Urban Renewal Design Strategies for the Julong Bay Waterfront Industrial Heritage Zone

A Dissertation Submitted for the Degree of Master

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Abstract

As urban development enters a phase dominated by “inventory renewal”, the renewal of waterfront industrial heritage zones—key nodes where history intersects with contemporary urban life—has become an increasingly pressing issue. The Julong Bay area in Guangzhou, a representative cluster of waterfront warehouse-type industrial heritage, faces multiple challenges, including outdated spatial functions, lack of publicness, diminished historical value, and excessive commercialization. This study focuses on the application of the “sharing paradigm” in urban regeneration, exploring how to reconstruct the urban living interface and cultural landscape of such areas through multi-party co-creation, functional integration, and spatial openness.

The thesis begins with a systematic theoretical review of key concepts such as the sharing city, industrial heritage conservation, and adaptive reuse, establishing “shared renewal” as the core standpoint and logical framework of the research. Drawing on field investigations and spatial syntax analysis of the Julong Bay and Pearl River Back Channel areas, the study identifies structural shortcomings in spatial permeability, temporal functional adaptability, and public engagement. In response, it proposes a “five-dimensional sharing evaluation” framework to provide qualitative support for the design strategies.

On this basis, the research develops a multi-scalar and multi-actor strategy system, structured around five spatial levels: zone, place, corridor, boundary, and node. Through design intervention in typical plots of the Julong Bay area, the study demonstrates a spatial transformation model centered on shared renewal, emphasizing the co-construction of spatial adaptability and the embedding of everyday public life. This approach addresses the dual demand in industrial heritage renewal—namely, the physical restructuring of space and the reintegration of human presence. The research outcomes offer a practical design reference and governance framework for similar urban waterfront industrial heritage zones, aiming to achieve a mutually beneficial integration of heritage conservation and urban development.

Key words: The Concept of Sharing; Waterfront Industrial Heritage; Urban Renewal; Julong Bay

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Chapter 1 Introduction

1.1 Background of the Study and Origin of the Problem

1.1.1 Background of the Study

1) Context of the Development of the Era: Waterfront Industrial Space Development Under Stock Renewal

Entering the post-industrial era, urban development has moved from incremental expansion to inventory renewal, and industrial restructuring has brought about the demand for the idle and reuse of a large amount of industrial heritage. In the early stage of industrialization, due to the limitations of transportation and the demand for water resources for production, factories were mostly located along rivers, forming a large number of waterfront industrial zones. Nowadays, with the acceleration of urban industrial restructuring and the process of “de-industrialization”, enterprises and industrial production and transportation activities in these areas have been relocated, leaving behind a large number of waterfront industrial heritage areas consisting of waterfront shorelines, spatial interfaces, hinterlands and industrial buildings. According to the results of the “Three-Olds” Renovation (the renovation of old factories, old villages and old towns) and Mapping Database, Guangzhou's inefficient land patches cover 588.96 square kilometers, with old factories accounting for 188.03 square kilometers. The reuse of this existing space has become a key issue in the city's urban renewal efforts.

The industrial relics on both sides of the Pearl River carry the historical lineage of Guangzhou's “Industry due to Commerce, Industry due to Prosperity”, completely preserving the appearance of modern foreign trade and commerce, and showing the development of modern trade and commerce in Guangzhou, which is an important basis for the study of Guangzhou and even South China's shipping and economy at that time, and has a very high historical, cultural, artistic and economic value. However, from the beginning of the 21st century, with the acceleration of urbanization, Guangzhou began to face environmental problems such as the black odor of river surges and air pollution.

Against the backdrop of the trend of refinement in urban renewal, the earlier model of “Big Demolition and Big Construction” has gradually exposed the drawbacks of lack of attention to the daily life space of the old city. Nowadays, spatial renewal needs to be based on responding to the daily needs of residents and respecting urban memory. At the same time,

the rise of the sharing economy has brought about a new trend of spatial organization, “from ownership to use” and “from possession to use”, which brings new opportunities and challenges for industrial heritage renewal.

Waterfront industrial heritage not only carries the cultural genes of the city, but also occupies a large number of high-quality waterfront space resources in the city. Under the background of limited carrying capacity of urban resources, how to promote the reuse of waterfront industrial heritage through the concept of sharing, transforming closed and isolated industrial sites into living shorelines shared by citizens, and enhancing the efficiency of space utilization has become an important issue jointly faced by urban development and heritage protection.

2) Policy Context and Waterfront Industrial Heritage Conservation Development

Pearl River Back Channel Port Terminal Area carries more than two hundred years of Guangzhou's history from the Thirteen Houses of Foreign Merchants to the modern industrial development, and witnesses the evolution of Guangzhou's port trade and industrial system. The area has both the dock warehouse area formed with the development of modern port ship transportation industry, and the industrial area built for the industrial development of Guangzhou from the early period of the founding of the PRC to the 1980s, which is an important witness to the development of modern industry in Guangzhou, and also a centralized display place of Guangzhou's modern industrial heritage. At present, the area is still distributed in Guangzhou and even South China, the more complete preservation of the remains of the foreign wharf warehousing complex, including the existing more complete historical buildings, including: Taikoo Warehouse Wharf (1927), Osaka Warehouse Wharf (1930), Asiatic Petroleum Co. Huadi Warehouse, Jardine's Warehouse (1913). 2008, Asiatic Petroleum Co. Huadi Warehouse and other 7 sites were included in the Guangzhou Municipal Cultural Relics Protection Units, for the subsequent protection and reuse of these sites.

In recent years, China's industrial heritage selection and protection system has been gradually established. 2017-2019, the Ministry of Industry and Information Technology (MIIT), the Innovation Strategy Research Institute of China Association for Science and Technology (ISRI) and the China Society of Urban Planning (CSUP) have successively released several batches of "National Industrial Heritage List" and "China's Industrial Heritage Protection List", marking the standardization and institutionalization of industrial heritage protection. In Guangzhou, the implementation of the "South Expansion, North Optimization, East Advancement, West Connection, Central Adjustment" strategy and the

"Suppress the Second Industry and Develop he Third Industry" policy since 2006 has driven industrial transformation and upgrading. A number of factories have relocated, leaving behind numerous industrial heritage sites along the Pearl River, marking the beginning of a new transformation chapter. In 2022, Guangzhou introduced the "Regulations for the Management of Industrial Heritage in Guangzhou", the first municipal-level normative document on industrial heritage in the province, providing policy support for the long-term protection and sustainable reuse of Guangzhou's industrial heritage.

Under the guidance of the policy, some industrial heritages have taken the lead in completing renewal and transformation and realizing industrial transformation. For example, the Guangzhou Textile Machinery Factory was transformed into the T.I.T Creative Park in 2009, introducing high-tech enterprises such as the headquarters of WeChat, and by 2020, the park will have an annual output value of more than 21 billion yuan, a tax revenue of 1.8 billion yuan, and more than 4,000 jobs, making it a successful example of the model of “industrial heritage + technological innovation” in Guangzhou. This model has also been extended to the former site of the Second Cotton Spinning Factory in Guangzhou and the former site of the Guangzhou Battery Factory, providing replicable experience for the renewal and spatial reuse of old factories.

The renewal and reuse of waterfront industrial heritage has become a key direction for optimizing the city's existing assets. In October 2016, the bidding for the Urban Design and Detailed Regulatory Planning of the Pearl River Back Channel in Haizhu District began, with the aim of integrating the functional layout of areas such as Guangzhi District and Haizhu Bay, revitalizing old factory and village resources, and forming an innovative waterfront corridor in Haizhu. In 2020, the “*Guangzhou Pearl River Greenway Master Plan (2019-2035)*” was released, establishing “landscape and recreational system construction” as one of the main tasks for the city's greenway development. The plan also proposed four major zones and several thematic greenway routes to tell the “Guangzhou Story”. Among these, the 18.2-kilometer-long Pearl River Back Channel Greenway, one of the six themed greenway routes in the central urban area, is defined as the “Industrial Heritage Trail” (Figure 1-1). This route connects key industrial heritage sites such as the Xinyi Guildhall, Taikoo Warehouse, Guangzhou Business Port, Guangzhou Steelworks Site, and Guangzhou Shipyard Site, comprehensively showcasing the struggles and development of modern industrialization in Guangzhou. In 2021, the 11th Party Congress of Guangzhou further proposed, “Coordinating the development and construction along the Pearl River, promoting industrial upgrading, urban renewal, water system governance, landscape optimization, landscaping, and the

organic integration of historical and cultural heritage." Against this backdrop, the Pearl River, as the birthplace of Guangzhou's industrial development, should become a key focus area for urban renewal. Guided by the shared space concept, the renewal should optimize the spatial functions, industrial layout, and public openness of the waterfront industrial heritage, transforming the industrial waterfront into a shared living waterfront, thus promoting sustainable urban development.

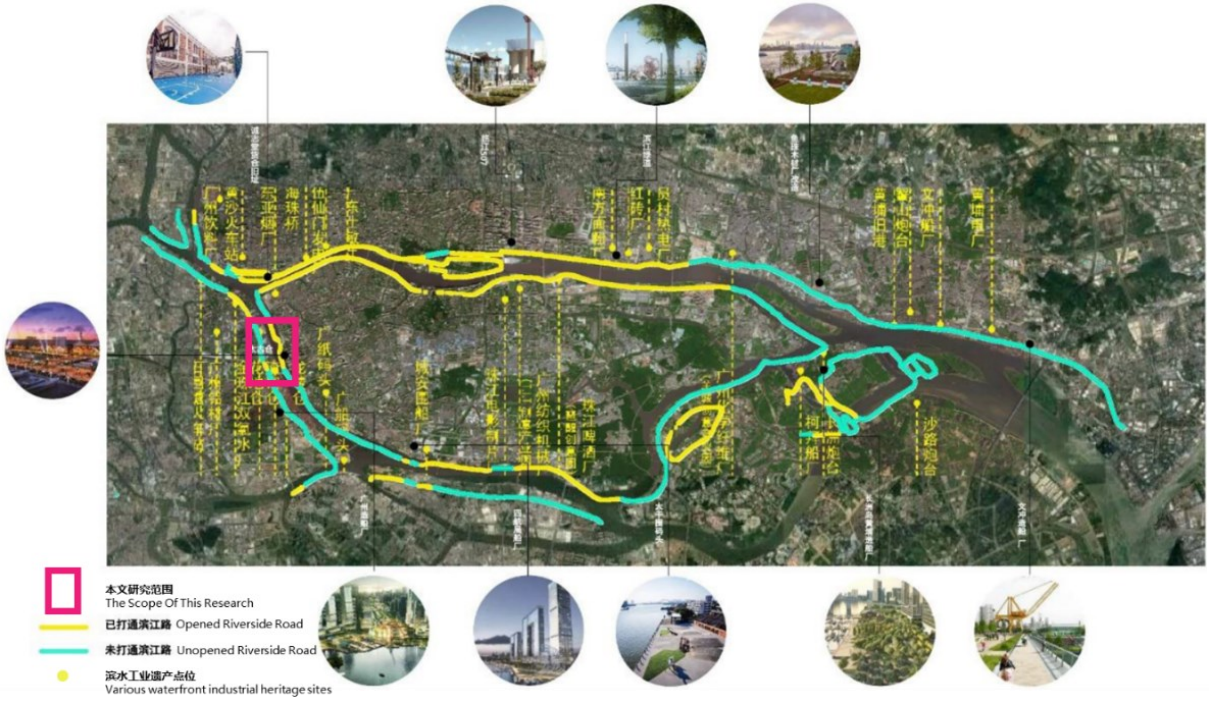


Figure 1-1 Diagram of Guangzhou's "Industrial Heritage Trail" Planning

(Source: https://news.qq.com/rain/a/20210408A0DFHB00)

3) The Rise of the "Sharing Concept" in Urban Renewal and Its Impact on the Regeneration of Waterfront Industrial Heritage

As a unique form of industrial landscape within the city, waterfront industrial heritage not only embodies the city's industrial culture, but also occupies significant public waterfront space. In the post-industrial era, global cities such as London, New York, Sydney, and Singapore have been actively working to transform waterfront industrial sites into public spaces, allowing rivers to reintegrate into the daily lives of citizens. The renewal of waterfront riverbanks has thus become a global trend in contemporary urban development..

The rise of the concept of sharing stems from the inevitable choice of social development in the context of limited resource carrying capacity. In 2010, Rachel Botsman put forward the concept of sharing economy, which is the transfer of the right of ownership to the right of use, emphasizing the transformation of consumption patterns and lifestyles. The rise of bicycle

sharing in 2016 further brought the concept of the sharing economy into the public's view. the public's view. In China, the concept of shared development has gone through a process of deepening from its introduction: in 2013, the Third Plenary Session of the 18th CPC Central Committee put forward for the first time the five new development concepts including "sharing"; in October 2015, it was formally included in the national development concepts; in 2016, the Central Committee of the Communist Party of China (CPC) and the State Council issued the "Opinions on Further Strengthening the Management of Urban Planning and Construction", which emphasized the transformation of consumption mode and life style. In 2016, the CPC Central Committee and the State Council issued the "Opinions on Further Strengthening the Management of Urban Planning, Construction and Management", which proposed "building a shared city, so that the people can have a greater sense of access in the construction and sharing of the city"; in 2017, in the report of the 19th National Congress, the five new development concepts, including "sharing", were once again emphasized. "In January 2023, the Ministry of Housing and Construction issued the Notice on the Pilot Work of Opening and Sharing of Urban Parks and Green Spaces, expanding the new space for opening and sharing of parks and green spaces, marking the in-depth practice of the concept of sharing in urban construction.

The concept of shared space has fundamentally altered the approach to the renewal and reuse of waterfront industrial heritage zones. Traditional renewal models often focus excessively on the heritage itself, leading to a potential disconnection from surrounding neighborhoods. Guided by the shared space concept, the focus of renewal has shifted from purely economic benefits to a more balanced consideration of social benefits. This also marks a transition from single-use development to multi-functional, mixed-use adaptation. Spatially, the goal is to break down enclosed boundaries and increase accessibility, creating multi-layered public activity spaces. In terms of renewal methods, a gradual micro-renewal approach is adopted, emphasizing public participation and interaction. For operational management, the model involves multi-stakeholder participation, establishing a flexible usage mechanism. This shared-space-oriented renewal model is becoming an important pathway for the sustainable development of waterfront industrial heritage.

1.1.2 Origin of the Problem

1) Low Attention to the Protection and Renewal of Waterfront Warehouse Industrial Heritage

In the post-industrial era, manufacturing, warehousing and other secondary industries

gradually declined, and tertiary industries became the leading force in urban development. As the stopping point of “things” in the city's commercial activities, the industrial heritage of warehousing has long been assuming the functions of material storage and trade circulation, which are closely related to the city's economic development[1]. However, due to the lack of scientific value assessment system, protection and reuse mechanism, many warehousing industrial buildings with reuse value have not been recognized in time, resulting in many warehousing industrial buildings being abandoned or dismantled due to not being included in the protection system of industrial heritage, which is less concerned about the research compared with the industrial heritage of other industries, such as factories and workshops.

2) The Conflict Between Waterfront Warehouse Districts and Contemporary Urban Development

Waterfront warehouse industrial heritage sites are often located in central urban areas or along riversides, historically dependent on waterways, railways, and highways as major transportation hubs. These conditions gave rise to distinctive industrial zones. However, with the upgrading of urban industries and the transformation of logistics models, warehouse resources in Guangzhou have gradually shifted to surrounding cities. This shift has led to a growing conflict between the spatial attributes of traditional warehousing districts and the functional demands of the modern city. According to data, from 2017 to 2019, Guangzhou's annual primary warehouse land transaction volume remained below 500,000 square meters, and the vacancy rate of local warehouse space has remained above 10%, showing a rising trend. As a result, many warehouse buildings have gradually faded from their historical role, leaving behind numerous underutilized waterfront warehouse heritage sites, such as Taikoo Warehouse, Osaka Warehouse, and Jardine Warehouse, all of which are in urgent need of revitalization. Currently, warehouse buildings account for 26 cases among Guangzhou’s recognized industrial heritage sites, making them a significant typology within the city’s industrial legacy.

3) The Significant Comprehensive Value of Industrial Heritage in the Pearl River Back Channel Area Has Attracted Much Attention

With the full advancement of the Guangzhou-Foshan integration and the implementation of Guangzhou’s “Three Olds” (Old City, Old Factories, and Old Villages) renovation, the Bai'etan area has encountered significant development opportunities. The available urban construction space is becoming increasingly constrained, while the vast social, economic, and environmental value of waterfront space has surged into prominence, particularly its

economic value, which has attracted attention from various stakeholders. As the human-centered value system makes a comeback, the relationship between people and water has gradually shifted towards “waterfront livings”. The waterfront spaces required by city residents should be open public spaces, easily accessible, and serve as the areas where people in urban centers can most readily engage with nature. The “water landscape” transforms waterfront areas into environmentally attractive, public activity-centric zones, and it is crucial to adhere to the principle of sustainable development, ensuring a balance between social, economic, and environmental benefits in the region[2].

4) Lack a Shared Space-Oriented Approach in Current Urban Waterfront Industrial Heritage Renewal Models

Currently, both domestic and international approaches to the renewal of waterfront industrial heritage zones often involve models such as cultural and creative parks, commercial complexes, and exhibition spaces, as seen in examples like T.I.T Creative Park in Guangzhou, Guangzhi Area, and Taikoo Wharf. However, these models tend to focus on the renovation of individual buildings, lacking the construction of a regional shared space system. Moreover, some renewal projects, due to their high-end and commercialization tendencies, have led to issues of urban gentrification, diminishing the public value of industrial heritage and failing to truly integrate into the urban space.

