

Landscape Design Method of the Urban Waterfront Slow-motility Space

GE DAN

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Chapter 1 Introduction

The waterfront area is the birthplace of human civilization and an ideal place for human gathering. Most of the world's famous cities are built with water and are prosperous by water. In 1991–1992 the UNCED Preparatory Committee (Prep Com) stated: 'The world's population is expected to exceed 8 billion by the year 2020. 60% of the world's population already lives in coastal areas, while 65% of cities with populations above 2.5 million are located along the world coasts'¹.

After thousands of years of development, the waterfront has gradually become the main axis of urban space development, carrying urban culture, presenting the image of the city, and providing a rare hydrophilic area and public space for local residents. The waterfront slow space is an indispensable transportation space in the waterfront area, and it is also an important place for people to experience and perceive the waterfront landscape. Under different design concepts, the route organization of urban waterfront slow-motility space has great differences, and significantly affects the landscape quality of the waterfront. This paper attempts to analyze the design and evaluation methods of the waterfront slow-motility space from the perspective of landscape perception. In order to analyze related issues in depth, this chapter first defines the relevant core concepts, clarifies the background, purpose and significance of the research, and clarifies the research ideas, content arrangements and research methods.

1.1 Research Background

1.1.1 The redevelopment of urban waterfront space

In the context of the leisure era, urban life has undergone major changes. The economic structure of the city has gradually changed from a manufacturing-type economic structure to a service-oriented economic structure. As a very dynamic economic and social carrier in the city and an attractive environmental carrier, the waterfront area is becoming a hotspot of planning and design and urban construction in the world. Its development not only brings many opportunities for shaping the future economy, environment and culture of the city, but also provides a rare opportunity for the city to fully express its unique style. From the perspective of functional evolution, production functions gradually give way to the consumption function is the main trend of urban waterfront development. In this area, leisure and entertainment, sightseeing, cultural preservation, and experience ecology have gradually become the main development orientation of the city's waterfront.

¹ Adalberto Vallega, Urban waterfront facing integrated coastal management[J], *Ocean & Coastal Management*, 2001, 44: 379-410.

1.1.2 Transformation of urban travel patterns

The widespread use of automobiles has brought a series of negative effects such as traffic congestion and environmental pollution to the city. Many cities have begun to rationally think about the rationality of car-centric urban transportation development models. Many European cities have proposed various "no car" programs. Compared with cars, walking and cycling and other slow-motility modes have low travel costs, low resource consumption, and low green carbon. It can not only improve the urban problems such as traffic congestion, air pollution, resource consumption, but also help people to relieve their mood and improve their physical and mental health. Therefore, encourage slow-motility traffic modes and establish a low-carbon and green traffic mode that is guided by "slow-motility + public transportation" and become a new idea for urban transport planning.

1.1.3 Transformation in the concept of health

With the acceleration of urbanization, more and more people live in cities, and various resources in cities are becoming scarcer. The rapid development of the city has also changed people's lifestyle and mental state. Crowded living spaces, dependence on motor vehicles, and modern lifestyles far from the natural environment have made residents more and more health problems, and the health of the population is threatened. In recent years, public health workers have become clear that health is a good state of all body, spirit, and society, not just that there is no sickness. The ultimate source of many health problems comes from the influence of physical and social environment. The environment has a more universal impact on health than human behavior. The Transformation in the concept of health has led to a shift in the resolution of health problems from a medical model to a social model. In this context, waterfront areas with unique natural resources are an important part of health promotion initiatives.

1.2 Significance of research

1.2.1 Improve the urban traffic structure and operational efficiency

The slow-motility system is a supplement to fast-motility traffic and an important part of urban traffic. It will not be affected by the rapid development of motorized traffic. According to statistics, the proportion of slow traffic travel in Shanghai (2004), Beijing (2000) and Guangzhou (2005) accounted for 59.8%, 45.8% and 46.1% of urban traffic, respectively. Denmark (2000), the Netherlands (1999), Switzerland (1999) and other countries, its slow-motility traffic mode accounts for about 40% of urban transportation modes.² The "slow-motility + bus" green transportation mode can solve the problem of the "last mile" of the city. The construction of the slow-motility system can provide conditions for the citizens to diversify their lives, and can meet the traffic demand of various vehicles, and can creates space for slow-motility

² Xiong Wen. Urban slow traffic planning: human-based space Research [D]. Shanghai: Tongji University, 2008

traffic such as walk. The waterfront slow-motility space is a part of the urban slow-motility system and urban transport. Therefore, the study of the slow-motility space in the waterfront area has certain value and significance for enriching the research of urban slow-motility system and perfecting the theoretical construction of urban slow-motility system.

1.2.2 Reshaping urban public spaces to provide a place for "slow life"

The walking and bicycle lanes in the waterfront slow-motility space are not only the intersection of short-distance commuting, but also the specific media space for people to experience the city's waterfront, and are a part of urban tourism leisure and residents' daily life leisure. As the main link connecting different types of public spaces in the waterfront, it connects the entire waterfront area and connects with the surrounding urban traffic, park squares and cultural monuments. It is a good place for city residents and tourists to visit, walk and communicate with each other. People can choose the appropriate exercise mode, time and intensity according to their physical condition and time, and increase the pleasure and physical quality while watching the landscape. Daily entertainment, leisure, shopping, sports and other activities can be carried out in the waterfront slow-motility space. Therefore, the research on the slow-motility space of waterfront will help to create a distinctive and high-quality urban public space. Providing an environmental foundation for "slow life", prompting people to increase outdoor activities and enhance social interactions, thereby enhancing the vitality of urban waterfront areas.

1.2.3 Enriching the design theory of the waterfront slow-motility space

This study attempts to combine the concept of slow-motility space with urban waterfront landscapes. The theoretical perception of the landscape perception of walking, jogging and riding in the slow water space is discussed. Combined with the case study of the world's successful waterfront open space, this paper proposes a targeted strategy for urban waterfront slow space landscape design and builds corresponding evaluation methods. In order to expand and supplement the relevant theories of urban waterfront slow space. At the same time, it has practical guiding significance for construction.

1.3 The analysis of related concepts

1.3.1 Concept Definition of Urban waterfront

The urban waterfront area is a general term for a certain area connecting the land area and the water area in the city. It is generally composed of a certain water area, a coastline and a land area adjacent to the water body³. Its spatial range includes 200-300m water space and its adjacent 1-2km urban land space,

³ Liu Binyi. Landscape planning and design of urban waterfront area [M]. Nanjing: Southeast University Press, 2006: 33-89.

which is equivalent to a distance of 15-30 minutes⁴. Due to its special geographical location and urban attributes, the city's waterfront area occupies a very important position in the urban environment construction. The waterfront area not only provides the public with various urban service functions such as green space landscape, leisure and entertainment, cultural display, and physical exercise, but also serves as an important window for displaying the image and style of the city.

1.3.2 Concept Definition of Slow-motility traffic

There are many ways to express slow-motility traffic. Non-Motorized transport (NMT) is a conventional term, including walking, cycling, jogging and roller skating. NMT focuses on the classification of vehicles and is therefore mostly used in transportation planning. Pedestrians & cycling (P&C) is a combination of pedestrian traffic and bicycle traffic. Compared to NMT, there are only two modes of transportation. Human Powered Mobility is basically the same as NMT, and it is a transportation method that uses manpower as a mobile force. Soft Mobility, which includes bicycles, pedestrians, skateboards, roller skating and other forms of transportation, first appeared in the report of the Swiss Ministry of Environment, Transport, Energy and Communications (DETEC). In addition to the meaning of transportation, it also contains a green and sustainable meaning, and also includes stops that occur during the tour. It is more suitable for the environmental characteristics of the waterfront. Similar words include Low-traffic, soft traffic, and so on⁵.

Slow-motility transportation usually refers to a transportation that is powered by human power⁶. The main features of slow-motility transportation include: average travel speed is low, generally not more than 15km/h, walking speed is distributed in 0.5m/s - 2.16m/s, bicycle speed is generally 10km/h. The distance traveled by slow-motility transportation is also relatively short, generally less than 3km. Slow-motility transportation is free, flexible and pollution-free, and it also has the effect of exercising. It is a green way of travel.

1.3.3 Concept Definition of Slow-motility space

The urban slow-motility space is a space form that carries the slow-motility traffic system. It mainly refers to a space that provides services by using slow-motility transportation such as walking or bicycle. Generally divided into commuting slow-motility space and non-commuting slow-motility space. The former is a traffic road provided for the necessary activities such as study and work, such as sidewalks attached to motor vehicles, crosswalks, pedestrian bridges, underground passages, etc. The latter is a

⁴ Zhang Tingwei, Feng Hui, Peng Zhiqian, urban waterfront design and development [M]. Shanghai: Tongji University Press, 2002

⁵ Rosa Anna La Rocca, Soft Mobility and Urban Transformation, Journal of Land Use, Mobility and Environment 2, 2010.04

⁶ Shanghai Municipal Government. Shanghai Metropolitan Transport White Paper [M]. Shanghai: Shanghai People's Publishing House, 2002

public space for a variety of activities such as recreational activities, fitness exercises, etc., including waterfront trails, pedestrian commercial streets, and walking trails.

1.3.4 Concept Definition of Urban Waterfront slow-motility Space

The waterfront slow-motility space is different from the general urban road that simply provides transportation functions. It has a combination of leisure, fitness, and sightseeing functions. The urban waterfront slow-motility space proposed in this paper refers to: A public space for users to perform slow activities, which is in the spatial scope of urban waterfront, distributed along the urban water system, connecting various waterfront green spaces, parks and plazas and with relatively complete supporting service facilities.

1.4 Research review

1.4.1 Research on the development of waterfront areas

According to the definition of the period of urban waterfront planning and construction development and evolution in the 2003 World Waterfront Urban Design International Expo, the development and evolution of urban waterfront space is mainly divided into: formation period, prosperity period, decline period, revival period⁷.

1) Formation period

Most of the early cities were formed in the waterfront adjacent to rivers and lakes, such as the Babylonian city of the Babylonian kingdom, Thebes in ancient Egypt, and Xianyang in the Qin Dynasty of China. The river water system is not only the main source of water for urban residents' living and industrial production, but also the main channel for urban transportation. The development of medieval European cities is mainly based on handicrafts and long-distance commercial trade, and trade capacity is an important factor in determining the status of cities. The cities on the waterfront, especially the cities located at the intersection of rivers, have become the transshipment points of commodity trade relying on convenient traffic conditions, and have been rapidly developed. As the city's waterfront area where the port is located, it has also become the main space for urban public communication.

2) Prosperous period

After the industrial revolution began, industrial areas were increasingly gathering in the waterfront. This is because the industrial site is located in the riverside area, which not only facilitates water intake and sewage discharge, but also facilitates the use of convenient water transportation conditions. The increase

⁷ Gan Can. Research on Urban Waterfront Spatial Landscape Ecological Planning and Design[D]. Hunan: Agricultural University, 2007

in trade volume has prompted the port area to gradually develop in a large-scale and specialized manner. The demand for industrial capital has made the life function of the waterfront area repelled. The residential, commercial and cultural facilities that were originally gathered here have also been degraded and migrated. The city is developing inland in the direction of the waterfront. The city's waterfront area has become the core of the city's production and transportation. The development of industrial capital has greatly promoted the development of the waterfront, and has driven the entire city into the era of industrialization, but it has also brought many ills. A large amount of industrial sewage and domestic sewage are discharged into rivers, and the natural environment of the riverside has been seriously damaged.

3) Fading period

After the 1960s, with the adjustment of the world's industrial structure, the city's waterfront area experienced a process of reverse industrialization. Industry, transportation facilities and ports have shown a tendency to accelerate their migration from central cities. This phenomenon involves the migration of industrial enterprises from urban to suburban or migration to developing countries, such as the migration from Europe to Southeast Asia. The production function of the waterfront in the city is gradually weakened. The original factories, warehouses, railway stations and docks are gradually abandoned, and there are a large number of vacant lands. In addition, the water pollution is serious, and the waterfront area once became a fading area with harsh environment and stinking.

4) Renaissance period

After the 1970s, economic production gradually entered a new stage. The driving force of social development has shifted from production to consumption. With the rise of the middle class and the change of labor methods, the material and spiritual living standards of the residents have been significantly improved. They have more leisure time, and the demand for the ecological environment and tourism and leisure is increasing. At the same time, people's values have changed. People began to realize that the city's waterfront is a living, available resource, and not just a ruined and ruined wasteland. In fact, the core position of the city once occupied by the factory, the warehousing industry and the terminal often has ample space function conversion possibilities, and the cost is low and the amount of demolition is small. At the same time, with the expansion of the city scale, the city began to develop across rivers and rivers, and the waterfront area also changed from the edge of the city to the center of the city. The importance of the waterfront in the city has re-emerged and has become an ideal public open space.

Waterfront revitalization in the more restricted sense in which we use the term today really started in North America in the 1960s, notably in Boston, Baltimore, and San Francisco, and spread to European port cities-prominently so to London -in the 1970s and 1980s and also to Australia, where Sydney and Melbourne are interesting cases, and to Japan. In the 1990s port-sphere redevelopment also became important in the newly industrializing countries (NICS) and, to a lesser extent, in the less-developed

countries (LDCS)⁸. (Fig 1-1)



Fig 1-1 Global diffusion of waterfront revitalization

Cities include not only buildings and other material structures, but also flexible components such as people, networks and memories, historical and social relationships, emotional experiences, and cultural identity. In fact, the city is an organism, and the various components are intertwined. The good waterfront renewal plan should be based on people's position on the city's emotional and psychological feelings. The basic principle is the place creation⁹.

Due to the unique geographical environment of the waterfront space and the unique culture formed in the historical development process, the waterfront landscape has formal aesthetic value, functional value, human value and ecological value. The theoretical research on the waterfront landscape is also concentrated on these four aspects. The practice mainly focuses on the environmental remediation of rivers and lakes, the revitalization of historical waterways, the development of waterfront open spaces, and the development and construction of waterfront buildings.

American scholars A. Brie and D. Ribbe have classified the city's waterfront into business, leisure, culture, ecology, history, residence and port¹⁰. The development of the waterfront mainly experienced three kinds of thoughts: natural concept of obeying the nature, contextual concept of obeying the context and the design trend of people-oriented design¹¹. Originally using the naturalistic form and the urban beautification art concept as the theoretical guidance, the focus is on the natural scenery of the waterfront. To pay attention to the context and the protection movement of historical and cultural areas, pay attention

8 BRIAN HOYLE, Global and Local Change on the Port-City Waterfront[J], Geographical Review, 2000: 395-417.

⁹ Marichela Sepe (2013) Urban history and cultural resources in urban regeneration: a case of creative waterfront renewal, Planning Perspectives, 28:4, 595-613, DOI: 10.1080/02665433.2013.774539

¹⁰ Breen Ann, Rigby Dick. The New Waterfront: A Worldwide Urban Success Story. London: Thames & Hudson, 1996

¹¹ Liu Yanhong. Urban waterfront landscape design research [D]. Shanxi: Northwest A&F University, 2007

to the important role of the waterfront landscape that constitutes the urban texture in the urban style and cultural connotation. Then to the humanistic design trend, in every detail to fully express the concern for people.

Wang Zhifang pointed out that the historical spatial organization and historical construction of the waterfront space is the carrier of traditional culture. To continue the traditional culture, the historical pattern must be strictly protected¹². Zhang Jianqiang and Wang Haifeng believe that the urban waterfront space shape should reflect the connotation of urban history and culture, and continue in the spatial renewal and integration¹³. Yu Shuang pointed out that traditional culture is not only the driving force of urban development, but also a part of the rich cultural heritage of waterfront space. Creating a waterfront space rich in tradition and fashion helps to reflect the urban cultural taste and status¹⁴.

Hao Jingxin and Zhou Anwei put forward their own views on how to excavate the traditional cultural elements to shape the urban waterfront environment characteristics¹⁵. Gongyu explored how to fully excavate the local cultural characteristics, integrate traditional culture into the construction of modern cities, and create a city waterfront landscape rich in local cultural characteristics¹⁶. Yuan Fengbin proposed that the urban waterfront landscape features a certain time and space within the excavation and modeling of the city's waterfront landscape features. The waterfront landscape features a group and optimization effect, rather than the effect of a single attraction. The characteristics of water landscape need to establish a scientific measurement system. At the same time, it is proposed to shape the characteristics of waterfront landscape from two aspects: aesthetic characteristics and functional use characteristics¹⁷.

On the basis of analyzing the causes of the continued prosperity of the North American and European waterfront areas after World War II, Mann (1988) has summarized 10 trends in the continuous revitalization of urban waterfront areas, ① Improving accessibility and openness; ② Comprehensive Development; ③ Reduce the intrusion of the main road to the waterfront; ④ Pay attention to the recreation of the embankment of the waterfront; ⑤ Restoration and imitation of historical sites; ⑥

¹² Wang Zhifang, Sun Peng. The content of the historical and cultural landscape area waterfront landscape protection and Analysis of Processing Techniques [J]. Chinese Garden, 2000 (6): 36-39

¹³ Zhang Jianqiang, Wang Haifeng. The integration and continuation of the historical and spatial forms of urban waterfront space--in Hangzhou An example of remediation planning in the lakeside area [J]. Journal of Zhejiang University of Technology, 2000, 28 (increase): 243-246

¹⁴ Yu Shuang. City Coast Research on the renovation of water areas [D]. Tianjin: Tianjin University, 2004

¹⁵ Hao Jingxin, Zhao Ming. Analysis of the Waterfront Spatial Reconstruction [J]. Planner, 2002(4): 33- 37

¹⁶ Gongyu. Cultural regeneration in the shaping of urban waterfront landscapes - Deyang City Lake Waterfront Landscape Planning and Design Concept [J]. Chinese Garden, 2003 (7): 29-32

¹⁷ Yuan Fengbin. Excavation and modeling of urban waterfront landscape features [D]. Wuhan: Wuhan University, 2005

Construction of commercial space (the growth of leisure land and commercial center); ⑦Holding a world-class exhibition Meeting; ⑧Lighting design and environmental art integration; ⑨Festivals and large-scale activities; ⑩ perfect waterfront management system¹⁸. In developing countries, the core issues of waterfront renewal are also concentrated, specifically: ①The public accessibility of the waterfront; ②The inappropriate development of the waterfront; ③Increase the relationship between the waterfront and urban center; ④protection, prudent development of public green space and open space; ⑤ diversity development, strengthen local sense; ⑥maintain the connection with the past. The above trends, principles and issues have highlighted the importance of leisure recreation to the development of urban waterfronts, and also highlight the main content of recreational space creation in urban waterfront areas, such as accessibility, historical heritage protection and the mix configurations of facilities, etc., in order to guide the public and tourists back to the waterfront¹⁹.

In terms of individual activities, the US Ministry of Internal Affairs Department has developed Water Recreation Opportunity Spectrum. The sequence of recreational opportunities in the waterfront is divided into the following areas from the original area to the city: Primitive, Semi Primitive, Natural countryside, Developed countryside, Suburban, Urban (Fig 1-2).

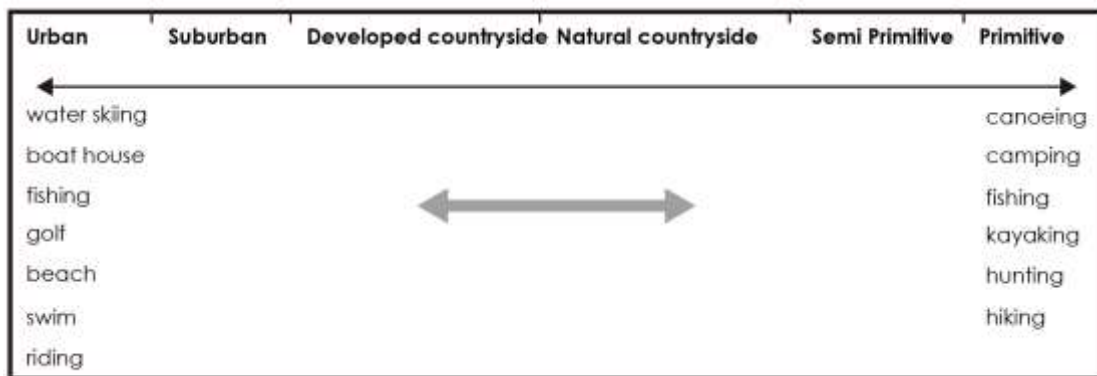


Figure 1-2 The sequence of recreational opportunities in the waterfront

1.4.2 Research on slow traffic space

Research on slow-motility traffic originated from Jane Jacobs's advocacy of street life and the diversified design of urban pedestrian space and Jan Gayer's research on the relationship between urban life and urban spatial change. Since then, European countries have formulated various traffic calming policies to reduce the interference of car traffic to residential communities, and discussed the construction standards of urban pedestrian, and put forward control requirements for the development of motor vehicle traffic in

¹⁸ Roy B. Mann, Ten trends in the continuing renaissance of urban waterfronts, *Landscape and Urban Planning*, 1988, 16(10): 177-199

¹⁹ Brian Hoyle ,Urban waterfront revitalization in developing countries: The example of Zanzibar's Stone Town[J], *Geographical Journal* 168(2):141-162.DOI: 10.1111/1475-4959.00044

the pedestrian zone.

China's theoretical research on slow-motility traffic is basically developed in parallel with practice. Many studies are analysis and summary of practical experience. For example, Cao Jing and other researches on the construction standards of regional greenway slow-moving systems in Guangdong Province, according to different classifications. The system proposes different requirements and measures for the construction of greenway slow-moving system. Zhang Wenting and Han Yuting studied the planning and design of urban waterfront slow space in Beijing from different angles. Qin Baoquan studied the slow space of the Suzhou moat area.

Shanghai is the city with the most complete construction of the slow-moving system in China. Many scholars have conducted in-depth research on the waterfront slow-motility space in Shanghai. Wang Zhuoer conducted a comparative analysis of the riverside slow-moving system between Shanghai and Amsterdam, and proposed the idea of activating the riverside vital space by adding a slow-moving system. Li Wei introduced the core content of the slow traffic system planning in downtown Shanghai, and analyzed and summarized the characteristics and positioning of urban slow traffic, and proposed the technical route of urban slow traffic system planning²⁰. Zou Meizhi proposed a “slow channel” planning strategy for the Expo Riverside Greenland. Liu Yang introduced the cross-section method of continuous vision into the study of determining the bicycle lane line. Eight evaluation indicators were selected by the analytic hierarchy process as the evaluation basis for selecting the bicycle lane route²¹.

With the deepening of research, some scholars have studied the specific behaviors in slow space. Yan Ming et al. conducted field research and statistical analysis on the characteristics of walking behavior in the riverside green space, and provided a strategic analysis for the planning method of the green space walking path of the waterfront. Xie Jia and Zhu Baoguo conducted research on the landscape design of the waterfront trail. Cui Jian studied the landscape design of the city's waterfront green bicycle lane. Yang Chunxia et al. explored the influence of different waterfront public space elements on the resident activities through the superposition analysis of behavior maps and feature distribution maps.

