Preliminary Study on Urban Functional Street Space -- Taking "Xi'an Functional Street Space Design Guidelines" as an Example

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Abstract. Street is not only a place for people to communicate, but also an important space for people to pass. In recent years, with the rapid development of social economy and the acceleration of urbanization in China, the number of motorization has doubled. On the basis of understanding and summarizing the relevant concepts and theories of street space functionality, through the analysis and judgment of the development trend of street space functionality, and the analysis and reference of practical cases, this paper makes a preliminary exploration of the ways to realize the maximization of street space functionality, with a view to providing a preliminary solution to the functional contradictions of the current street. And plan.

Key words: Street; Space; Function; Way.

In recent years, the relationship among people, cars and streets has attracted more and more attention. The original street functions are communication and communication, social and economic development and human evolution. Utilitarianism and human nature urge people to need high-quality life, social differentiation, efficiency, and constantly strengthen based on external pressure. Driven by these concepts, the emergence of transportation means the gradual beginning of the process of weakening the function of "communication place" in street space. The contradiction between vehicles and pedestrians persists. With the upgrading of transportation, traditional streets are difficult to meet people's needs, and the contradiction between pedestrians and vehicles is increasingly difficult to reconcile, so the process of "qualitative change" of streets begins.

Based on the above analysis of the relationship among people, cars and streets, the author believes that the function of modern urban street space is mainly embodied in two aspects, namely, the pursuit of high efficiency and convenience, safety and comfort, equality and harmonious coexistence between the two, in order to meet the common interests of people and cars as a starting point to maintain balance. Therefore, only by exploring the relationship between people and cars and aiming at achieving the balance and maximization of street functions, can we "clear up" many existing problems.

1. The Construction Level of Functional Street Space

Efficiency and comfort are the themes of modern urban life, and the interaction between people and cities is a dynamic process. In the future urban development trajectory, street space can provide satisfactory pedestrian space and pleasant driving space, which is what we are pursuing. "People-oriented" is the foundation of modern society, and "function-oriented" is the soul of modern streets. Only by defining the concept of "harmonious coexistence of people and vehicles" and taking it as the direction of efforts, can we truly move towards the harmony of urban life. Therefore, the construction of functional street space only takes "people-oriented, function-oriented" as the basic principle, in order to grasp the development direction and process of the street fundamentally.

Based on scientific and rational thinking, the construction of functional street space should start from the following three levels:

1.1 Macro Level——Overall Decides Good or Bad

On the macro level, the construction of functional street space should take the word "function" as the basic starting point, and consider the positioning of street in the city, including the investigation and study of the city's regional location, main functions, history and culture, overall style and

humanistic characteristics, and the location, history, culture, style and nature of street in the city (communication). The related factors such as general or life-style, grade (primary or secondary), function and orientation are analyzed in order to realize the accuracy and reality of our macro grasp of the street as a whole and lay a correct, advantageous and good foundation for the follow-up work. (Figure 1).

Figure 1 General Functional Division of Streets
Photo Source: Self-drawn

1.2 Medium-Level: Order Comes from Zoning

After macro-positioning, the construction of functional street space should start from two aspects of "benefit" elements and "use" space. In line with scientific and rigorous research attitude, this paper divides "benefit" elements and "use" space into two parts: universality "benefit" elements and universality "use" space; individuality "benefit" elements and individuality "use" space. Therefore, from the medium level, this level is to find ways to meet the minimum requirements of universality "benefit" elements and universality "use" space, and to create orderly functional space, so as to achieve the purpose of classification, deconstruction and integration of street functions, as well as the division, primary and secondary judgment and positioning of functional sections. (Figure 2).

