

Rural Street Design under the Background of In-situ Urbanization

—Taking Fushan Village as an Example

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1. Introduction

The term in-situ urbanization clearly belongs to the conceptual scope of urbanization. Therefore, the meaning of urbanization should be clarified first. Demographically urbanization can be described as the transformation of rural population into urban population, economically it can be described as the transformation and upgrading of industrial patterns into secondary and tertiary industries, and sociologically it can be defined as the structural change of human social organization. In comparison with the term urbanization, urbanization denies the traditional binary division structure of rural and urban. This perception changes the tradition since New China, where the distinction of urbanization in terms of urban form does not reflect the essence of urbanization, which is full modernization. In general, urbanization has always been associated with phenomena such as modernization, industrialization and population agglomeration. In-situ urbanization (in-situ urbanization) is defined in the 2019 promulgation of the Evaluation Index System of In-situ Urbanization¹ as a new type of urbanization in which the population does not migrate to foreign places or large cities on a large scale, and within the county, relying on the town system in the area, promotes the scientific and reasonable gathering of population, industry, resources, and information, and realizes the integration of social security for residents, equalization of basic public services, and production. This is a new type of urbanization, in which residents' social security is integrated, basic public services are equalized, and production and lifestyle are citizenized.



Figure 1 Rural planning in the context of local urbanization

2. Characterization of the Fushan Village Street System

In Fushan village construction history, the street has always been an indispensable link, this section through the search of historical maps, old photographs, village narratives and other materials, restore the structure of the street in four important historical periods, and its rural development of economic construction, the villagers' living conditions for analysis, to get Fushan street system development trajectory.



Figure 2 Choice analysis of 2020 segment map of Fushan village with a radius of 500 meters



Figure 3 Integration analysis of 2020 segment map of Fushan village with a radius of 500 meters



Figure 4 Choice analysis of 2020 segment map of Fushan village with a radius of 500 meters



Figure 5 Integration analysis of 2020 segment map of Fushan village with a radius of 2000 meters



Figure 6 Choice analysis of 2020 segment map of Fushan village with a radius of overall



Figure 7 Integration analysis of 2020 segment map of Fushan village with a radius of overall

¹ GB/T 36918-2019, 就地城镇化评价指标体系[S].

Fushan village has become a typical representative of rural development in the past thirty years of development history, and it also faces new development problems in this decade. Highly polluting chemical and other enterprises are facing development dilemmas in the new economic situation, and conflicts have arisen between the demand for a high quality human living environment. Fushan Village has adopted the path of high-tech transformation, with Northeastern University and other universities for the construction of industry-university research to improve the added value of enterprise science and technology. In addition, the construction of Zibo Bonded Logistics Center has also allowed the proportion of tertiary industries to gradually increase. Fushan's in-situ urbanization model is driven by the development of leading enterprises, the special point is that this leading enterprise is different from other villages, is the village collective economy born of the Fushan Group. Fu Shan Group in the process of its own development has driven the village's habitat construction, generating a large amount of tax revenue for improving rural infrastructure, optimizing the economic structure of Fu Shan, absorbing the surplus labor in rural areas. This path has its own blood-making capacity, giving the village of Fuoshan economic support for rural construction.

A street is a space that enables pedestrians or transportation to pass. Based on machine dynamics, urban roads mainly consider the design speed to determine the road class, i.e. four classes: expressway, main road, secondary road and branch road. The scale and number of streets in Fushan are far from being comparable to those in the city, and are not applicable to the four-class classification model. In the "Shanghai Countryside Landscape Planning, Design and Construction Guidelines", the roads are classified into three classes: regional link roads, major roads and general roads. This classification model mainly considers the difference of roads in connectivity, which is more in line with the actual needs of Fushan.



Figure 8 Distribution of points of interest in Fushan Village



Figure 9 Street level map of Fushan Village

Baidu Open Platform was used to capture the data of POIs (points of interests) in the area of Fushan Village to study the distribution of businesses. There are various types of points of interest in the Baidu platform, and the secondary classification of points of interest is done according to the needs of street classification. The traffic streets were examined to see if the interface on both sides of the street was open and the points of interest were less relevant, while the comprehensive streets were difficult to classify, so the points of interest were classified into three categories: commercial, living service and landscape leisure, and then the number of points of interest were mapped to specific streets.