Some scholars have also studied the characteristics of the slow space or the elements of space composition. For example, Xiao Ningling analyzes the specific analysis of the landscape design of different types of urban slow-moving space from the perspective of spatial characteristics. Lv Wei takes the spatial nodes of the waterfront trail as the research object, analyzes and summarizes the typical elements of the node space, and summarizes the principles of space node construction. Yu Fan et al. conducted a field survey to study the current situation of the waterfront space of the Suzhou River in Shanghai. Through the comparative classification method, the interface characteristics and

²⁰ Li Wei, slow traffic system planning) Discussion—taking Shanghai as an example, *Urban Planning Journal*, 2008.03

²¹ Liu Yang, Wang Yun, Lu Junyao, Sheng Siyuan, Construction of Bicycle Greenway in Binjiang Section of Huangpu River Expo, *Journal of Shanghai Jiaotong University (Agricultural Science Edition)*, 2017.12

characteristics, spatial combination mode and visual perception of the waterfront trail were systematically analyzed.

1.5 Research content

The content of this study includes three parts: landscape perception analysis, design experience and design method summary and landscape evaluation system, including the following points:

1) Combine the relevant theoretical and practical results of waterfront landscape and slow-motility space, and explore the relationship between urban waterfront landscape and leisure slow-motility system, and summarize the landscape design factors and influencing factors of waterfront slow-motility space.

2) Analyze the landscape characteristics of the waterfront area and the interaction between the landscape and human behavior and psychology; study the activity characteristics and demand levels of the slow-motility people; around the sensory perception, spatial perception, risk perceive and conduct research on emotional perception and other aspects, and comprehensively understand and grasp the landscape perception of the waterfront slow-motility space.

3) Collect and organize excellent waterfront development cases, such as the construction of the Chicago Riverwalk Expansion, the landscape reconstruction along the Thames River in London, the construction of the bicycle lane around Taiwan, and the design of the Shanghai World Expo Riverside Greenland and Suzhou Creek, analyzing the reasons for its success and the perception of landscape designed for reference.

4) Propose the landscape design method of urban waterfront slow-motility space from three aspects: Organization of the functional structure, organization of the path and view and Organization of the space sequence.

1.6 Research method

1.6.1 Research method

(1) Literature review method

This paper mainly obtains Chinese and English literature materials and actual aspects on waterfront landscape, slow-moving system, landscape perception and landscape evaluation through library access, database search such as “China Knowledge Network” and “ScienceDirect”. Case. It sorts, reads, analyzes and summarizes the existing results and basic data of relevant research. Through the analysis of previous research cases, it absorbs the experience and finds the deficiency, summarizes the methods suitable for the research of this paper, and extracts some evaluation indicators.

(2) Field investigation and photo analysis

Conduct on-site reconnaissance of typical riverside slow-moving space, record and analyze walking, jogging, cycling, staying behaviors, etc. through questionnaires, moving lines, recording plans, photographs, etc., and collect relevant scenes. data. The study records the landscape form of the survey site through photos, extracts the objective characteristics of the landscape elements and investigates the user's perception and evaluation level of the landscape as an important source of basic data.

(3) Questionnaire and expert consultation

The indicator screening of the evaluation model and the scoring of the index weights were obtained by questionnaires in the fields of experts and professionals in the fields of gardening, architecture, and landscape. After the evaluation model is established, questionnaires are randomly distributed in the vicinity of the empirical case area to understand the satisfaction of tourists and residents on the landscape perception of slow-moving space, and verify the validity of the model.

(4) Statistical analysis of data - AHP analytic hierarchy process

Based on the collected landscape data, this study will select several major quantitative methods. Using Excel and SPSS software to process the raw data, a series of analysis and discussion results can be obtained.

1.6.2 Research frame

The study takes the waterfront slow space in the city as the research object, and focuses on how to design and evaluate from the perspective of landscape perception. First, the theory and literature of cognitive theory, slow traffic and waterfront landscape are collated. Under the existing theoretical framework, a reasonable and effective questionnaire was designed to conduct on-the-spot investigations on the waterfront area, and through behavioral records and photographs, as the basic data of perceptual analysis. Secondly, combined with the conclusions of the landscape perception survey, the reference cases are analyzed, and the experience and existing problems of slow space design are summarized. Then, the method of designing the waterfront slow space is studied from three aspects: slow line design, space design and facility design. Finally, the analytic hierarchy process is used to construct the landscape evaluation model of the waterfront slow space, and the model is applied and tested in the example.

The preliminary research framework for this study is drafted as follows (Fig1-3):

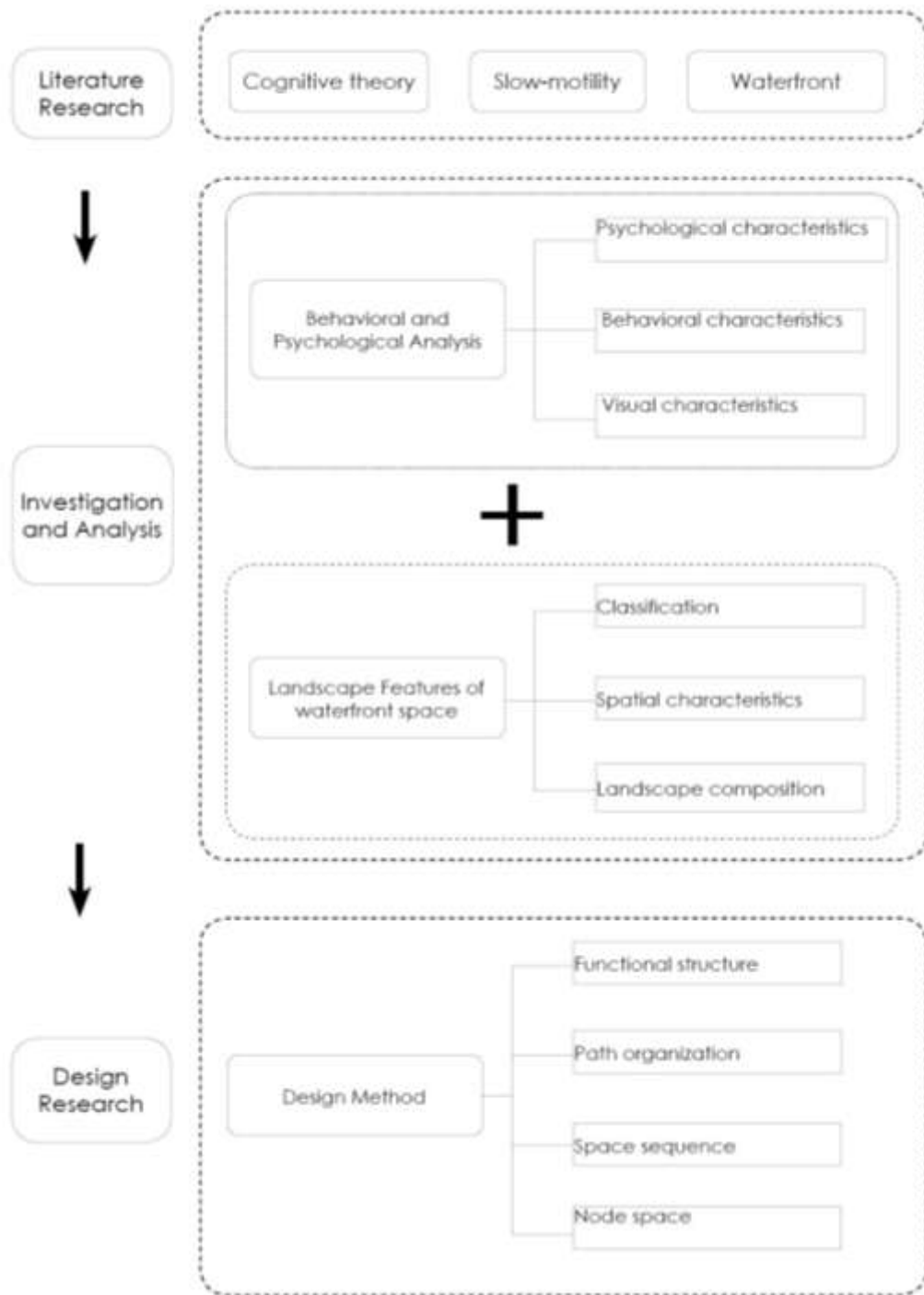


Fig1-3 Research framework

Chapter 2 Behavioral and Psychological Analysis in the Waterfront Slow-motility Space

According to the "behavior-space" theory, space is closely related to the behavior of users. Successful design needs to conform to human behavior characteristics such as activity patterns, environmental perception, and behavioral psychology²². A good slow-motility system can not only provide smooth slow-motility roads, but also consider the user's behavioral habits and psychological needs. In the process of slow-motility, users can stop and rest and experience the joy of life.

It can be known from the theory of environmental psychology that the stimulation of the spatial environment is received through psychological perception and generates complex psychological reflections, which in turn leads to behavioral motivation. The process from receiving stimuli to the formation of motivation is the process of psychological perception, and the behavioral state shown is the way people use space. Most of the sources of stimulation depend on the visual information of the space environment, so the psychological perception of slow movement, the relationship between behavior and space, and the law of visual perception are mutually related, mutually influential, and inseparable (Fig 2-1).

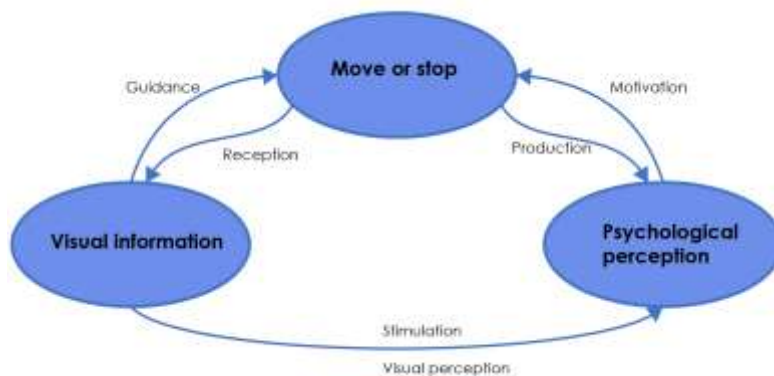


Fig 2-1 The interaction of behavior and space

2.1 The psychological perception characteristics of the slow-mover

2.1.1 Classification of psychological awareness

The slow-mover enjoys a state of relaxation and fun, so part of it is unconscious and distracted. And when they encounter something of interest, they will be happy to invest in it and become a conscious and active search. These two mental states correspond to two kinds of environmental perceptions: direct

²² Zhang Houcan. Behavioral Psychology [M]. Hangzhou: Zhejiang Education Press, 2003: 485-506.

perception and indirect perception.

1) Direct perception

Direct perception is the sensation that the spatial environment perceives through the body's perception system (visual, auditory, tactile), which enables people to produce instinctive and intuitive behaviors²³. This direct perception of instinct is the result of human adaptation to environmental evolution for thousands of years, there is no individual difference. In continuous walking exercise, the images received by the retina of the person continuously change with the movement process. This direct perception of instinct is the result of human adaptation to environmental evolution for thousands of years, there is no individual difference. Through direct perception, the rambler can judge his or her position, speed and direction, and establish a comprehensive understanding of the spatial structure. However, the material elements, morphological colors, etc. of the landscape in the environment have no difference in the direct perception process.

2) Indirect perception

Indirect perception is the process of filtering and reorganizing environmental stimuli through existing knowledge, experience, and memory on the basis of direct perception. This process involves perception, information extraction, imagination, and thinking, so that people can generate cognition and emotions about objective things. For example, when people see an art piece, they combine their experiences or familiar things to associate, contrast, and react. The indirect perception process emphasizes the subjective construction of the individual, which embodies the individual's unique perspectives, needs and objectives. Personal experience varies according to living environment, age, gender, occupation, etc. For the same scenes, sculptures, patterns, etc., different groups of people have their own unique appreciation and understanding.

Indirect perception corresponds to the conscious state of mind during walking. In this state, people will actively and deliberately seek the meaning of walking. This meaning can be realized through the design of mood and plot.

2.1.2 Behavioral psychology process

The psychological perception process of behavior is a repetitive cyclic process from direct perception to indirect perception. When people enter the environment, the visual information generated by the movement is transmitted to the brain. At first, the entity only determines the occlusion of the line of sight by the intuition. If local information attracts attention at this time, people will stop and observe carefully. According to the existing knowledge and experience, Rational understanding of the shape, color, and texture of environmental elements, and Compare it with the existing impression.

²³ Zhang Yu. Visibility-based space and its configuration analysis [D]. Southeast University, 2004.

If the visual information that the slow-mover pays attention to is called the "point of interest", such as the landscape node in the waterfront space, the visual focus, etc., the "point of interest" in the tour will attract people's attention more than once. Each "attention" experiences a process from direct perception to indirect perception, that is, a process of perception from no awareness of understanding, from space to form and other elements. After each point of interest, people will form an impression, and the formation of each impression is the result of integration with the previous impression. After the comparison, people will have expectations and predictions for the next point of interest.

In the slow process, direct perception and indirect perception alternate and complement each other. In the direct perception stage, the space design should consider the configuration of the space, including the spatial boundary scale and the degree of enclosure, analyze the influence of the entity's line of sight occlusion on the slow-motility behavior, or guide the direction of the slow-motility through the spatial configuration. It is necessary to pay attention to the elements of space nodes, the shape and color of visual focus, and form "points of interest" to draw people's attention and guide people to convert from direct perception to indirect perception. In the design of the entire waterfront slow-motility space, maintaining the alternating of these two stages of perception can encourage people to move and perceive space (Fig 2-2).



Fig 2-2 The composition of landscape experience

2.1.3 The psychological characteristics of the slow-mover

1) Personal space

The existence of personal space in the environment refers to the minimum spatial extent that people need psychologically. Once someone crosses this range, people feel anxious and nervous. Therefore, when someone can only walk through a person's garden, others will always wait for him to enter or choose other roads after passing through; if the personal space of the Rambler is disturbed, it will also affect the mood of the Rambler. Therefore, it is necessary to have a reasonable road classification and a variety of path organization to create a suitable distance space for the Rambler.

2) See and be seen

Studies have shown that most people are willing to pay attention to others or be concerned for a long time, which is a manifestation of human self-esteem. Recognize self-worth through "performance" in front of others. There are no restrictions on the objects of the performance, such as acquaintances and strangers.

Both performers and viewers will each receive satisfaction²⁴ (). Under the influence of the dominant psychological tendency of “seeing and being seen”, people are expected to obtain an “optimal viewpoint” in the open space, that is, the best parking position. Therefore, in the design of slow space, appropriate places should be provided for people to “show”, design appropriate public event space as “stage”, and provide relatively quiet areas as “audience seats” for people to rest or stay, and to make the area face the "stage", in order to meet the psychological needs of people to "see and be seen."

3) Boundary effect

Psychologist DeKed Joan proposes that the edges of forests, beaches, bushes and forest hollows are all areas where people like to stay, while open mines or tidal flats are untouched unless the border area is overcrowded. The urban waterfront slow-motility space also follows this boundary effect theory. In the slow-motility space, the human behavior path is fluid, and the tortuous boundary area often becomes a place for people to stay. Moreover, the more the zigzag changes in the boundary, the more obvious the detention phenomenon. This is because people feel supportive when they stay in the border area and provide the best conditions for observing the space. Therefore, the urban waterfront slow-motility space should pay attention to the interpretation of the boundary effect, and use the border area to create a space that attracts people to stay for a short time.

4) Longing for natural psychology

Being close to nature is the nature of mankind. However, with the rapid expansion of the city, the density of buildings in the city has increased, people have been forced to stay away from the familiar natural environment, and have suffered a certain degree of damage both physically and psychologically. In modern society, people often feel depressed and even cause diseases. People in the city need to escape from the noisy pure artificial environment of the city occasionally, and have a certain amount of environmental spaces in the city that can release pressure and return to the nature. Therefore, in the construction of urban waterfront slow-motility space, we should strive to create a comfortable natural landscape environment, especially taking advantage of the natural conditions of waterfront, providing people with the opportunity to contact the natural water environment as much as possible while ensuring the artificial environment is in harmony with the natural environment.

2.2 The behavioral characteristics of slow-mover

2.2.1 Behavioral characteristics of walking activities

1) Walker activity type

According to the motivation and content of the slow-mover, the type of walking behavior in the

²⁴ Jan Gehl, *Communication and Space* [M], China Building Industry Press, 1992

waterfront can be sorted and refined such as stroll, watch the scenery, watch others, date, fitness and chat. Based on the three types of activities of the people in Yang Geer's summary in the public space, most walking behavior in the waterfront are mainly a spontaneous activity.

2) Walking speed

The walking speed of a person is influenced by various factors such as the purpose of walking, the nature of the walker, the geographical area, and environmental conditions. In general, the free walking speed is "1.14m/s-1.25m/s" in the "pregnant period" (30-44 years old). Except for the specific period of 5-14 years old, males are faster than females in terms of gender, especially at the age of 15-39. The difference is obvious. By the age of 60, both men and women have significantly reduced their speed to about 2/3 of the age of youth and youth, which is about 0.9m/s. The group (crowd) walks slightly slower than walking alone²⁵.

Yang Gal's survey of the speed of pedestrians on the Strovert Street in Copenhagen shows that the walking speed in the cold winter is 35% faster than in the warm summer. On average, summer is equivalent to 4.2km/h, and winter is equivalent, at 5.2km/h (Tab 2-1). In addition, the walking speed will decrease with the increase of the pedestrian's density. When the distance in front of people is less than 4.5m and the height difference changes by more than 6%, the walking speed of people will decrease²⁶.

Tab 2-1 Average walking speed of different people

Type of people	Average walking speed(km/h)
Ordinary adult	4.68
Old people	3.87
Group of people	3.6
Down the stairs	2.74
Up the stairs	1.02

3) Characteristics of walking time

According to the survey and analysis²⁷, most people choose to walk in their leisure time. The behavioral subjects are more inclined to leisure, and the demand for information stimulation is higher. Therefore, the walking behavior is rich in the visual elements of the path. Higher requirements. The largest number of people walk in the spring, and the least in winter, shows that it can increase the route of spring walks and

²⁵ Edited by the Japanese Architectural Society, Japanese Architectural Design Data Integration (Human Space) [M], Tianjin University Press, 2007

²⁶ Yang Gal, Public space, Public life - Copenhagen 1996 [M], China Building Industry Press, 2003

²⁷ Yan Ming, Research on Urban Line-type Riverfront Greenland Landscape Design Based on Walking Behavior [D], Southwest University, 2017

enhance the attraction of the walking path in winter. As the Fig 2-3 shows out, walking is mainly done in the morning and evening. The main strolling crowd in the morning is the elderly. In the evening, the number of elderly people has decreased and the number of young people has begun to increase. In the morning near the activity center for the elderly and near the youth activity venues in the evening, attention should be paid to the setting of multi-level paths and the setting of road sizes to reduce crowd density and crowding. The middle-aged and elderly people who walk for 30 to 60 minutes are the most, while the young people are mainly concentrated in 15 to 30 minutes. It is necessary to set the length of the walking path and the distance between the nodes in series according to the tour time of different groups of people.

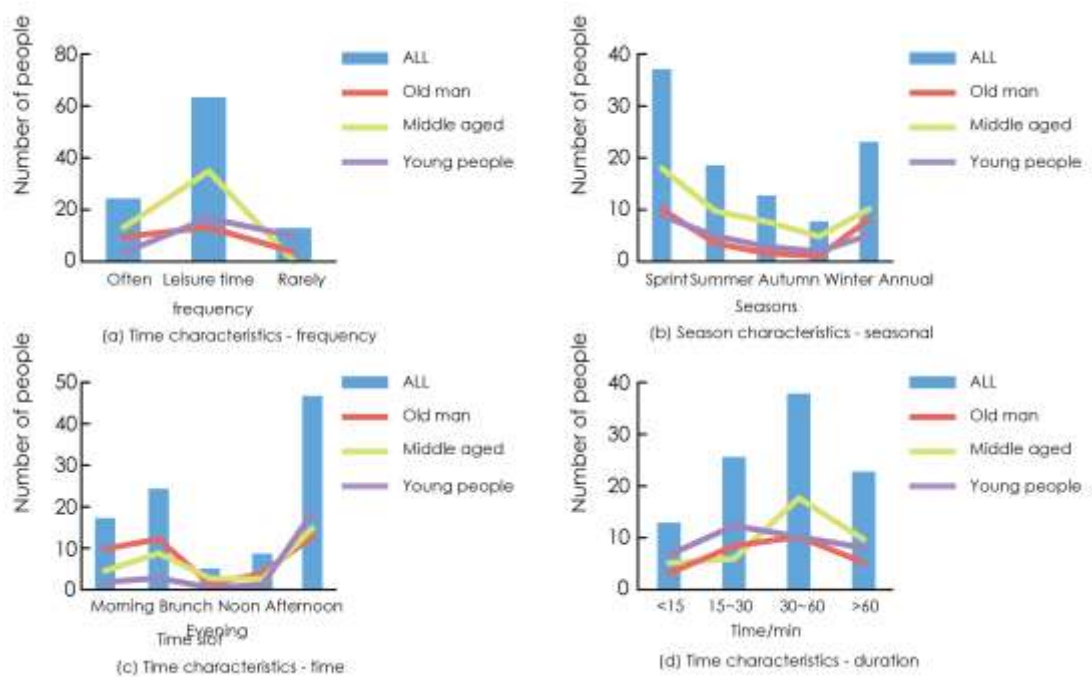


Fig 2-3 Time characteristics of walking

4) Walking distance

Walking distance is not only limited by the physical strength of the walker, but also subject to his psychological factors. The long walking distance will lead to physical and mental fatigue. In the study of walking distance, there are two concepts of “extreme walking distance” and “acceptable walking distance”. “Extreme walking distance” refers to the longest distance people can walk, usually around 2km. “Acceptable walking distance” refers to the distance people are willing to walk. Within this distance, walking will not be exhausted and will not get bored. It’s generally 400 ~ 500m, walking 5-7min.

This "acceptable distance" is not an absolute truth, but also depends on the quality of the walking route. A sturdy and varied path can increase the fun of the tour and slow down mental fatigue. Therefore, a

complete path sequence length can be controlled within 600m or 1000m. Seats or active nodes should be placed above 600m and 1000m. At the same time, it is also possible to extend the walking distance of people by enriching the functions, spaces, visual and perspectives of the path, the shape of the path and the fluctuation of the terrain.

5) Walking route

When a person walks in nature, the traveling route is not a strict straight line, but with a tendency to fluctuate with a certain curvature (Fig 2-4). The standard diagram of the curved line type when a person walks has a wavelength of about 48 m and an amplitude of about 3.0 m, and the curved line type also includes a case where the excitation is 3.0 m or more. Therefore, in order to improve the comfort of the route, it is necessary to have a certain plane curvature for the slow walk²⁸.

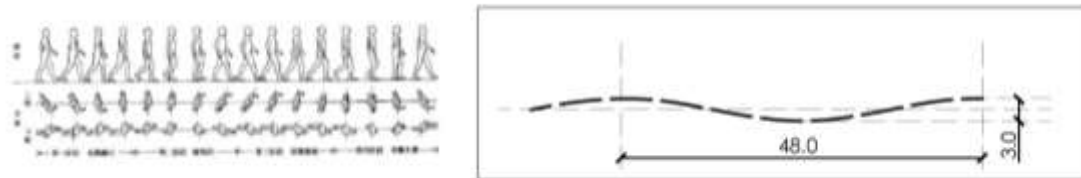


Fig 2-4 Human wavy walking characteristics

People of different ages have different choices for space routes²⁹(Tab 2-2):

Children (0-12 years old): Children generally walk with their parents and like to interact with the landscape, such as touching, climbing, etc. The children's walking route shows uncertainty, the direction changes greatly, and the line shape twists and turns, so Adapting to the space of children's walking flow characteristics requires a complex and safe fun path space.