5) Challenges of Waterfront Industrial Heritage Renewal Under the Shared Space Concept

Guided by the shared space concept, the renewal of waterfront industrial heritage zones must address multiple challenges, including spatial openness, property rights relationships, functional integration, and regional connectivity. The goal is to transition from closed industrial sites to open living waterfronts, balancing heritage preservation with development, improving spatial efficiency, and boosting the overall vitality of the region.

Based on the above issues, this study starts from the shared space concept, analyzing the current situation of the Pearl River Back Channel waterfront industrial heritage zone. Through spatial morphology analysis, operational model research, and shared strategy development, the study explores new pathways for the renewal of the Pearl River Back Channel industrial heritage zone. The aim is to create a waterfront public space that integrates historical value with modern vitality.

1.2 Purpose and Significance of the Study

1.2.1 Purpose of the Study

This study is guided by the shared space concept and focuses on the Pearl River Back Channel waterfront industrial heritage zone. The aim is to explore a strategic system for the shared renewal of waterfront industrial heritage, achieving a balance between heritage preservation, spatial renewal, and social sharing. The specific objectives include:

(1) Review the current characteristics of the Pearl River Back Channel waterfront industrial heritage, summarizing the experiences and shortcomings from existing renewal practices using a shared-space-oriented industrial heritage renewal evaluation perspective;

(2) Explore the paths and methods for the renewal of waterfront industrial heritage under the shared space concept, and develop a renewal strategy system that covers dimensions such as spatial sharing, functional integration, and social participation;

(3) Conduct a practical design using the waterfront industrial heritage zone in the Julong Bay area as a case study to validate the applicability and operability of shared-space-oriented renewal strategies in industrial heritage renovation in the Pearl River Delta region.

1.2.2 Research Significance

1) Theoretical Significance

(1) Enriching the theoretical research on the shared renewal of urban waterfront industrial heritage zones

Current studies on the renewal of urban waterfront industrial heritage largely focus on individual building preservation and functional transformation. This paper, by introducing the shared space concept and analyzing relevant cases and experiences, expands the theoretical perspective on industrial heritage renewal and offers new insights into addressing the decline of publicness in current renewal practices.

(2) Deepening specialized research on waterfront warehouse industrial heritage

This study focuses on the specific typology of waterfront warehouse industrial heritage, systematically reviewing its spatial characteristics and historical value, and exploring targeted shared renewal strategies. It contributes to broadening the typological dimension of industrial heritage research.

2) Practical Significance

(1) Providing Targeted Shared Renewal Strategies for Guangzhou's Waterfront Industrial Heritage Zones

As "unintended monuments" (ungewollte Denkmal), industrial heritage sites derive their unique value more from their functional nature than symbolic meaning. However, current urban heritage and industrial heritage conservation systems often overlook these assets. It is therefore necessary to reexamine the value orientation of industrial heritage to determine its positioning, renewal strategies, and implementation strength in the process of conservation and regeneration. This study proposes targeted and operable renewal strategies from a shared-space perspective, offering reference for the protection and renewal of waterfront industrial heritage zones along the Pearl River Back Channel.

(2) Enhancing the Vitality of Waterfront Spaces

By constructing a shared-oriented renewal model, this research helps transform closed industrial heritage areas into open and accessible public spaces, enhancing the environmental quality and functional vitality of waterfront zones. It promotes the transition of waterfront areas from productive shorelines to livable public waterfronts.

(3) Providing Practical Reference for the Pearl River Delta Region

The theoretical framework and strategic approaches proposed in this study can serve as a valuable reference for the renewal of waterfront industrial heritage sites in the Pearl River Delta and other regions across China, promoting the coordinated integration of industrial heritage conservation and urban development.

1.3 Objects and Content of the Research

1.3.1 Object and Scope of the Research Defined

1) Spatial Scope

This study focuses on the industrial heritage along the Pearl River Back Channel and its surrounding waterfront spaces (Figure 1-2). Centered on the industrial heritage sites themselves, the research also encompasses the adjacent waterfront areas and related supporting facilities, aiming to explore shared oriented renewal strategies. This area saw the construction of a large number of wharves and warehouses from the late 19th century to the 1940s, bearing witness to the development of modern industry in Guangzhou.

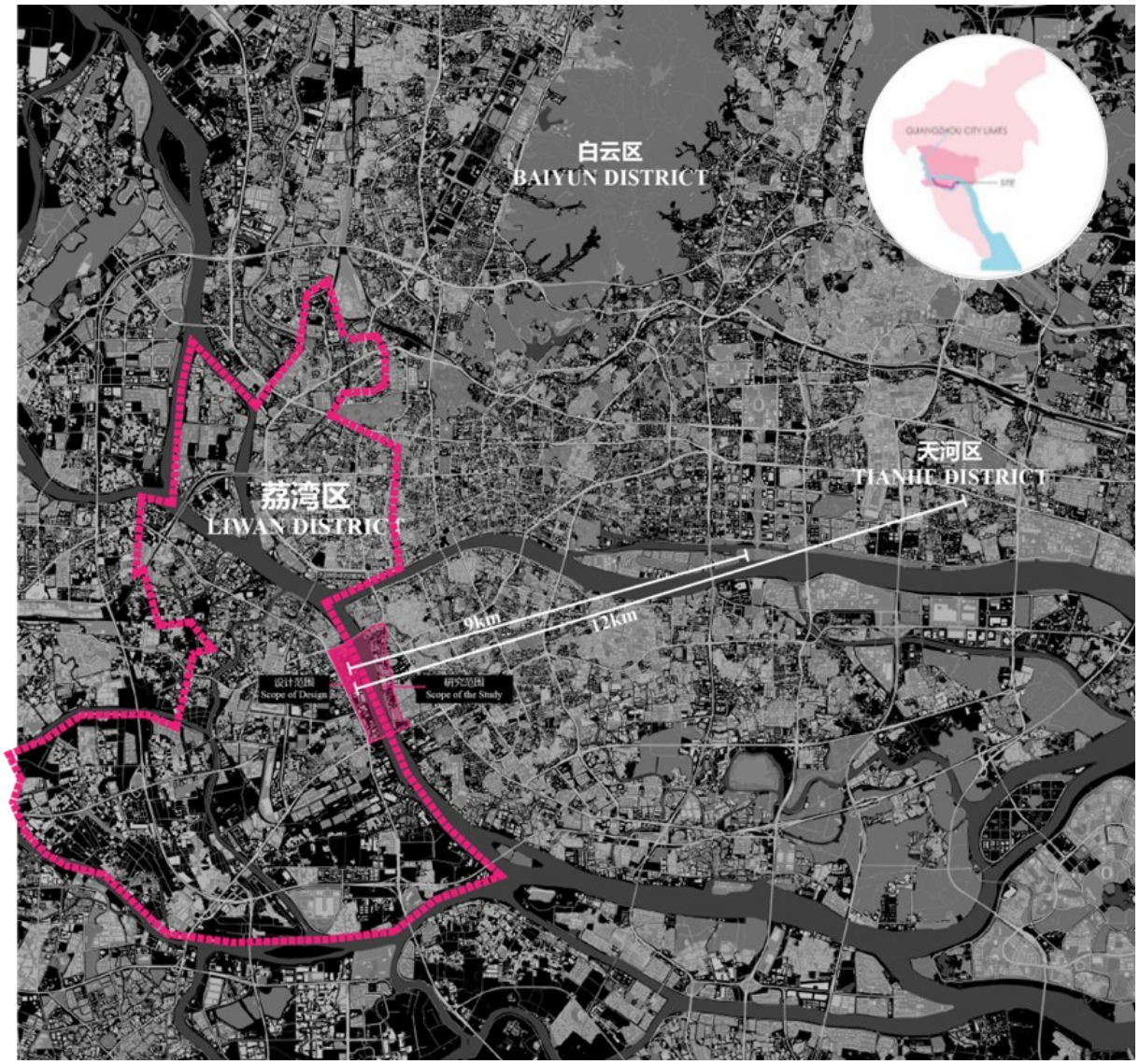


Figure 1-2 Study Area Location Map

(Source: Drawn by Author)

The primary scope of this study is the Foreign Trading Wharf and Warehouse Zone along the Pearl River Back Channel. This area is delineated based on the Creative Corridor proposed by SOM in its Urban Design for Guangzhou Bai'etan Area, which identifies this zone as having both historical significance and unique spatial vitality. The study area extends from the Zhoutouju Tunnel in the north to Hedong Bridge in the south, Fangcun Avenue in the west, and Gexin Road in the east (Figure 1-3).

(Source: SOM, Bai'etan: HEART of GUANG-FO Phase One Area Detailed Urban Design)

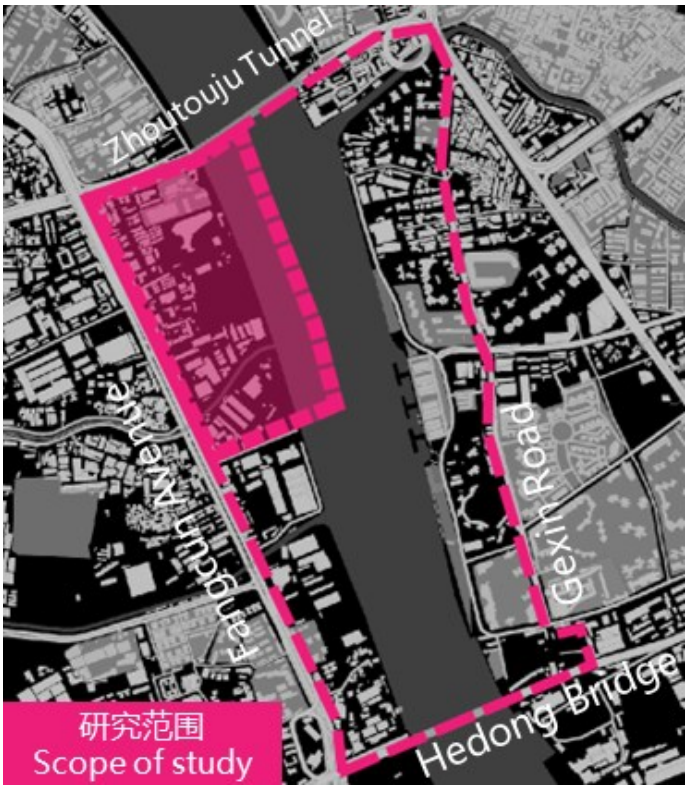


Figure 1-3 Study Area of Urban Renewal

(Source: Drawn by Author)

The Foreign Trading Wharf and Warehouse Zone is an important part of the Pearl River Back Channel (Liwan-Haizhu-Panyu-Huangpu) waterfront area. According to *The Tender Announcement for the Planning and Action Plan for the Pearl River Back Channel (Liwan-Haizhu-Panyu-Huangpu) Waterfront Area*, issued by the Guangzhou Municipal Government Procurement Platform, the Pearl River Back Channel is defined as the waterfront area from the Liwan District Pearl River Tunnel to the Huangpu District Hongshengsha Waterway, with a total coastline of 90 kilometers. The segment of the river focused on in this study stretches from the Zhoutouju Tunnel to Hedong Bridge, with a total riverfront length of approximately 2 kilometers, and an average width of the waterway ranging from 0.28 to 0.39 kilometers. The farthest point from the riverbank is approximately 390 meters (at the intersection of Fangcun Avenue East and Zhoutouju Tunnel), and the nearest point is approximately 249 meters (at No. 8 Fangcun Avenue East, Baihekou Street). Although this river segment is not long, it contains numerous foreign trading wharf warehouses of significant historical value, making it one of the most densely concentrated areas of industrial heritage along the Pearl River Back Channel (Figure 1-4).

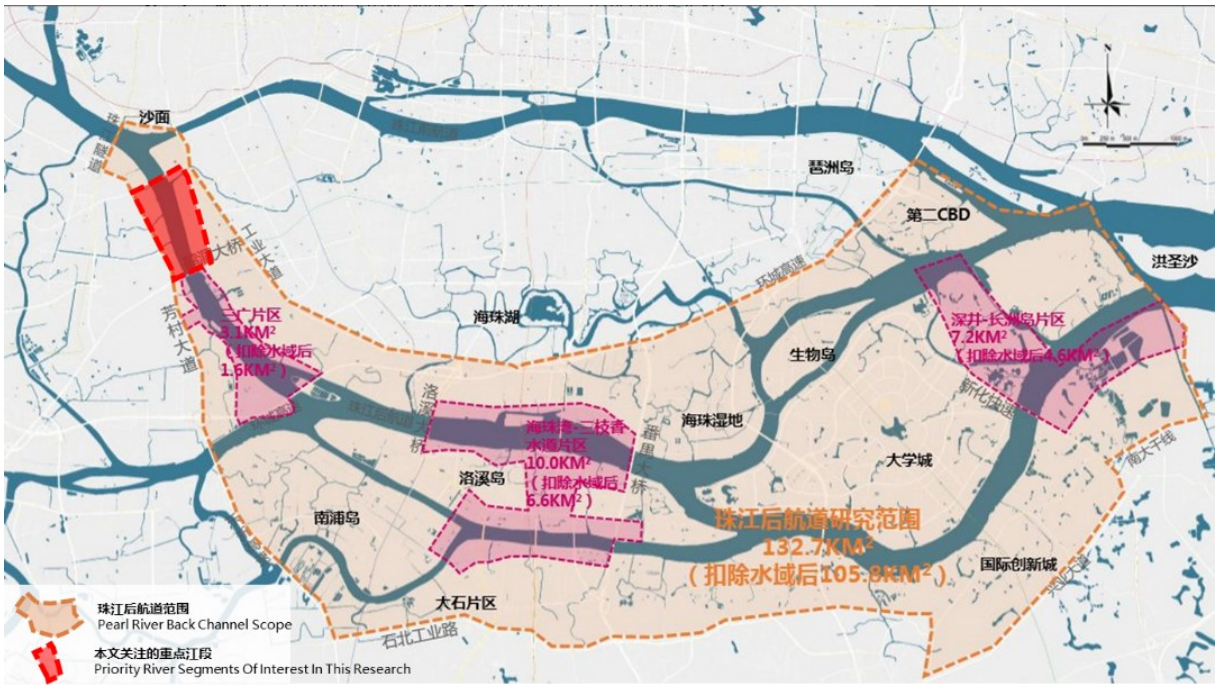


Figure 1-4 Pearl River Back Channel Area and the River Segment Focused on in This Study

(Source: *Tender Announcement for the Planning and Action Plan for the Pearl River Back Channel (Liwan-Haizhu-Panyu-Huangpu) Waterfront Area*)

The design scope of this study (Figure 1-5) mainly refers to the Julong Bay Launch Area Sub-Unit as delineated in the "*Detailed Planning Adjustment Scheme for the Julong Bay Launch Area Sub-Unit (AF0212 Planning Management Unit)*", issued by the Guangzhou Bai'etan Julong Bay Urban Renewal Project. The boundary of this urban renewal sub-unit extends west to Fangcun Avenue East, north to Zhoutouju Tunnel, east to the Pearl River, and south to the planned road north of Jardine Warehouse.

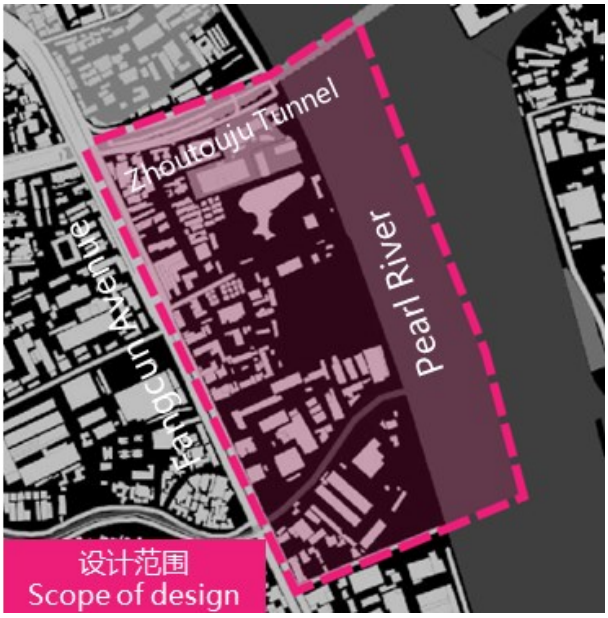


Figure 1-5 Design Scope

(Source: Drawn by Author)

2) Scope of Content

(1) Waterfront Industrial Heritage

Waterfront industrial heritage involves two dimensions: the old waterfront industrial area and the industrial heritage. Waterfront industrial area is defined as “the urban construction land occupied by industrial and mining enterprises for industrial production within a certain range where land and water meet in the city”[3]. Its spatial scope is generally defined as “the water space of 200-300m and

the adjacent urban land space”; according to its main function, it can be divided into a waterfront area mainly for transportation and an industrial area mainly for industrial production, and its structure types include wharves, factories, warehouses, and other industrial facilities as well as related supporting infrastructure.

According to the definition in the “*Nizhny Tagil Charter*”, industrial heritage refers to "industrial cultural relics that have historical, technical, social, architectural, or scientific value, including buildings and machinery, factories, production workshops and factory mining sites, processing and refining sites, warehouses and storage facilities, places of production, conversion, and use, transportation infrastructure, as well as social activity sites related to industry, such as those used for residential purposes, religious worship, or education".