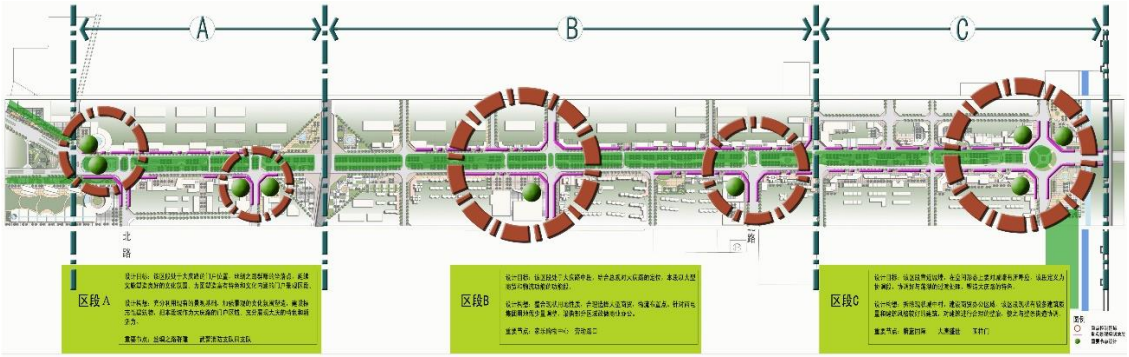

Figure 2 Functional Zoning Plan of Daqing Road
Photo Source: Comprehensive Renovation Planning Project Group of Daqing Road, Xi'an City

1.3 Microscopic Level: Classics Originated from Details

At the micro level, specific analysis of the street ontology is carried out to find out the detailed design of the scheme suitable for the street from the perspective of individual "benefit" elements and individual "use" space (Fig. 3). The progressive construction mode makes Street Research achieve functional harmony in a scientific, top-down way.

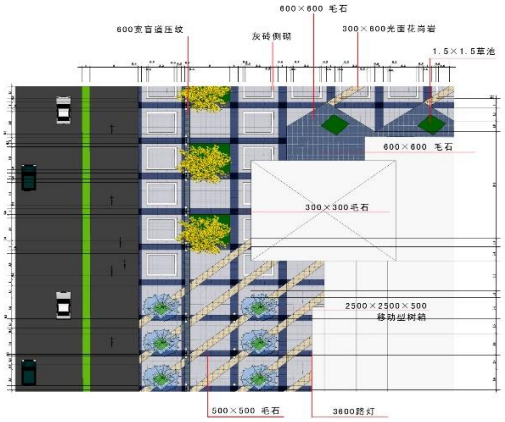

Figure 3 Detailed diagram of a node in the labour Road
Photo Source: Xi'an Labor Road Recent Comprehensive Renovation Planning Project Group

2. Exploration of The Guidelines for the Design of Functional Street Space in Xi'an

The study of functional street space belongs to the category of urban design and can also be divided into two levels:

(1) To control and guide the key elements of the street, so as to make the street design more rational and standardized, and grasp the design criteria of the street from the overall and systematic aspects.

(2) The design scheme for a specific street. If the former is called "way", the latter should be called "empirical". This paper explores the way to realize functional street space by putting forward the mode of design guideline, taking "Xi'an Functional Street Space Design Guidelines" as an example.

In view of the contradiction between people and cars, the guidelines strive to achieve a balance between people and cars. According to the classification of functional-living street space and functional-traffic street space, combined with the current situation of Xi'an City, and based on the experience of the subject group in street space design projects of Daqing Road, Labor Road and other streets in Xi'an City, the spatial forms of these two types of street space are guided and controlled from the perspective of urban design, so that Urban space will be used more reasonably.

(1) Characteristics of the Guidelines

This guideline runs through a basic principle from beginning to end, that is, the concept of "harmonious coexistence of people and vehicles", and in the process of formulating it, work is carried out with this goal to lay a foundation for the development and improvement of the guideline.

(2) The factors controlled by the guidelines

The factors controlled by the guidelines mainly include urban planning factor, urban design factor, street furniture factor and other factors (including greening, transportation, etc.). These four factors are the constituent factors of the complete functional street space. Secondly, they are in accordance with the relevant procedures in the actual construction process to guide the construction and management work more practically.

1) urban plan factor

Urban planning factors mainly include the scale of pedestrian space, the nature of land use, the setting of T-shaped mouth, pedestrian crossing control and so on.

2) urban design factor

Urban design factors mainly include D/H, building demarcation, interface density and so on.

3) street furniture factor

Street furniture factors mainly include the control content of Main Street furniture.

4) other factor

Other factors mainly include minimum green space rate, planting spacing, tree species selection, road speed, road red line width, peak hour two-way traffic flow, human flow, minimum turning radius, vehicle lane width, number of lanes and so on. Detailed results are shown in the attached table (Table 1).