Youth and Adulthood (18-35): Because of the limited walking time in youth and adulthood, most of them spend time strolling with their families. There are few stops during the walk. If novelty or fun things go straight to the target point. Therefore, the characteristics of youth and adult strolling flow are mostly linear and have a positive direction change.

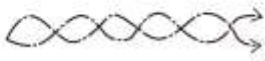
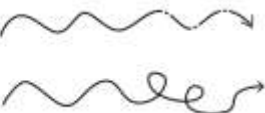

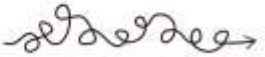
Middle-aged (35-60): Middle-aged ramblers mostly aim at fitness and communication, with a long walk distance. According to their personalities and hobbies, they are continuous or intermittent during the walk. The overall flow is linear and they like to choose continuous path, do not like to change direction at will. When the time is sufficient, the roundabout path will be selected.

²⁸ Japanese Architecture Society, Japanese Architectural Design Data Integration (Human Space) [M], Tianjin University Press, 2007

²⁹ Zhai Yujia. Research on the characteristics of urban park design to promote the walking behavior of the elderly - based on content analysis method [J]. Landscape Architecture, 2016, 07: 121-128.

Old people (over 60 years old): The elderly mainly rely on exercise, and they have the habit of walking. They often accompany social activities during the walk. They have higher requirements for rest facilities, and there are more stop and rest points during the walk and tend to repeatedly visit the same area.

Tab 2-2 Characteristics of walking behavior in different age

Slow-mover	Flow line type	Flow characteristics
Old man		Repeatedly
Middle aged		Smooth, passively changing direction
Young people		Straight line, the point of interest determines the direction
Children		Twists and turns, direction is uncertain

Relatively speaking, young people are more sensitive to changes in slow-motility space, preferring to choose more interesting and rewarding lines. Therefore, according to different walking crowds and purposes, it is possible to design a path rhythm that conforms to various types of walking. For young people and people who walk alone, set the route with rich spatial variations and sharp amplitudes. For the middle and old aged and the crowds who walked together, set the route with moderate spatial change.

2.2.2 Characteristics of stop and stay behavior

Stopping is a sudden behavioral behavior caused by sporadic external stimuli and environmental events. After the stopover, it will soon be converted to a mobile state³⁰. The main purpose of causing the stop is (1) An acquaintance or an acquaintance greets (2) an instant wait-and-see that is caused by an incident, including watching temporary performances or plants. (3) Short-term interaction with landscape elements, including listening, playing in the water, picking fruits, feeding birds, etc. However, people do not stay for a long time during the walk, but keep moving continuously and constantly looking for attention.

Curiosity is the original motivation for causing behavior³¹, interesting landscape forms can be a condition for attracting ramblers to stop. Base on the investigation and statistics, the most important viewing sequence for people to walk is: landscape sketch, plant, event venue, pavilion, gallery, building and sitting facility, and the order of stays is: event venue, Landscape sketch, pavilion, gallery, sitting facility,

³⁰ Chen Jianhua. Research on the environment and crowd behavior patterns of the Rest Plaza in the Pearl River Delta region [M]. China Building Industry Press, 2010.

³¹ Xu Conghuai. Behavioral space theory [D]. Tianjin University, 2005.

plant and building ³²(Figures 2-5 and 2-6). Therefore, in the path organization, landscape essays and event venues can be used as the main factors to attract and guide the crowd, and the location and spatial scale of the nodes can be reasonably arranged. In addition, it is also possible to use the elements such as color and shape to improve the recognizability of the nodes, such as the use of landscape elements such as waterscapes and plants with distinct seasonal characteristics.

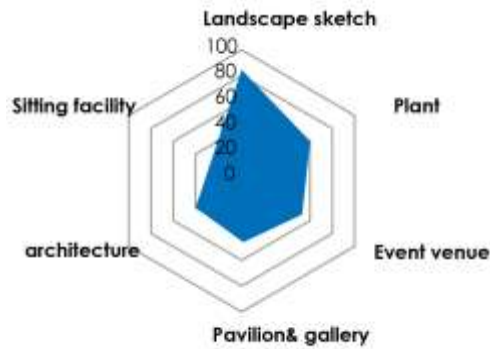


Fig 2-5 The focus of walking behavior



Fig 2-6 The stop point of strolling behavior

2.2.3 Characteristics of riding behavior

1) Classification of riding purposes

Early studies on cyclists-categorization proved that weather, infrastructure status, riding attitude, social attitude, and built environment have reference significance for the classification of cycling activities. Gabriel et al. divided the riders into the following four categories based on the purpose of riding: (1) dedicated cyclist: they love the speed and convenience of cycling, not affected by weather conditions; (2) path-using cyclists: focus on the fun, sports value, cyclist identity of cycling; (3) leisure cyclists: focus on the fun of cycling, identify with their own riding identity; (4) Fair weather utilitarians: for transportation purposes, not a strong supporter of cycling activities, it is relatively influenced by weather conditions and comfort, and is a relatively unique group³³.

2) Cyclist population composition

Among the riders, men are more than women at most ages. Cycling activities are greatly influenced by age factors. Middle-aged people, teenagers and children constitute the main cycling group (Fig 2-7). Among them, middle-aged teenagers (13-18 years old) have a higher proportion. The design of the riding environment requires special young people. Psychological characteristics and behavioral

³² Yan Ming, Research on Urban Line-type Riverfront Greenland Landscape Design Based on Walking Behavior [D], Southwest University, 2017

³³ Gabriel, Mi-chael. What's your type: a multidimensional Cyclist typology [J]: Transportation.2014:41

characteristics³⁴.

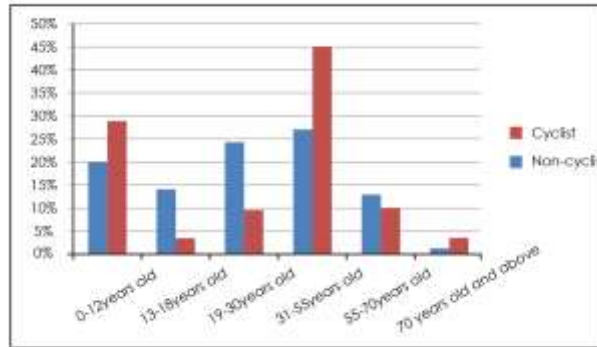


Fig 2-7 Age composition chart

3) Cyclist's time rule

During the day, sports cyclists focus on the morning and evening, leisure rides are distributed throughout the day, and traffic cyclists focus on the evening (Fig 2-8). Most cyclists have regularity and daily routine, and the frequency of activities is “2-3 times per month³⁵”. The activities in spring and autumn are the most frequent, and activities in winter and summer are reduced.

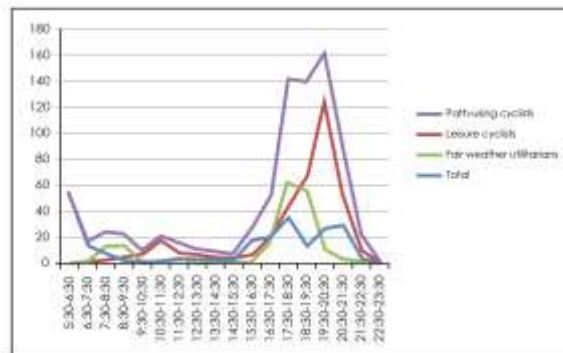


Fig 2-8 Various types of cyclists

2.3 Visual characteristics of slow-motility

Visual perception is the link between movement and space. Studies have shown that 83% of people's information comes from vision, 11% comes from hearing, and the remaining 6% comes from smell, taste and touch. Therefore, vision is the most important source of information for people's perception of the

³⁴ Guo Chong, Research on the Design Method of Cycling Environment in Tangdaowan Park Based on Public Evaluation and Research [D], Qingdao Technological University, 2015

³⁵ Guo Chong, Research on the Design Method of Cycling Environment in Tangdaowan Park Based on Public Evaluation and Research [D], Qingdao Technological University, 2015

environment, and it has produced various psychological and behavioral responses³⁶.

Visual perception can trigger a range of psychological activities. Firstly, the spatial scale, shape, color and texture of the waterfront landscape are experienced through vision. Secondly, the vision changes with the movement of the body, and gradually forms a series of continuous visual landscape images through the changing visual experience. In the process of landscape design, it is necessary to comprehensively consider the perspectives, viewing points, viewing routes, and viewing distances. The visual experience forms different visual effects due to the distance (Fig.2-9). Third, vision itself has the initiative to choose, and likes to pick things that change frequently the environment³⁷.

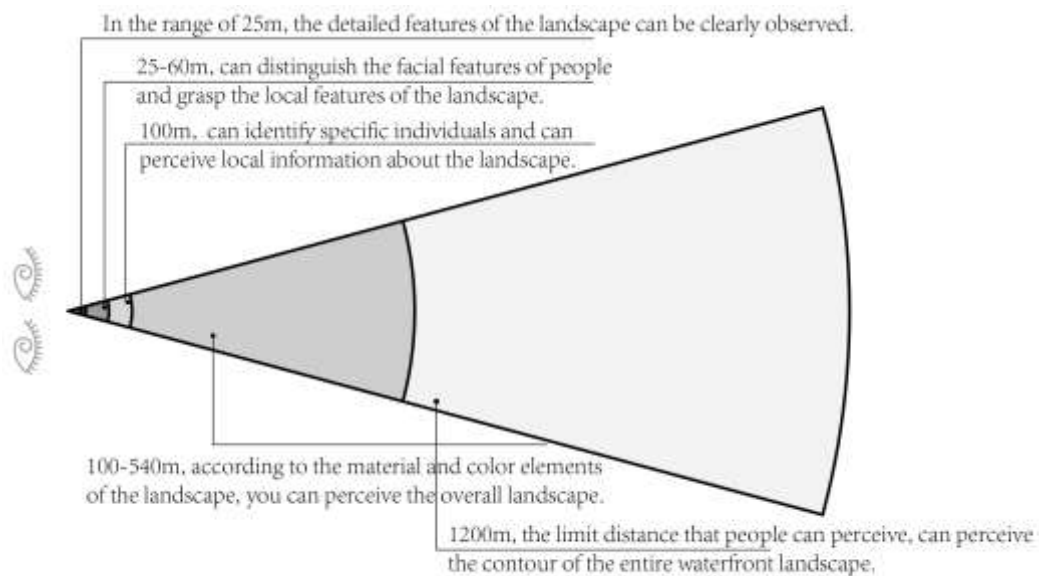


Fig 2-9 The viewing range of people's viewing distance and the relationship between landscapes

2.3.1 Visual field analysis

The human field of view can observe a range of 120° in the horizontal range, and the waterfront space in this range is usually unobstructed. A range of 130° can be observed in the vertical range, 60° up and 70° down. If you can't see the water within 70° of the line of sight, you will usually feel that the water surface is not wide enough and the distance from the water is far, so this relationship determines that the horizontal distance between the bank line and the water point is not too large³⁸.

³⁶ Yang Gongxia, ed. Visual and visual environment [M]. Tongji University Press. 2002

³⁷ Rudolf Arnheim; Teng Shouyi translation. Visual thinking: aesthetic intuition psychology[M]. Sichuan People's Publishing House. 1998

³⁸ Hans. Royde Stephen Brad, Open Space Design, Luo Juan, Lei Bo, China Electric Power Press, 2007

2.3.2 Viewpoint analysis

American architect Lawrence Harperin once said in the book "City" that "water has a trait, that is, it can evoke the original roots of human nature." Visibility is a measure of how easy it is for people to view the various landscapes and environmental ecological functions of rivers. Therefore, in the design of urban water landscape, the position of the viewer and its possible field of view should be fully considered to make the landscape transparent and visible³⁹.

The viewpoint refers to the location of the viewer, and can also be called a viewing point. The viewpoint of river landscape should be characterized by multi-directional, multi-angle, static and dynamic. In order to meet the needs of river landscapes from various perspectives, it should be considered from the perspective and distance of appreciation⁴⁰.

1) Static viewpoint

The static viewpoints in the waterfront slow space can be divided into three levels: high, medium and low. When people look down at the surface of the water and the angle of the eye level is greater than 70 °, it is a high point of view, such as waterfront buildings, high platforms, and water features on the bridge. The landscape effect is far-reaching and spectacular; when people look down at the water's line of sight and the eye level When the angle is less than 20°, it is a middle-level viewpoint, such as a walk along the water body, a stop on the trestle or a sit-down view; when the angle of view of the person looking down at the water and the angle of the eye is less than 10°, it is a low point of view, such as a low water level. Viewing on the platform and the promenade near the water.

2) Dynamic viewpoint

The richer the change in viewpoints during exercise, the stronger the initiative of people, and people actively try multiple perspectives to create more angles of view. Therefore, the waterfront slow space needs to create such an opportunity for the crowd to meet the needs of people to experience a variety of experiences, attract more people to participate in the walk.

Feng Jizhong mentioned the combination of two viewpoints and landscape points in the group view. One is the outside view point, which refers to people outside the scene, through the side view, surrounding scene observation, etc., so that the viewpoint passes or surrounds the landscape point, and observes a relatively stable picture or the overall physical form of the scene, such as looking around the sculpture or watching the plants while walking along the road.

The other is the view point in the scene, which means that the person in the landscape point looks around

³⁹ Zhang Tingwei, Feng Hui, Peng Zhiqian, "Design and Development of Urban Waterfront" Tongji University Press, 2002

⁴⁰ Yang Gongxia. Visual and Visual Environment [M]. Tongji University Press, 1985

from the position where the person stands, and the continuous picture formed constitutes the visual interface of the space where the viewpoint is located, such as looking around in the structure located at the commanding height, and feeling the surrounding space at a node with a high degree of closure⁴¹. In contrast, the outside view point can make the understanding of the scene more comprehensive through multiple viewpoints, and the viewpoint in the scene is more sensational than the outside viewpoint, increasing the possibility of interaction between the person and the scene. By using these two combinations to organize the viewing route of the waterfront slow space, you can get interesting changes (Fig. 2-10).

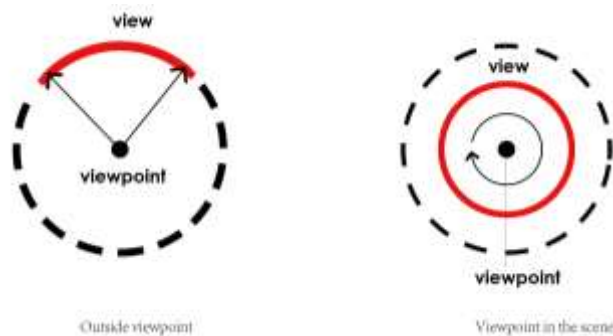


Fig 2-10 Two types of viewpoints

2.3.3 Line of sight analysis

Sight refers to the unit visual connection between the viewpoint and the viewing object⁴². The line of sight includes head-up, looking up, and looking down. Among them, head-up is the most comfortable and the most habitual way of viewing. In the waterfront area, the landscape essays, plants and people's activities in the vicinity are all sights that can be observed through the head-up. Even in an unconscious stroll, the human eye can easily scan the view that is level with the line of sight. The view of the landscape looking up is easily blocked, and the greening can form a layered visual effect. It overlooks the place where there is a terrain difference. In the waterfront area, the rich vegetation and water surface are also good looking down. Through the shaping of the terrain and the high and low levels of the landscape, people can explore the riverside space in a multi-dimensional line of sight.

2.3.4 Vision analysis

Vision is the view that can be seen from a given observation point⁴³. It includes all the scenes that can

⁴¹ Feng Jizhong. Group view [J]. Journal of Tongji University (Building Edition). 1979 (4): 1-5

⁴² Rudolf Arnheim; Teng Shouyi translation. Visual thinking: aesthetic intuition psychology [M]. Sichuan People's Publishing House .1998

⁴³ John Ormsbee Simonds. Landscape design - site planning and design manual [M] China Building Industry Press. 2000

form a picture and play an active role. It can be the reflection of the river surface or a main scene sculpture that highlights the designer's intentions and themes. In the waterfront, the view is not only an element that defines the space, but also an inducer of the emotional changes of the Rambler. For example, the Le Corbusier-style walk space is the “set-up” of the vision to guide people to expect and surprise during the tour [X Monteys, P Fuertes. Le Corbusier. Streets, promenades, scenes and artefacts [J]. *Journal of Architecture & Urbanism*, 2016, 40(2): 151-161. Vision can stimulate people's curiosity and stimulate people's interest and pleasure. Therefore, setting a continuous view in the waterfront is an important means to extend people's walking time. Because the vision is continuous, people's curiosity and expectation are continuous, and this kind of mood will encourage them to continue to walk.

In the waterfront, the vision is not only an element that defines the space, but also an inducer of the emotional changes of the Rambler. It can inspire people's curiosity and trigger people's interest and pleasure. Therefore, setting a continuous view in the waterfront can prolong the movement time of people in the slow-motility space.

The continuous view of the scene includes the continuity of the position of the scene and the continuity of the people's mind. The continuity of the location requires reasonable arrangement of attractions and corresponding viewing points. For example, if the main scene sculpture is placed at the entrance, the pedestrian can decide whether to glance or stop gazing, and decide whether the passer will pass or enter. Psychological continuity focuses on the correlation between the visions. This kind of correlation can lead people's association and autonomous interpretation of the design meaning, so that the Rambler can continue to move with thinking and expectation, and continuous thinking with the emergence of more visual scenes, and the content perceived by the psychology during the walk is also more enriched.

2.3.5 Visual perception rules

1) Closed law

Max Wertheimer defaults to visual perception of the tendency to combine defective or incomplete things with their own subjective experience⁴⁴. In the three-dimensional space, the four-sided space can create a strong sense of closure, and several plants that define the corner can also make people feel the complete space. The highly enclosed space is introverted and tends to be stationary. The partially enclosed space allows the inflow and outflow of space, which not only allows people to perceive the existence of complete space, but also maintains a certain connection and penetration of space. Therefore, when organizing the spatial sequence, the closed law of the visual organization is used to appropriately weaken the closedness of the subject space. Through the mutual penetration and interweaving of space, the flow of space is promoted, and people are continuously guided into the next space to ensure the continuity of

⁴⁴ Fu Xinlei. Research on spatial sequence of park landscape based on visual perception principle [D]. Nanjing Forestry University, 2013

experience.

2) Similar law

The closer the features (shape, size, color, texture) of the visual elements are, the more we can visually relate them. By utilizing the continuity of the waterfront slow-motility space, similar sequence spaces or landscape elements can be repeated, which can increase the integrity of the waterfront landscape and form a strolling order. Morphological similarity is a particularly important factor. Landscape elements of similar shape (revetment, pavement) are repeated within a certain interval, which will produce a sense of rhythm⁴⁵. For example, consciously changing the use of grass slope into the water, step-type and other revetment forms, and changing the recurring interval, can create a sense of rhythm of change, increase the richness of walking behavior.

2.4 The design strategy in urban waterfront space based on slow-motility behavior

2.4.1 Vitality create strategy

The vitality of the city's waterfront slow-moving space stems from the creation of various event spaces, including lively event spaces, as well as quiet, natural and imaginative introspection spaces. First of all, the lively event venue is easy to visually perceive, adapting to the psychological state of direct sensation and adapting to the tendency of strolling behavior. Secondly, the quiet space can lead to the search for meaning and the appreciation of details, retaining certain Personal space; finally, the event space is also a continuous view that drives the slow-movers to stop.

2.4.2 Guide interesting points strategy

All the landscape elements can be interesting points that appeal to slow-movers, including novel road forms, activity scenes, passing people, rivers, sculptures, and more. Through the guidance of interesting points, the direct perception of walking can be transformed into indirect perception, which stimulates the initiative of walking and gains a deep impression. Interesting landscapes can reduce mental fatigue, extend walking time, guide people to pay attention, stop, and guide people to constantly find points of interest to ensure the continuity of walking behavior. According to the force field characteristics of visual perception, the fusion of the interesting point and the space of the powerful field form can promote the movement of the pedestrian.

⁴⁵ Simon Bel. Landscape Visual design elements [M]. China Architecture & Building Press,2004

2.4.3 Dynamic Change Strategy

The urban waterfront slow-moving space itself is dynamic, which is consistent with the continuous movement state of the walking behavior. Through the dynamic spatial organization, it is possible to organize the rhythm of walking, preset surprises, slow down mental fatigue, extend the walking time, and adapt to the free flow characteristics of walking behavior. Dynamic changes are reflected in the need for mobility in space, the proper placement of path space, and the creation of dynamically changing viewpoints and lines of sight.

2.4.4 Artistic conception strategy

Artistic conception enables the Rambler to trigger associations in the process of direct perception, from unconscious to conscious state, to enhance the overall impression of the environment. This conscious state is more attractive to the Rambler to stop, making the stop point a node for the distribution of walking behavior. By arranging these different symbolic joint spaces, the waterfront can make the course of the walks fluctuate. In addition, people pay more attention to details when they are consciously observing, so the creation of artistic conception requires space to pay attention to the creation of details and the inheritance of cultural connotations.

Chapter 3 Landscape Features and Components of Waterfront Slow-motility Space

3.1 Classification of waterfront space

3.1.1 Classification of waterfront spatial patterns

The urban waterfront space mainly includes riverside, lakeside and seashore. According to the relationship between city and water, there are generally three types of urban waterfront space:

1) Waterfront space along the water type: The main feature of this type of waterfront space is that the city is located on one side or both sides of the water surface, and the edges of the land and water surface are banded. According to the nature of the water, it is divided into riverside, lakeside and coastal areas. For example: New York Battery Park District and Shanghai along the Huangpu River (Fig 3-1);

2) Water-based waterfront space: The main feature of this type of waterfront space is that the city encloses the water surface, or close to the surrounding water surface, and the edge of the land and water surface is roughly annular. According to the nature of water, it is divided into the types of lakes and bays. For example: Baltimore Inner Harbor Area and Hangzhou West Lake Area;

3) networked waterfront space: The main feature of this type of waterfront space is that a large number of waterways are interlaced in a network, and the city are cut into several pieces, and the edges of the land and water surface are also distributed in a network. For example: Venice (Fig 3-2) and the ancient city of Suzhou.



Fig 3-1 Shanghai Huangpu river and the Band



Fig 3-2 The water net in Vince

3.1.2 Classification of waterfront scales

According to the width of urban rivers, urban waterfront space can be divided into three scales:

1) Waterfront space on large-scale water surface: the river channel is wide, there is basically no visual

connection between the two sides of the waterfront, and the water surface acts as an isolation. If the land is surrounded by the water surface, it can create a private and quiet island atmosphere; In the city, due to flood control, water transportation and other reasons, hard berms are generally built, and the river bank is less of accessibility to water, which can only be called “waterfront space”;

2) Waterfront space of medium-scale water surface: the width of the river channel is moderate, there is visual connection between the two sides of the waterfront, but there is no dialogue and exchange, the isolation effect of the water surface is not obvious, and certain hydrophilic facilities can be constructed to create a “hydrophilic space”;

3) Waterfront space with small-scale water surface: the river channel is narrow, the waterfront is not only visually connected, but also can communicate and exchange. The water surface becomes the link between the two sides of the strait. It can build a richer hydrophilic facility and form a “entertainment water space”.