The "waterfront industrial heritage" studied in this paper refers to the waterfront industrial remnants located along the Pearl River Back Channel, which are in the process of renovation and redevelopment as part of the city's "Suppress the Second Industry and Develop he Third Industry" transformation. This scope includes not only industrial heritage with high protection value, but also industrial remnants that, although not yet granted formal heritage status, possess certain historical significance. The study’s spatial scope encompasses not only the internal spaces of heritage buildings but also the outdoor areas that are publicly accessible and walkable, specifically those exterior landscapes that allow free public entry and use.

(2) Warehouses, Storage Spaces and Waterfront Warehouse Industrial Heritage

"Warehousing" refers to the use of a specific place for the storage of goods, the act of safekeeping. As a product of commodity production and circulation, the modern meaning of warehousing with the prosperity of trade in the port cities and the development of the early stacks, warehouses, and gradually developed into a modern warehousing and logistics system. "Warehousing space" refers to the buildings and sites used for storage, storage and custody of goods. According to the type of building, it can be divided into room-type warehouse, vertical warehouse, soil round warehouse, etc.

"Waterfront warehouse industrial heritage" refers to storage buildings and related facilities associated with cargo storage and logistics transportation, which hold historical, technical, social, or artistic value. It mainly includes two categories: ① Industrial heritage dominated by warehousing functions, such as Taikoo Warehouse, Asiatic Petroleum Co. Huadi warehouse, and Jardine Warehouse; ② Storage spaces within other types of industrial heritage that possess storage attributes, such as warehouses and stacking yards. Although these sites may not belong to the warehousing industry, their spatial typology is consistent

with that of warehouse-related spaces. In addition, this definition encompasses infrastructure related to warehousing, including docks, station buildings, freight yards, rail lines, and transportation equipment and facilities, as well as supporting service buildings such as office buildings and workers' dormitories.

According to the definition of industrial heritage in the "*Nizhny Tagil Charter*", waterfront warehouse industrial heritage falls under the broader category of industrial heritage, holding significant value in terms of spatial characteristics, industrial functions, and historical and cultural importance:

- **Spatial Characteristics**: Large spans, high load-bearing capacity, and multi-layer storage, designed to accommodate large-scale cargo storage needs;
- **Industrial Functions**: Formerly served as an important support for urban commerce, industry, and transportation;
- **Historical and Cultural Value**: Reflects the development of urban commerce, trade, and transportation logistics, and carries the memory of the city.

In Guangzhou, waterfront warehouse industrial heritage is primarily concentrated along the Pearl River, railway corridors, and old commercial districts. Notably, the warehouse heritage sites along the Pearl River Back Channel, such as Taikoo Warehouse, Asiatic Petroleum Co. Huadi warehouse, and Jardine Warehouse, have well-preserved characteristics of Guangzhou's modern port trade and warehousing logistics system. These sites serve as important physical carriers for studying the city's economic, industrial development, and commercial logistics.

(3) The Concept of Sharing

The sharing concept originates from the idea of shared economy. It refers to the sharing of space, facilities, information, and social resources under the context of limited resources and optimized usage efficiency, aiming to increase resource utilization, promote social equity, and foster sustainable development. The core of the shared space concept is the shift from ownership to usage rights, i.e., "from owning to using", encouraging a transition from the individual ownership model to a collaborative usage model, making the utilization of social resources more efficient, flexible, and sustainable.

In architecture and urban studies, "sharing" not only represents a mode of space usage, but also signifies the regeneration of space exchange value[4]. In the field of urban development and spatial optimization, the shared space concept has become an important theoretical foundation for driving urban renewal, land use optimization, and the

transformation of existing spaces. Particularly in the context of existing city development, the shared space concept improves traditional single-function development models through means such as spatial openness, functional integration, resource sharing, and collaborative governance. This shift enables urban spaces to transition from being closed and inefficient to being open, diverse, and efficient, enhancing the adaptability and inclusiveness of public urban spaces.

In the renewal of waterfront industrial heritage, the practical goal of the shared space concept is to transform closed industrial spaces into “collective commons”, balancing heritage preservation, economic vitality, and social equity[5]. For example, the Yangpu Riverside project in Shanghai integrates a waterfront pedestrian pathway with the installation of “industrial rust belt” art pieces, achieving a deep integration of industrial heritage with urban life.

1.3.2 Research Questions and Content

1) Research Questions

This study focuses on the following questions:

(1) What are the challenges faced in the shared renewal of the Pearl River Back Channel waterfront industrial heritage? Based on the current situation and field research, this study analyzes the specific manifestations and underlying causes of the lack of shared space in the renewal of urban waterfront industrial heritage areas.

(2) How can the shared space concept guide the spatial design, functional configuration, and operational management of industrial heritage, and build a shared-oriented renewal strategy system? Drawing on domestic and international experiences, this study explores renewal methods from the perspectives of spatial openness, functional integration, and social participation.

(3) Taking the Pearl River Back Channel waterfront industrial heritage zone in the Julong Bay area as a case study, how can the renewal of waterfront industrial heritage be organically integrated with urban life? This study explores the practical application of the shared space concept in specific case studies.

2) Content of the Study

The research content includes:

Theoretical Framework: Integrating shared city theory and industrial heritage preservation theory to develop a shared space evaluation framework;

Current Situation Analysis: Using the shared space evaluation system, this study analyzes the spatial distribution, functional layout, and shared space bottlenecks of the Pearl River Back Channel industrial heritage;

Strategy Design: Proposing a five-dimensional renewal strategy: region, place, corridor, boundary, and node, including strategies such as waterfront interface openness, time-sharing functional integration, and the establishment of community participation platforms;

Practical Validation: Using the waterfront industrial heritage zone in the Julong Bay area as a case study to optimize the adaptability of the proposed strategies.

Through this research, the aim is to provide a systematic methodology for the shared renewal of Pearl River Back Channel and similar waterfront industrial heritage areas, and to promote the transformation of industrial heritage into "urban shared spaces".

1.4 Research Methodology and Framework

1.4.1 Research Methodology

This study focuses on the renewal strategies of Pearl River Back Channel industrial heritage under the shared space concept. It adopts a combination of theoretical research, case analysis, and field research, to construct a systematic research framework. The research methods include literature review, case study, field research, inductive and comparative analysis, and interdisciplinary approaches, ensuring the scientific rigor and practical guidance of the study.

Literature Review: By collecting and organizing literature related to industrial heritage preservation, the shared space concept, and waterfront space regeneration, the study reviews the research status and theoretical foundations. It also reviews the historical evolution and current development of the Pearl River Back Channel waterfront industrial heritage to construct the theoretical framework of the study

Field Research: Field visits will be conducted along the Pearl River Back Channel to gather first-hand data through on-site surveying, spatial mapping, and user behavior observation. The study will focus on the Julong Bay area industrial complex, investigating its spatial characteristics, current usage, and existing issues.

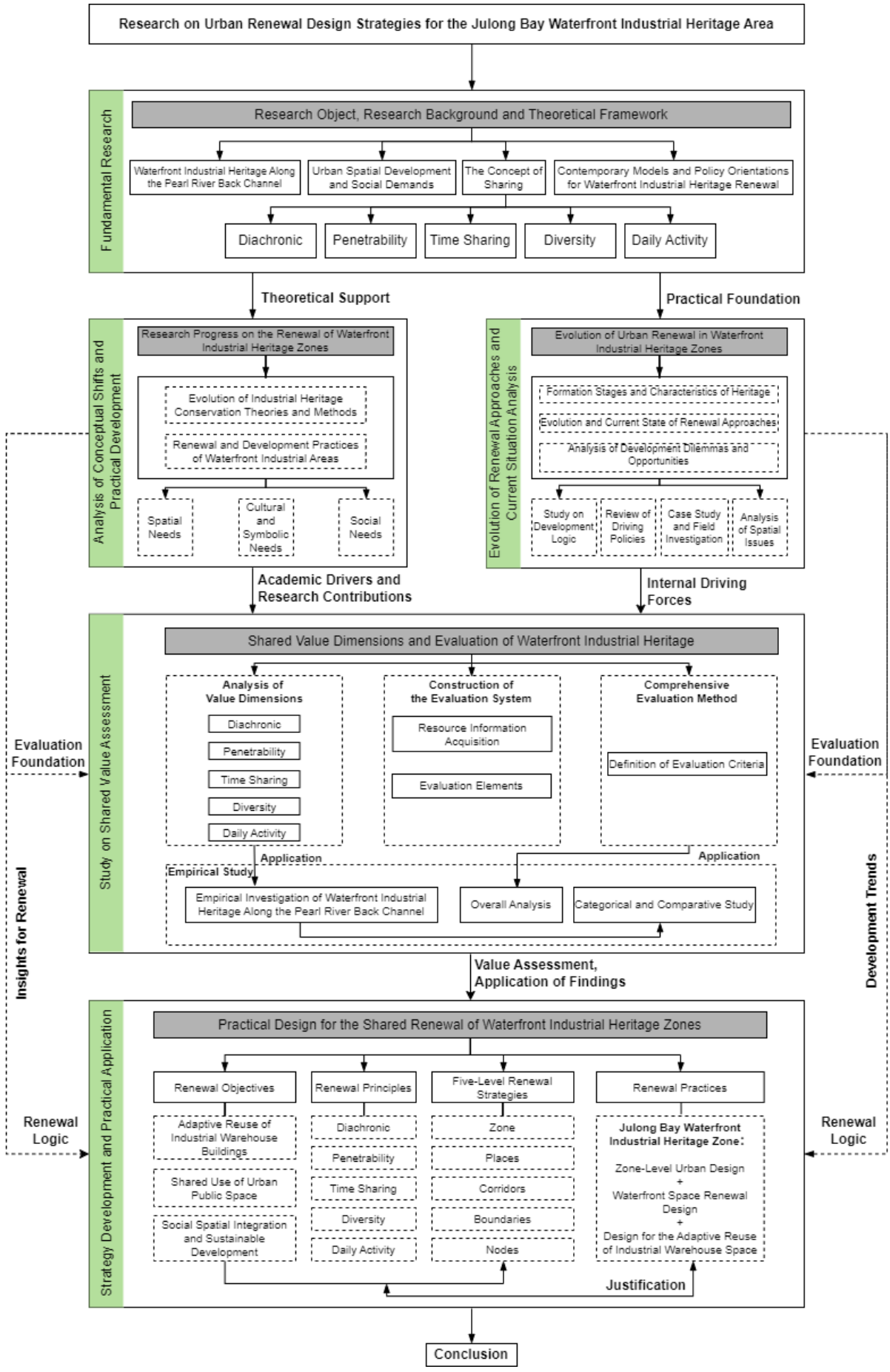
Case Study: This method selects representative cases of shared renewal of waterfront industrial heritage from both domestic and international examples. The analysis will focus on dimensions such as shared space organization, shared functional configurations, and shared operational mechanisms. The case analysis will start with the evaluation criteria of

Diachronic-Penetrability-Time-sharing-Diversity-Daily activity, extracting lessons from different cases on spatial morphology, renewal strategies, and shared operations, and applying these to the Pearl River Back Channel context to form applicable shared renewal strategies.

Interdisciplinary Approach: The study integrates theories and methods from multiple disciplines, including urban design, architecture, urban planning, sociology, and economics, to comprehensively explore the shared renewal strategies for waterfront industrial heritage. Specifically, urban design focuses on spatial form, architecture on the adaptability of shared spaces, sociology on user behavior and community participation, and economics on the sustainability of shared models. The interdisciplinary approach ensures the completeness and scientific rigor of the research conclusions.

1.4.2 Research framework

The research framework demonstrates the four stages of this study: "theory → current situation → strategy → practice".


Research on Urban Renewal Design Strategies for the Julong Bay Waterfront Industrial Heritage Area
Fundamental Research
Research Object, Research Background and Theoretical Framework
Waterfront Industrial Heritage Along the Pearl River Back Channel
Urban Spatial Development and Social Demands
The Concept of Sharing
Contemporary Models and Policy Orientations for Waterfront Industrial Heritage Renewal
Diachronic
Penetrability
Time Sharing
Diversity
Daily Activity
Theoretical Support
Practical Foundation
Analysis of Conceptual Shifts and Practical Development
Research Progress on the Renewal of Waterfront Industrial Heritage Zones
Evolution of Industrial Heritage Conservation Theories and Methods
Renewal and Development Practices of Waterfront Industrial Areas
Spatial Needs
Cultural and Symbolic Needs
Social Needs
Evolution of Renewal Approaches and Current Situation Analysis
Evolution of Urban Renewal in Waterfront Industrial Heritage Zones
Formation Stages and Characteristics of Heritage
Evolution and Current State of Renewal Approaches
Analysis of Development Dilemmas and Opportunities
Study on Development Logic
Review of Driving Policies
Case Study and Field Investigation
Analysis of Spatial Issues
Academic Drivers and Research Contributions
Internal Driving Forces
Study on Shared Value Assessment
Shared Value Dimensions and Evaluation of Waterfront Industrial Heritage
Analysis of Value Dimensions
Diachronic
Penetrability
Time Sharing
Diversity
Daily Activity
Construction of the Evaluation System
Resource Information Acquisition
Evaluation Elements
Comprehensive Evaluation Method
Definition of Evaluation Criteria
Application
Application
Empirical Study
Empirical Investigation of Waterfront Industrial Heritage Along the Pearl River Back Channel
Overall Analysis
Categorical and Comparative Study
Evaluation Foundation
Evaluation Foundation
Insights for Renewal
Development Trends
Value Assessment, Application of Findings
Strategy Development and Practical Application
Practical Design for the Shared Renewal of Waterfront Industrial Heritage Zones
Renewal Objectives
Renewal Principles
Five-Level Renewal Strategies
Renewal Practices
Adaptive Reuse of Industrial Warehouse Buildings
Shared Use of Urban Public Space
Social Spatial Integration and Sustainable Development
Diachronic
Penetrability
Time Sharing
Diversity
Daily Activity
Zone
Places
Corridors
Boundaries
Nodes
Julong Bay Waterfront Industrial Heritage Zone:
Zone-Level Urban Design
+
Waterfront Space Renewal Design
+
Design for the Adaptive Reuse of Industrial Warehouse Space
Renewal Logic
Renewal Logic
Justification
Conclusion

Chapter 2 Theoretical Overview and Practical Cases

2.1 Review of Relevant Theories

2.1.1 Studies Related to the Renewal of Waterfront Industrial Heritage

1) Current Status of Foreign Research

The research on the reuse of waterfront industrial heritage in foreign countries can be discussed from two aspects: the evolution of the idea of industrial heritage protection, and the practice of redevelopment of waterfront industrial zones. These researches not only enrich the theoretical foundation of waterfront industrial heritage, but also provide useful experience for practice.

(1) Evolution and Practice of International Ideas and Methods for the Preservation of Industrial Heritage

In the field of international industrial heritage conservation, the following three important documents and charters constitute the core framework of the conservation approach:

- *The Nizhny Tagil Charter for the Industrial Heritage* (2003): initiated by the International Committee for the Conservation of Industrial Heritage (TICCIH), submitted to the International Council on Monuments and Sites (ICOMOS) for approval and finally adopted by UNESCO. The Charter is the world's first internationally recognized convention dedicated to guiding the protection and preservation of industrial heritage. It provides guiding opinions on the definition, value recognition, legislative protection, and preservation methods of industrial heritage. For the first time, it explicitly clarifies the protective value of warehouse buildings, which were previously on the periphery of the heritage definition.
- *Dublin Guidelines* (2011): The Charter further expands the scope of industrial heritage protection, covering not only industrial buildings and structures but also entire areas and landscapes. Additionally, the Charter emphasizes the protection of "intangible heritage", such as industrial processes, technical knowledge, work practices, labor organization, and the associated social and cultural traditions.
- *Taipei Declaration for Asian Industrial Heritage* (Taipei Declaration, 2012): The Declaration is a significant outcome of a TICCIH conference held in Asia. It was the first to systematically articulate the universal value of industrial heritage in the Asian context, emphasizing its diversity, and advocating for a conservation approach that

takes into account regional characteristics, cultural diversity, and the multi-layered nature of universal heritage values.

In addition, *The Burra Charter*, developed by the Australia ICOMOS (International Council on Monuments and Sites), provides technical guidance on the methods and practices of industrial heritage conservation. It introduces the concept of "adaptive reuse", which refers to assigning new functions to heritage sites while maintaining their integrity and ensuring the appropriateness of existing buildings and spaces, thus achieving a dynamic form of conservation. *The Burra Charter* has been widely adopted in the field of industrial heritage, offering approaches to finding suitable adaptive reuse strategies for heritage buildings.

The evolution of international charters and guidelines reveals that the conservation and adaptive reuse of industrial heritage has undergone a clear transition—from "static preservation" to "active utilization". During the 1970s to 1990s, the dominant approach was static preservation, which focused primarily on the physical conservation of industrial heritage. A representative example is the Ruhr Region in Germany, where former industrial sites were transformed into industrial museums and cultural landscapes to showcase the historical value of industrial relics. Since the early 2000s, the concept of adaptive reuse has emerged, emphasizing the functional regeneration of industrial heritage. A prominent case is the Lingotto Fiat Factory renovation in Italy, which retained the original industrial structure while introducing commercial, office, educational, and recreational functions, transforming it into a mixed-use complex. This project not only revitalized the industrial relic but also created a diverse urban public space for the surrounding community, thereby enhancing the building's image and assigning new social value to the heritage[6]. From the 2010s to the present, the focus has shifted towards approaches that integrate ecology and culture, with an emphasis on environmental sustainability and cultural interaction. For example, the transformation of the Parma Sugar Factory in Italy explored the value of industrial heritage through graded conservation, reorganizing spatial and functional systems. The project blended industrial forms with musical architecture, ultimately producing the renowned Paganini Concert Hall[7].