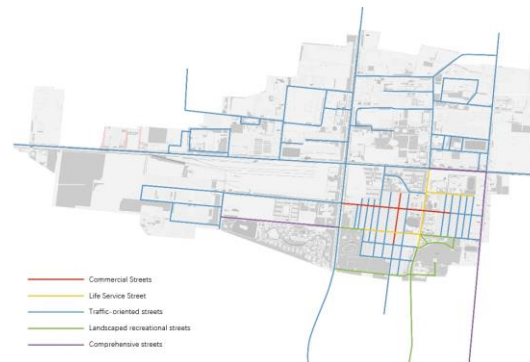


Figure 10 Street type distribution map of Fushan Village

The street type map shows that the vast majority of streets in Fushan Village are focused on purely access functions, with fewer total miles of other types of streets, and commercial and amenity streets are arranged centrally on a few major roads. For smaller villages, the centralized arrangement maximizes the concentration of commercial volume and service volume, and the routes that are closely connected to the living areas also increase the utilization of facilities. Public services are arranged sequentially on the

central road, creating a frequently changing scale relationship on the central road. In the outlying areas of the village, there are a small number of comprehensive streets, with multiple street types appearing on the same section of street at the same time. For example, Weigang Road itself has a heavy demand for motor vehicle traffic, but there are also a small number of commercial and schools, resulting in a mixture of street attributes.

3. Analysis of the problems of the sample streets

Use sampling questionnaire research method to understand villagers' intention and demand for street improvement. A total of 132 valid questionnaires were collected after eliminating invalid responses in this questionnaire survey, and some of the unselected options were excluded after preliminary data processing for data statistics. From the viewpoint of the respondents, as the questionnaires were distributed by household, most of the respondents were family elders. A summary of the contents of the survey questionnaire has the following points.

a. the serious aging in the village, when considering the use of the population should pay attention to the applicable population, outdoor street activity space in the long term use of the population is mainly the elderly, short term concentrated use of the population of young children and elementary school students.

b. in the mode of travel, the separation of different tools in the current street section is too low, leading to the mixing of various modes of travel in the same space, especially parking occupies a lot of street space, affecting the quality of their respective activities.

c. Strong demand for public space, strong demand for staying open space and activity space, demand for collective activities has exceeded access, and high expectations for paving, lighting and greening of public space.

d. villagers in Fushan, who rely on both local ties and blood ties, have a strong willingness for collective activities.

After the street issues identified in the previous section, the issues are categorized and correlated for analysis to form the direction of street development.

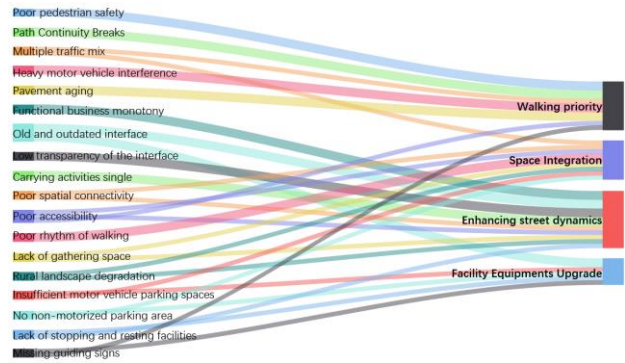


Figure 12 Analysis of the relationship between current problems and development direction

4. Design Solutions

The street design scheme takes a macro-depth micro logic to set the overall positioning development orientation of the four sample streets, select the street section form and intersection form, and later refine the design of important nodes.