3.1.3 Classification of waterfront functions

According to the nature of the land in the city's waterfront, it can be roughly divided into five types:

- 1) Waterfront areas connected to the central area of the city. These waterfront areas are often mixed areas with multiple functions and open spaces with strong publicity;
- 2) Waterfront areas with tourism and leisure functions;
- 3) The waterfront area connected with the old industrial, warehousing and docking areas of the city is often in the stage of transformation and redevelopment with the adjustment of the urban industrial structure;
- 4) Waterfront areas connected to urban residential areas (Fig 3-3);
- 5) Waterfront areas dominated by ecological conservation. These waterfront areas are mostly located on the edge of the city or isolated green belts between different groups.



Fig 3-3 The site plan of Egret lake community

3.1.4 Classification of the revetment of waterfront

From the point of view, the revetment space is in the low-level line of sight below the normal line of sight of the person, and is the low-level waterfront space. This area is also the theme space in the landscape sequence of the waterfront, and is an excellent area to reflect the accessibility to the water of the waterfront. The two-stage space of the waterfront internal road and the bank can form a slow space with good. Make full use of this water and land height difference for vertical connection, and arrange the activity space, which not only can provide rich landscape, but also provide more fields of vision for the water area, forming a three-dimensional space system, fully reflecting the most characteristic of the waterfront area. Hydrophilic and open. According to the size of the waterfront green space and the width of the water area and the type of the revetment, the relationship between the waterfront road space and the revetment space can be focused on the following types of sections: natural slope style, platform style, and pick out style.

1) Natural slope style waterfront space

It is usually applied to a wider waterfront space, which is usually located on the outskirts of the city or locally in the waters flowing through the city. The water and land pass the natural gentle slope topography, weaken the high temperature difference of the water and land, form a natural spatial transition, have better safety, can also ensure the water exchange between the water body and the water shore, and enhance the self-purification ability of the water body. The waterfront coastal line sets a walking trail, combined with the planting of plants to form a natural curved waterfront, forming a natural ecology, full of wild interest, open and stretchable waterfront space (Fig 3-4).



Fig 3-4 The section of natural slope style waterfront space

2) Platform style waterfront space

For areas where the water and land height difference is large and the waterfront space is not very open, the height difference of the platform-type weakened space can be adopted to avoid a stiff transition. The total height difference will be solved through multiple floors, and each floor can be designed as a platform, paving or planting space according to needs.

The multi-stage platform space can form a recreation space with good , and each platform uses various means to make vertical connection to form a three-dimensional landscape system. This construction of the dynamic waterscape using the terrain height difference relationship is much more scientific and

aesthetic than the simple protective revetment or retaining wall. On different platforms with different elevations, walkways can be set up through various forms of internal nodes of the green space. The platform communicates between the upper and lower floors through the steps. Combined with the barrier-free design, it is suitable to set up ramps in the middle of the steps for disabled persons and baby carriages. In the case where the width of the road is allowed, the local area can be enlarged to form a space for the water to be seen at different levels. The waterfront promenade and retaining wall of the ground floor can form an inward-facing waterfront space. In this space, a platform, a dock and a plank road can be set up to make it easy to reach the water and sit on the steps. Look out over the water. However, the place to stop is flat, easy to accumulate water, people can slip easily, and should pay full attention when using (Fig 3-5).



Fig 3-5 The section of Platform style waterfront space

3) Pick out style waterfront space

For the open water surface, the design of the water or the water platform and the plank road meet the requirements of people's and far-sighted viewing. The water level platform and the surface level of the plank road are generally designed with reference to the normal water level of the water body. Generally, according to the condition of the water body, the normal water level is 0.5 to 1.0 m higher. If the wind and waves are larger, the height can be raised appropriately. Under the premise of safety, try to be close to the water surface. It is appropriate. The waterfront trestle is overhanging in a cantilevered manner to improve . The selected platform and plank road should be provided with railings in the deeper water depth. When the water depth is shallow, it can be fenced or fenced. (Fig 3-6)



Fig 3-6 The section of Pick out style waterfront space

3.2 Spatial characteristics of urban waterfront slow-motility space

The urban waterfront slow-motility space is more open because of its longitudinal extension and connection with the city, so it has become the main place for recreational activities such as walking and strolling.

3.2.1 Accessibility

Including psychological and physiological accessibility, so that people can easily reach the waterfront, and promote the occurrence of deep hydrophilic activities, requiring the site to have the following characteristics:

1) Accessibility: According to C. Alexander's research, "People are willing to go to public space activities within 20 minutes of walking. People who have arrived in more than 20 minutes will rarely use it if it is in ten minutes or more. People will use it frequently in public spaces that arrive in a short period of time⁴⁶." Therefore, the waterfront slow space should emphasize the transportation links with other parts of the city, especially the connection with public transportation and pedestrian transportation.

2) Openness. The city's riverside space is the main part of the city's public open space, with high-quality recreation and tourism resources. It provides a place for citizens and tourists to relax, walk and talk, and is an ideal area for people to enjoy the gift of nature. It must follow the general principle of open space, that is, it cannot be closed, so that citizens can freely enter and use and support the citizens' spontaneous behavior.

3.2.2 Continuity

Continuity includes continuity in space and time. The slow space in the waterfront has a clear band-like spatial distribution, and its spatial continuity shows obvious directionality. Mainly in the continuous transition of water and land space perpendicular to the shoreline (walking continuously and the line of sight facing the water surface is not obstructed); the continuous extension of the hydrophilic space parallel to the shoreline, refers to the public space of the waterfront. It should not be cut off by human factors, such as artificial buildings or structures. The continuity of time refers to the continuation of the historical context, which enables people to obtain a sense of stability in the place.

The waterfront slow space can play a role in combining elements, linking functions, sequences, and forms. Through the visual continuity and psychological continuity, the organic whole of the waterfront space is formed, forming a continuous slow space, and thus expanding the spatial order of the slow movement.

⁴⁶ Christopher Alexander. *A Pattern Language: Towns, Buildings, Construction*[M]. Oxford University Press, 1977:199

3.2.3 Possibility of staying

The vitality of space depends not only on the number of people, but also on the time people stay. If the number of people is small but the length of stay will increase the vitality of the space, the following factors affect the following factors:

1) Safety. The sense of security is the primary consideration in the slow water space of the waterfront, and it is also indispensable for the entire waterfront space. People who are leisurely in the waterfront have only a psychological sense of security and will stay in space, thus generating more spontaneous and social activities. Therefore, in the design of the waterfront slow space, people should eliminate the psychological insecurity caused by the space environment, and preclude the potential threats to the human body from factors such as water bodies and drops.

2) Comfort. There is physical comfort and psychological comfort. As a public activity place, the waterfront slow-moving space will have a comfortable environment with beautiful environment, convenient facilities, pleasant scale, orderly, free and equal, and no restraint.

3) sense of flourish. People have the psychological need to communicate with other people. It is a pleasure to see and be seen. Organizing a variety of leisure activities in the waterfront slow space, allowing different people to participate in it, and gaining knowledge, enjoyment and fun from it is a good way to increase popularity.

3.3 Landscape composition of urban waterfront

The waterfront landscape consists of three types of elements: natural landscape, artificial landscape and cultural landscape.

3.3.1 Natural landscape elements

Natural landscapes are a natural component of slow-moving landscapes. Can be divided into three categories:

1) water, the most dynamic space in the slow-moving landscape, but also the main content of the difference between the waterfront space and other urban spaces;

2) Vegetation, the background elements of the slow space, the science of vegetation planting directly affects the tour experience and visual impression of the slow-moving subject. In the selection of vegetation, we should try to avoid the selection of vegetation types that have side effects on the human body;

3) Terrain, the slope of the terrain has a direct impact on the direction of the road and the arrangement of the stair steps, and also affects the line of sight and the field of view of the slow-moving subject.

3.3.2 Artificial landscape elements

Artificial landscape is an unnatural component of a slow-moving landscape. Can be divided into three categories:

- 1) spatial interface and the external image of the slow-motility space, including the pavement, color, material, scale, etc. of the road;
- 2) landmark and the symbol of slow-motility space. The architectural style, color, style, etc., need to be consistent with the surrounding environment;
- 3) Landscape sketch. To enhance the taste and taste of slow-moving space, required to meet the aesthetic characteristics, with a certain degree of participation.

3.3.3 Cultural landscape elements

Cultural landscape is the non-material element of the slow-moving landscape. Taking the material elements of slow-moving space as the carrier, it has regional, historical and cultural characteristics, conveying the historical features and cultural connotations of the region. Through the design of the method of expression, the venue is given a "place spirit."

3.4 Elements of waterfront slow-motility space

The landscape design of the waterfront slow-moving space is based on the traffic organization of the slow-moving roads, integrating the surrounding landscape nodes with recreation and landscape, and providing service facilities to achieve safe and convenient travel requirements. The components of the slow-moving space include the slow-moving road network and the slow-moving supporting facilities.

3.4.1 Network

The slow-motility road network is the basic structure of the city's waterfront slow-moving space, and is the basic guarantee for the slow-moving system to operate. The slow-moving network is mainly used to connect attractions and organize tours. The slow road network has the characteristics of linear space, and the space boundary is clearly defined and has strong directionality. The slow-motility road network consists of three elements: a slow path, a slow line node, and a slow line area (Fig 3-7).

1) Path

A slow-motility path is a fundamental component of a slow network. According to different division methods, it can be divided into two categories: 1 according to road grade, it can be divided into main roads, secondary roads and branch roads; 2 according to road types, it can be divided into bicycle roads, walking roads, mixed roads, and so on.

2) Node

A slow-motility node is a node that the slow network crosses. Mainly divided into two categories: ① Traffic node, can be divided into plane traffic nodes and three-dimensional traffic nodes. Such nodes are highly passable and cannot be retained, such as road intersections, stair steps, etc.; ② Landscape nodes, nodes with certain landscape values, generally close to the path or at the end of the path, such as hydrophilic platforms, landscape towers.

3) Zone

The slow-motility zone is the site where more activity occurs in a slow network. Mainly divided into two categories: ① Collection space, mainly refers to the entrance and plaza area, such space scale is large, including a variety of activity types; ② Activity space, all related activities have their own activity space and area, including basketball court, Badminton courts, playgrounds, etc.



Fig 3-7 The network of slow-motility space in Chaoxi Lake waterfront

3.4.2 Supporting Facilities

Slow-motility supporting facilities are an important part of the urban waterfront slow-motility space. The basic function of the slow-motility supporting facilities is to meet the different needs of the slow-mover and provides the assistance and services to the slow-mover. The slow-motility supporting facilities reflect the quality of the slow-motility space from the side, and directly affecting the slow-motility satisfaction of the slow-motility space. The slow-motility supporting facilities are generally evenly point-like distribution in space.

1) Slow-motility station

The main function of the slow-motility station is generally bicycle rental and replenishment. It can also

provide rest, diet and other services for slow-mover. The establishment of a station will help slow-movers to increase their walking distance and provide the necessary protection and services for the slow-movers. As a comprehensive service place, the station should be combined with public transportation stations such as subway stations and bus stations to facilitate users to transfer to different modes of transportation.

2) Traffic identification

The urban waterfront slow space is a green low-carbon space for residents to relax, exercise, ride and socialize. The establishment and improvement of the identification system can ensure the personal safety of residents. Traffic signs are generally divided into guide signs, travel signs and warning signs. The navigation indicator is the direction of the slower direction and the location of the relevant activity venue, so that the slower can go to the desired destination, such as a road sign, in a targeted manner. The marching sign indicates the road condition for the slow-moving person and guides the slow-moving person to travel in the road of his or her activity mode, such as a traffic light sign, a dedicated bicycle lane, and the like. The warning sign reminds the slow-mover to pay attention to the matter, and at the same time, it shows that the slow-moving person is vigilant in the special area and timely takes necessary protective measures, such as slowing down.

3) Service facilities

The service facility system includes leisure seats, trash cans, public restrooms and kiosks to facilitate user activities. The service facilities have direct contact with the slow-movers, and at the same time have the most direct impact on the slow-moving people in terms of function. The sensory aspect of the slow-moving person's impression of the overall landscape is also the key detail of the humanized design.

4) Security facilities

Safety protection facilities include guardrails, speed bumps, zebra crossings, traffic light signs, etc. to ensure the safety of slow-movers. The security facility is based on a visual and tactile sensory experience, with a flat logo combined with a three-dimensional entity. Warning signs are mostly based on vision, while protective facilities are generally based on physical objects to separate or intercept slow-movers, ensuring the personal safety of slow-movers.

5) Lighting facilities

The waterfront slow-motility space is mainly for leisure and entertainment, and the service time is long. It is necessary to ensure the efficiency of use at night. The construction of the lighting system can meet the requirements of urban residents to use slow-motility space in the evening, providing a safe and reliable guarantee for the waterfront slow-motility space. While ensuring safety, the lighting facilities can also create a landscape atmosphere and enhance the characteristics of the waterfront landscape.

Chapter 4 Landscape Design Method of Urban Waterfront

Slow-motility Space

Based on the above research on the user's behavioral characteristics, psychological needs, visual and waterfront spatial interaction and other perception principles. This chapter mainly discusses the urban waterfront slow space landscape design method from the aspects of structural organization, spatial sequence and artistic design, path and line design, node and detail design of the waterfront slow space, aiming to adapt and promote walking. Waterfront landscapes such as cycling.

4.1 The program of urban waterfront slow-motility space landscape design

4.1.1 Analysis site

The basic information of the site is analyzed from three aspects: urban construction, terroir culture and site conditions. First, interpret the city's overall planning, green space system planning and other information, and clarify the planning and design goals and positioning of the waterfront site based on urban functions (Fig 4-1), and provide direction for the theme design of the core vision. The waterfront slow-motility space needs to be connected with urban roads and traffic. Therefore, it is necessary to analyze the traffic system planning around the site (Fig 4-2), grasp the current situation and the main flow direction of the future, and provide the basis for the slow-motility path organization. Secondly, it collects information on urban history (Fig 4-3), culture and customs, and provides a source of inspiration for the creation of artistic conception in slow-motility spaces. Finally, on-site reconnaissance, analyze the basic conditions such as site topography, ecological environment, surrounding landscape resources, and make full use of the site's natural resources and characteristics to create a slow overall atmosphere.

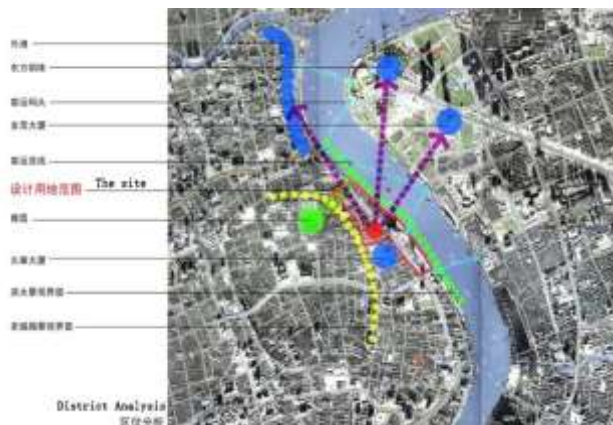


Fig 4-1 The district analysis of Shiliupu district

Fig 4-2 The traffic analysis of Shiliupu district

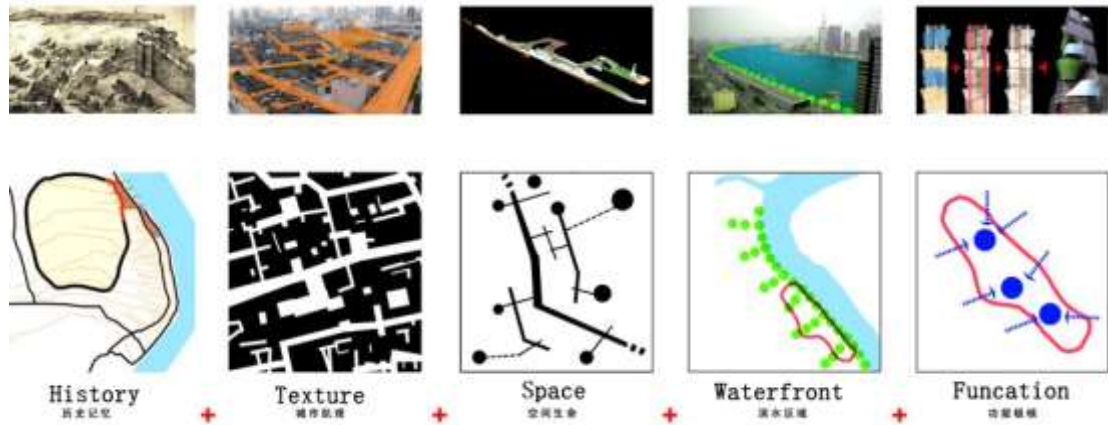


Fig 4-3 The history, texture and special structure analysis of Shiliupu District

4.1.2 Clear requirements

Analyze the land use situation and service population around the waterfront site (Fig 4-4). Survey and summarize the existing slow space usage, behavior types and residents' needs. Analyze the behavioral characteristics of slow-moving people in this regional culture. Understand people's evaluation and expectations of the current waterfront slow space. Defining the behavioral needs to be met by the landscape design of the waterfront slow space. Initially identify landscape themes and positioning to adapt to the needs of the behavior.

Service population		Demands of the population:	
金融 高管		高级江景豪宅、高端私人会所、私人收藏博物馆、景观花园和运动场、奢侈品专卖店、派对场所、高级定制	
企业 中高层		江景住宅、高端酒店、文化演艺场馆、奢侈品商店、高级餐厅、宴会场所、高级定制、国际学校	
行业 精英		高级公寓、SOHO办公、LOFT工作室、江景酒吧、高级购物中心、特色酒吧、室内运动馆	
商务 白领		商务酒店、江景餐厅、咖啡厅、酒吧、室外草地、健身房、综合购物中心、文化娱乐场馆	
周边 居民		学校、医院、综合购物中心、餐厅、健身房、广场绿地	
游客		旅游购物商店、江景酒吧、室外草地、休闲茶室、游船码头、特色博物馆	

Fig 4-4 The service population and their demands analysis

4.1.3 Building a structure

Based on the analysis of site characteristics and the needs analysis of the population, the comprehensive characteristics and main needs are obtained. Based on this, the structural relationship is constructed and segmented reasonably to determine the function, theme and characteristics of each part waterfront

landscape (Fig 4-5). In the structural design, it is integrated with the surrounding land, and the corresponding slow-moving activities and space are arranged according to the main groups of services. Through the reasonable arrangement of the structure, it provides an order for the continuously changing space during the slow-motility movement.



Fig 4-5 The structure analysis of Shiliupu District

4.1.4 Organizing the tour line

According to the analysis of the surrounding traffic system and pedestrian flow, organize the waterfront area as a whole and the slow path of the paragraph to determine the size and location of the node. The path setting needs to be integrated into the urban pedestrian transportation system to connect the urban public space. According to the characteristics of slow-motility behavior of different groups of people, a variety of multi-level paths are set up to fully stimulate the interest and curiosity of the slow-movers, so that people can enjoy the urban scenery and the historical and cultural connotations during the slow-motility movement (Fig 4-6).



Fig 4-6 Multi-level paths was designed in Shiliupu waterfront district

4.1.5 Planning events and activities

Based on the analysis of landscape features and the needs of different groups of people, carry out a variety of event planning to build a unique landscape experience theme. Through the development of relevant experience activities, users can understand the subtleties of regional culture from various perspectives, such as festival activities and folk activities (Fig 4-7). When planning activities, consider the behaviors and psychological needs of people in different locations, different environments, different seasons, and different spaces, and use the various elements of the city's waterfront space and the organization of the tour to create a variety of scenarios that meet people's needs and increase the fun of the landscape.



Fig 4-7 Events-based activities in waterfront area

4.2 Organization of the functional structure

The slow-motility space is not only a riverside walkway with traffic functions, but also a dynamic landscape space that focuses on artistic conception and spatial fun. According to the trend tendency of slow-motility behavior, most slow-movers will first tend to be multi-functional, providing a variety of experience and experience options, such as the civic square, the sun lawn (Fig 4-8). The rich functional activity space creates the vitality of the waterfront space. Organize the associated activity scenes based on functional relationships will enable each functional area to have its own unique and harmonious slow-motility atmosphere⁴⁷, and became a prerequisite for the slow-motility activities.

⁴⁷ Huang Ai. Urban Waterfront Linear Landscape Planning and Design [D]. Central South Forestry University of Science and Technology, 2007.



Fig 4-8 Activities that can happen in waterfront

The function of slow-motility includes fitness, viewing, communication, closeness to nature, feeling the city, understanding history, thinking about meditation, and so on. The corresponding functional space includes the river trail space, the forest walking space, the stream stone path space, and the cultural corridor space. Each functional space needs to determine the strolling theme according to its functional requirements, and to create a different style of slow-motility space based on one or a certain type of slow-motility activities. So that people can form a distinctive impression by combine their own experience with the continuous indirect perception.

Common landscape function plane structure relationships include sequence type, branch type, center type, grid type⁴⁸. The waterfront space is generally a narrow space with a limited width, so the functional structure should adopt a sequence type, including a longitudinal sequence and a lateral sequence. The specific structural forms include axis-belt-spot, axis-belt, axis-spot, belt-spot.

①Axis: including the real axis and the virtual axis, the real axis refers to the traffic axis, including the walking and bicycle lanes inside the waterfront area, and the virtual axis refers to the channel itself and the longitudinal or lateral structural axis or the sight corridor.

②Spot: the gathering point of the crowd, and it is also the point of interest and visual attraction in the slow-motility process, including the riverside landscape nodes and activities, highlights and so on.

③Belt: refers to the riverside space leisure green space dominated by plant landscape, filling the middle area between the axis and the axis, the axis and the point. It is mainly composed of plants and small landscape nodes, which is a slow-moving viewing experience belt.

⁴⁸ Wang Xiaojun. Landscape Architecture Planning and Design [M]. Jiangsu Science and Technology Press. 2008

4.2.1 Axis - belt – spot mode

The axis-band-spot structure (Fig 4-9) is represented by the New South River Park in New York (Fig 4-10), forming a combination of riverside walkway-leisure green belt-node. The activity content is comprehensive, forming a dot-line composition, suitable for waterfront with a width of 50-200m.

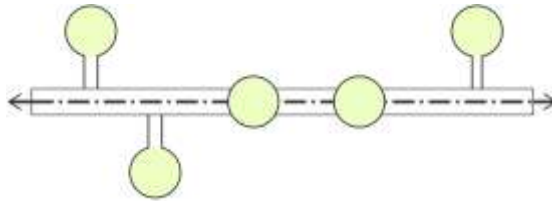


Fig 4-9 Axis - belt – spot mode functional structure

Fig 4-10 The New South River Park in New York

4.2.2 Belt – spot mode

The structure of the belt-spot (Fig 4-11) is represented by the urban design of the Suzhou Creek in Shanghai by Sasaki company (Fig 4-12), forming a combination of leisure green belts and nodes. The waterfront activities are mainly strolling. The venues are scattered in the linear space in the form of spot or belt. It is highly compatible with the waterfront area and is suitable for waterfront areas with a width of 30-100m.

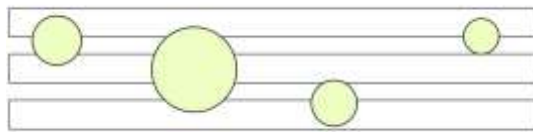


Fig 4-11 Belt – spot mode functional structure

Fig 4-12 Suzhou Creek in Shanghai by Sasaki company

4.2.3 Axis-spot mode

The axis-spot structure (Fig 4-13) is represented by the landscape of Singapore's Rochor canal (Fig 4-14), forming a combination of riverside trails and nodes. The space is dominated by walking, forming a continuous chain of open spaces. It is a combination of riverside trails and rest points, suitable for waterfront spaces with a width of 30-50m.