(2) Development and Practice of Reuse of Waterfront Industrial Zone Renewal Worldwide

In the 19th century, major port cities in Europe and the United States relied on their superior geographic location to rise rapidly, such as the Port of London once became the world's largest port, driving the United Kingdom to become the "factory of the world." In the middle of the 20th century, as industrialization reached its peak, the port facilities were aging,

and the development of highways and railroads impacted the port economy, leading to a large number of waterfront industrial areas being gradually abandoned.

Until the late 1950s, Western countries began to address the issue of post-war urban decline. The United Kingdom was the first to initiate the renewal of waterfront industrial heritage, followed by other Western nations, which started to repurpose port areas to meet the demands of modern urban development and improve urban landscapes. The Liverpool waterfront, Baltimore Harbor in the United States, and the Docklands area in London became early representatives. In the early 1980s, the UK government launched the "Action 1980" initiative, establishing a single decision-making body, the Merseyside Development Corporation, and releasing the "*Early Development Strategy*", which set the mixed-use function for waterfront land. In 1988, the publication of the "*Waterfront Area Regeneration*" comprehensively analyzed the protection strategies for waterfront industrial heritage. In 1989, the concept of "dockyard industrial heritage" was officially proposed, marking the establishment of the port industrial heritage concept. In 1999, Jeffrey Steinglass of Canada proposed the "Dockyard Industrial Area" theory, advancing the systematic development of practical applications. In 2008, the Heritage Areas Organization of the United States, through empirical research, confirmed the multidimensional value of port heritage, including historical, cultural, economic, and scientific aspects. Louis Fask Gillard introduced the "Historical Urban Landscape" methodology, emphasizing that the protection of port industrial heritage should be integrated with urban development, covering research, culture, and urban organizational structure.

To date, there are thousands of excellent waterfront industrial heritage renewal examples worldwide, and the renewal concepts have evolved and upgraded over time. From the 1960s to 1970s, waterfront renewal was primarily focused on material space renovation, with large-scale demolition and reconstruction triggering reflections. From the 1970s to 1980s, the renewal of waterfront industrial heritage entered the stage of creating consumer spaces (e.g., Bilbao port and San Francisco's Fisherman’s Wharf), but excessive commercialization led to the privatization of space. After 1990, with the advent of the information age, the emphasis shifted towards comprehensive regeneration, and the concept of waterfront industrial heritage renewal evolved from material transformation to a combination of culture and ecology, such as the revitalization of Hamburg's old port area in Germany, which blends historical and modern elements to enhance urban vitality. Overall, there has been a shift from a single economic focus to a balance of multiple goals, from government-led to multi-stakeholder governance, and from short-term development to sustainable vitality regeneration.

The theoretical research on waterfront industrial area renewal involves multiple aspects, including urban planning, socioeconomic factors, architectural landscape, and heritage conservation. The research directions encompass spatial optimization, balancing economic and social benefits, environmental improvement, and the enhancement of policy and institutional frameworks:

a. Spatial Dimension: Enhancing the spatial quality and regional attractiveness of waterfront areas

Luís Loures (2008) proposed a renewal plan and strategy for the old industrial area along the Arade River in Portugal to improve spatial quality and enhance regional vitality[8]. Meanwhile, as a significant cultural carrier of the post-industrial society, waterfront industrial areas face the challenge of diversifying their spatial functions and strengthening their connection with other urban areas. This issue has gradually become a key focus. Marijn van de Weijer (2019), in his research on waterfront industrial areas in the Netherlands, emphasized that decaying docks and industrial sites have transformed into cultural hotspots. Previously, the functions of these areas were relatively single and lacked strong connections with the community. The renewal strategies should respond to social needs, balance heritage preservation with modern functions, and strengthen their connection with other urban areas[9].

b. Economic and Social Dimensions: Beyond the Promotion of Economic Development in Waterfront Industrial Area Renewal, Focus on Balancing Public Interest and Economic Benefits, and the Role of Public Demand in the Renewal Process

Barry Shaw (2001) summarized that the renewal of waterfront industrial areas has gone through four stages of development: first, driven by tourism to revitalize cities; second, land renewal driven by large urban development companies attracting new industries and commercial investments; third, heritage-led urban regeneration promoting the revival of traditional industrial cities; and fourth, social welfare prioritized in high-intensity developments, balancing art and public space creation. These stages have all contributed to the effective use of urban space resources at various levels[10]. Shaw further pointed out that the renewal of waterfront industrial areas in the 21st century is not just an economic engine for revitalization but has gained additional social value, becoming essential places for daily activities and cultural exchanges for urban residents. Susan Oakley (2014) examined the redevelopment of abandoned docks in Australia, noting the controversy caused by the dominance of economic interests over social demands and the neglect of public participation[11].

c. Ecological and Environmental Dimensions: Focusing on Brownfield Restoration

and the Shaping of Post-Industrial Landscapes, Emphasizing the Role of Waterfront Areas in Urban Environmental Regulation

Nail Kirkwood (2001) summarized the ecological restoration of industrial wastelands, providing a theoretical basis for the development of post-industrial landscapes[12].

d. Policy and Institutional Dimensions: Comparing Development Mechanisms and Renewal Models of Different Cases, Summarizing the Strengths and Weaknesses of Different Development Approaches to Improve Policy Systems

Luis Loures (2013) studied six cases and proposed that industrial heritage renewal policies should balance legislation, administration, citizen participation, institutional management, and market orientation to ensure sustainable development[13].

The research perspective on waterfront industrial areas has continuously evolved. Early literature focused on the transformation of individual cities' waterfront areas from the industrial era to the post-industrial era, such as Ann L. Buttenwieser (1987), who studied the planning and development of Manhattan's waterfront from the 17th century to the 1980s[14]. After the 1990s, scholars began focusing on multiple international cities, reflecting on urban planning and design concepts through the successes and failures of waterfront industrial area renewal. Richard Marshall (2001), in his book *Waterfront in Post-Industrial Cities*, pointed out that the renewal of waterfront industrial areas is not only a continuation of the historical memory of the city's waterfront but also an experiment in a new urban construction paradigm that addresses the lack of urban complexity, justice, and publicness[15]. The reconstruction of waterfront industrial areas often means repositioning urban core activities, presenting an opportunity to restore the connection between urban centers and peripheral waterfronts, reestablishing city image, and becoming an engine for economic investment and city center revitalization. Moreover, Professor Han Meyer (2003) in *City and Port: Transformation of Port Cities - London, Barcelona, New York, Rotterdam* reviewed waterfront revitalization since the 1960s in global cities like London, New York, Barcelona, and Rotterdam. He believes that urban planners and designers should fully recognize the importance of cultural factors in functional space and their decisive role in transforming large-scale urban infrastructure, such as port areas[16].

Since the 21st century, the focus of waterfront industrial area renewal has shifted from pure economic-driven approaches to more comprehensive social value-oriented approaches. Harvard University professor Alex Krieger (2004), in his work *The Transformation of the Urban Waterfront*, proposed that successful waterfront spaces should not only serve as water-front lines or tourist destinations but should also include functions such as residential, social,

and daily life. By bridging physical and psychological barriers, waterfront spaces should ensure public attributes and establish a close connection with the city's core, making it one of the most vibrant areas in the city[17].

Since 2010, the renewal of waterfront industrial areas has gradually aligned with the concept of Resilient Cities, making sustainability a core issue. Amirante, MI Frettoloso, C of University of Naples, Italy (2008), proposed strategies to address issues such as unprotected cultural heritage, insufficient coverage, and inaccessibility. Emanuele Morezzi (2010), in his research on Cape Town's Victoria and Alfred Waterfront in South Africa, emphasized the balance between commercial development and historical and cultural preservation. He highlighted how, through integrating economic development, functional optimization, and cultural memory, the waterfront area can achieve a sustainable transformation[18].

The renewal of waterfront industrial areas is transitioning from single urban renewal strategies to more comprehensive development models. This shift moves the focus from economic interests to social equity, from short-term benefits to long-term sustainability, from single government or developer-led efforts to multi-stakeholder involvement, and toward vibrant regeneration. The future development trends will place greater emphasis on functional diversification, integrating commercial, residential, and cultural uses, while also strengthening public participation in the name of social equity and ensuring fair access to waterfront resources. Ecological sustainability will become a core goal, combining innovative technologies to enhance waterfront environmental quality and foster resilient urban development. The renewal of waterfront industrial areas is no longer just an engine of urban revitalization; it has become an important practice in shaping the future urban landscape, promoting social equity, and achieving sustainable development.

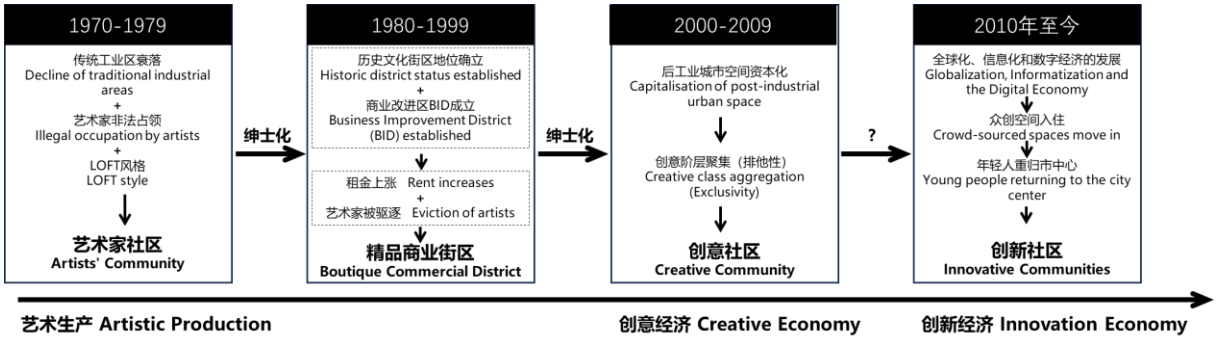


Figure 2-1 The Pathway from "Artistic Production Model" to "Entrepreneurial Innovation" in Urban Center Industrial Heritage

(Source: Reference[4])

(3) Development and Practice of the Renewal of the Industrial Heritage of the International Waterfront Warehouse

Research on the protection and regeneration of waterfront warehouse industrial heritage abroad covers a wide range of perspectives and topics, including storage technology engineering, heritage tourism, port area spatial transformation, architectural types and technologies, as well as regional and social attributes. These studies not only focus on the protection methods of heritage but also emphasize the pathways for renewal, striving to guide practices through scientific methods to achieve the effective transformation of old industrial warehouse buildings. Many studies are dedicated to exploring renewal strategies under specific development models, such as transforming industrial warehouse buildings into heritage tourism sites, museums, art galleries, or multifunctional cultural spaces. John T. studied the geographical distribution of the warehouse industry and its relationship with transportation facilities such as air, road, and rail[19], while Leonardo Guerin explored the correlation between the layout of warehouse spaces and factors such as social population, infrastructure, municipal service rates (STR), and land prices[20].

On the practical level, the transformation and renewal of waterfront warehouse buildings are often integrated with the overall development of urban waterfront areas or port spaces. In renovation projects such as the Docklands area in London, Sullivan Bay in Australia, and the Singapore River region, warehouse buildings with well-preserved historical features were retained and transformed into functional spaces such as restaurants, bars, artist studios, and art exhibition halls. Furthermore, waterfront warehouse industrial heritage, due to its strong spatial plasticity, significant renovation potential, and initially low rent, has been favored by artists and cultural creators, becoming an important carrier of the cultural and creative industries. After the 1970s, some cities in the UK and the US saw the emergence of the "art warehouse" (Loft) model. A typical example of this model is the redevelopment of Manhattan’s SoHo district, which was transformed from abandoned warehouses into artist studios and led to the development of the Loft concept. These cases show that the renovation of warehouse buildings often started as unofficial, spontaneous transformations driven by the cultural and artistic industries, eventually leading to the overall revival of the area.

With the development of globalization, industrial heritage renovation practices in various countries have shown certain similarities, but also exhibit uniqueness due to their respective socio-economic backgrounds. In the United States, the transformation of industrial buildings has been widely applied in urban renewal. For example, New York’s SoHo district was

transformed from abandoned warehouses into artist studios, leading the development of the Loft concept. In the UK, having entered the post-industrial society earlier, some industrial areas faced abandonment, and the government promoted industrial heritage protection through laws and regulations. Famous transformation projects include London's "Roundhouse" mechanical warehouse and the Darclays Tobacco Warehouse, both of which have been transformed into urban leisure and entertainment spaces. In Japan, with the development of the maritime economy, a large number of ports were built, but in the post-industrial era, there were also many idle warehouse parks. The government placed high importance on this and actively promoted transformation, such as the Hokkaido Hakodate Bay project, which transformed warehouses into commercial entertainment venues, and the Sapporo Beer Museum, which was transformed from an old beer factory warehouse into a cultural exhibition space (Table 2-1).

In general, the renovation of old warehouse buildings has become quite common internationally and has had a widespread influence on related practices in other countries. Entering the post-industrial era, the concept of industrial building transformation has gradually shifted from mechanical thinking to humanistic care. The objects of renovation are more diverse, including not only traditional industrial heritage but also ordinary idle factories and warehouses. The renovation concept now emphasizes green and low-carbon approaches, spatial comfort, and the continuation of architectural context and local cultural exploration. The methods of renovation have also become more diverse, extending from facade treatment to spatial structure reshaping, emphasizing individuality and functional flexibility. Although research on the transformation of waterfront warehouse industrial buildings has not formed a separate subfield, the overall trend of industrial building renewal shows that countries are actively exploring the best ways to address the challenges of the post-industrial era..

Table 2-1 Renovation Methods for International Waterfront Warehouse Industrial Heritage

(Source: Drawn by Author)

Utilization Method	Country	Representative Projects	Post-Renovation Use
- Warehouses as historical buildings in urban waterfront districts and port areas, integrated into overall redevelopment practices. - Warehouse buildings with good historical features are preserved in appearance while their functions are replaced.	United Kingdom	Docklands area, London	Commercial wholesale center, Docklands Museum
	Australia	Sullivan Bay, Australia	Restaurants, Bars, Art Galleries, Offices
	Singapore	Singapore River Area	Restaurants, Hotels, Commercial Streets
- Renovation and transformation of old warehouses by artists and cultural creatives. - Old warehouses, due to their high spatial flexibility, greater potential for renovation, and initially low rent, are favored by many.	United States	SoHo District, Manhattan (South of Houston Street, SoHo)	"Art Warehouse" (Loft)

2) Research Status in China

(1) Research on Industrial Heritage Protection: Evolution of Ideas and Practices in China

Early industrial heritage in China did not receive sufficient attention. During the process of urban development, the rapid replacement of industries led to the neglect of these heritage sites that carry historical memories. At that time, urban design mainly focused on new construction projects, lacking in-depth recognition of the value of existing industrial heritage. Over time, awareness of the historical and cultural value of cities gradually increased. In the late 1990s, China began to research the protection and renewal of industrial heritage. In 2006, the release of China's first guiding document on industrial heritage protection, the "*Wuxi Proposal*", marked the beginning of a new stage in the protection of industrial heritage. This document clearly outlined the historical, social, architectural, technological, and aesthetic values of industrial heritage, providing a theoretical basis for its protection. Subsequently, a series of policy documents, including the "*Wuhan Proposal*", "*Beijing Initiative*", and "*Hangzhou Consensus*", were introduced, gradually promoting the legalization and systematization of industrial heritage protection.

Table 2-2 Major International and China Charters on Heritage Conservation

(Source: Reference[1])

	1933	1964	1972	1976	1977	1987	1999	2003	2006	2014
The Athens Charter	Monuments of diachronic significance									
The Venice Charter	Historical monuments, urban and rural historic environments									
Convention Concerning the Protection of the World Cultural and Natural Heritage	Natural areas, monuments, architectural complexes, and ancient cultural sites with aesthetic and scientific value.									
Warsaw-Nairobi Recommendation	Historic districts, historic towns, and groups of monuments in old city centers or villages									
Charter of Machu Picchu	Historic monuments, traditional culture, and notable contemporary architecture, as well as a broad range of cultural heritage									
Charter for the Conservation of Historic Towns and Urban Areas (Charter of Washington)	Historic towns, historic areas, and traditional residential environments									
UIA Beijing Charter : The Future of Architecture	Urban and architectural heritage									
The Nizhny Tagil Charter for the Industrial Heritage	Including buildings, machinery, workshops, factories, mines, warehouses, energy production, transportation, and infrastructure related to industrial production and related social activities									
The Wuxi Recommendations	Factory workshops, mills, warehouses, shops, industrial buildings, mining and related processing sites, energy production and transmission facilities, transportation infrastructure, social spaces related to industrial production, industrial equipment, as well as material and immaterial cultural heritage such as production processes, data records, and corporate archives.									
The Guidelines for the Protection and Utilization of Industrial Heritage	Material and immaterial heritage. **Material heritage** includes workshops, factories, mines, warehouses, docks, bridges, roads, transportation infrastructure, office buildings, residential services, and other immovable elements, as well as movable heritage such as machinery, production tools, office supplies, personal items, historical records, trademarks, documents, manuscripts, photos, recordings, books, and other materials. **Immaterial heritage** includes production processes, craftsmanship, raw material formulas, trademarks, business management, corporate culture, and other industrial cultural forms.									

