of the external space of the temple and ancestral hall, and the vitality of the streets and lanes will increase.

Therefore, a large number of people will gather outside the temple and ancestral hall to stay. At ordinary times, villagers will also play cards and mahjong outside the ancestral hall and folk houses, staying from day to night. Therefore, the sight concentration here is high. According to this feature, when combing and analyzing the space of Cuiwei historical block, we should distinguish the places with different agglomeration coefficients by nodes and levels.

## **Analysis of traditional buildings in villages -- Webster mansion and Sanwang Temple**

### **Architectural space characteristics of Guangfu building**

The buildings in the ancient villages in Guangfu area adopt the plane shape of a courtyard, and the alleys formed between the buildings are called "Li", and the doors of each house are opened on the side to connect with the alleys. There is a wide square in front of the building complex, which is mainly the local Sun Valley area. The street space is crisscross, forming a relatively rich spatial form. The climate in Zhuhai is hot, with frequent wind and rain, and the requirements for ventilation are extremely high. According to the local climate conditions, the building plane design has good ventilation, sunscreen, moisture-proof and other functional characteristics.

### **Micro spatial scale analysis in Webster Mansion**

Considering the representativeness, Wechsler mansion and Sanwang temple are selected for the syntactic analysis of the internal space of the architectural courtyard. The current characteristics of the mansion are relatively distinct, and the axis of the main hall and the central axis of the courtyard together constitute a symmetrical pattern. The single building is obvious in scale and volume, reflecting a strong family culture, paying great attention to the use of materials and the description of structural details, resulting in a strong visual impact in height, material, structure and color. The themes of detail components are relatively rich, reflecting the rich characteristics of Wechsler culture. There are tall trees outside the courtyard, and the greening in the courtyard is mainly potted plants, with rich varieties.

With Webster mansion as the center and buildings around 45m as the radius, it is first processed in CAD, and then imported into Depthmap for quantitative processing. It can be concluded that the area with the highest visual field integration passes through the tail end of dunmuri and is distributed in the east by south of the mansion, the higher area is mainly distributed in the East and west of the mansion, and the rest are in cold colors, indicating that the integration is low (FIG. 11).

From the perspective of visual depth, the south by East, West and east sides of the mansion are all in the form of cold colors, and the distribution is relatively average. The lowest area is interspersed with the end of dongmuli, where the line of sight needs less turns, which is easier to attract people's attention. The intersection of cuiqian North Road and cuixian Road, the external Road on the east side of the mansion, has a large traffic flow and pedestrian flow. As the seventh batch of cultural relics protection units in the city, Webster mansion is the only immovable cultural relics within the scope of renewal. Due to years of disrepair, the overall structure will be loose, and the internal components will be damaged to a certain extent. The planning plan will focus on repair to protect it, retaining the original components and spatial form. In the process of restoration, traditional processes and materials are used to repair the old as old as possible, and it is necessary to reproduce the original style of the old building with the original flavor. Some parts are treated with modern architectural techniques, the facade structure is repaired, public service facilities are created, the original elements of historical buildings are fully retained, and the wishes of villagers are respected and reasonably utilized in operation and development. Each mansion has a daily activity center, usually halls and patios. The visual depth and visual field integration of the mansion are analyzed. The areas with high visual field integration are concentrated in the middle of the connection from one area to another, that is, the aisle. At the same time, the visual depth of the aisle area is low, indicating that the number of turns in the line of sight in this area is less, which is easier to attract the attention of people's line of sight, and the people in the house stay here for a long time. At the same time, there are two atriums on both sides of the area. In summer, it is also a good place for indoor people to enjoy the cool, and it is also an activity center. It means that the space has frequent pedestrian flow, high visual depth at the corners, low integration, and fewer people gather here. If the width of the aisle

is expanded, the global integration around will be reduced, but the global integration of the middle courtyard will be greatly improved, and the hot space has obvious agglomeration effect. Generally speaking, it has the centripetal agglomeration effect of the middle space (Fig. 12-13).

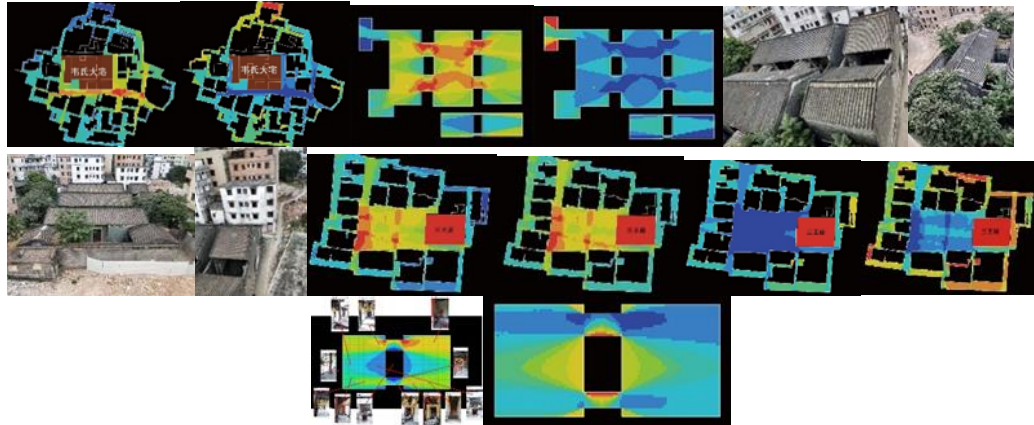


Figure 11. Visual Field Integration Within 45m Around Webster Mansion  
Figure 12. Visual Depth Within 45m Around Webster Mansion  
Figure 13. Visual Integration of Webster Mansion  
Figure 14. Visual Depth of Webster Mansion  
Figure 15. Visual Angle 1 Aerial View of Webster Mansion  
Figure 16. Visual Angle 2 Aerial View of Webster Mansion