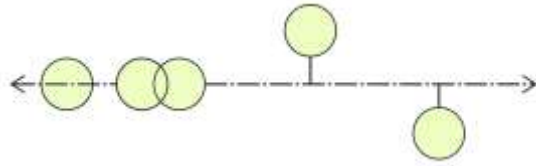


Fig 4-13 Axis-spot mode functional structure



Fig 4-14 The landscape of Singapore's Rochor canal

4.2.4 Axis- belt mode

The axis-belt structure (Fig 4-15) takes the Chicago Riverwalk Expansion (designed by Sasaki company) as a representative case, forming a combination of riverside trails and leisure green belts. This type of waterfront has comprehensive functions and is the link between urban public spaces, with a wide radiation area. It is suitable for waterfront space with a width of 10 -30m.



Fig 4-15 Axis- belt mode functional structure



Fig 4-16 Riverwalk concept typologies



Fig 4-17 The Maria – state to Dearnorn

To determine the functional structure relationship of the waterfront slow-motility space, it is necessary to take the function as the leading factor, comprehensively measure the width of the riverside green space, the service population, the nature of the surrounding land, etc., and select the appropriate structural form to organize the order of the slow-motility space. For example, the design of the Shanghai World Expo Houtan Park. In the narrow strip between the Huangpu River and the Expo site, the Turen scape design company has formed a number of interfaces through terrain reconstruction, including intertidal wetlands, riverside reed belts, inland wetlands and terraced turf belts, and distributed in multiple nodes in these interfaces (Fig 4-18).



Fig 4-18 The functional structure of Shanghai World Expo Houtan Park

4.3 Organization of the space sequence

The slow-mover's feelings about the waterfront space are not simply superimposed, but in a multi-dimensional intersection of space and time, the continuous vision associated with the movement is compounded after the comprehensive synthesis of psychological perception⁴⁹. The spatial sequence forms the order of the tour. The continuous space experience formed by this order guides people's movement direction in the direct perception stage, stimulates people's emotions in the indirect perception stage, and finally through the extraction and integration of the perception system, the rambler's overall feeling of the waterfront space is formed. Walking the spatial sequence not only needs to establish a rich spatial order, but also pay attention to the setting of time order.

4.3.1 Spatial sequence organization mode

The shape of the spatial sequence can be abstracted into the structural relationship between the node space and the main path space. The overall space of the waterfront space is linear, and the basic pattern of the sequence is a line combination. Because the main axis direction is vertical and horizontal, the connection between the linearly arranged node space and the traffic axis (walking path, waterfront trail) is different, subdivided into the following organizational models:

1) Tandem mode spatial sequence

A main traffic axis runs through the whole, and the joint space is connected one by one in the direction of the river. The space of nodes with the similar size, form and function is repeated, which constitutes a series of landscape sequences (Fig 4-19). This sequence of walking paths and the landscape node space are on the same traffic axis. Usually, the riverside walkway is connected in series, which is easy to create a variety of water and hydrophilic activities, such as viewing platforms, rest seats, water steps, etc. If there is a condition to create a wetland walk space, a sequence of experiences with a rhythm of leading,

⁴⁹ Shen Kening. Space perception Time and memory in [J]. Architect, 2015, 04:48-55.

developing, climax, and ending can be formed. Compared with the other two modes, the spatial mobility is stronger, the spatial sequence forms a stronger sense of direction, and the walkway can be well combined with the water body to satisfy people's hydrophilic nature. It is suitable for riverside green space with compact land, high water level and line of sight along the river side.

The landscape design of the riverside road in Changxing (Fig 4-20) has the tandem mode spatial sequence. The waterfront area in this site is narrow. Some parts are wider and can be designed as open spaces or activity venues. The walkway along the river likes an axis connected five activity venues one by one. The contrast, penetration and interpenetration of the space on the axis formed a rhythm sequence.

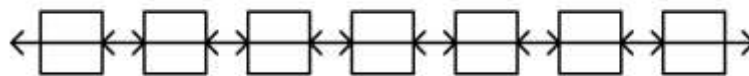


Fig 4-19 Tandem mode Spatial sequence

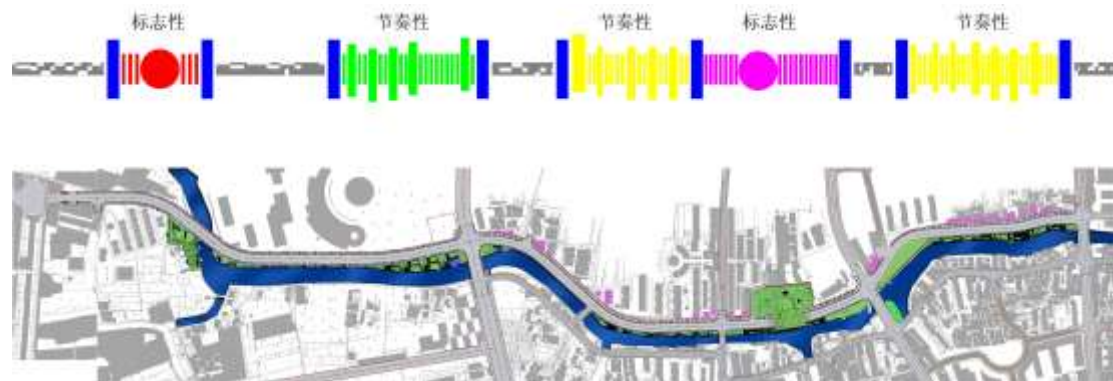


Fig 4-20 The Spatial sequence of the riverside road landscape design in Changxing

2) Parallel mode spatial sequence

The tandem sequence and a linear space are parallel along the river channel constitutes a parallel sequence (Fig 4-21). The green space and the riverside walkway are independent and interconnected. They have a spacious embankment space and a walking space under the forest. The parallel type adds a horizontal spatial sequence on the basis of the series type, and can create a plurality of open small-scale spaces in the series sequence part, so that it can be interspersed with the line space to form a rich tour space sequence. It is suitable for the waterfront space with a slightly larger green space. It strengthens the interaction between the node space and the water body during design, enriches the form of the riverside walkway, strengthens the internal and external connections, and handles the line-of-sight relationship with the water surface.

The Bund flood control wall (Fig 4-22) is located on the west side of the Huangpu river and on the east side of Zhongshan east road. the design is bounded by Huangpu park in the north and Yan'an east road in the south, about 1km long. The original space is reorganized by linear space as the dominant and partially

interspersed with square nodes. the linear space forms an overall sense of stability, while the insertion of the square nodes is a stable overall change. The space is reorganized by means of stability and change, forming a new image of urban landscape, and highlighting the rhythm and order.

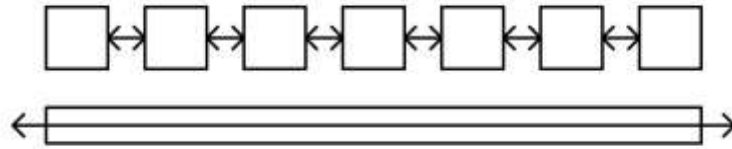


Fig 4-21 Parallel mode Spatial sequence



Fig 4-22 The landscape design of the Bund flood control wall

3) Compound spatial sequence

The series sequence intersects with the transverse line space vertically, and the space expands in two directions⁵⁰. This mode increases the longitudinal spatial sequence relative to the parallel type, giving the space a diachronic nature in both directions (Fig 4-23). The composite sequence can more directly connect with surrounding buildings, squares, and road spaces, and quickly introduce people into the riverside walk space. Due to the similar pattern of walking visual perception, the longitudinally arranged sequences should be related in terms of spatial size and shape, so as not to affect the appearance of non-continuous views and influence the length of the walk.

⁵⁰ Qian Chen. Research on the basic pattern of spatial sequence [D]. Zhejiang University, 2003

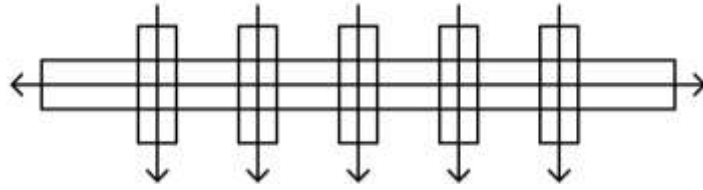


Fig 4-23 Compound Spatial sequence

The Liuwu River is located in the central and western part of Xiajin County, Shandong Province, and it runs through the entire city. The landscape design project includes the riverside green belt and three riverside parks of the Liuwu River. The width of the waterfront trails on both sides is only about 2m. The waterfront was built to be a green belt with a walkway inside, and the three riverside parks connected between the waterfront and the city, formed a compound spatial sequence (Fig 4-24,25).



Fig 4-24 The site plan of Liuwu River



Fig 4-25 The structural analysis of Liuwu River landscape

4.3.2 Method of organizing spatial sequences

1) Spatial contrast and slight difference

Contrast and slight difference are the main ways in which spatial sequences can change. “Contrast refers to significant differences between elements, and slight differences refer to insignificant differences. Contrast can be based on each other to highlight their respective characteristics in order to obtain change, and the difference can be obtained by mutual commonality harmony”⁵¹. It can be said that the contrast corresponds to a mutation visual perception, while the slight differential corresponds to the visual perception of the gradient change. A series of elements of continuous differential variation can maintain continuity and form a gradual change, and if several elements are removed from it, continuity is interrupted, resulting in dramatic mutations (Fig 4-26). Slow walking is a continuous process. Through the gradual change, the continuity of the slow-motility space can be maintained, and the mutation can make a deep impression. Combine these two methods to organize the spatial sequence and form the effect of diverse and unified dynamic space.

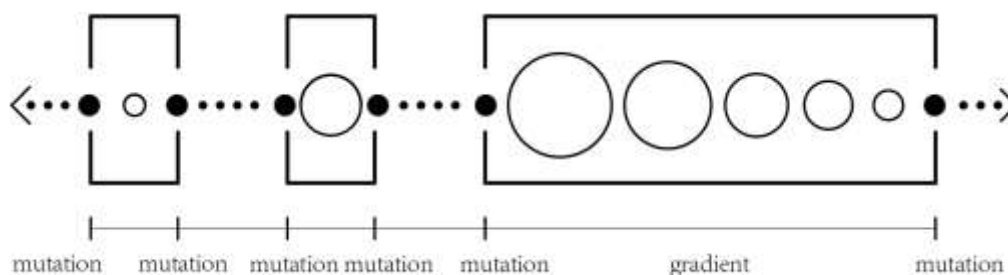


Fig 4-26 Gradient and mutation diagram

Traditional spatial comparison methods include: size, shape, straightness, light and dark. The waterfront slow space because of the limited lateral width and few clusters of hard sites, so the application of space size comparison is less, but mainly through the opening and closing comparison, the comparison of internal and external space, and the straightness of the road to form an orderly change in the spatial structure. When two spaces with significant differences are arranged together, the structural features are more prominent due to the comparison of features such as openness and claustrophobia.

The structure consisting of open-semi-open-closed, open-closed-opened and other spatial changes forms rhythmic rhythm and progressive hierarchical relationship, allowing slow-movers to feel the transition of space during the tour. This type of organization is suitable for natural slow spaces where plants create space. For example, in the French park on the banks of the Saône River (Fig 4-27), the spatial structure forms a jungle (closed) - lawn (open) - sparse forest (semi-open) rhythm changes. When people walk on the winding trails or along the river trails, they feel the rhythmic spatial sequence. There is a small and medium-sized experience, as if walking through the natural forest.

⁵¹ Peng Yigang. Architectural Space Combination Theory [M]. China Building Industry Press, 2008



Fig 4-27 Saône riverbanks site plan

2) Space transition and convergence

In the sequence of walking landscapes, if the contrast space is directly connected, the spatial sequence is non-continuous, which will make people feel awkward and chaotic, resulting in a sense of breakage. Therefore, the organization of spatial sequences requires convergence and transition to improve continuity, while at the same time promoting a slow-paced sense of rhythm. The transition space is usually used as a development part of the spatial sequence, as a space for the main scene and the accumulation of emotions. Generally, there is no functional requirement, the space should be as small as possible, and the landscape elements are less, so that it can play a role in accumulating potential⁵². For example, before the slow-mover arrives at the main open node space of the waterfront, the creeper and the forest space are buried first, so that the slow-mover can generate more intense excitement when reaching the node.

The waterfront slow-motility space is mainly open and semi-open space, and the vertical interface is mainly plant. When walking, it is in the process of continuous visual perception. According to the closed-law principle of visual perception, the higher the sealing, the more complete the spatial shape, and the space tends to be inward and stationary, corresponding to the stopping behavior. On the contrary, the partial enclosure, that is, the space with low closure, has fluidity and can guide people to continuously enter the next space.

By breaking the spatial interface, the spatial closure is weakened, and the space is extended to create space penetration and flow. For example, in the Shiliupu District Urban design project (Fig 4-28), we use slop paths and green space to break the observatory's boundary, allowing the space to extend along the path and merge with the surrounding space. In addition, the boundary is incompletely and blurred, and the boundary space is interspersed with each other, which is the bottom of each other, so that people cannot quickly and clearly perceive the existence of boundaries, and the space can blend with each other,

⁵² Yang Fan, Jin Ling, Sun Zhili. Organization of Landscape Sequences [J]. Central South Forestry Investigation and Planning, 2000, 04:39- 43

and can also break the closedness to form a flow space. For example, in the New York High Line Park (Fig 4-29), soft plants and hard pavements are interlaced to achieve a single space blur and multiple spaces.



Fig 4-28 The roof walkway of Shiliupu district in Shanghai Fig 4-29 The New York High Line Park

4.3.3 Creation of the artistic conception

Ashihara Yoshito explained the space in "External Space Design": "Space is basically caused by the relationship between an object and the person who feels it"⁵³. The creation of landscape conception is the way to organize time order through spatial sequences. During the slow-motility process, slow-movers pay more attention to detail perception and meaning interpretation. The perception system needs to be arranged in an order, so that the final feeling is concise, complete and profound.

Chinese classical gardens make good use of the senses of hearing and taste, as well as the use of seasonal and climatic changes to give the garden a poetic and artistic conception. The artistic conception of modern landscape design is realized by a narrative spatial sequence. The landscape spatial sequence can be seen as a narrative process for designers to present a series of visual views to slow-movers for a certain experience and feelings⁵⁴.

The plot creation of narrative techniques can be summarized into themes, rhythms, and conflicts. First, the narrative sequence should be based on a common theme, allowing people to continuously integrate and deepen the theme impression while visiting the linear space sequence. Secondly, a good sense of rhythm can bring a lot of emotional changes to the Rambler and realize the psychological needs of pursuing meaning. Finally, the use of conflict techniques can give people unexpected surprises, resulting in a peak-turning, fascinating effect.

1) Image symbol expression space node

⁵³ Awara Yoshishinori; Yin Peitong translation. External space design [M] China Building Industry Press. 1985

⁵⁴ Zhu Xiaotong. Research and application of landscape space experience based on narratology [D]. Southwest Jiaotong University, 2013

A series of consecutive nodes along the River in Shanghai Houtan Park, such as colored shade and rust-colored long scrolls, use image symbols to create imagination and create an endless artistic conception.

"Lotus in the waterfront" (Fig 4-30): it is woven from many tiny metal pieces, the decorative pattern is similar to the back pattern, hanging on the white stigma, powdered and white, in the hot sun Under the illumination of the lights, there are colorful images. This kind of void design method, avoiding the boring situation, greatly enhances the spirit of the scenery.



Fig 4-30 Lotus in the waterfront



Fig4-31 Rust long roll

"Rust long roll"(Fig 4-31): It is made up of recycled scrap steel from the original site, like a stretch of satin. When it floats on the ground, it is paved, and when it is dancing into the air, it turns into a frame and closes the landscape. The setting of the frame makes it intentionally block the sight and psychological experience of the visitor, inducing the visitors to explore the mood and make a multi-angle and all-round tour.

2) Narrative landscape sequence

The imagery element in the spatial pattern of urban waterfront landscape design is a symbol of expression space, and the subjective feeling of emotional catharsis and place identity generated by people in the time process of landscape space form experience is the creative method of artistic conception. The rambler has the psychological need to actively seek meaning. The city's waterfront area has a long history. The coastal areas are connected with the scenes of traditional life scenes and historically important viewing nodes, providing design materials for the creation of space artistic conception. In particular, the waterfront space of historical and cultural cities preserves the poetic title of the classic literati and the literati recorded in the landscape. These poetic titles represent an important landscape point or historical scene. Some of them disappeared due to urban construction, but they became the key point for the historical traceability of the line-type riverside green space landscape. The

creation of the modern waterfront landscape can continue the historical "script" to form the experiential order of the linear space. Through continuous poetry and painting, the Rambler associates the existing landscape with the historical image, and the imagination and the reality are interwoven. Together, I walk, feel, and expect in the feelings and reflections of poetry and painting.

The modern waterfront landscape uses a narrative spatial sequence such as Nanbin Road in Chongqing. Dock culture and historical allusions provide cultural clues to the spatial sequence of Nanbin Road. The scenic spots along the coast of Nanbin Road are taken from the 12 scenes of Bayu culture⁵⁵. For example, the first attraction of the space series was once an important ferry crossing for business travel (Fig 4-32). Now that the ferry is not in the prototype, the scenic area recreates the historical scene with landscape elements such as sculptures and stone carvings, allowing the slow-movers to think of the scenes of thousands of sails when they look at the water.



Fig 4-32 The stone carvings in Nanbin Road

The narrative spatial sequence can not only describe the historical scene at a certain point in time, but also describe the locality formed by the overlapping of landscape images in different historical periods on the same site. The urban waterfront space has undergone the function evolution of “energy supply—agricultural transportation-industrial production-leisure recreation”, Its diverse culture records the traces of urban historical development.

The Houtan Park adopts a three-dimensional layering method to analyze and interpret the history and future of the site in the context of time, superimposing the three levels of civilization imagery (Fig 4-33) of the pastoral aftertaste, industrial memory and post-industrial civilization⁵⁶. In the construction of “Farmland” (Fig 4-34), high-pitched terraces, ridges, grain crops, cash crops, native plants and trees are all different landscape symbols of farming civilization affect people's sense of consciousness through diverse landscapes. The industrial memory of Houtan Park is reflected in the preservation of industrial

⁵⁵ Yang Jingqiao. Research on the spatial composition of the waterfront area of Nanbin Road in Chongqing [J]. Journal of Southwest Agricultural University, 2011, 05: 13-17.

⁵⁶ Yu Kongjian. 2010 Shanghai World Expo Park - Houtan Park. Beijing: China Building Industry Press, 2010

sites such as industrial plants and cargo terminals, using the method of stripping and reappearing to force the plant. The structure is preserved and displayed, highlighting the simplicity of beauty, and built a comprehensive service center “Sky garden” (Fig 4-35); the original Linjiang Wharf was preserved and designed as an ecological water garden and observation deck; a rust-colored long roll folded from steel plates There are countless vicissitudes of memory. These symbols guide people to integrate their feelings and look for places in the industrial age. Industrial civilization continues the memory of agricultural civilization and industrial civilization, showing the development trend of ecological civilization, enabling people to experience and enjoy the ecological services of the ecosystem, and to obtain education and aesthetics. Houtan Park has removed the cement flood control wall and switched to the stone cage and the gravel is used for ecological transformation of the river bank. The large area of reed and thatch can purify the water.

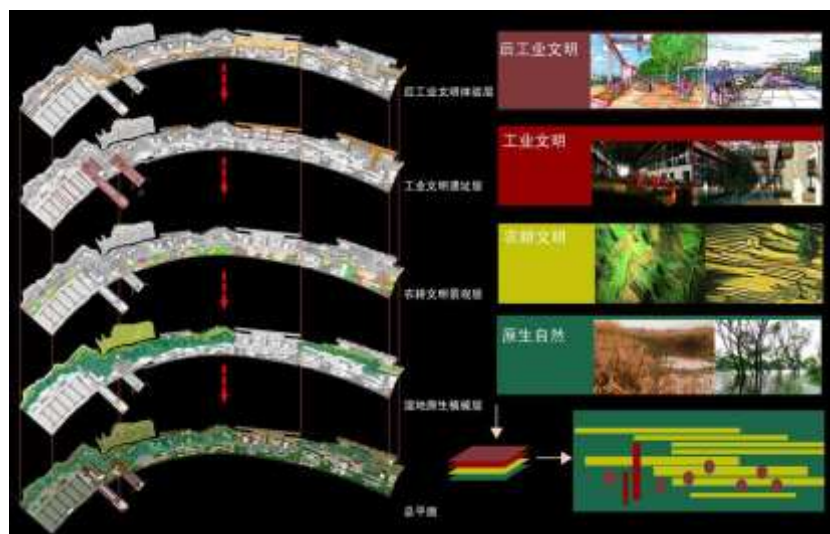


Fig 4-33 Three-dimensional layering in Houtan Park

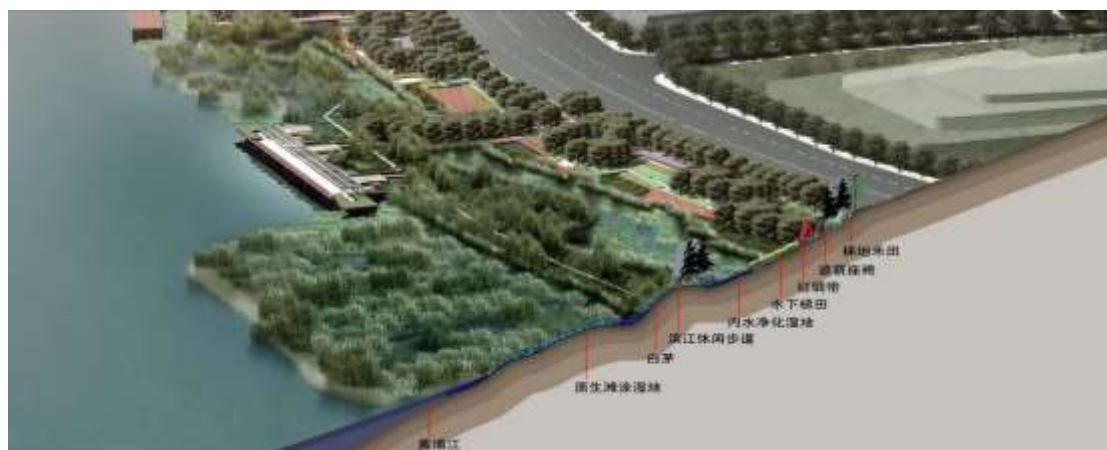


Fig 4-34 The Farmland in Houtan Park



Fig 4-35 The Sky garden in Houtan Park

4.4 Organization of the path and view

Path organization in landscape design refers to the setting and arrangement of the tour route. The path organization of the waterfront slow-motility space is not only a traffic organization but also an organization of spatial sequences and visual sight. The important means of organizing dynamic tours and creating emotional experiences is to guide the direction of slow behavior through paths.

4.4.1 Enhance landscape perception with dynamic views

Path experience is one of the ways people experience positioning based on access routes. In the process of traveling, the continuous series of paths form a series of continuous experience spaces. Chinese classical gardens pay attention to "different and dense, and the source of the pulse". We should pay attention to the change and continuity of the bottom interface and the side interface in the process of path experience. The path experience is affected by the speed of travel. Generally speaking, the fast-passing experience can only perceive the overall impression of the landscape, while the pedestrian-based mode of transportation is more aware of the detailed processing of the landscape.