China’s approach to industrial heritage protection has undergone a transformation similar to that of international practices—evolving from “static preservation” to a dual emphasis on adaptive reuse and organic renewal, and further advancing toward urban revitalization. Early research primarily focused on the static protection of industrial relics, emphasizing the preservation of architectural entities and the study of their historical value—for example,

through the documentation, surveying, and structural safeguarding of factories, chimneys, water towers, and other industrial buildings. However, with the acceleration of urbanization and the growing demand for urban renewal, more attention began to be paid to the renewal models of industrial heritage. In 2014, the National Cultural Heritage Administration issued the *Guidelines for the Protection and Utilization of Industrial Heritage (Draft for Comments)*, which further emphasized the adaptive reuse of industrial heritage and encouraged reasonable transformation to realize its social and economic value. In 2018, the Ministry of Industry and Information Technology released the *Notice on the Survey of Industrial Heritage and Industrial Museums (MIIT Industry [2018] No. 114)*, which provided further elaboration on the protection and utilization of industrial heritage. In January 2018, the first list of China's Industrial Heritage Protection Sites was officially announced, playing a positive role in preserving industrial heritage and passing on the historical fabric of cities.

From the perspective of research methodology, Chinese scholars have gradually adopted more systematic theoretical frameworks to analyze industrial heritage conservation strategies. From an architectural design standpoint, Wei Feng et al. (2015), based on the concept of functional replacement, categorized the renewal models of industrial heritage into six major types, with many studies focusing on design methods for adapting old industrial buildings into specific uses[21]. Yu Lihan and Pu Peiyong (2014, 2017) used the transformation of manufacturing-led productive industrial zones as examples to explore conservation and renewal approaches through the evaluation of industrial heritage renewal practices[22,23]. Liu Fuying et al. (2018) focused on case studies of silo renewal, examining functional evolution, spatial transformation, and façade regeneration, with an emphasis on specialized types of industrial heritage. From the perspective of urban planning[24], Zhang Yishan (2008) explored integrated renewal strategies at the urban scale based on the functional positioning and spatial integration of plots within urban development[25]. Lin Zurui et al. (2015) proposed a new model for the transformation of mining areas and revitalization of surrounding land based on ecological restoration, cultural reproduction, and appropriate renovation[26]. Guan Binjun et al. (2017), within the context of urban renewal, introduced the concept of architectural recycling and proposed methods to build a symbiotic relationship between industrial heritage buildings and the city through recycling strategies[27]. At the level of industrial landscape regeneration, Dong Cui (2017) proposed industrial heritage landscape renewal methods involving the holistic planning of industrial site environments, retention and renewal of ceramic industrial building façades, and reuse of waste materials[28]. Luo Yi et al. (2014) introduced the concept of “contextual continuity” and explored how to achieve spatial regeneration while preserving

authenticity by analyzing spatial layout, architectural features, and functional evolution of industrial heritage sites[29]. Ji Hong (2012) and Wang Changsong (2017) placed greater focus on the evaluation criteria and value systems of industrial heritage, with most related research examining different perspectives and evaluative elements, such as ecological, technological, and economic value systems for industrial heritage and corresponding renewal pathways[30,31]. Overall, the breadth and depth of research on the conservation and renewal of industrial architectural heritage in China are continuously expanding. The scope of study has gradually evolved from individual cases to district-level, city-level, and thematic research. The evaluation systems for industrial heritage value are receiving increasing attention, and interdisciplinary research is becoming more prevalent.

In practice, methods for the renewal of industrial heritage in China have been continuously innovating, expanding from the initial museum model to diverse models such as cultural creativity, commercial offices, and leisure tourism. For example, Beijing's 798 Art District, through the renovation of old factories and the introduction of art institutions and cultural creative industries, became one of the earliest successful cases of industrial heritage transformation in China. Shanghai has demonstrated greater diversity in industrial heritage renewal, adopting not only the 798 model but also transforming industrial buildings into technology incubators, commercial complexes, and other uses, such as the M50 Creative Park and Tianzifang. In recent years, with the country's increasing emphasis on stock updates, the trend of combining industrial heritage protection with urban revitalization has become more prominent. In 2022, the research on industrial heritage in the Guangdong-Hong Kong-Macao Greater Bay Area further emphasized the value evaluation, adaptive protection, and renewal methods for industrial heritage, exploring how to promote the sustainable use of industrial heritage in the context of regional coordinated development.

(2) Development and Practice of Renewal of Waterfront Industrial Zones in China

The protection and renewal of waterfront industrial heritage in China has evolved from fragmented approaches to a systematic one, and from single transformations to comprehensive developments. Around the year 2000, research in this field began to emerge, but early studies primarily focused on buildings with high historical and cultural value, while typical industrial buildings were often regarded as products of economic decline and were demolished. Research content was also limited to primary restoration, with less attention paid to static preservation and the regeneration of existing structures. After entering the 21st century, research perspectives gradually expanded, going through three major development

stages: The late 1990s' phase of experience introduction and practical exploration, primarily focusing on the redevelopment of waterfront areas and the shaping of post-industrial landscapes. The early 2000s' industrial heritage corridor construction phase, which began to emphasize the adaptive reuse of buildings. The post-2010 urban stock renewal phase, emphasizing mixed-use development, industrial transformation, and the enhancement of public spaces.

In terms of theoretical research, domestic scholars have proposed various innovative concepts and methods, driving the transition from traditional single-function renewal to multi-dimensional value integration. For example, He Weihua (2023), using the case of the Pearl River Back Channel in Guangzhou, constructed a quantitative analysis framework to reveal the deep mechanisms of the transformation of industrial heritage from production space to multi-functional living space, and proposed a systematic solution to break through traditional renewal models, shifting the research perspective from single-function to multi-dimensional value integration[32]. The team of Guo Hao (2022) proposed the “Industrial Heritage Corridor” model, achieving cultural revival and urban renewal synergy through spatial connection[33]. From the perspective of the evolution of protection concepts, the research has progressed from Zhang Tingwei's (2002) environmental remediation phase, which introduced Western experiences[34], to Zhu Yichen's (2018) three-stage evolution model — experience introduction (1990s), adaptive reuse (early 21st century), and stock transformation (post-2010), ultimately forming the “shared” concept and “urban dual renewal” strategy, reflecting the shift in protection ideas from single landscape renovation to cultural-industrial composite regeneration[35].

At the same time, research from the perspective of different cities continues to enrich and improve. Liu Kaiming (2007) proposed an optimized urban design strategy through a comparative analysis of the public space, waterfront buildings, green landscapes, and heritage protection status along the Huangpu River and Suzhou Creek[36]. Zhang Song (2010) focused on Xuhui Riverside and discussed the design strategies for the holistic renewal of waterfront industrial heritage areas[37]. Yang Ming (2017) explored how to achieve a balance between historical preservation and economic revitalization in urban life[38]. Scholars such as Wu Jiang (2015)[39], Zhang Ming (2017)[40], and Ding Fan (2018)[41] examined industrial heritage transformation under policy guidance and cultural intervention, drawing on cultural events such as the Shanghai World Expo and urban space art seasons, providing rich case studies for practice. Research focused on key urban areas has also matured. For example, Li Zengjun (2010) conducted a comprehensive review of the quantity, historical periods, function types,

and current spatial conditions of the entire Huangpu River waterfront industrial heritage, and proposed a symbiotic protection strategy from three levels: urban planning, urban design, and the industrial heritage itself[42]. Huang Lei and Wei Chunyu (2014) reviewed the distribution and current status of modern waterfront industrial heritage in Changsha, offering strategies and suggestions from a macro perspective of policy planning[43]. Zhang Hong (2019) conducted a comprehensive analysis of the value characteristics and current situation of the waterfront industrial heritage in Guangzhou's city center, using typical cases to analyze optimization strategies for future heritage renewal[44]. Tian Meng (2019) discussed the four relationship modes between Changsha's riverside industrial heritage and waterfront space, exploring strategies for reshaping the riverside industrial waterfront of Changsha[45]. These studies focus on the survey, value assessment, and status analysis of waterfront industrial heritage in various cities, and summarize related renewal strategies, providing solid support for further practice through literature and case studies.

In terms of spatial form, early research primarily focused on design methods for the renewal of heritage sites, while recent studies have emphasized the organic integration of the overall city functions. Ma Hang (2017) introduced the concept of spatial integration, proposing the idea that "the whole is greater than the sum of its parts," and summarized the main models of overall development of waterfront areas, complementary community functions, and multi-functional mixed development[3]. Chi Fangai (2018), using the example of heritage renewal along the Grand Canal of Beijing-Hangzhou, developed a "symbiotic" recycling system from individual units and group centers to the entire city, achieving the organic connection of various functions in the region through the integration of landscapes, leisure, and cultural corridors[46].

Regarding the stimulation of urban vitality, some studies focus on the social impacts of waterfront industrial heritage renewal. Dalia Šatkauskaitė (2017) outlined the historical evolution of the relationship between waterfront areas and cities across pre-industrial, industrial, and post-industrial periods, arguing that waterfronts should serve as iconic representations of global cities. She emphasized that renewal efforts should avoid fragmented development and instead create shared spaces integrating old buildings with new functions[47]. Yang Ming (2017) proposed seeking a balance between economically driven and public-welfare-driven values by coordinating economic revitalization, historical preservation, and public policy to enhance the public nature of waterfronts and turn them into centers of urban activity[38]. Zhang Dou (2019) emphasized the pivotal role of waterfront revitalization in promoting urban prosperity. He noted that, during the renewal process, the reconnection

between waterfront and city areas, as well as the reshaping of ecological and recreational functions, are mutually reinforcing and jointly contribute to improving both economic and social benefits[48].

At the ecological landscape level, researchers focus not only on the application of ecological technologies but also on the influence of contextual continuity in shaping post-industrial landscapes. Zhu Yichen (2018) described the transformation of waterfront industrial heritage from the protection of material space to the creation of shared urban landscapes, emphasizing the expression of shared landscapes in terms of diachronicity, penetrability, time-sharing, diversity, and everyday usability[35]. Liang Qiao (2018) advocated for green design as the core principle, proposing to establish connections between modern cities and water, as well as between residents and water, from both spatial and temporal perspectives, in order to preserve and enhance urban character[49].

In addition, the concept of "urban ecological and spatial repair" (known as "Shuangxiu") has emerged as a new perspective for exploring heritage renewal. Zhang Song (2017) argued that industrial heritage is not only a monument to industrial civilization but also a carrier of urban collective memory. Unlike traditional large-scale demolition and reconstruction, the urban dual-repair model is better suited to tapping into regional resources and addressing livelihood issues[50]. Scholars such as Xi Tingxia (2018)[51], Zhang Xiaojing (2019)[52], and Rong Yue (2019)[53] have interpreted the application of "ecological restoration and urban repair" in the renewal of waterfront industrial spaces from both macro and micro perspectives. Mao Yalong (2020), using the Shunde Millennium Paper Mill as a case study, applied urban network and space syntax analysis to propose a dual approach of repairing environmental texture and human-scale dimensions, thereby promoting the mixed-use renewal of the site's functions[54].

As a leading example of domestic practice, Shanghai has undergone multiple stages of development since the comprehensive development of the Huangpu River waterfront area began in 2002. Literature and practical research on this subject are abundant. Zhang Qiang (2014)[55] and Zhang Song (2015)[56]discussed design strategies for overall regional updates starting from Yangpu Riverside and Xuhui Riverside, respectively. In the 2017 "Urban Waterfront Industrial Heritage Corridor Transformation Research" seminar, guests such as Zhang Ming, Yu Yifan, and Wang Fang emphasized the value of industrial waterfront renewal in creating a humanized city. They pointed out issues such as the destruction of original factory textures and the homogenization of waterfront landscapes, and also called for the improvement of guidelines to enhance practical results[57]. By 2019, significant progress had

been made in Shanghai's Riverside Connectivity Project, and architects such as Zhang Ming, Zhang Zi, Liu Yuyang, and Liu Yichun reviewed their practical experiences. Their focus was generally on improving waterfront space experiences and meeting residents' daily recreational needs. At the “Green Hill” workshop, Chang Qing, Wang Xiaoan, and Zhang Bin discussed how to achieve interdisciplinary integration of public systems in the renewal process, extending the vitality of the riverside and pointed out that the Pudong Riverside renewal had evolved from “physical publicnesss” to “cognitive publicness.” This not only provides public activity spaces but also records the city's history and enhances residents' urban identity[58]. Meanwhile, Zhao Baojing (2019)[59], Zhang Zi (2019)[60], and Zou Junwen (2020)[61] systematically reviewed the progress of Shanghai’s riverside renewal from a planning perspective. Xu Yisong (2020) analyzed the practical concept of government, market, and society jointly building, governing, and sharing from the perspective of cultural events[62].

In practice, many cities in China have already initiated the renewal and reutilization of waterfront industrial heritage. Shanghai's Yangpu Riverside renewal model is regarded as a paradigm, as its transformation from “industrial rust belt” to “living showcase belt” fully demonstrates the revitalization strategy led by culture. Other projects such as Beijing's 798 Art District, Tianjin's Haihe River, and Wuhan's Yangtze River waterfront have also realized the regeneration and utilization of waterfront industrial areas through industrial guidance, cultural shaping, and ecological restoration.

Overall, research on the renewal of China's waterfront industrial heritage is shifting from single landscape transformation to comprehensive functional integration. The research paradigm is also gradually expanding from environmental remediation to cultural heritage preservation and urban renewal. In the future, with the introduction of digital management and intelligent planning, the role of waterfront industrial heritage in urban revitalization will be further enhanced. This not only enriches the theoretical framework but also provides valuable practical experience for urban renewal in various cities.

Figure 2-2 Research Trends and Development of Waterfront Industrial Heritage Renewal in China (Source: Reference[4])

(3) Development and Practice of Renewal of Industrial Heritage of Waterfront Warehousing in China

In 2006, *The Wuxi Recommendations* officially recognized the heritage value of waterfront warehouse industrial buildings in China. In 2014, *The Guidelines for the Protection and Utilization of Industrial Heritage* further proposed specific requirements for appropriate protection and renewal. However, specialized studies that systematically explore "waterfront warehouse industrial heritage" as an independent concept remain limited. Related research has mostly focused on the historical development of the warehousing industry and its impact on urban trade and logistics systems, with insufficient attention to the value of the architectural heritage itself and its protection strategies. Early scholars such as Du Xiying (2013)[63], Jing Yuanyuan (2014)[64], and Wu You (2016)[65] respectively studied the development of the warehousing industry in Tianjin, Hankou, and Shanghai, sorting out the relationship between warehouse buildings and urban trade. Since the beginning of the 21st century, research perspectives have gradually shifted from individual buildings to regional renewal, and began to focus on the adaptive transformation of warehouse buildings in urban regeneration. Wang Nan (2019) was the first to conduct research using "waterfront warehouse industrial heritage" as an independent conceptual category. She systematically analyzed the current conditions, spatial characteristics, and renewal methods of modern waterfront warehouse industrial heritage in Hankou, and proposed three functional regeneration strategies for warehouse heritage: "cargo transit warehousing", "market-oriented warehousing", and "commercial-financial warehousing" [66]. In recent years, the research has further expanded to topics such as warehouse heritage and industrial economy, cultural and creative industries, and urban revival. Shu Bo (2020) explicitly proposed the concept of "warehousing and logistics industrial building heritage", and analyzed its classification, component elements, and values, as well as proposed regeneration and utilization models[67].

The theoretical system of waterfront warehouse industrial heritage research has been continuously improved, shifting from single-focus protection to revitalization and renewal, from studies of individual buildings to regional regeneration, and gradually forming a new trend of integration with cultural industries. Early research focused on the historical value and static preservation of warehouse buildings, while in recent years, more attention has been paid to how to revitalize warehouse heritage into multifunctional spaces such as cultural and creative parks, commercial complexes, or urban exhibition halls. For example, Yang Xiwen (2011) proposed an adaptive reuse model for warehouse buildings along the Pearl River Back

Channel, exploring how to achieve functional transformation of industrial warehouse buildings in urban waterfront areas[68]; Zhang Hong (2019) proposed renewal strategies for waterfront warehouse buildings based on waterfront environment shaping, external public space creation, and industrial heritage building renovation[44].

Research on waterfront warehouse industrial heritage in China mainly focuses on aspects such as the protection and revitalized utilization of warehouse buildings, spatial reshaping, and landscape integration, with an emphasis on transformation models and adaptive reuse strategies. For instance, Wang Xin (2019) analyzed the classification and transformation methods of silo-type industrial heritage[69], and Liu Fuying (2020) proposed protection and renewal strategies for granary building heritage in the Hangjiahu region[24]. In practice, the transformation models of waterfront warehouse industrial heritage in China are diverse. Representative models include the creative industry park model and the museum and exhibition hall transformation model. The research on the protection of warehouse heritage along the Huangpu River in Shanghai and the Suzhou Creek is considered a typical example in China. Gu Chengbing (2003) conducted investigations on industrial heritage along the Suzhou Creek and proposed strategies for its protection and renewal[70]; Deng Kunyan (2004) carried out a spatial replacement regeneration design for an old granary in a cluster of transit and logistics warehouses in the same area, exploring the functional revival model of warehouse buildings[71]; Xu Yongli and Li Jing et al. (2010), taking the “Dongjiadu Warehouse No. 1, 2, and 3 Commercial Transformation” project as an example, discussed spatial replacement strategies for warehouse buildings[72]. In addition, Beijing’s 798 Art District successfully transformed former warehouse buildings into a cultural and creative park, becoming a national model for waterfront warehouse industrial heritage renewal. The Suzhou Creek Creative Warehouse Cluster in Shanghai was developed from a batch of old warehouses in the late 1990s into designer studios, eventually evolving into a cultural and creative industry hub known as “Suhe”. In terms of museum and exhibition hall transformations, the Minsheng Wharf Silo in Shanghai has been converted into an art exhibition space, and the Nanfang Warehouse Museum in Guangzhou uses old warehouses to showcase industrial culture, fully reflecting the cultural value of warehouse heritage.