Table 1. A List of Guidance and Control Elements of Functional Street Space Construction in Xi'an
Photo Source: Self-drawn

A List of Guidance and Control Elements of Functional Street Space Construction in Xi'an City							
	Functionality-Traffic Street Space				**Functionality-Living Street Space**		
	Classification	Level 1	Level 2	Level 3	Level 1	Level 2	Level 3
Planning control	Proposed pedestrian space width (m)	3	3		8	5	5
	Nature of land use on both sides	Residence, Industry and Green Space	Land for residential, industrial, green and public facilities		Land, Residence and Green Space for Public Facilities	Land, Residence and Green Space for Public Facilities	
	Use of Building Bottom Floor along Road	Constructions to Limit Adult Flow	Public Buildings Allowing Attractive Low Flow		Encouraging Business Operation	Encouraging the establishment of small public buildings	
	Traffic entrances and exits except intersections	Keep your mouth shut as far as possible	Allow 1-2 openings		Set up 1-3 openings	Set 1-5 openings	
	Pedestrian Crossing Section	No crossing in the same plane	Weak degree of freedom of crossing (restricted crossing)		Strong degree of freedom of crossing (moderate allowable crossing)	Self-owned crossing (coexistence of passengers and vehicles)	
urban design	Aspect ratio of road building (D/H)	3~8	1~3		≤1.5	≤1	
	Red Line Distance (m) of Backward Road for High-rise Buildings	≥18	12~14		≤8	≤5	
	Red Line Distance (m) of Back Road for Multi-storey Building (or Skirt House)	≥12	5~6		≤5	≤3	
	Street interface wiring rate (%)	≤50	50~80		≥60	≥60	
	Street interface density (%)	≤60	60~80		≥80	≥80	
Street furniture	Whether to set up isolation/railing	√	◎		◎	×	
	Whether to park the motor vehicle on the roadside	√	√		√	√	
	Waiting booth spacing	1000~1500	400~600		400~600	200~400	
	Street lamp height (m)	18~30	9~18		6~15	1~4.5 (Walking street lights)	
	Street lamp spacing (m)	30~50	10~30		5~20	5~10	
	sign	(Indicating vehicles, mainly suspended, reflective materials at night) tall, mainly traffic signs - low, dark tone, mainly other signs (indicating pedestrians, mainly ground signs, night lighting, additional guiding signs: such as tour guides, shopping guides, clock towers, etc.)					
	Whether to set up benches or not	×	×		√	√	
	Garbage bin spacing (m)	≥300	100~200		＜50	＜50	
	Public telephone booth spacing (m)	≥500	200~300		100~200	100~200	
	Sketch sculpture	◎	◎		√	√	
	Pavement	Larger pavement partition, considering economy - smaller, flexible, multi-material pavement form, considering comfort					
	lighting	Large Power, Wide Exposure - Small Power, Individualized Easy Lighting					
Other	Minimum Green Space Rate of Street Space Greening (%)	15	15		5	5	
	Planting Spacing of Street Space Greening (m)	6~20	6~10		4~8	4~6	
	Selection of Tree Species for Greening Street Space	Tall trees, tall and tall-medium or small trees or shrubs, having varying shapes, shading, and affinity					
	Designed driving speed (km/h)	＞60	30~40		20~30	≤20	
	Suggested road red line width (m)	36, 44, 50	28, 36	≥4	24, 28, 36	≤20	⩽4
	Street Space Capacity in Peak Hour (Vehicles, Vehicles/Hours)	≥1500	≥500		≤1000	≤500	
	Street Space Capacity in Peak Hour (Person, Person/Hour)	≤300	≤300		≥500	≥500	
	Minimum turning radius (m)	30	16		10	5	
	Spatial Width of Motor Vehicles (m)	3.5	3.5		3.5	3.0~3.3	
	Vehicle space partition Lane (number)	6	4~6		4	1~2	

3. Conclusion

As Alan B. Jacobs wrote in The Great Street, "A Great Street should be the place people want to go most." Starting from the essence of streets, this paper sums up the problems existing in the development of urban streets. On this basis, it puts forward the importance of street functions, explores the construction methods and ways of functional street space, and seeks the best fit point between street development and urban development, so as to achieve the rationalization and coordination of space use to the greatest extent.

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