Vietnam Veterans Memorial is a simple and powerful landscape design, it enhances the perception of the landscape by designing the route (Fig 4-36,37). The design is based on the concept of wound, engraved with a fold line on the natural hills. This fold line is a black granite wall with two v-shaped intersections. The walls are engraved with the names of all the Vietnam War soldiers. The ends of the line point to the Washington Monument and the Lincoln Memorial. The route of the visitors is limited to the masonry road next to the wall. Throughout the course of the journey, the road gradually sinks with the terrain, the height of the dark wall gradually becomes higher, the names of the dead on the wall are more and more, and the atmosphere is becoming more and more dignified. Up to 3.1m in the deepest part of the intersection of the two walls. After the turning point, everything gradually became lighter, and finally it was calmed down by the obelisk in the distance. In the course of walking less than 500m, the changes in

height, slope, line of sight and landscape have made people feel the pain and hope after the whole war.



Fig 4-36,37 The Vietnam Veterans Memorial

The path of conscious organization allows people to experience continual and instantaneous feelings, have a deep understanding of the theme of the landscape, and also create a multi-sensory experience with phenomenological landscape design methods. However, it is also necessary to properly "save blank" to provide a suitable place for unconscious and purposeless slow-motility behavior, allowing individuals to freely appreciate the scenery they like and decide whether to go inside and feel it. The path that is not deliberately guided can trigger people's curiosity, and can also guide the slow-mover to feel freely. In the Shanghai Houtan Park, there is an ecological space made up of rocks and shrubs. People can roam and shuttle along the winding paths without purpose (Fig 4-38).



Fig 4-38 Shanghai Houtan park

4.4.2 Guide the direction of motion by path

The linear waterfront space itself has directionality, but the direction is single, and it is always easy to create a monotonous feeling when walking in the same direction. Therefore, change the direction of movement through the guidance of the path to create fun and change is needed. In addition, when the rambler is tired, the guiding cues can stimulate his desire to explore, maintain the state of motion, and

promote the flow of walking.

The shape of the path space with a sense of direction can guide the direction of motion, such as a line shape, a trapezoid shape, a long arc shape, and the like. The road space can be surrounded by wavy flower beds and benches to guide the Rambler to move in the direction of the design unconsciously (Figure 4-39).

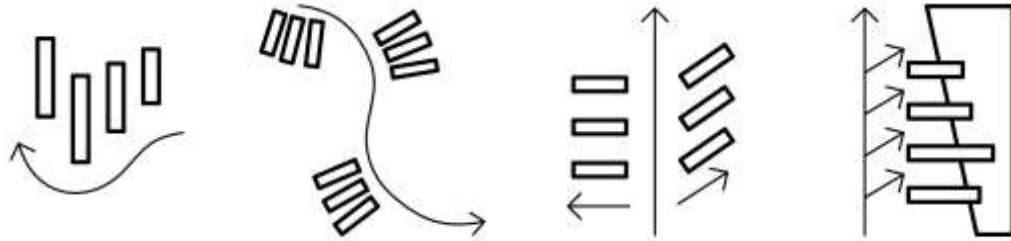


Fig 4-39 Borders guide the direction of walking

In the landscape design of the Bund Flood Control Wall in Shanghai, we defined the path by different color in pavement and the benches as a border form (Fig 4-40). In the landscape design of Baisha River in Weifang, the boundary line is designed on both sides of the walkway, and the greening and the scenic wall are further defined outside the line (Fig 4-41).



Fig 4-40 The path in landscape design of the Bund Flood Control Wall in Shanghai



Fig 4-41 the walkway in landscape design of Baisha River in Weifang

4.4.3 Organization of paths and visions

Active scenes and water features are the most important sights for slow-movers, and can be used as a major factor in attracting and guiding slow-movers, guiding sight and walking directions. To become a point of interest, the vision needs its own diversity and attractiveness, creates activity scenes (square dance, children's play, etc.) with functional features, or uses elements such as color and shape to improve the recognizability of points of interest.

The organization of paths and views is also the organization of dynamic viewpoints and sights. “When we go pass, through or observe an object, the visual experience that each situation brings to us is different. The perception of the work or the content that the work itself wants to express will change with the observer's perspective⁵⁷. There are four basic organizational relationships between walking paths and visual views: bypass, pass, through and approach (Figure 4-42). Bypass is the path around the view through, can form an extra-visual dynamic viewpoint of the overall view of the view. Through, let people be a part of the space, can form a strong participation in the view of the scene. Pass, it is usually a medium or far-sighted way, has a certain guiding effect, does not affect the spatial integrity of the visual view, but the direction of the viewpoint is single, only part of the viewing surface. Approaching, is setting the target Point to guide the way the walking crowd moves to the target view or space. The approaching path line shape can be a curve, a discount or a straight line, and the relationship with the target point can be convergence, roundabout, gathering, and the like.

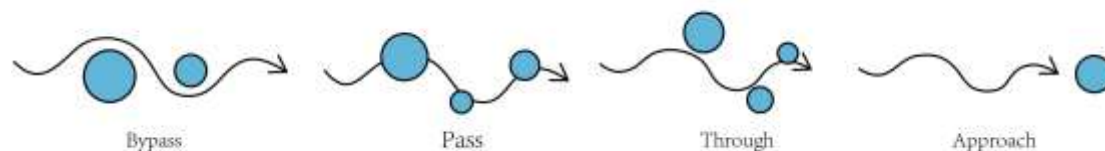


Fig 4-42 Organizational pattern of path and view

1) Sight hiding and exposure

This is a common method used by Chinese classical gardens to create a scenic route. In the waterfront area, the unobstructed view will make people's psychological perceptions lack of change, reducing expectations and walking intentions. With proper hiding and revealing, dynamic viewing effects can be produced for the same scene, and people can see more scenery as the path unfolds.

The main slow-motility path inside the waterfront area requires the use of various organizational relationships between the path and the line of sight, to create an interesting tour order. For example, by organizing a line of sight facing the river, and when entering the waterfront, obscuring the line of sight through the trees, only through see the opposite side of the gap, see the narrow frame, then the more open

⁵⁷ Rudolf Arnheim. Art and visual perception [M]. Sichuan People's Publishing House. 1998

areas, then change the visual focus, only the river surface, then change the view, to see the relatively open view through the trees, then the line of sight is tightened, and finally show an unobstructed panorama.

2) Progressive depth of sight

The waterfront space can realize the depth progression of the line of sight through the organization of structures and paths such as trusses and landscape walls. The so-called line-of-sight depth progression refers to the fact that a person's line of sight crosses different spatial divisions in depth at a certain visit point⁵⁸ (Fig 4-43). That is to say, at the same viewpoint, the space presents different levels of depth in the same line of sight, just as the Chinese classical gardens allow the objects to penetrate each other through the framed scene, increasing the depth of the picture. For example, several landscape walls were used to progress the depth of sight line in the landscape design of Qian Lake Park in Yanzhou (Fig 4-44).

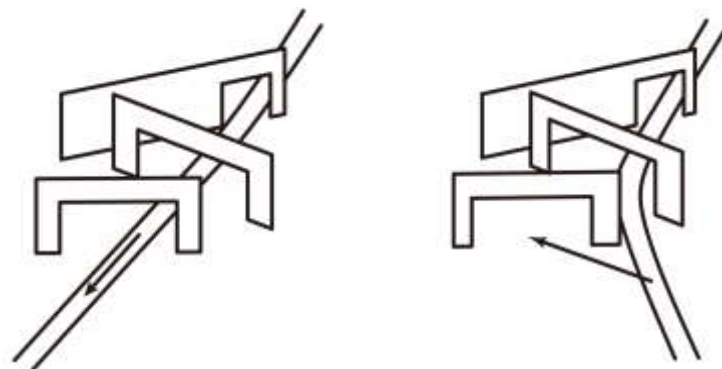


Fig 4-43 Progressive of depth of sight line



Fig 4-44 The landscape wall in Qian Lake Park in Yanzhou

3) Deep progress of the route

Refers to the person's visit position as the route continues to deepen and promote the same vision, the route is approaching (Fig 4-45). On the basis that the path does not break the spatial integrity, the same view, with the change of the viewpoint caused by the approach of the route, presents a different viewing distance from the view. This is a method of forming a variety of viewing gaze through the organization

⁵⁸ Dou Degu. Basic Analysis of Line of Sight and Route in Architectural Space Experience [J]. Taizhou Vocational and Technical Journal, 2004, 03:18-21

and view of the path for a single view. For example, in the landscape design of riverside road in Changxing (Fig 4-46), through the method of route progression, the landscape walls were used to divide the space guides the people's line of sight, provides the possibility of people changing the direction of the line of sight, avoids the line of sight of the simple heading direction, and thus enriches the visual experience.

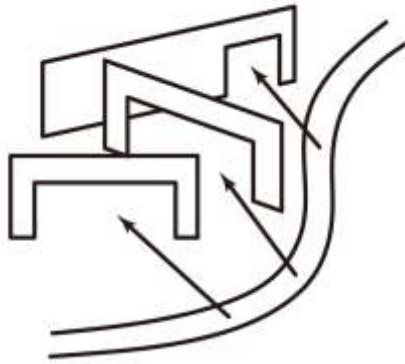


Fig 4-45 Progressive of depth of path Fig 4-46 Landscape design of riverside road in Changxing

4) Dynamic observation perspective

The observation perspective includes a horizontal perspective and a vertical perspective. Changes in the horizontal perspective, such as the changing view of the route, can achieve the effect of step-by-step and form a dynamic observation. The view can be set in the direction of the path and the conversion space such as entrances and transitions to attract people's attention. The application of the vertical perspective in the waterfront slow space is mainly reflected in the shaping of the terrain. The river embankment path forms a multi-level path space through the platform and the ramp, and also provides a vertical line of sight for mutual communication. The central green space can create a hilly landscape through micro-topography, with multi-level planting, so that the viewer can continuously convert the view from the top and the bottom in the slow process, and enjoy the rich dynamic perspective experience process.

In the urban design project of Shiliupu district in Shanghai, the roof of the building is designed as a walking path, and the roofs of different heights are connected by slopes. Different elevations, different scales of squares, trails and greening provide visitors with a variety of viewing platforms. Looking at the Bund and Lujiazui scenery from different heights and angles has increased the perception of the landscape (Fig 4-47).

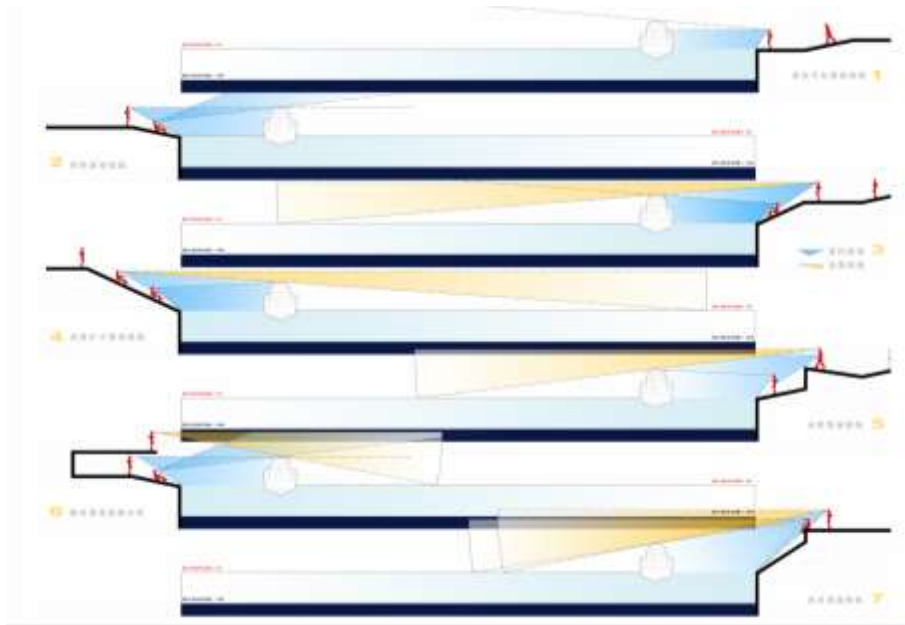


Fig 4-47 Diverse viewing line of sight in Shiliupu district

4.5 Design of the node space

Path space is the main walk experience space in the waterfront area. The node space is scattered among them, which plays the role of emphasis, transition and connection. The node space includes the horizontal and vertical entrances of the line-type riverfront green space, various event venues such as plazas, children's activity centers, etc., as well as seating and standing rest spaces. As a point space or a planar space and a linear space of a path, a node forms a sequence of landscape spaces. A node can be a climax point, a pause point and a turning point in a spatial sequence rhythm, and is an important component of the rhythm of the spatial sequence. The dynamic visual landscape of the line-type riverside green space organized by nodes and paths enables the walking crowd to present behaviors such as walking and stopping by visual and psychological perception. The design of the node space affects the rhythm and duration of people's travel and stationing. It is both an attractive factor for inducing stop and a driving force for people to walk.

4.5.1 Types of node space

1) Activity venue

The various types of activity sites in the nodes mainly refer to the node spaces of various scales and functions distributed and organized along the path, such as the theme square (Fig 4-48), the hydrophilic platform (Fig 4-49), the fitness activity venue, and the children's playground. These event venues provide a great view of the strollers and a short-term interactive stopover.

The setting of the active node must first meet the theme of the space paragraph, highlight the theme through the landscape element and the space atmosphere, and enhance the overall perception of the space

by the Rambler; secondly, provide space for various activities for different walking purposes, such as the event square, children's play, the field, the plant maze, etc., correspond to the psychological needs of the communication, perception, and exploration that the Rambler wants to experience.



Fig 4-48 The theme square of Chaoxi Lake



Fig 4-49 The Marina of Chaoxi Lake

2) Leisure venue

It is necessary to set a space to stay at a certain distance for a rest, and also as a place for viewing, watching, communicating and activities. The rest space includes a recessed stop and rest space on the side of the waterfront slow space, a seat structure, an accessible small hard square, etc. In the compact tandem path structure, the rest space is also a visually appealing point of interest. Through the connection and interspersing of the path space, the rest space enriches the flow characteristics of slow-motility behavior and forms the continuous and transformation of activities such as walking and stopping. It is an indispensable element that constitutes the sequence rhythm.

The rest area must have a certain space to shelter, and maintain a comfortable line of sight with the square, road, water surface, etc., providing personal space and communication opportunities for the stop and rest activities. The waterfront slow space can adopt the concave boundary form to avoid mutual interference between the rest and pedestrians, and form a semi-public and semi-private space. Such space can be defined by the hedges, the height of the steps, the changes in the paving, etc., following the boundary

effect theory, and arranging more rest facilities for people to use, both having a good view and appropriate shelter. Seats, guardrails and other ancillary services should be based on the scale of people's use, enhance the recognizability of the facilities through the expression of details and themes, and simplify the unity as much as possible, such as designing a set of service facilities that conform to the theme, color and overall tone uniformity.

3. Bicycle station and rental point

The station can be equipped with facilities such as small shops, rental points and public restrooms (Fig 4-50). It mainly undertakes functions such as rest, service and consultation. The average distance between stations is 3-5km. Depending on the nature of the venue, you can design a variety of themed stations to enrich the slow experience.

The best distance for cycling is 2km. Therefore, the distance between bicycle rental points on the slow road should be no more than 2km. When the public bicycle rental point needs to be set on the road, leave enough passage space to ensure the walking and cycling.

In addition, bicycle parking spots should be set up in the vicinity of the slow-moving space and urban public transportation, such as bus stops and subway entrances and exits, in order to achieve seamless transfer of public transportation and bicycles. The shelters such as rain shelters and landscape porches can be extended to cover the entire bicycle rental point, and the seats can be used to make it easier for the tourists to rest and avoid the wind and rain during the play, and also to protect the bicycles and other facilities.



Fig 4-50 Bicycle station in Qingdao

4.5.2 Arrangement of nodes

1) Location of the nodes

The position and spacing of the nodes need to be reasonably and efficiently configured according to the time-distance characteristics and basic requirements of the slow-moving mode. According to the walking distance characteristics, active nodes or leisure buildings are set every 500-600m, and large-scale event

venues are set every 1000m. In the book "Communication and Space", Yang Gayer suggested setting a rest seat at least every 100m in the public space, because the physical support distance of the elderly, children and the sick are much less than normal.

2) Organization of the nodes

Adjacent nodes must have a certain degree of association, forming corresponding logical relationships in groups. For example, having the same theme, similar spatial form or element, etc., enables a person to have a sense of breakage in continuous visual perception, thereby maintaining a state of strolling behavior. The joint space between the node space and the path space has a good transition, forming a unified continuous spatial sequence relationship. According to the marginal tendency of people, the node space can guide the direction of the walking behavior through different enclosing methods, so that the node space has fluidity.

Chapter 5 Masterworks

5.1 Landscape Design of Riverside Road in Changxing

Changxing County is located in the northernmost part of Huzhou City, Zhejiang Province, on the southwestern shore of Taihu Lake. It is one of the three counties under the jurisdiction of Huzhou City, and is also the county with the strongest comprehensive strength in Huzhou. In 2010, it ranked 14th in Zhejiang Province and the 45th in the top 100 counties in China.

Changxing County has a long history, profound cultural heritage, rich natural resources and conditions, superior ecological environment, and rapid economic and social development. It is like a sly "Pearl of Taihu Lake". In 2008, the International Garden City Class D Gold Award and Environmental Protection Sustainable Development ranked first. In 2009, Changxing won the title of "Zhejiang Forest City".

5.1.1 Site situation



Fig 5-1 Site location analysis

The Riverside Road is located to the east of Jinling Road, south to Jiefang Road and north to Longshan Avenue. The river is connected to Changxing Port, and the southern section is facing the moat (Fig 5-1). The river flows into Changxing Port through the moat river and eventually flows into Taihu Lake. The river is 14-30 meters wide and has a design length of 3 kilometers. There is a height difference between the river and the riverside avenue, which is about 1.5 meters. The road has a unique historical style on both sides, and it is a river with rich historical and cultural connotations and rich ancient city features.

One side of the road is the moat river, and the other side is a built-up area of the city, most of which are residential areas (Fig 5-2). The riverside green space is relatively narrow, most are less than 10 meters wide. There are also several wide areas in the site, which are the key parts of the design (Fig 5-3).

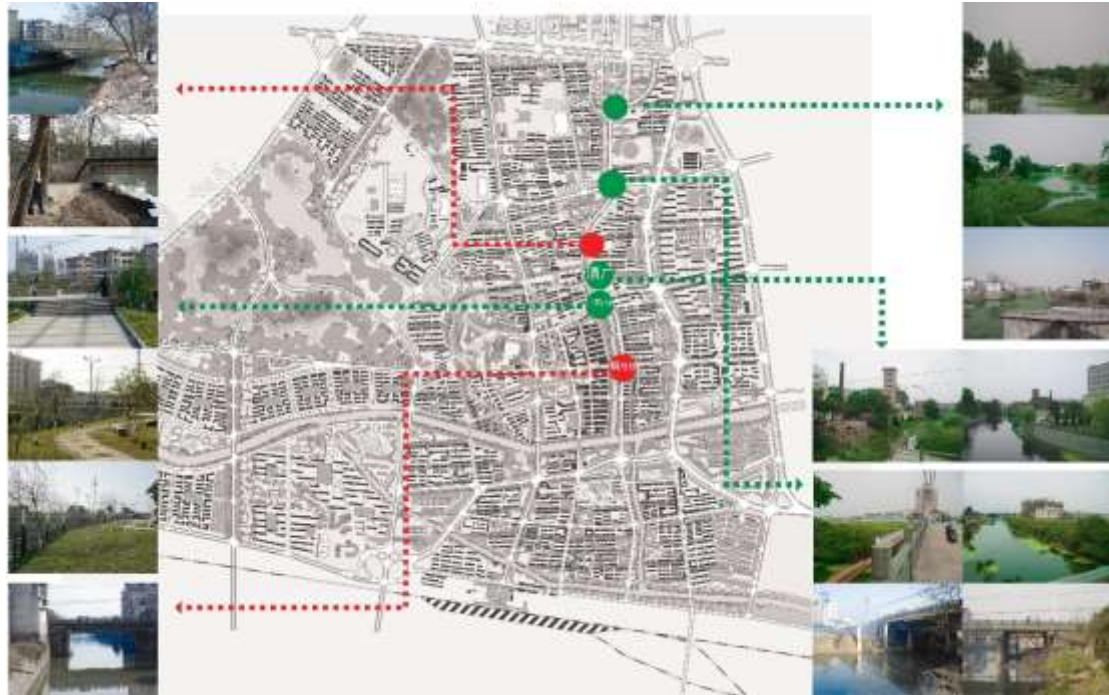


Fig 5-2 Site status analysis

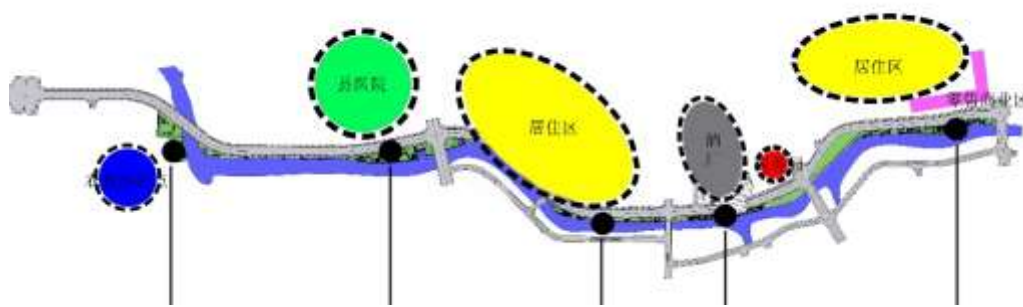


Fig 5-3 Surrounding environment analysis

Part 1, The opposite of the road is a rural residential area, and the vision is the administrative center of the city. The contradiction of the visual environment is more prominent.

Part 2, close to the hospital, the riverside land is relatively plentiful, but the activity of the people is relatively small

Part 3, close to the residential area, there are more people in the activity, but the landscape is relatively tight.

Part 4, the original winery has a certain impact on the surrounding environment, so considering move it out. The open space after the demolition is suitable for the leisure activity square of the city.

Part 5, the land is adjacent to Jiefang Road Commercial Street and the newly built residential area. The commercial activities and people flow activities are high, and thxe riverside land is abundant.

5.1.2 Design concept

The design concept is based on the analysis of the history and culture of Changxing County (Fig 5-4).