The renewal of industrial heritage in China has evolved from single-focus landscape renovation to integrated multifunctional development. The research paradigm has gradually shifted from environmental remediation to cultural inheritance and urban regeneration. With the continuous advancement of urban stock renewal, the renewal models for industrial heritage have become increasingly diverse, and research perspectives have expanded from

architectural technology to broader fields such as urban regeneration and the integration of cultural industries. Future research directions will further focus on topics such as digital management, intelligent warehouse transformation, and the integration of warehousing industries with cultural tourism, in order to promote the sustainable development of waterfront warehouse industrial heritage.

2.1.2 The Sharing Concept and its Application

1) Conceptual and Theoretical Development of Sharing

"Sharing", as a concept with both a long history and modern significance, has undergone continuous deepening and evolution in its connotation. From an etymological perspective, "sharing" originates from the Old English word *scearu*, which carries meanings of division and allocation, revealing the essence of resource transfer and redistribution of usage rights inherent in the act of sharing[4].

The development of the concept of sharing has gone through several historical stages. In early societies, sharing was mainly characterized by simple sharing of goods and resources; the concept of sharing faded in the 18th century with the rise of the concept of private property, but the rise of Marxism in the 19th century re-emphasized the social value of sharing. In the 21st century, the development of Internet technology has greatly expanded the methods and scope of sharing, and 2007 marked an important turning point in the development of the concept of sharing. Joe Gebbia and others created a modern sharing economy model by posting short-term rentals on the Internet, revitalizing idle resources through online platforms, creating economic benefits, and promoting social exchange and resource conservation[73]. The success of this model has triggered in-depth thinking about sharing in all sectors of society, promoting the widespread application of the sharing concept in various fields. Meanwhile, in terms of theoretical research, the "Sharing Paradigm" proposed by Duncan McLaren and Julian Agyeman in 2016 has become an important breakthrough. They divided sharing into four dimensions: commercial, public, media and socio-cultural, and emphasized that the sharing paradigm should go beyond the traditional logic of market economy to promote the collective use of resources and social equity[74].

China's research on the concept of sharing started relatively late compared to foreign countries, and the related exploration mainly focuses on four fields: sociology, political science, economics and urban planning. Sociologist Liu Zhanyong (2017) argues that shared development is comprehensive and systematic, and is an important strategy for realizing the coordinated functioning of society[75]; political scientist Peng Fuming (2019) points out that

although the sharing idea of Marx and the contemporary concept of shared development are different in terms of the context of the times and the mechanism of occurrence, their spiritual essence is the same, reflecting the inheritance of the theory of socialism with Chinese characteristics in the new era[76]; and economic Scholar Zhang Zhuoyi (2020) argues that the sharing economy model can reduce the waste of capital and enhance the value of the industry through the effective classification, integration and reuse of idle assets[77]. This paper focuses on the field of urban design, which mainly explores the design and development mode of shared cities under the background of the sharing economy, as well as the exploration of the application of the sharing concept in different urban public spaces.

The concept of "sharing" demonstrates great potential across various fields such as knowledge and culture, life sciences, and information technology, due to its advantages in facilitating easy access to information, efficient resource utilization, and active participation in collaboration. Online courses offered by major universities around the world, as well as platforms like Zhihu / Quora and Bilibili / YouTube, provide valuable knowledge resources for teachers, students, and the general public. In the field of life sciences, China's Wuhan quickly released the genetic sequence of the coronavirus based on the principle of gene sharing, and the global seed vault preserves 4.5 million crop samples, both of which illustrate the vital role of sharing in addressing global challenges. In the field of information technology, open-source software and operating systems (such as collaborative creations based on the GNU General Public License) further highlight the power of this concept.

The contemporary concept of sharing has evolved from a purely economic model to a comprehensive social development strategy, the core of which lies in optimizing resource allocation, enhancing social equity and promoting spatial accessibility and sustainable development. The concept of sharing also serves as a connecting link for cross-regional, cross-field and cross-disciplinary research and development, and continues to promote the deep integration of various industries, providing a constant stream of power and creativity.

2) The Concept of Sharing in the Context of Urban Design and Architecture

The development of the concept of sharing in the field of urban design and architecture has gone through a process from the early functional integration of urban space, to the proposal of the shared space model, and then to the evolution of intelligent shared space in the digital era. Sharing is not only embodied in the redistribution of spatial resources, but also involves the innovation of architectural forms, the organization of urban public space, and the mode of social interaction. Under the global trend of sharing economy, the concept of sharing

has been widely applied to many levels of urban renewal, architectural design, public space planning, etc., and has become one of the core issues in the sustainable development of contemporary cities.

As early as the 1960s, Kisho Kurokawa's “Metabolism” theory advocated for variability and adaptability in cities. Later, his “Symbiotic City” theory emphasized the diversity, complementarity, and coordination of urban systems, laying a theoretical foundation for the concept of sharing in the fields of urban planning, urban design, and architecture[78]. In recent years, with the advancement of information technology and the development of the sharing economy, the architectural field has paid increasing attention to the concept of sharing. Professor Li Zhenyu of Tongji University (2017) was the first to propose the concept of “shared architecture”. He argued that shared architecture is an important trend in the future development of architecture, emphasizing openness, transparency, and the blurring of boundaries. This enables architectural spaces to break away from singular functions and adopt more flexible usage patterns. He further proposed three main forms of shared architecture: universal sharing, transfer sharing, and group sharing, and summarized four types of shared spatial forms: spatial division, vertical layering, temporal segmentation, and functional differentiation. They believe that shared architecture should not only open up the physical space of buildings but also reorganize spatial functions to make them more adaptable[79]. Later, Li Zhenyu (2020) also pointed out that the spatial characteristics of shared architecture are reflected in four aspects: blurring the boundaries between inside and outside, extending linear spaces, enhancing transparency, and reorganizing the relationship between public and private space. These features make architectural form and function more flexible[80].

The application of the concept of sharing in the field of urban design further expands the social value of urban space. Yu Kongjian (2017) points out that the urbanization process can be understood as “sharing”, and urban planning should focus on the optimization of shared resources and public space to enhance livability and sustainability[81]; Wang Gefang (2019) proposes that the core of a shared city lies in the coordinated development of economy, social culture, ecological environment and infrastructure, emphasizing that that the spatial structure of a shared city should promote the rational distribution of public resources and promote urban social equity[82]; Zhao Hongyu (2020) explored the application of the sharing concept in pocket park design in a study of Nanan District, Chongqing, and argued that the sharing concept can optimize the urban environment and improve the efficiency of the use of public space through micro-spatial renovation[83]; Lai Ziming and Wang Shifu (2021) summarized the sharing concept in urban planning application, pointing out that the construction of shared

space mainly relies on three aspects: policy guidance, spatial design, and social activity planning, in order to realize the deep connection of urban space, facilities, and technological resources, and to improve the sustainability and livability of the city[84].

In addition, scholars have classified shared spaces from multiple perspectives. Gu Wen and Li Zhenyu (2018) analyzed the characteristics of shared housing and proposed that shared spaces should have three major features: public participation, spatial composite and spatial hierarchy[85]; Song Changhai (2021) proposed that shared spaces need to consider three elements: co-construction, sharing and empathy, in which co-construction is the prerequisite for sharing, and sharing needs to be empathetic to remain sustainable[86]. Regarding the application of shared streets and public spaces, Zan Jiali (2019) points out that shared streets should encourage pedestrian priority and create livable urban environments through the rational layout of pedestrian paths, bicycle paths and public activity spaces[87]; Wu Xinyue and Li Zhuying (2020) emphasize that shared streets are not only a transportation space, but also a platform to promote social interaction and enhance the social attributes and living functions of streets[88].

The concept of sharing has moved from theoretical construction to widespread practice in the field of urban design and architecture, pushing buildings to become more open, flexible and multifunctional. At the same time, the concept of sharing has led to the transformation of urban space from closed to open, providing residents with a fairer and more efficient way of utilizing space.

3) Exploring the Application of the Sharing Concept in Industrial Heritage Renewal

The concept of sharing in the reuse of industrial heritage has played an important role in breaking through the traditional renewal mode, realizing the optimal allocation of resources and the presentation of multiple values, and promoting the sustainable development of cities. Internationally, the New York City Government launched *The New York Waterfront Comprehensive Plan* in 2011, taking the enhancement of the public nature of waterfront space, the promotion of socialized governance and the synergistic development of industries as the starting point, realizing the shared transformation of waterfront industrial heritage, and providing a model for subsequent practice.

In China, the exploration of the sharing concept in the renewal of waterfront industrial heritage began with an emphasis on the creation of publicness. In 2017, Liu Yichun, through reflecting on the renovation and design of four industrial heritage sites along the Huangpu River, emphasized that the renewal of waterfront heritage should focus on the construction of

publicness[89]. In the same year, Sun Miao and Li Zhenyu, from the perspective of sustainable development, pointed out that the concept of sharing not only optimizes resource allocation and reduces spatial waste, but also promotes cooperation among stakeholders, enabling the long-term development of heritage sites[90]. In 2018, Zhu Yichen stated that the sharing concept promotes the regeneration of waterfront industrial heritage and enhances the vitality of urban space through the sharing of waterfront spatial resources, the enhancement of public activity spaces, and the optimization of industrial layout[4]. At the same time, Li Zhenyu and Zhu Yichen further proposed the concept of "shared urban landscape", advocating for the transformation of industrial heritage into shared urban landscape resources, using socialized utilization to activate public spaces[35]. In the same year, Ding Fan and Wu Jiang, in their study of global waterfront revival mechanisms in post-industrial cities, argued that the cultural industry positioning of Xuhui West Bund reshaped the city's image but did not provide sufficient industry and employment opportunities. Therefore, they believed that the waterfront revival process must pay greater attention to citizens' daily activity needs and job opportunities in order to truly realize public benefit[41].

Since 2011, both international and domestic theories and practices have continued to deepen, and the application of the sharing concept has gradually expanded from single spatial sharing to industrial and social sharing. In 2021, the *Regulations on Riverside Public Space along the Huangpu River and Suzhou Creek of Shanghai Municipality* explicitly established, for the first time, the principle of shared governance in waterfront industrial heritage areas. This regulation promoted the transformation of old factories and warehouses along Suzhou Creek into art spaces, creative studios, and cultural centers. At the same time, through ecological restoration and the construction of public facilities, a continuous pedestrian system, bicycle lanes, and viewing platforms were created, significantly enhancing spatial openness and accessibility. In recent research, Yao Zhihao (2024) criticized the traditional model that overly relies on real estate development, pointing out that such an approach neglects the social value of industrial heritage and tends to result in singular functions, financial unsustainability, and low social benefits. He proposed a sharing-oriented renewal model centered on "spatial sharing, functional integration, and social participation" to achieve the sustainable utilization of waterfront industrial heritage[5].

The application of the concept of sharing in the reuse of industrial heritage has gradually expanded from the initial spatial sharing to industrial and social sharing, breaking the single dependence on real estate development, providing a new path for the realization of multiple sharing of industrial heritage in the cultural, ecological, economic and spatial dimensions, and

at the same time promoting the continuous innovation in the field of urban design and architecture and the sustainable development of cities.

2.2 Research on the Renewal of Guangzhou's Urban Waterfront Industrial Heritage

At present, research on the renewal of waterfront industrial heritage in Guangzhou remains relatively fragmented, primarily focusing on case studies that explore experiences in industrial heritage regeneration, while lacking an overall theoretical framework (Table 2-3). In 2001, Wang Jianguo and others conducted early explorations of the renewal of the Pearl River waterfront area, discussing the relationship between protective renewal of sites and historically industrial urban buildings[91]. However, during the subsequent long-term real estate-led waterfront development process, academic attention was limited. Since 2007, with the rise of waterfront space research, related studies have gradually increased. Lin Lin et al. (2007) summarized the renewal models of the Pearl River waterfront area in Guangzhou, proposing a multi-layered and integrated renewal model. They argued that waterfront regeneration should not only involve the protection and renewal of individual buildings but also include overall optimization of spatial structure, excavation of cultural landscapes, functional integration, creation of ecological spaces, construction of management systems, and enhancement of transportation accessibility[92]. In the same year, Zhu Xiaolei proposed planning ideas based on the Xiashi Canal section project, advocating for mixed land use, spatial sharing, and moderate development[93]. In 2008, Yang Jiangqiang and Luo Chao were the first to study the warehouse areas along the Pearl River Back Channel from the perspective of industrial heritage[94]. By 2020, at the International Forum on Human Settlements and Future Cities cum the 10th Yuan Ye Summit Forum, Yang Jiangqiang once again emphasized that the transformation of urban waterfront areas should not be limited to real estate development. Instead, he proposed planning based on industrial retreat and service industry introduction, relocating production functions, and reviving the 2-kilometer-long industrial waterfront zone along the Pearl River Back Channel through the restoration and reuse of historic buildings and structures, thereby gradually transforming the waterfront into a space of daily life and public access. In 2021, Fu Shiyun systematically reviewed the historical development, value elements, and characteristics of modern industrial warehouse heritage in Guangzhou from the perspective of heritage conservation, laying a foundational reference for subsequent studies[1].

Table 2-3 Research on the Renewal of Waterfront Warehouse Industrial Heritage in Guangzhou

(Source: Drawn by Author)

Research Category	Time	Article Title	Author	Research Area and Subject	Research Content
Historical Development and Research Context of Waterfront Warehouse Industrial Heritage in Guangzhou	2021	Research on Warehouse-type Industrial Heritage in Guangzhou	Fu Shiyun	Guangzhou Urban Warehouse Space and Warehouse Industrial Heritage	Spatial characteristics of Guangzhou's warehouse industrial heritage, main types and structural features of warehouse buildings, and their interactive relationship with urban development
Analysis of the Renewal Models of Waterfront Warehouse Industrial Heritage in Guangzhou	2022	Research on the Renovation Strategies of Guangzhou's Warehouse-type Industrial Heritage Based on Regional Characteristics	Zhao Zikai	Guangzhou's Warehouse-type Industrial Heritage	Sorting out the formation, spatial characteristics, and current protection and renewal status of Guangzhou's warehouse-type industrial heritage. Exploring how to carry out adaptive transformation of Guangzhou's warehouse-type industrial heritage based on regional theories.
Spatial Characteristics and Value Excavation of Waterfront Industrial Heritage in Guangzhou	2011	Research on the Landscape Reconstruction of Riverside Industrial Sites — A Case Study of the Baietan Riverside Industrial Site in Guangzhou	Chen Yiwei	Baietan Riverside Industrial Site Area	Summarizing and analyzing the development model, site remediation, and reconstruction techniques of cases that have undergone landscape reconstruction; proposing strategies for landscape reconstruction of sites that have not been reconstructed, based on heritage surveys and domestic and international case studies.
	2019	Research on the Renewal of Waterfront Old Industrial Areas in the Central Urban Area of Guangzhou	Zhang Hong	42 Existing Waterfront Old Industrial Areas in the Central Urban Area of Guangzhou	Sorting out the historical background and development of waterfront old industrial areas, analyzing the characteristics and trends of renewal based on the current situation; proposing improvement suggestions from three aspects: waterfront environment shaping, heritage building renovation, and public space creation.
Analysis of the Renewal Models of Waterfront Industrial Heritage in Guangzhou	2007	Reconstruction and Sharing: Renovation of the Old Industrial Waterfront Area in Fangcun, Guangzhou	Zhu Xiaolei	From Xiashichong to Hedong Bridge, Fangcun District	Taking the waterfront industrial area project in the Xiashichong section of Guangzhou as an example, proposing planning ideas such as mixed land use, spatial sharing, moderate development, and implementation of surplus capacity.
	2016	Design Research on the Waterfront Area of Guangzhou's Old City Based on Human-Nature Harmony	Liu Rui	Guangzhou Old City Waterfront Area	Exploring design strategies for the waterfront area of Guangzhou's old city from the perspective of human-nature harmony.
	2017	Research on Industrial Building Heritage in Guangzhou	Jia Chao	Industrial Building Heritage in Guangzhou	Summarizing the Lingnan characteristics of Guangzhou's industrial heritage and systematically classifying and organizing the existing heritage; proposing model strategies for the renewal of different types of industrial heritage.
	2017	Survey Research on the Renovation and Renewal of Old Industrial	Cao Xing	Old Industrial Buildings Renovated in Guangzhou	Conducting research and analysis on multiple old industrial building renovation cases in Guangzhou, summarizing the current renovation

Research Category	Time	Article Title	Author	Research Area and Subject	Research Content
		Buildings in Guangzhou			models and existing problems of old industrial buildings in Guangzhou, and studying and reflecting on the current evaluation system for old industrial buildings.
	2020	Study on the Impact Factors of Public Space Vitality in the Regeneration of Industrial Heritage along the Pearl River Back Channel in Guangzhou	Li Ruojia	Waterfront Spaces along the Pearl River Back Channel	Based on quantitative analysis methods, establishing a vitality evaluation system for public spaces in waterfront industrial heritage, exploring the impact factors of spatial vitality at different scales, and summarizing strategies for enhancing spatial vitality.
	2021	Study on the Daily Life of Public Space in the Renewal of Waterfront Industrial Heritage in Guangzhou	Gao Kunduo	Public Space in the Renewal of Waterfront Industrial Heritage in Guangzhou	Sorting out the characteristics and current renewal status of waterfront industrial heritage in Guangzhou, introducing a daily life research perspective, and establishing a research framework for the daily life of public spaces.
	2021	Research on Design Strategies for Urban Waterfront Space Oriented by Health Promotion — A Case Study of the Pearl River Waterfront Space in Guangzhou	Liang Jiahao	Urban Waterfront Space in the Core and Central Areas of Guangzhou	Based on relevant health promotion models, preliminarily exploring the mechanisms applicable to urban waterfront space and related environmental impact factors.
	2022	Study on the Design of Open Spaces in the Renovation of Waterfront Old Industrial Areas in Guangzhou	Wu Peixuan	Open Spaces in the Old Industrial Areas along the Waterfront in Guangzhou	Exploring the spatial organization and morphological characteristics of open spaces in the renovation of old industrial areas from the perspective of open space design, addressing issues in the renovation process, and providing feasible suggestions for open spaces in the already renovated old industrial areas.
	2022	Research on Urban Design Strategies for Waterfront Areas Based on Internal Vitality Creation — A Case Study of the Pazhou Eye Area in Guangzhou	Yu Weiliang, Xiao Jinxie, Zheng Yong	Pazhou Eye Waterfront Area in Guangzhou	Exploring the connotations and vitality of waterfront spaces from aspects such as spatial characteristics, cultural attributes, and the spirit of place, and constructing a vitality creation mechanism for waterfront spaces that is adaptable to the sustainable development of the city.
	2024	Space Perception Assessment After the Renewal of Waterfront Industrial Heritage Sites Based on Nvivo — A Case Study of the Taikoo Wharf in Guangzhou	Du Yu. Wei Zongcai	Post-renewal Space of Taikoo Wharf	Using Nvivo qualitative analysis and online review data, this study adopts a bottom-up perspective to explore the overall spatial perception and temporal-spatial perception differences of Taikoo Wharf; from the aspects of authenticity, efficiency, and daily life, providing planning strategies for the protection and development of waterfront industrial heritage sites.