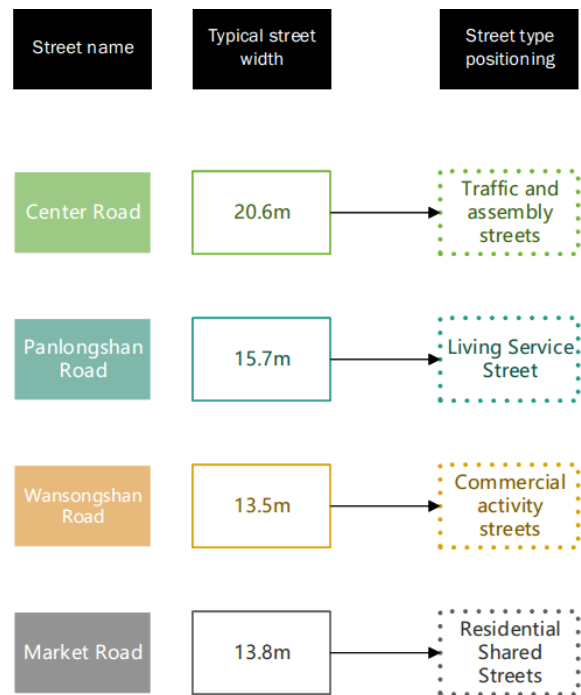


Figure 13 Street type

Each street must fit into a specific context and function as part of an overall street system. The development of a street cannot be positioned in isolation from the foundation of past development and the physical reality of the conditions.

The design scope was measured and plotted as a map, and a total of seven street planes (labeled S-1 to S-7 on the map) and six street intersections (labeled C-1 to C-6 on the map)

map) were designed within the scope.

The intersection of Center Road and Panlongshan Road is the most important intersection space within the village area.



Figure 16 C-1 intersections design

All four corners of the intersection of Center Road and Panlongshan Road are public gathering space, so the curb expansion zone and pedestrian space are added to shorten the distance of crosswalks. Compared with the original state, the crossing time of the renovation plan is greatly reduced, and the walking speed of the elderly is calculated at 0.5 m/s, and it only takes 12 seconds to cross the street. The expanded street area is used to arrange landscaping and street facilities to reduce the speed of vehicle crossing. The bus stop on Panlongshan Road is moved to the near side stop in the lane, which allows passengers to board at red lights, increasing efficiency and improving the priority of public transportation services. Crosswalks are aligned with the sidewalk whenever possible to straighten the walking route and improve walking comfort.

Street regeneration is not only the work of the design provider, nor is it just a one-time construction job, it is part of the rural urbanization work, and is a long-term work in cooperation with multiple parties. As an urban construction worker, the author proposes a process for street renewal management.

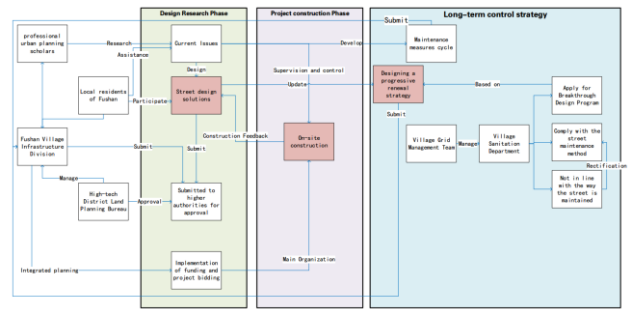


Figure 17 Street regeneration Management Process

5. Conclusion

In this thesis, under the background of the national vigorous promotion of in-situ urbanization, Fu Shan Village is chosen as a typical case, from macroscopic research on the history of the whole village street space to microscopic research on the typical street in-situ, as a prerequisite basis for street design, and finally to propose a renewal and transformation plan for the street space in the village area. Specific work results are.

a. The origin and definition of the important urbanization type of in-situ urbanization, the policy context faced by planning and architectural work, and the clarification of the shift in the focus of rural construction work in this era. The evolution of the street in the habitat and the shift in academic perception.

b. The historical evolution and structure of the street space in Fushan Village, using spatial syntax analysis to do structural perception of the street system in the past four periods in Fushan, the current street system to determine the hierarchy and categories, the formation of the street system matrix.

c. Selecting key streets for detailed research, using questionnaires, structured interviews, on-site counting, data measurement and other methods to measure the physical environment of the streets.

d. Design the renovation plan for the main streets in Fushan, starting from the path, plane, public space creation, facility arrangement and implementation path, to improve the quality of the Fushan street network as a whole, to solve the challenges brought by the urbanization of the village on the human environment, and to provide samples for the remaining uninvolved street