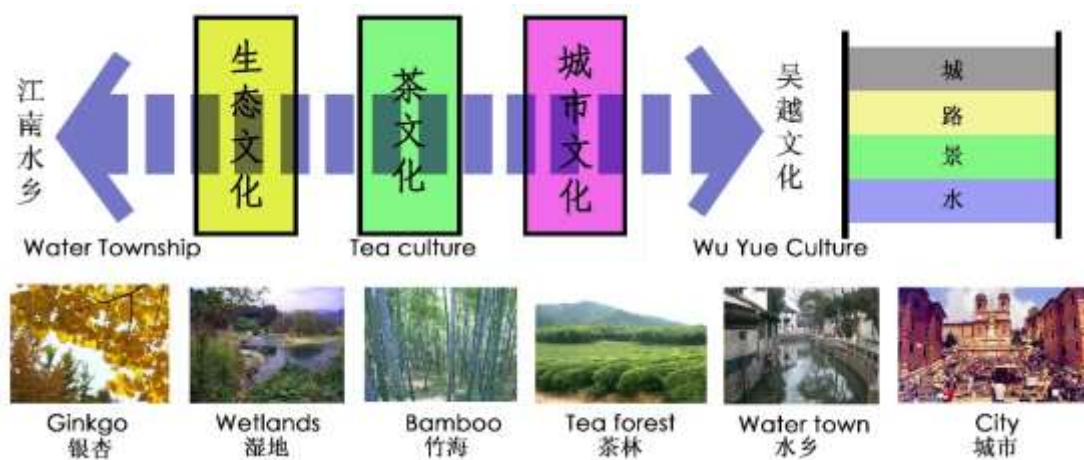


Fig 5-4 Design Concept analysis

1) Natural environment

Changxing County is located in the center of the Yangtze River Delta. It is located at the intersection of Zhejiang, Anhui and Jiangsu provinces. It is located on the south bank of Taihu Lake in Suzhou and Wuxi, and is known as the “Three Provinces Wanted”. Changxing County belongs to the Hangjiahu Plain, and its terrain is high in the west and low in the east. The terrain has both plains and mountains. The rivers in the plains are intertwined, and the mountainous areas are streams and mountain ponds. The main water systems in Changxing include the Xiqiao River system, the Changxing Plain water system, the eastern plain river network and the canal. The water system originates from the western mountainous area and enters Taihu Lake from west to east. There are 20 rivers in the territory can be navigable, with a total length of 59 kilometers. There are 20 lakes in the county, covering an area of about 6 square kilometers. There is a complete moat in the city, and the water network in the city is densely covered. It is a typical Jiangnan water town. Changxing County has ginkgo and other listed as national second-class protected plants.

2) History

Changxing has a history of more than 1,700 years. It was called the Great Wall in ancient times. During the Spring and Autumn Period, Wu Guofu built a city here. The city was long and narrow, hence the name "Great Wall." After the Qin Dynasty belonged to Wucheng County, Jin Taikang three years (282 years) began to set up Changcheng County, since the Six Dynasties are Wuxing County (Huzhou). Liang Kaiping four years (910 years), Wu Yue Wang Qianxuan changed the Great Wall to Changxing. It was the hometown of Chen Badi, the founding emperor of Chen Chao, and he kept the holy well bathed by him.

3) Culture

In ancient Chinese history, Zhejiang was the birthplace of Wuyue culture and Jiangnan culture. Changxing has a profound tea culture. Tea Saint Lu Yu wrote the great tea "Tea Classic" in Changxing and became the founder of Chinese tea culture. Changxing has thus become the birthplace of tea culture. In the five years of the Tang Dynasty (AD 770), it was built in the Guzhen Tea House of Guzhen Mountain in Changxing County. It is the earliest tribute tea house in China. Every year, the Qing Dynasty prefects the "Gu Yu Zisun" cake tea and tributes to Chang'an.

5.1.3 Function organization

The function of each part is considered according to the flow of people around the site, the function of the building and the width of the land, etc. The width of the riverside space is less than 10m, with several parts more than 30m, so the axis-belt mode will be the suitable functional structure (Fig 5-5). The mode will form a combination of riverside trails and rest points.



Fig 5-5 Function organization analysis

5.1.4 Space sequence design

The spatial sequence of this site is the tandem mode. This is because the waterfront area in this site is narrow, and some parts are wider that can be designed as open spaces or activity venues. The walkway along the river likes an axis connected five activity avenues one by one. The contrast, penetration and interpenetration of the space on the axis formed a rhythm sequence (Fig 5-6).

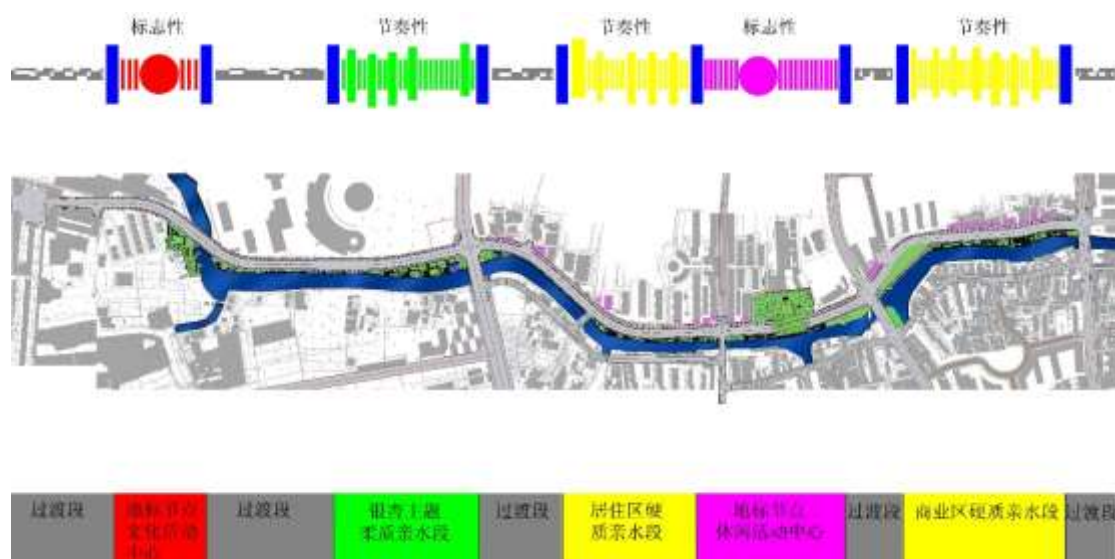


Fig 5-6 Space sequence analysis

The entire spatial sequence has two landmark nodes, namely the cultural activity center landmark node and the leisure activity center landmark node, which are located at the part of river turn and river gathering. It is an important landscape-to-view and a climax of the spatial sequence. There are also three rhythmic landscape passages in the sequence, the soft hydrophilic section of the ginkgo theme, the hard hydrophilic section of the residential area, and the hard hydrophilic section of the commercial area. Each of the three passages has a theme and features. The design creates a unique sense of rhythm. There is a transition between them and between them and the iconic nodes. The transition is relatively narrow, with the pedestrian path as the core.

5.1.5 Design of the node space

Part 1 is relatively well-developed and can be used for green spaces, squares, and buildings. Considering that the visual environment of the surrounding rural settlements is rather messy, it is advisable to construct buildings with a certain height to cover them. The land is located at the turning point of the river and is the opposite of the river. Therefore, it is considered to construct a city's activity center to form a landmark building (Fig 5-7~9).



Fig 5-7 Plan of part 1



Fig 5-8 Landmark building: activity center



Fig 5-9 Aerial View of Part 1

Part 2 is close to the hospital, the site is long and narrow but has a certain width, and there is a preserved ginkgo tree. The design is mainly focused on concentrated green space, appropriately equipped with activity squares, spatial division through the landscape wall, forming the artistic conception of “garden” and highlighting the landmark role of ginkgo trees (Fig 5-10~13).

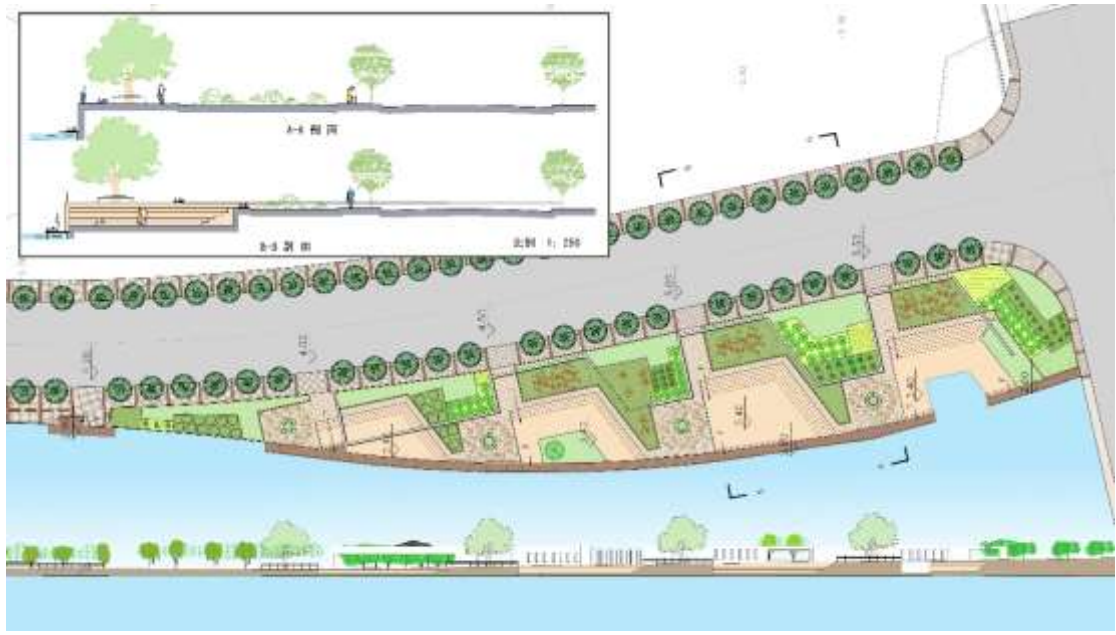


Fig 5-10 Plan of Part 2

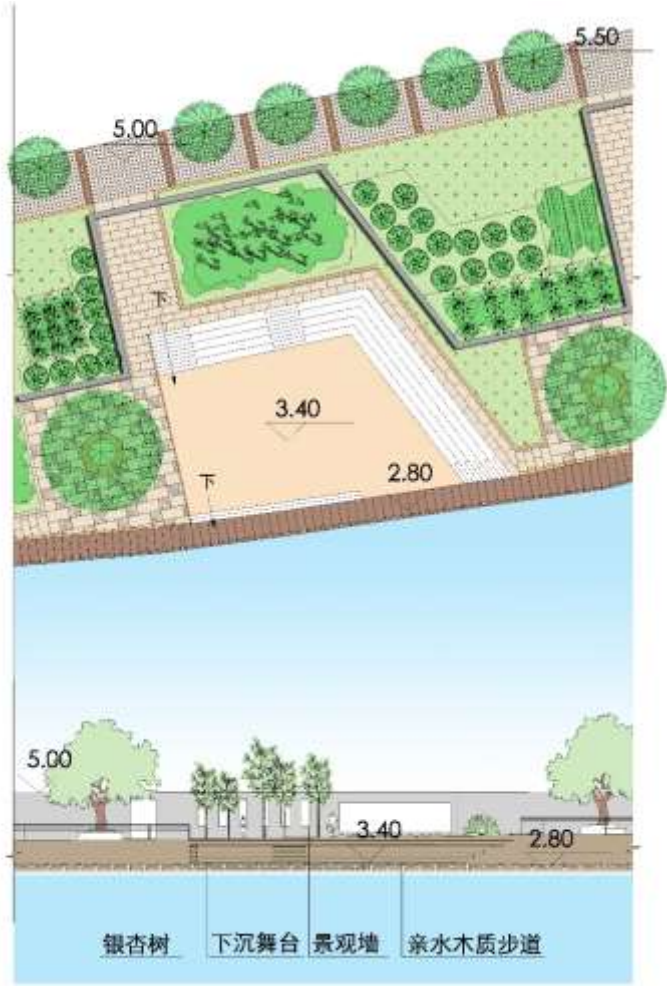


Fig 5-11 Section of part 2



Fig 5-12 Rendering of the landscape along the river



Fig 5-13 Aerial View of Part 2

Part 3 is close to the residential area, with a large number of active people. The design is more concerned with the of the landscape, and the hard landscape and the green landscape are interlaced. The height is different between urban roads and rivers, so the space is divided into three levels of high, medium and low in the vertical direction to form a landscape pavilion with rhythm. A landscape tower was set up at the corner of the river, as the commanding heights of the space (Fig 5-14~17).



Fig 5-14 Plan of part 3

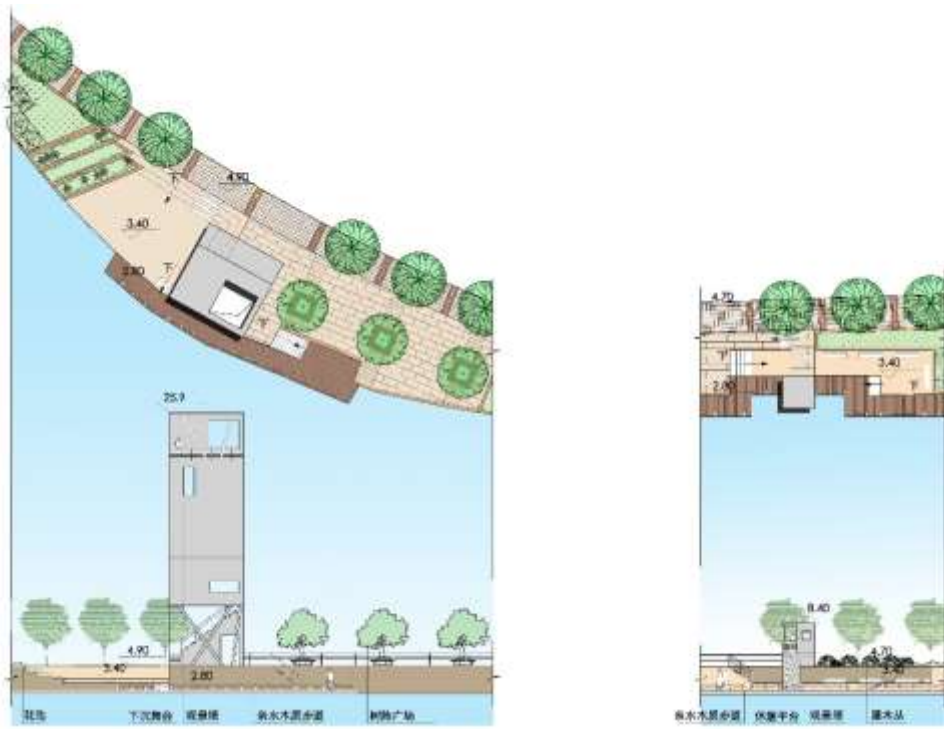


Fig 5-15 Plan of the landscape tower



Fig 5-16 Rendering of the landscape along the river



Fig 5-17 Rendering of the landscape tower

Part 4, the open space formed after the relocation of the factory can provide space for a large number of people to flow, centrally arrange tea, coffee and other recreational facilities, and build a suitable scale of activity squares for fitness and social interaction activities. Vertically, raising the height of the road, the waterfront, the road and the activity square are integrated into one, which becomes the spatial tension point of the entire design area. The waterfront planted bamboo, forming a view of the tea room and the bamboo forest (Fig 5-18~19).



Fig 5-18 Plan of part 4



Fig 5-19 Rendering of the leisure activity center

Part 5, the flow of people is strong, requires more activity space and better waterscape. Through the design of the landscape pavilion, the sense of order and rhythm of the space is enhanced (Fig 5-20~23).



Fig 5-20 Plan of part 5

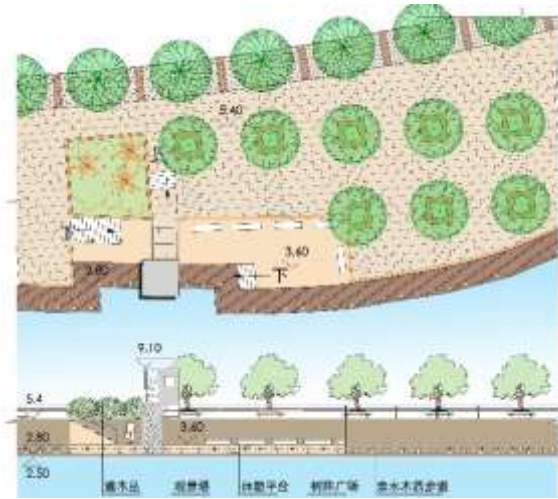


Fig 5-21 Detail design of Part 5



Fig 5-22 Rendering of the view pavilions along the river



Fig 5-23 Aerial View of Part 5

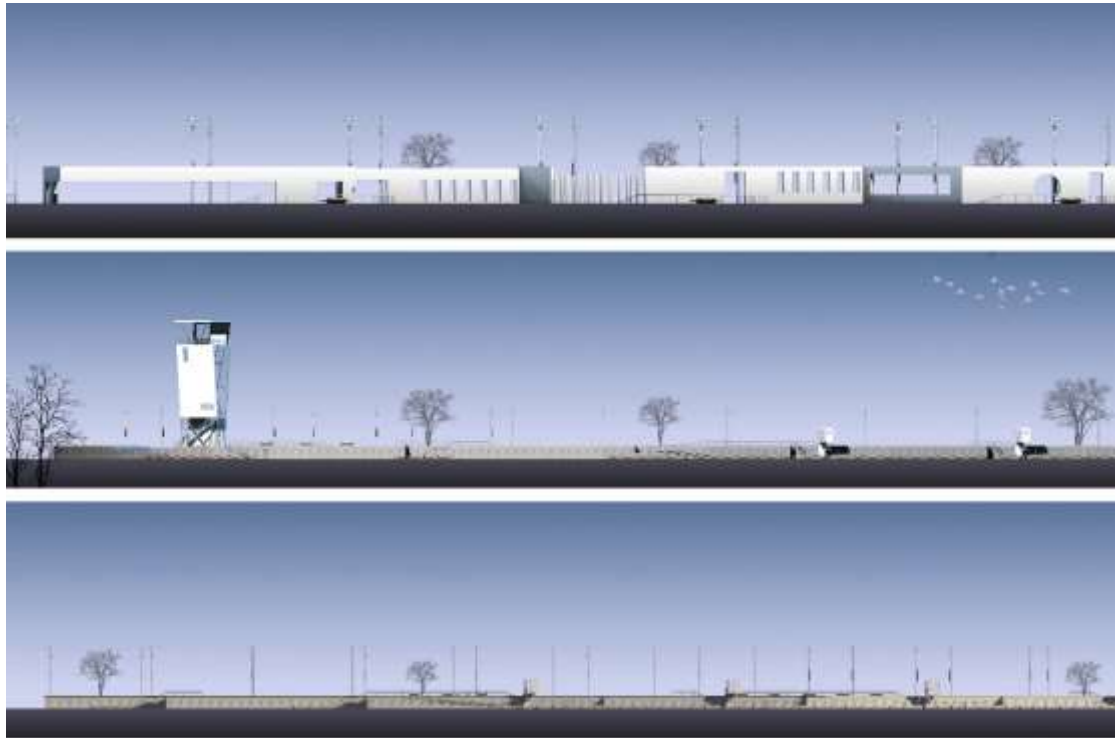


Fig 5-24 The elevation along the river

5.1.6 Design of the landscape furniture

Landscape structures and street furniture are an important part of the design, especially as the landscape tower of the space high point. As a landmark, it is an important factor in people's "psychological map" about the river landscape and even the urban landscape. The landscape tower is 21m high with 5 floors and stairs inside (Fig 5-25). People can climb to the highest point, where they can get an excellent view and see the full picture of the river landscape.

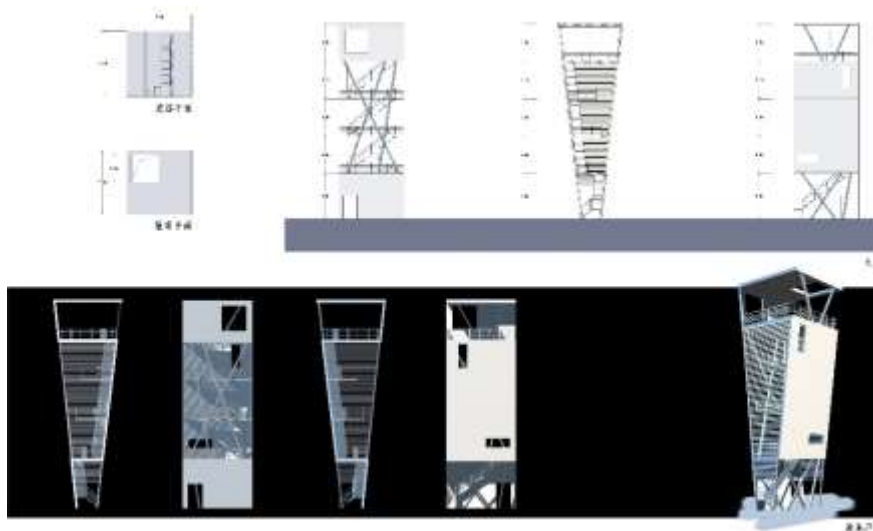


Fig 5-25 Design of the Landscape tower

The enclosed form of the landscape tower combined the virtual and real interfaces. In the 2-4 layers, a solid space and a horizontal grid are used to form a gray space, and an open space is formed in the

bottom layer and the top layer. A spatial sequence of "open-closed-open" is also formed in the vertical direction.

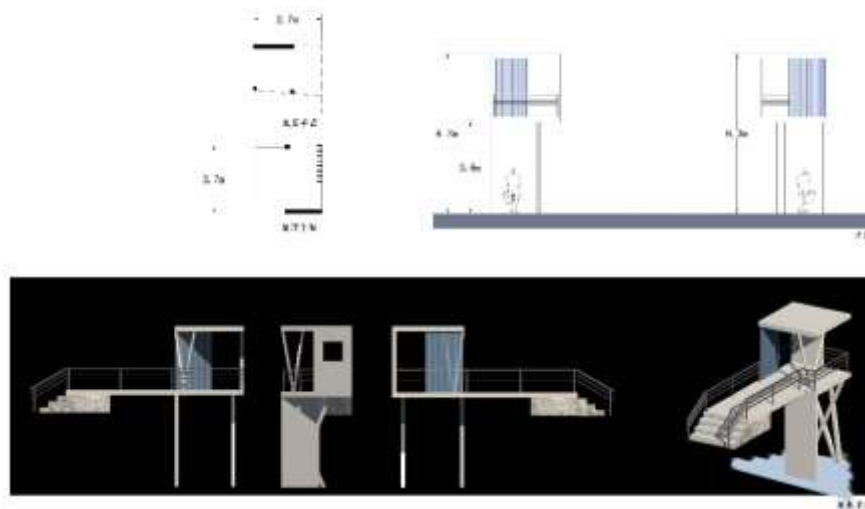


Fig 5-26 Design of the view pavilion

The view pavilion is 2 stories high and extends slightly into the water. It is designed to draw people from the road to the river, so the height is slightly higher than the road and can be accessed through 4 steps. The lower level of the pavilion is empty, and the continuous sidewalks and boardwalks pass through below (Fig 5-26).