In terms of renewal practices, Zhang Hong (2019) took the waterfront industrial heritage in the central urban area as an example and pointed out that the current renewal model is shifting from scattered protection to integrated renewal. He emphasized that protection should not only focus on the building itself but also on the shaping of the waterfront environment, the renovation of heritage, and the creation of public spaces, promoting the return of public value[44]. Based on different research perspectives, relevant literature mainly focuses on two major directions: ① The spatial characteristics and value excavation of warehouse-type industrial heritage. Chen Yiwei (2011) took the Baietan Riverside heritage as an example, analyzing its renewal status from the perspective of landscape reconstruction. He argued that the single-form approach fails to drive surrounding social benefits and cannot achieve "returning the river to the people"[95]. Li Ruojia (2020) used quantitative methods to construct a vitality evaluation system for public spaces in the Pearl River Back Channel waterfront heritage, exploring influencing factors and improvement strategies at different scales[96]. ② Discussion on renewal models. Most scholars believe that the renewal of Guangzhou's waterfront warehouse industrial heritage has undergone three stages: functional replacement, cultural implantation, and industrial integration. Jia Chao (2017), in his doctoral thesis, analyzed cases from the Pearl River Back Channel and Baietan areas, proposing integrating industrial heritage renewal with waterfront landscapes, exploring the intrinsic connections between history, industry, and architecture, and introducing cultural activities to enrich residents' lives[97]. However, Cao Xing's (2017) survey shows that although Guangzhou's waterfront industrial heritage generally has strong hydrophilic characteristics, the special value of waterfront warehouse industrial heritage has not been deeply analyzed[98]. Gao Kunduo (2021), focusing on the daily life of public spaces in the renewal of Guangzhou's waterfront industrial heritage, explored the usage of public spaces post-renewal, revealing how spatial design can enhance daily life and thereby boost public vitality in waterfront areas[99]. He Wei Hua (2023), through quantitative data, explored the strategies for transforming Guangzhou's Pearl River Back Channel waterfront industrial heritage from production spaces to living spaces, proposing systematic solutions such as planning coordination, policy improvement, and implementation pathways. He revealed the deeper mechanisms of the transformation of industrial heritage from a singular function to a composite function[32].

However, there are still several issues in the current research: First, the research system is fragmented and lacks an overall framework. Second, the integration of waterfront public

spaces is relatively low, with most warehouse heritage not being fully incorporated into urban public spaces, resulting in insufficient openness of the waterfront coastline and poor accessibility for residents (Wu Peixuan, 2022)[100]. Third, the renewal models are singular, with insufficient excavation of cultural and historical value. Some renewal practices are overly commercialized, causing citizens' experiences to lean more towards consumption rather than cultural identity (Du Yu, 2024)[101].

Although the overall research on Guangzhou's waterfront industrial heritage is becoming more comprehensive, the focus on typical waterfront warehouse industrial heritage is still in its infancy. Deepening research in this area will not only help enrich the value semantic system of heritage protection but also provide more targeted and actionable practical references for the revitalization and utilization of industrial heritage.

2.3 Case Studies on Waterfront Industrial Heritage Renewal in China and Abroad

2.3.1 The Case of Italy: Turin Dora Park and Murazzi del Po Renewal Project

As a former important industrial city in Italy, Turin faced the double challenges of industrial restructuring and urban space transformation at the end of the 20th century. Turin has adopted a multi-level and multi-dimensional design strategy for the renewal of urban waterfront space and industrial heritage, which provides a model for the revitalization of post-industrial cities. Among them, Parco Dora and Murazzi del Po, as representative cases, respond to the issues of “shared renewal” and “public reconstruction” from different perspectives.

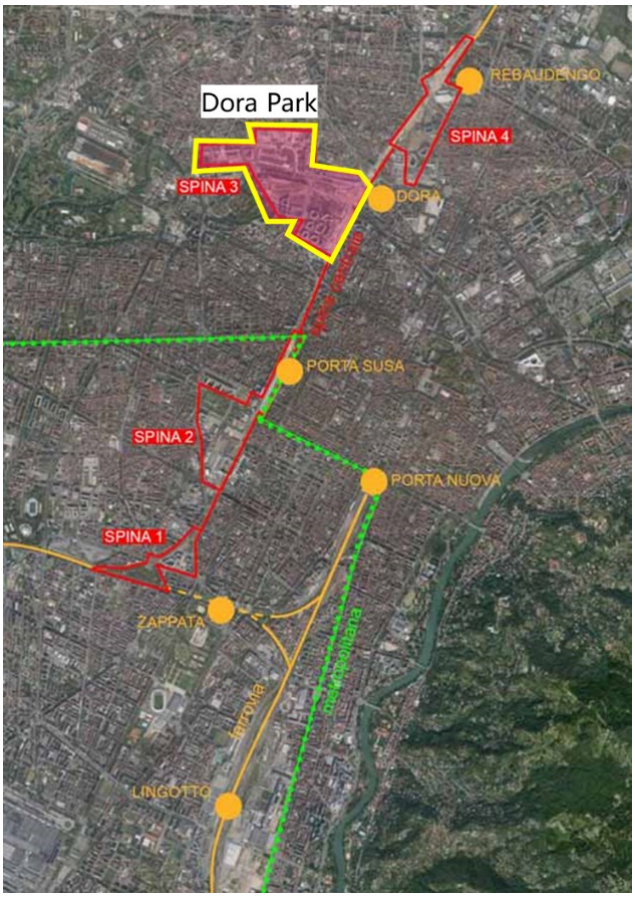


Figure 2-3 Location of Dora Park

(Source: https://atlas.landscapefor.eu/category/luoghi-speciali/poi/6887-lambito-di-spina-3/5664-the-spina-centrale/)

1) Dora Park in Turin: A Model of

Transforming Industrial Heritage into Shared Urban Landscapes

(1) Background of the Project

Dora Park is the core project of Turin's 1995 urban master plan, “Spina Centrale”, aimed at reconnecting urban fracture zones through the undergrounding of railways and restructuring the core functional structure of the city (Figure 2-3). The “Spina Centrale” plan is divided into four areas to achieve an integrated transformation of “transport infrastructure—urban space—industrial heritage”. Among them, Spina 3 is the most complex and representative, encompassing multiple industrial sites. Dora Park is located in the core area along the Spina 3 axis, and it was originally an industrial base for factories such as Fiat, Michelin, and Vitali. With the relocation of industrial activities, the area had long been abandoned, with a deteriorating urban environment and fragmented space, making it a key target for urban renewal. In 2004, Latz+Partner adopted a "site memory embedding landscape urbanism strategy" to reconstruct the industrial heritage into an open, shared, and ecological urban public space, reflecting a planning model driven by both "infrastructure + industrial renewal".

Figure 2-4 Five Zones of Dora Park

(Source: https://www.gooood.cn/parco-dora-turin-by-latz-partner.htm)

(2) Renewal Strategies

a. Reactivation of spatial organization and industrial structure

Figure 2-5 Urban shared sports spaces.
(Source: https://www.gooood.cn/parco-dora-turin-by-latz-partner.htm)

Dora Industrial Heritage Park covers an area of approximately 45 hectares and is divided into five distinct zones, three of which are named after the former companies: Ingest, Vitali, and Michelin (Figure 2-4). The other two zones are located above the new tunnel and are named Valdocco North and Corso Mortara. The original steel-framed factory buildings were transformed into the visual core and activity spaces of the park. For example, the steel frame greenhouse area has been turned into a multifunctional space for markets, sports, exhibitions, and other activities. This strategy emphasizes the transformation of industrial heritage into a new "shared urban space," which not only evokes collective memories of the citizens but also accommodates contemporary, diverse social needs (Figure 2-5).

Figure 2-6 The Renovated Dora River
(Source: https://www.landsea2008.com/show-12-622-1.html)

b. Water culture and regeneration of sustainable systems

As part of the “Torino, Città d’Acqua project”, Dora Park has revealed sections of the Dora River that were previously covered by concrete. By constructing a sustainable water management system that integrates rainwater collection, filtration, and drainage, the city has

rediscovered and utilized this water resource（Figure 2-6 The Renovated Dora RiverFigure 2-6）. This approach not only responds to the need for waterfront ecological restoration but also creates a “water-accessible” hydrophilic experience zone, strengthening the integration of natural elements into the industrial landscape.

Figure 2-7 Transportation Elements and Landscape Network

(Source: https://www.gooood.cn/parco-dora-turin-by-latz-partner.htm)

c. Networking for accessibility and inclusiveness

Various transportation elements such as colonnades, ramps, stairs, and bridges are interwoven throughout the park, closely linking the five large areas of the park. Among them, an elevated pedestrian walkway, spanning 700 meters in length and 6 meters in width, crosses the main area of the park, providing a new level of perspective for visitors (Figure 2-7). These bridges, ramps, and aerial walkways not only connect different areas with surrounding communities but also form an open “landscape network”, offering possibilities for daily walking, commuting, gatherings, and other activities. This multidimensional connection strengthens the expression of publicness and aligns with the "shared city" principle that emphasizes spatial fairness and accessibility.

2) Muraz Embankment: Exploration of Waterfront Co-construction Mechanisms in the Context of Flood Risks

(1) Project Background

The Murazzi del Po is a section of waterfront linear space located on the left bank of the Po River in the city center of Turin. It extends from San Maurizio Avenue in the north to the city’s “oasis”, Parco del Valentino, in

Figure 2-8 Location of Murazzi del Po

(Source: Reference[102])

the south, closely connected to the city's "living room", Piazza Vittorio Veneto (Figure 2-8). Historically, this area was an important hub for water transport, warehousing, and laundry activities. In the late 19th century, the city government built a two-level embankment system for flood defense. The upper level became the riverside avenue (now Lungo Po Armando Diaz Avenue), which connects to the lower level via large steps and ramps, leading to the riverside towpath. The lower level consists of arches facing the Po River, primarily used for warehousing and industries that required large amounts of clean water, such as laundries. However, by the end of the 20th century, with the decline of water transport and inadequate management, the area gradually deteriorated, and its functions became disordered. The "Regional Integration Project," launched in 2006, centered on "mixed functions + flexible design," and systematically updated the Murazzi del Po.

(2) Renewal Strategies

a. Waterfront Resilient Space and Hydrological Adaptation Design

The natural topography of the city road is nearly 10 meters above the riverwalk, creating two levels of platforms and a row of rooms facing the Po River (Figure 2-9). These two levels were retained and utilized in the renovation to provide a variety of alternative carriers for waterfront activities, creating a diverse waterfront space suitable for a wide range of activities.

Lower Level: close to the water and occasionally flooded, providing a unique recreational and sightseeing experience. In response to flooding, the renovation project developed guidelines that require structures to respond quickly when flooding occurs.

Upper Level: nearly flush with city streets, incorporating sidewalks and bike lanes to provide safe spaces for movement.

This design strengthens the "shared space building capacity from the perspective of resilient cities".

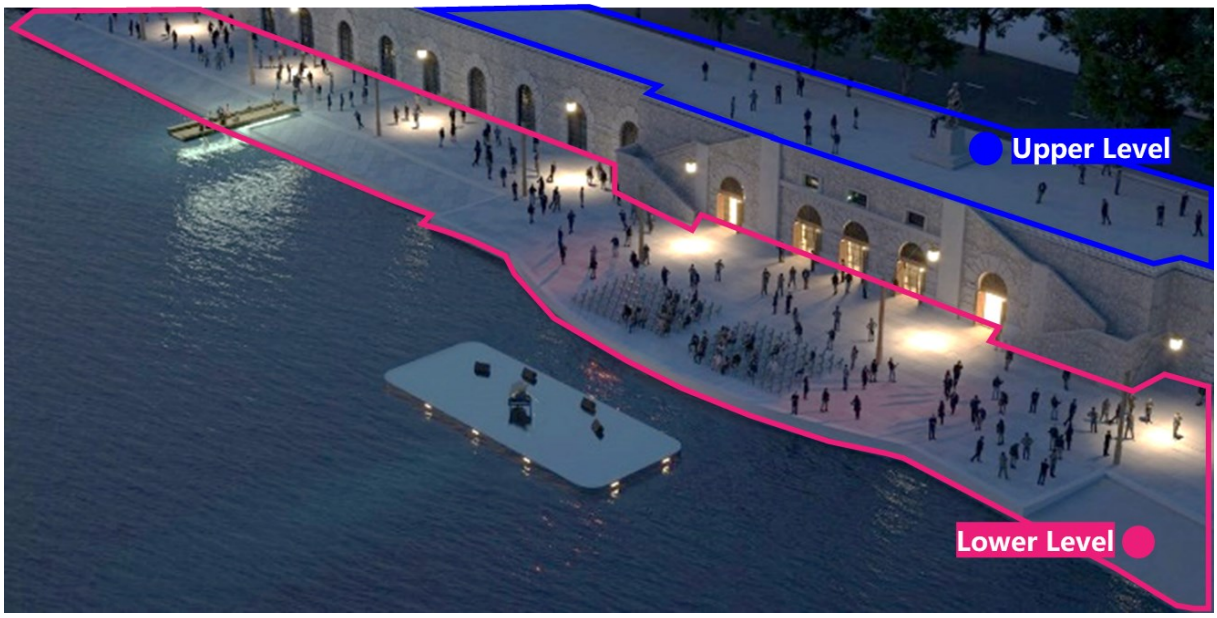


Figure 2-9 The spatial form of Murazzi del Po

(Source: https://www.infobuild.it/torino-riqualificazione-murazzi-del-po/)

b. Public Participation and Guided Co-Construction Mechanisms

The renovation and renewal project developed a street furniture implementation plan, reflecting the principles of unity and diversity. Through guidelines, elements such as the color, size, and materials of street furniture are standardized, but no specific illustrations are provided. Individual operators select the furniture according to the principles, creating a space with both unity and diversity in its features. The urban management authorities also established regulations to standardize the installation, maintenance, management, and cleaning of street furniture, encouraging community residents and operators to "co-create the street landscape" based on actual needs, reflecting the coexistence of "unity and diversity."