Figure 17. Front View of Webster Mansion  
Figure 18. Back View to Cuiwei Market  
Figure 19. Visual Field Integration of Sanwang Temple (Middle View)  
Figure 20. Visual Field Integration of Sanwang Temple R3 (Middle View)  
Figure 21. Visual Depth of Sanwang Temple (Middle View)  
Figure 22. Sanwang Temple Visual Depth R3  
Figure 23. Sanwang Temple Visual Field Integration (Micro)  
Figure 24. Sanwang Temple Visual Depth (Micro)

Image source: figures 11-14, 15-18, 19-24,

#### Micro spatial scale analysis in Sanwang Temple

First of all, conduct a mesoscopic analysis of the Sanwang temple, guide the Sanwang temple into the Depthmap together with the nearby buildings and roads, and analyze the visual depth and visual field integration, as shown in Figure 17-21. It can be concluded that the visual field integration of the external space of the Sanwang temple is higher, the visual depth is lower, and the higher the representative agglomeration coefficient of the area, indicating that the less visual restrictions it has with the surrounding spatial interface, the weaker the shielding it receives in the system. After field investigation and analysis, this area belongs to the public space in the village, that is, the external square space. The square is attached to temples, ancestral halls and other religious buildings. During the Spring Festival, more villagers put wine in this area to celebrate, and more people gathered in the peak period.

Then, the microscopic analysis of the Sanwang temple is carried out, and the plane outline of the Sanwang temple is drawn on CAD and imported into Depthmap for quantitative analysis, as shown in Figure 23-24, including visual integration and visual depth. It can be found that the areas with high visual integration and low visual depth are concentrated in the two corridors, of which the areas with high visual integration and low visual depth in the left corridor are concentrated at the entrance of the corridor. After field investigation and analysis, it can be found that there are incense sticks hanging above the left and right corridors, the statue of God at the end of the left corridor, and the statue of Avalokitesvara at the end of the right corridor. People often gather here to worship, and there is also a incense altar in the middle of the patio. In the direction of the main hall and the front door, the visual field integration gradually increases, and the visual depth gradually decreases, indicating that most people will gather in this direction.



Figure 25. Aerial View Of Sanwang Temple

Figure 26. Sanwang Temple Gate

Figure 27. Wood Carving Beam Frame And Wall Lintel Color Painting Of Sanwang Temple Head Door

Figure 28. Stele In Sanwang Temple (Left Side Is "Inscription Of New Auxiliary House Of Sanwang Ancient Temple")

Figure 29. Front View Of Sanwang Temple Figure 30 Sanwang Temple Peak Period Figure

Image source: Figure 25-28 wechat official account of Zhuhai Natural Resources Bureau, Figure 29-30

<https://static.nfapp.southcn.com/content/201711/24/c806817.html> ,

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### Future renewal mode of Sanwang Temple

Sanwang temple is not only an important place for commodity exchange in market trade, but also a stage for people to watch plays, etc. From the perspective of the protection and renewal of Lingnan buildings, the square space not only simply plays the role of space enclosure, giving people a visual enjoyment, but also ensures the master-slave coordination relationship between the old and new buildings in the village and the continuous role of time and space. Because of its low visual depth value, it attracts people's attention. On the whole map, Sanwang temple is on the right side of Cuiwei street, a historical street, and belongs to a relatively prosperous area in the village. In the organic renewal of the future village, we should focus on using this area. Here, we should improve the infrastructure construction, combine the public space

with the residents' living micro space, and combine the open space with the private space. Reasonably optimize the spatial structure, increase entertainment facilities, observation platforms, plant corresponding landscapes and decorate the space. Add signs on the road to guide outsiders to watch, build temporary space, divide the functions of the internal plane, and arrange corresponding display boards on both sides of the wall to introduce the past and present lives of Cuiwei village, so as to attract more people to stop and stay. Effectively combine the protection of buildings and squares to stimulate the vitality of the block.

Therefore, in the process of renovation, as the display of the cultural and historical characteristics of the three kings temple and various ancestral halls and ancestral halls in the village, signs and maps should be set up at the entrance of the gate to guide visitors to visit different temples and ancestral halls. Outside the temples and ancestral halls, signs and introductions of the past and present lives of ancient buildings should be set up to provide people with viewing and understanding, and the restrictive effect on the surrounding space should be appropriately reduced, Integrating the historical and cultural characteristics of Cuiwei into the spatial expression and protecting traditional temples has very important historical value and reference significance for the research and inheritance of Zhuhai Cuiwei's traditional folk customs, folk customs and other intangible cultures.

#### **ADVANCED RESEARCH**

This paper studies the characteristics of historical villages based on spatial syntax in Qianshan, Zhuhai. However, each region has its own architectural identity and different cultural heritage. Our current direction in the future can only be borrowed from historical villages of the same type or buildings in the same area. This is also a limitation. In the future, you can also try to add quantitative research methods to make design decisions more scientific.

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