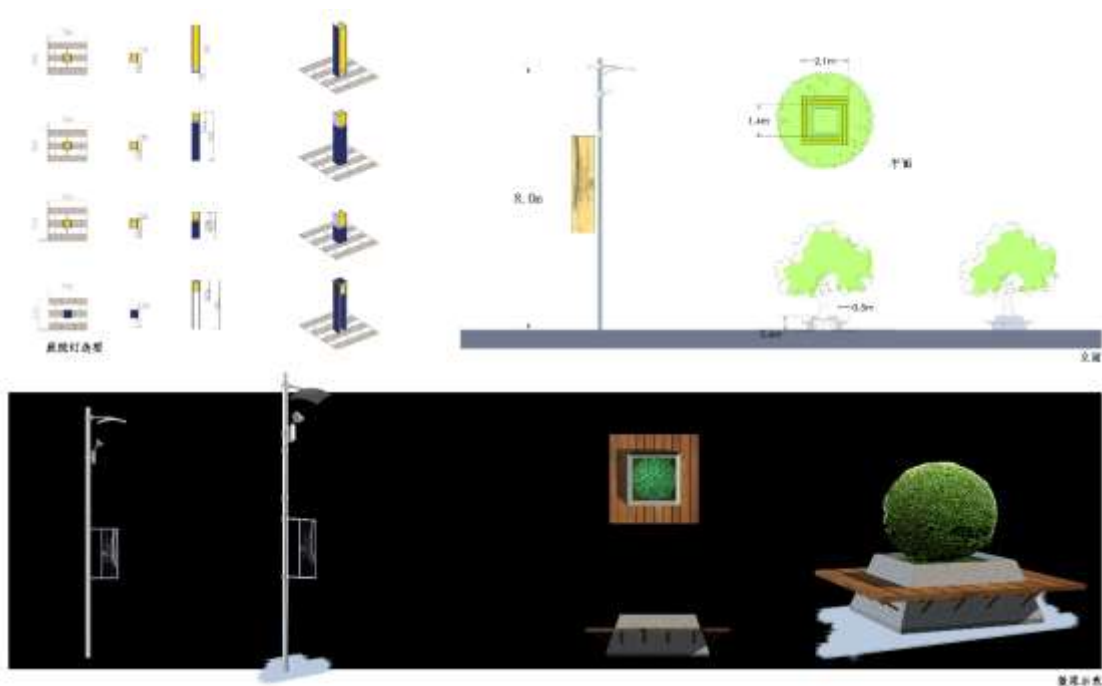


Fig 5-27 Design of the light and seat

5.1.7 Real picture after the construction



Fig 5-28 The view of part 2



Fig 5-29 The view of pavilion



Fig 5-30 The view of landscape wall



Fig 5-31 The lighting along the river



Fig 5-32 The night view of the river

5.2 Landscape Design of Baisha River in Weifang

The Fangzi District is located in the southeast of Weifang, Shandong Province. It founded in 1983 and now is the key development area of Weifang.

5.2.1 Site situation

Baisha River is a seasonal river. The terrain is high in the south and low in the north. It is high in the east and low in the west. The total length of the Fangzi District is about 7,800 meters. It runs through seven blocks and is the most important river in Fangzi District. It is also the mother river in Fangzi District. The current riverbed is about 60 meters wide at its widest point; the narrowest point is about 10 meters. The average width is about 30 meters, and it also retains a certain flood discharge effect. The scope of this plan is from the Jiaoji Railway in the north to the Jiaoji Road in the south, which is about 6,000 meters long. The green belts on both sides of the river are mainly controlled by 30 meters (Fig 5-33).

The Baisha River intersects Fenghuang Street, the scenic avenue, adjacent to the city center and flows through the future regional business center. Coastal development and construction of Baili Garden, Fangyi House, Shuangyang New City, Phoenix Sun City and other real estate, there are a large number of undeveloped plots along the river.



Fig 5-33 The site location analysis



Fig5-34 The historical building in Fangzi

5.2.2 The history and culture analysis

The Fangzi Old Town covers an area of 21 square kilometers. It has a hundred years of history and rich cultural heritage. There are many cultural sites such as Banqiao culture, Qi culture and mulberry culture. At the beginning of the 20th century, Fangzi was once an important commercial port in the Shandong Peninsula. It is known as the “Hundred Years of Business”. Eight countries including Germany, Japan, Britain and the United States have repaired railways, opened coal mines, and set up companies. Two countries have set up consular offices and left many cultural relics. The German-Japanese building cluster is distributed in the old city and now holds 166 places, including 103

German-style buildings and 63 Japanese-style buildings with a total construction area of 45,246 square meters (Fig 5-34). The German-Japanese architectural complex completely reflects the heavy history of China's transition from a feudal society to a semi-feudal and semi-colonial society. It is a historical testimony of imperialist aggression and expansion. It is an important historical and cultural resource and a precious cultural landscape resource in modern China. It has a high historical, scientific, educational and artistic value.

5.2.3 Design concept

Advocating on the basis of ecological environment construction, the interaction of mass recreation is the core, and the fashion of landscape image is the means of the trinity landscape planning and design(Fig 5-35).



Fig 5-35 The design concept

(1) Urban ecological water system - ecological (low carbon)

River management should respect and improve hydrological systems, planting systems, and wildlife habitats to conserve existing wetlands and create new water bodies to enhance flood protection, create urban belt-shaped green lungs, and build urban airways. Reduce construction costs, repair and extend waterfront local characteristics of landscape planting to reduce maintenance costs and use natural materials to create environmental markers

(2) Urban Strip Park - Interaction

Different from other rivers in Weifang, Baisha River is closely integrated with urban blocks and has a strong sense of life. It should provide waterfront activities suitable for all ages and classes; as a belt-shaped city park, it serves the general public. Strengthen the connection between the city and the waterfront, and the Baisha River intersects with many municipal roads. Through the guidance and interpretation of roads and environmental signs at all levels, people are attracted to the colorful waterfront sequence space to improve people's accessibility to the waterscape.

(3) Urban development belt - fashion

Through the river management and the construction of the strip park, the city's environmental quality will be improved, and then the whole city development will be promoted--the Baisha River will become the urban development belt of the Fangzi District.

The human history of Fangzi District should be condensed in combination with the status quo, and finally presented in a modern and fashionable way. Appropriately embellished with bright colors and active nodes, the new look of the new district is presented in modern Chinese and modern German styles through modern materials and design techniques.

5.2.4 Planning structure

The planning structure is: “one river, three sections and five parks” (Fig 5-36).

One river: The Baisha River

Emphasize the friendly human scale of the river itself, and expand the water space as much as possible under the premise of ensuring the pleasant scale. The upstream is 35 meters wide and the widest is 100m. The narrowest part of the middle reaches 15 meters, while the largest downstream reaches 150 meters.

Create rich and hydrophilic spaces, and water bodies such as lakes, harbors, trickles, fountains, and falling water bring different waterfront experiences.

The revetment adopts a combination of natural cultivation and artificial carving. Unify waterfront space through a consistent traffic system, environmental signage system, and lighting system.

On both sides, a two-way road at the city level and the river level is used to construct a tour system. They are the main road with a width of 3 meters and a running track and a bicycle path, and a 1.5-meter wide hydrophilic walkway. The main road is the main route for riverside excursions and activities, and is connected to the urban roads without barriers. The promenade is a place for waterfront recreation. It carries out three-dimensional traffic with the city roads throughout the journey, and is not subject to motor vehicle interference.

For the surrounding residents, the distribution of small activity fitness squares is no more than 300 meters. And will consider setting up three larger fitness squares along the coast.

Three paragraphs: three-section theme of the urban strip park

1. Upstream - River Valley Park Section

From the Jiaolu Road to Chongwen Street, the water resources on the ground are missing, the vegetation is formed in a single shape, and the land on both sides is abundant.

The design emphasizes openness and nature. Expanding the water body, shaping the terrain, creating an open, atmospheric green space with natural cobblestones and natural vegetation. Between the residential area and the water surface, visitors fluctuate with the natural waterfront.

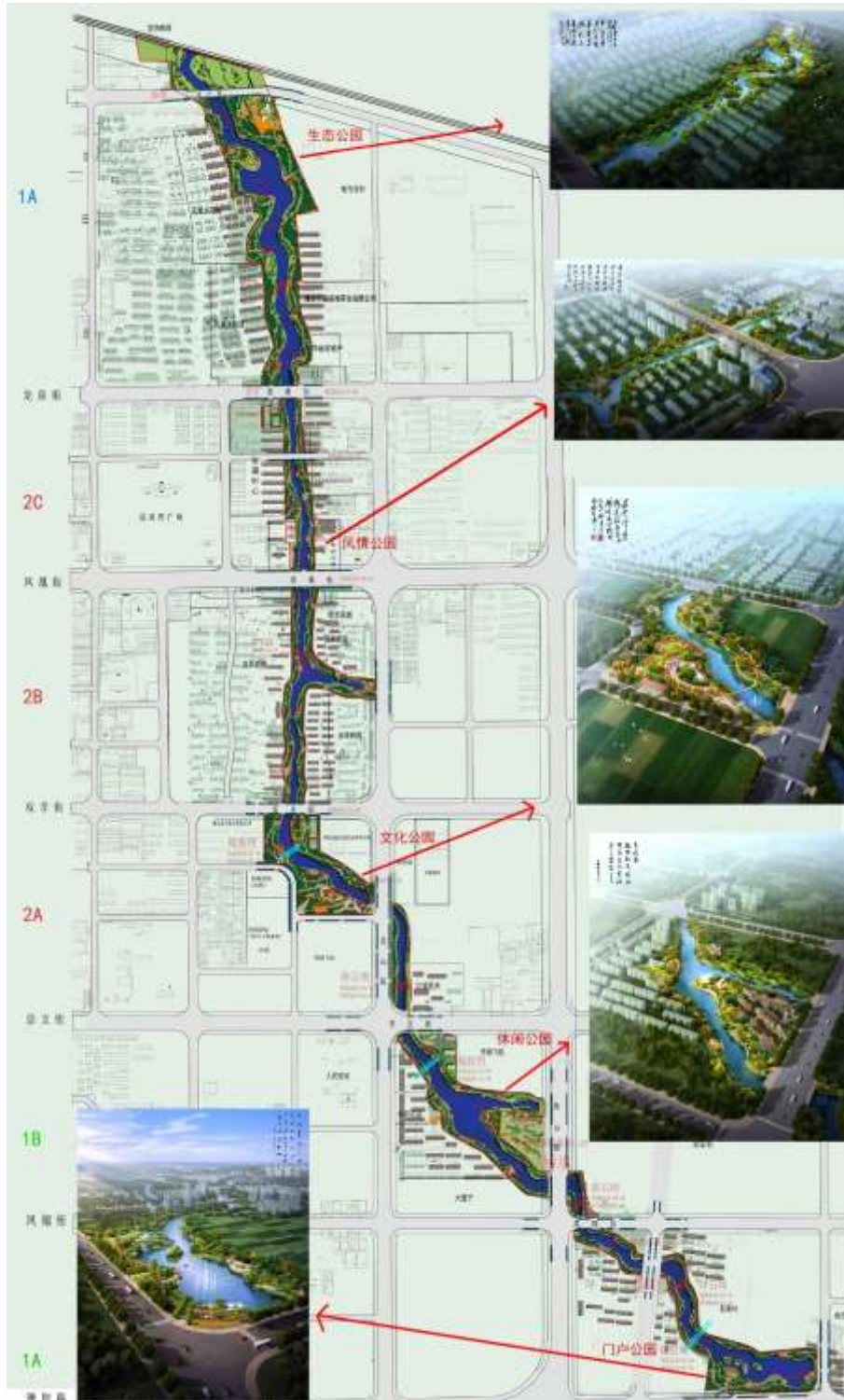


Fig 5-36 The main plan of Baisha River

2. Midstream - Community Park Section

From Chongwen Street to Longquan Street, it is a built-up area in the center of the district. The river is narrow, the population is dense, and the vegetation is seriously damaged. It is urgent to restore it.

The design emphasizes the intimacy and richness of the scenery. This section is characterized by a

rhythmically changing surface, hard revetments and urban three-dimensional elements, adapted to the average width of the river is 20 meters. The main road is at the height of the municipal road, and it maintains zero-distance contact with the city and the community. The secondary road is closely combined with the water surface. It is combined with various forms of communication places, activity squares, and high and low shrub trees to create a waterfront space for loved ones.

3. Downstream - Wetland Park Section

From Longquan Street to Jiaoji Railway, there are a large number of beautifully shaped willows and phoenix trees. The water resources on the ground are rich, with complete ecosystem and beautiful local characteristics.

The design emphasizes nature and originality, and is carefully transformed into a linear wetland ornamental protection zone. The reconstructed natural vegetation and ecological revetment, emergent plants and floating plants constitute a colorful waterfront space. Both the main road and the secondary road shuttle between the water body and the shoreline, forming a tour loop and a number of resting viewpoints, and maximizing contact with nature.

Five Parks: Gateway park, Leisure park, Cultural park, Style park and Ecological park.

5.2.5 Design of five parks

1) Gateway Park

The Gateway Park located on the Jiaolu Road, it is the starting point of the Baisha River (Fig 5-37). The lake is 100 meters wide from north to south and has a wide view. A fountain is set up in the lake to design a slope of water and a large area of black ore water play area, reflecting the cultural theme of coal mines. Activities include fishing, camping, water sports and more.



Fig 5-37 Gateway Park



Fig 5-38 Leisure Park

2) Leisure Park

The leisure park is located in the wide area of the Sancha River mouth of Fengshan Road, with plenty of water (Fig 5-38). Set up a stretched film square, with two large stretched membranes and a small sail film to present beautiful water scenery. There is a sleeper pebble leisure trail at the shoreline, and a children's train park at the height, reflecting the theme of railway culture. The activities are boat cruises, water fireworks performances, small on-shore performances, and children's play.

3) Cultural Park

At the Shuangyang Street, the most central block in the future district, a district-level cultural park will be set up (Fig 5-39). The park has convenient transportation and combines the surrounding area with an adult sports area, a children's playground, a sinking historical square, a waterfront cultural square, and commercial and cultural facilities, reflecting the history and culture of the Fangzi District. The activities are historical and cultural education, traditional art exhibitions, outdoor performances, dance parties, and commercial publicity.



Fig 5-39 Cultural Park



Fig 5-40 Style Park

4) Style Park

Style Park is the junction of the Baisha River and the east-west main road of the Fangzi District (Fig 5-40). It is an important node for displaying the image of the city. The blue line of the river is only 70 meters, and a 20-meter wide river channel has been built on the south side. The design expands the water surface, with the square water, the regular dynamic waterscape, the water drop sculpture, and the column square, adapting to the rigorous and atmospheric nature of the nearby administrative area. A cultural history that reflects the German style.

5) Ecological Park

The ecological park is in the northernmost part of the Baisha River, with the principle of conservation (Fig 5-41). Extend the existing lotus pond to the surface of the wetland landscape with flood storage

function to form a peninsula scenery. The adult willow tree is preserved to form a water tree island. The grading of the lake is refined and refined in the existing water features. The surrounding fruit trees are also partially preserved. The activities are fitness plaza, children's field education, fruit farmers experience, leisure, sightseeing, viewing, and rest.



Fig 5-41 Ecological Park

5.2.6 The detail design of activity avenue

1) Folk culture park

The Folk Culture Park (Fig 5-42) is located on the south side of Shuangyang Street and on the west side of Longshan Road. The node mainly reflects the legend of Fenghuang Mountain in the Fangzi District and the regional culture of the Jiaoji Railway. The combination of the topographic design of the Phoenix legend sculpture, red silhouette sculpture and embossed culture Gallery and railway culture theme space and other content.

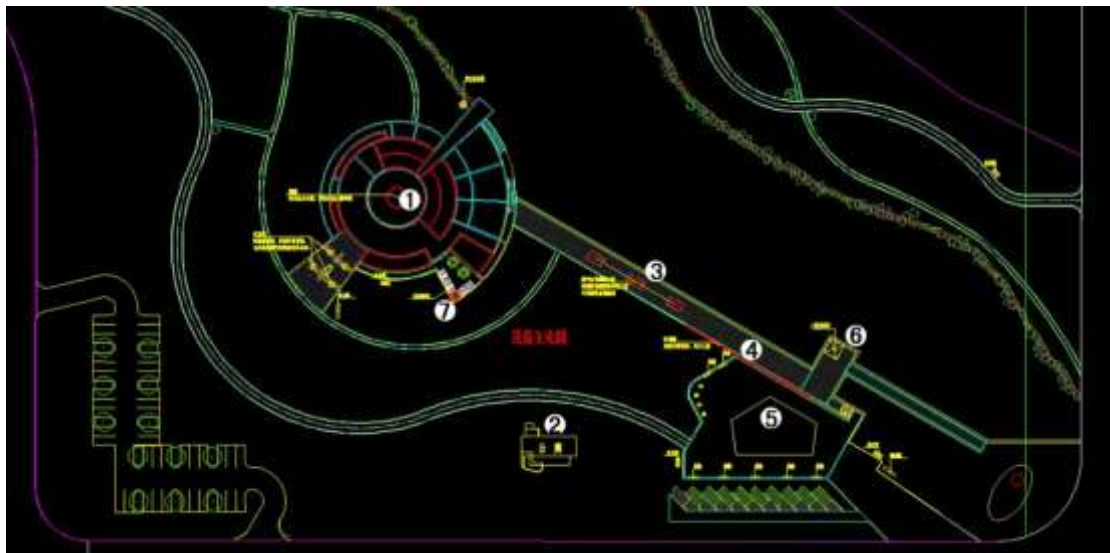


Fig 5-42 Plan of the folk culture park

The legend of Phoenix sculpture originated from the legend of the local Phoenix Mountain. The

sculpture is made up of three sides, 2m wide and 6m high. The pattern adopts the phoenix shape of the folk paper-cut hollow, the four corners match the traditional Chinese pattern, and the overall color is red (Fig 5-43).

The red silhouette sculpture is in the form of folk paper-cut, using butterfly-shaped kite as the design element, reflecting the kite characteristics of Weifang. The sculpture is 2.8m wide and 2.3m high. A group of three sequences are discharged, and the butterfly like a flying butterfly looks like a traditional paper-cut (Fig 5-44).



Fig 5-43 Legend of Phoenix sculpture



Fig 5-44 Red silhouette sculptures

2) Banqiao Park

Banqiao Park is located on the west side of Fengshan Road. The node mainly reflects the Banqiao culture (Fig 5-45), and is designed with landscape stone pavilions, landscape walls, bamboo forests and mountain stones, and with gray-white pavement to create a traditional Chinese landscape space (Fig 5-46~47).



Fig 5-45 Banqiao Park



Fig 5-46 Rendering of the Banqiao Park



Fig 5-47 Rendering of the Banqiao Park

3) Community Park

The community park is located on the west side of Longshan Road and has a large area. It is divided into Welcome Square, Landscape Gallery, Fitness Square, Ticket Friend Plaza and Double sheep Square (Fig 5-48).

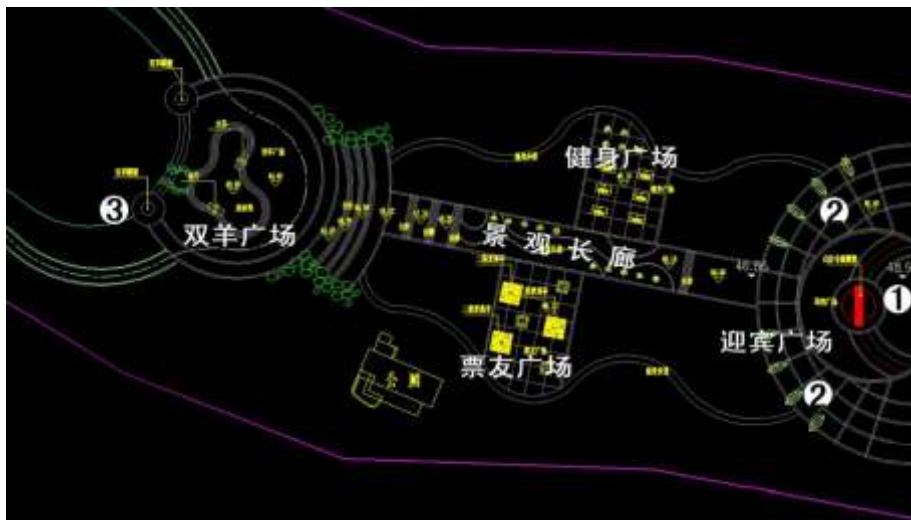


Fig 5-48 Plan of Community Park

The white sand sourcing sculpture is conceived from the legend of Phoenix. The sculpture theme is an abstract phoenix shape, also like a ring (Fig 5-49). The sculpture is 9m high.

The Double sheep sculpture originated from the local legend “Double sheep Drinking Water”. The sculpture was placed at the water's edge to form the appearance of the double-headed dagger, and the visual impact was strong (Fig 5-50).



Fig 5-49 The white sand sourcing sculpture

Fig 5-50 The Double sheep square

5.2.7 Real picture after the construction



Fig 5-52 Folk culture park



Fig 5-53 Legend of Phoenix sculpture



Fig 5-54 River trail landscape



Fig 5-51 Baisha River under construction

Chapter 6 Conclusion

Under the background of the redevelopment of the waterfront and the transformation of living attitude and transportation modes, the waterfront area has become an important destination for people to carry out recreational activities. The development of waterfront areas has always been a hot topic for scholars, but the research on the slow-motility space is not very deep.

Starting from the behavioral psychological characteristics of the slow-motility activities and the landscape features of the waterfront space, the paper uses the theory of environmental psychology to map the landscape perception process of slow-motility behavior with the organization of the landscape elements of the waterfront space, and proposes landscape design procedure and method of the waterfront slow-motility space based on landscape perception, finally confirmed the applicability of the research results through two examples.

The main theses of the paper are:

1. The design of the slow-motility space needs to be based on the slow-mover's functional requirements of the space and the perception process of the landscape.

People move or stay in the slow-motility space, pass through open spaces and activities in different themes, and gradually form an overall impression of the waterfront landscape. Therefore, the slow-motility space is not only a riverside walkway with traffic functions, but also a dynamic landscape space that focuses on artistic conception and spatial fun. This paper summarizes and analyzes the related theories of slow-motility behavior from the three aspects, namely psychological perception, behavioral characteristics and visual perception, and draws four design strategies of urban waterfront space.

2. The waterfront space has many different types according to scales, surrounding environment function, and the relationship between water and city. As a place for recreational activities and open space, the waterfront has common spatial characteristics, namely, reachability, continuity and possibility of staying. These three attributes are also the landscape design principles and goals of slow-motility space.
3. The slow-motility space is the link between the open space and the activity place in the waterfront area. Therefore, the organization of functional structure is one of the key points of landscape design. The specific structural forms of waterfront slow-motility space include axis-band-point, axis-band, axis-point, axis-zone mode. Each mode is suitable for waterfront with different width.

It is necessary to take the function as the leading factor, comprehensively measure the width of the riverside green space, the service population, the nature of the surrounding land, etc., and select the appropriate structural form to organize the order of the slow-motility space.

4. The waterfront space overall is linear, and can be subdivided into three organizational modes: Tandem mode spatial sequence, Parallel mode spatial sequence and Compound spatial sequence. Each mode can form a space sequence with rhythm changes.

The spatial sequence forms the order of the tour. The continuous space experience formed by this order guides people's movement direction, stimulates people's emotions, and finally forms the rambler's overall feeling of the waterfront space. The shape of the spatial sequence can be abstracted into the structural relationship between the node space and the main path space. The organization methods of spatial sequences include spatial mutations and gradations, spatial transitions and articulations, and spatial artistic creation.

5. The path organization of the waterfront slow-motility space is both a traffic organization with slow motility behavior and an organization of viewpoint and sight lines. Guiding the direction of movement by the path organization is an important means of organizing the order of dynamic tours and creating emotional experiences. Specific design methods include enhance landscape perception with dynamic views, guide the direction of motion by path, organize paths based on visions.

In this paper, the landscape design method of the slow-moving space in the waterfront area is analyzed and some methods that can be applied to the design are obtained. However, the research is not deep enough, mostly theoretical analysis and subjective description, lack of actual research and quantitative analysis. In the future, research on landscape evaluation can be increased, and the conclusions of the study can be verified and corrected.

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