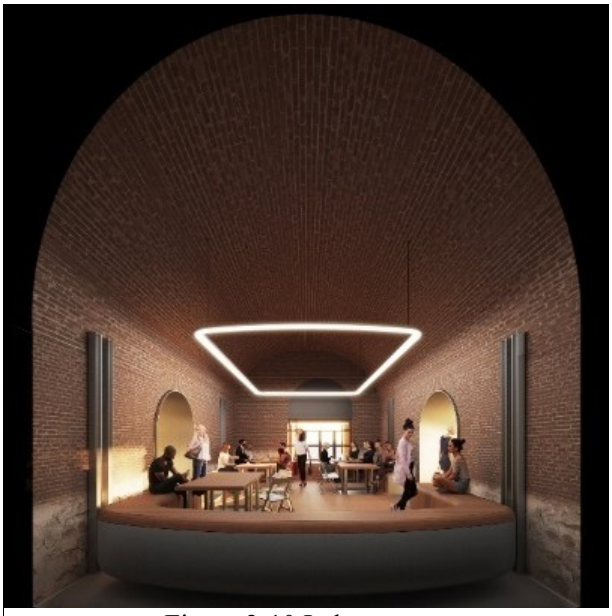


Figure 2-10 Indoor space

(Source: https://www.infobuild.it/torino-riqualificazione-murazzi-del-po/)

As a public-facing River Center, the Murazzi del Po features community activity spaces, cafes, a city library, study rooms, and co-working spaces. In addition, the area plans to construct four new piers, which will serve both boats and function as "riverfront plazas" with views of the river. The new river center and the electric river bus fleet are expected to be

operational in early 2026.

c. View Corridors and Cultural Continuity Preservation

As a waterfront linear space, the Murazzi del Po renewal project strictly controlled the boundaries and height of structures to ensure unobstructed sightlines (Figure 2-11). Following the principle of minimizing the impact on architectural texture, no permanent structures were placed along the embankment. Instead, movable multifunctional street furniture was used, with strict regulations on its size and range. This ensures that sightlines from Piazza Vittorio Veneto to Parco del Valentino are maintained, preventing obstruction of the cityscape. At the same time, sight corridors perpendicular to the river extend the water views into the city's deeper interior. The building heights in Turin's riverside areas have remained unchanged for centuries, preserving the skyline and street profiles, allowing more citizens to enjoy the water resources.

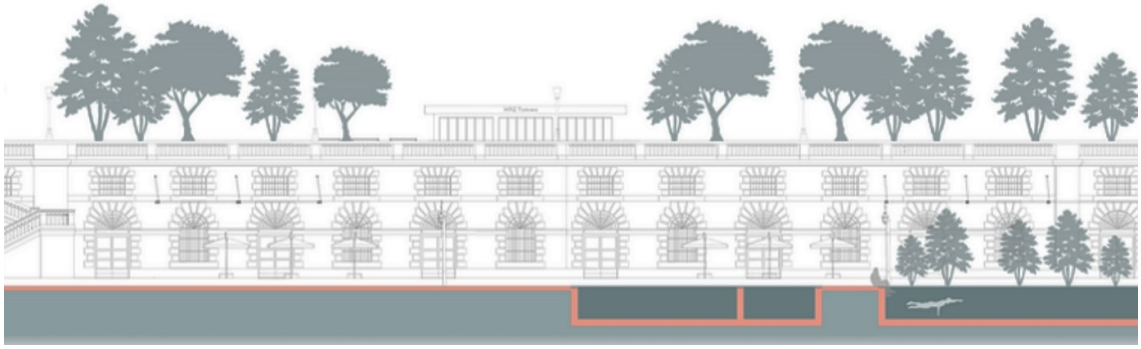


Figure 2-11 Control of street profiles

(Source: https://www.andreapotenzaarchitect.com/progetti/urban-redevelopment-%22i-murazzi-del-po%22)

d. Time-sharing design

Diverse activities depend on creating rich spatial effects, and for this reason the renovation project introduces the concept of time (Figure 2-12). Given that the area is threatened by stage flooding, the project conducted a thorough assessment of the hazardous conditions and made reasonable recommendations for the opening hours of the base based on the type of activity. In addition, the project pointed out that the type of activity should evolve over time, both adapting to the environmental, historical and architectural context and contributing to the improvement of these conditions. The project investigated in detail the current state of use of the rooms along the river and assessed the feasibility of adding new activities based on spatial characteristics and the function of the area, and encouraged those existing functions and activities should not restrict the development of new activities, but rather change or replace them gradually over time.

Figure 2-12 Time-sharing

(Source: https://www.ilnino.it/articoli/articoli.aspx?art=6)

The Murazzi del Po project provides an inspiring paradigm in terms of spatial governance, regulatory strategies, and public mechanisms. It adapts to the special requirements of natural risk areas and also offers strategic support for the social reactivation of waterfront spaces.

Parco Dora is an industrial site rich in heritage and ecological potential, emphasizing the reconstruction of cultural landscapes and the compound use of shared spaces in its renewal process. Murazzi del Po, a waterfront heritage site with deep cultural significance and high environmental risk, focuses on the flexible preservation of historical spaces and the development of operational mechanisms in its renewal. Both projects embody the core idea that “industrial heritage is not for isolated display but is a public engine for urban renewal”. The insights for Julong Bay and similar waterfront industrial areas in China are that renewal is not only about physical reconstruction but also the reshaping of shared mechanisms and the regeneration of spatial sociality.

2.3.2 Singapore Case: Clarke Quay's Renewal and Reuse in Singapore

1) Location and Historical Background

Clarke Quay is located on the upper reaches of the Singapore River and was an important port and warehousing transport hub in 19th-century Singapore, serving as the commercial center during the colonial period. As port functions moved elsewhere, the area gradually declined, facing the challenges of industrial heritage renewal and the reuse of urban space. Starting in the 1980s, the government promoted waterfront regeneration and renewal through the urban strategy of “revitalizing the old city”, making Clarke Quay one of the iconic projects of urban renewal in Singapore.

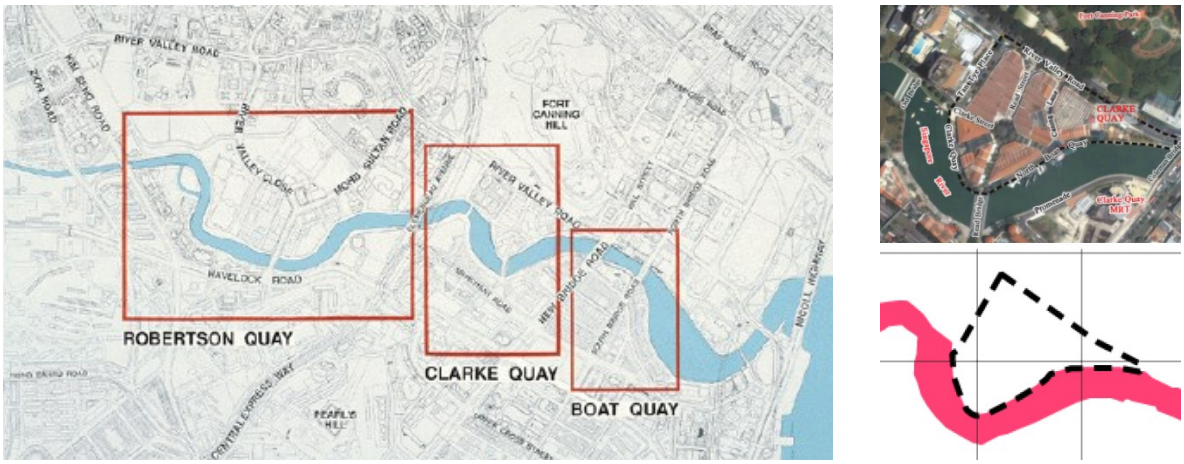


Figure 2-13 Location of Clarke Quay

(Source: Reference[103])

2) Renewal Strategy

The renewal of Clarke Quay follows the "Preservation—Revitalization—Reuse" path, based on cultural heritage protection, and achieves the modern vitality reshaping of the area through functional replacement and spatial redesign. The project mainly adopts the following strategies:

(1) Equal emphasis on heritage protection and spatial regeneration

The facades of old warehouses, five-foot walkways, and traditional roofs are preserved as part of the historical architectural fabric, continuing the sense of place. At the same time, modern art and cultural activities are introduced, promoting the integration of diverse and multifunctional uses, and creating a “shared memory place” with cultural depth.

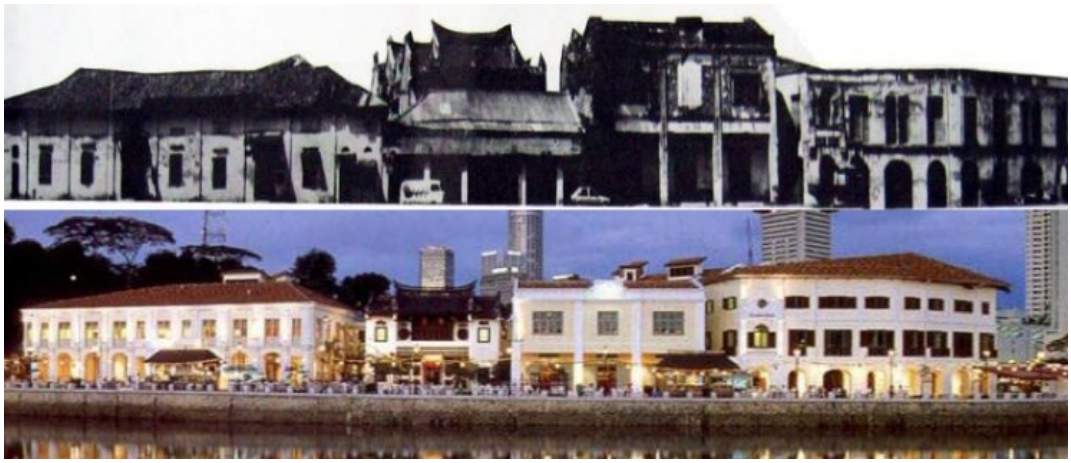


Figure 2-14 Embodiment of diachronicity

(Source: Reference[103])

(2) Functional Mixing and Vitality Activation

Introduce diversified businesses such as restaurants, bars, retail, cultural and artistic

spaces to stimulate all-weather social activities. Support the development of local brands, small cultural and creative enterprises, and flexible business models to form an inclusive economic structure and encourage the participation of multiple actors in operations;

(3) Climate Adaptive Design

Adopt large-span awnings (e.g., waffle structures) to climate-adjust the space and improve the comfort of the space and the sustainable utilization of the space.

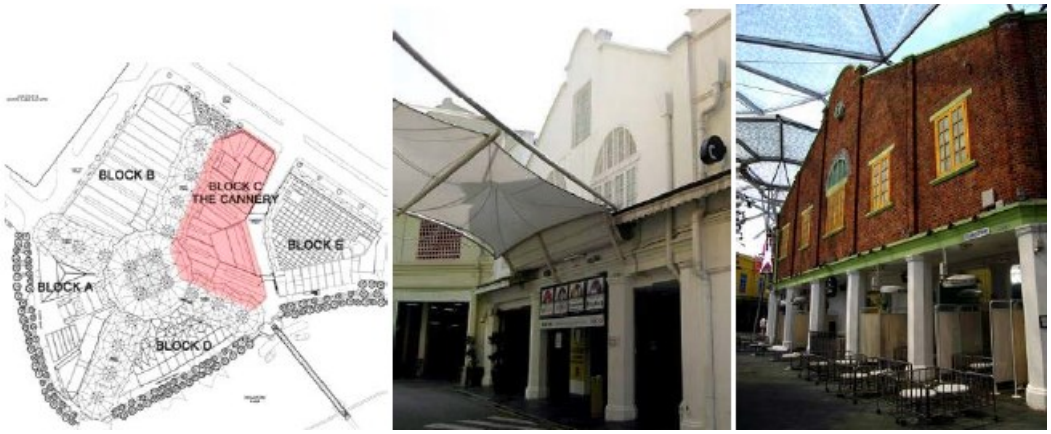


Figure 2-15 Climate Adaptive Design

(Source: Reference[103])

(4) Enhancement of Waterfront Space Publicity

Optimize the riverbank trail system, enhance pedestrian accessibility and continuity, and create a public waterfront space integrating leisure, strolling, and viewing functions, so as to enhance public participation and sense of belonging.

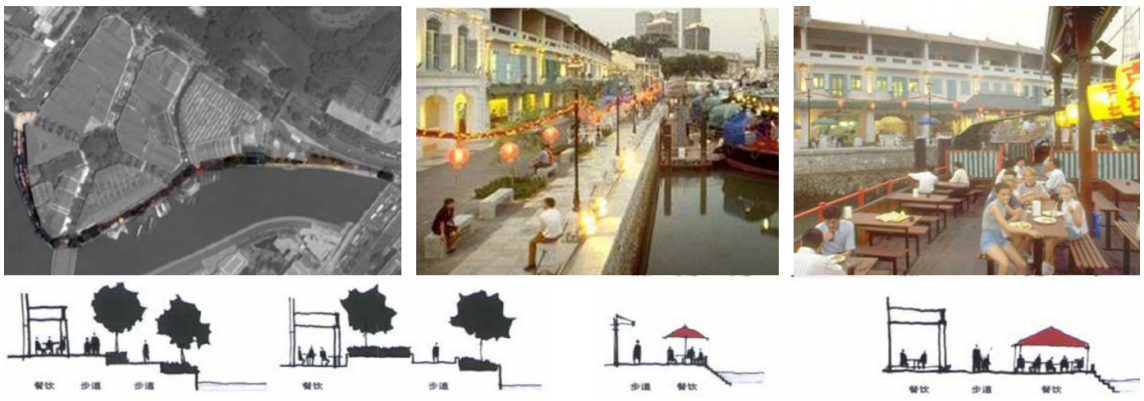


Figure 2-16 Publicity of the Waterfront

(Source: Reference[104])

(5) Time-based utilization, achieving "time-sharing" of urban space

The Clarke Quay project particularly emphasizes the "day-night time-sharing" mechanism. During the day, low-intensity activities such as cultural tourism, light dining, and leisurely strolling dominate, creating a quiet, hydrophilic, and historically rich waterfront environment. At night, the space is led by the night economy, including bars, performances,

and festive activities, activating the spatial atmosphere and commercial value. Through flexible lighting design and functional layout, the space achieves 24/7 multifunctional use, enhancing the efficiency and vitality of public spaces.

The renewal of Clarke Quay has transformed industrial heritage from a "closed storage space" to an "open public living space", becoming a model of urban waterfront life that integrates tourism, leisure, culture, and commerce.

2.3.3 Shanghai Case: Shanghai Yangpu Riverside Renewal

1) Background and Current Situation: The Opportunity for Spatial Transformation of the Industrial Rust Belt

Shanghai Yangpu Riverside, located along the middle and lower reaches of the Huangpu River, was once one of the birthplaces of modern industry in China, with over twenty historical industrial buildings, including the Yangshupu Waterworks, power plants, shipyards, and more (Figure 2-17). However, with the relocation of industries and the decline of waterfront functions, the area gradually transformed into an urban industrial "rust belt", with fragmented spaces, a lack of publicness, and untapped waterfront value. To address the structural issues of "weak publicness in waterfront spaces—disconnection in industrial transformation—discontinuity in urban functions", Shanghai has promoted renewal practices guided by the concept of a "shared city" since the "13th Five-Year Plan". The goal is to create an open, inclusive, and ecological shared waterfront system through collaborative governance of three spatial layers: "shoreline—first interface—interior".

Figure 2-17 Location of Yangpu Riverside
(Source: https://www.archdaily.cn/cn/916772/yang-pu-bin-jiang-gong-gong-kong-jian-er-qi-she-ji-da-guan-jing-guan-she-ji)

2) Renewal Concept: Spatial Integration Model Based on Shared City

The project starts from the theory of "shared city", emphasizing the social and cultural value of waterfront areas as carriers of public goods and highlighting the expansion of spatial usage rights and public accessibility. This is specifically reflected in the following three paths:

(1) Shoreline Connectivity and Slow-Movement System Construction

Using the “three intertwining vitality zones” as the core strategy, the project connects waterfront walkways, bike paths, and jogging tracks to enhance shoreline continuity and slow-movement accessibility, creating an all-weather, barrier-free shared activity space;

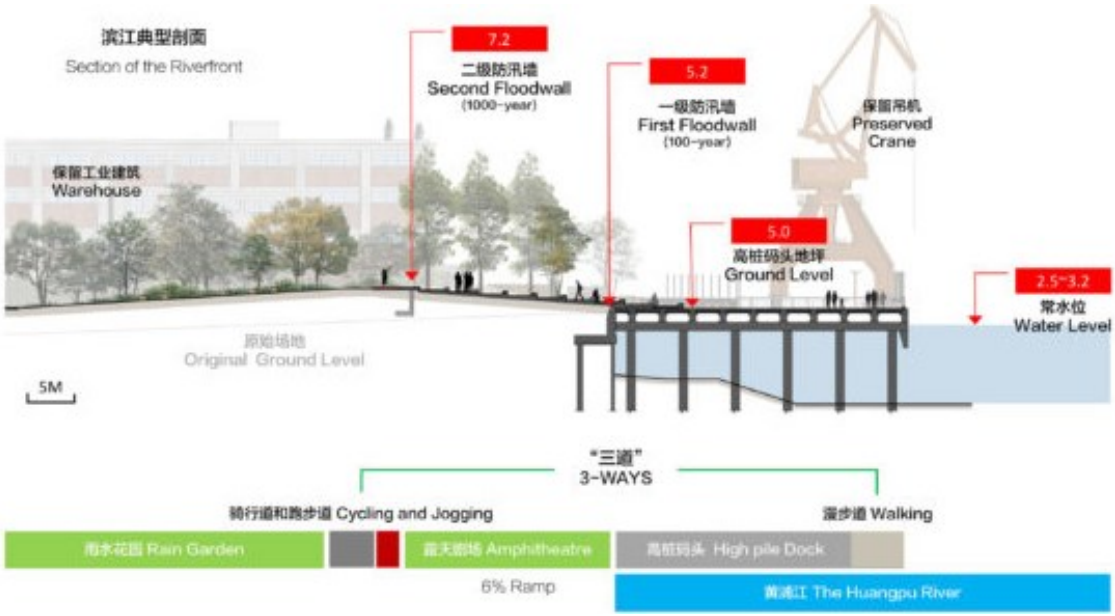


Figure 2-18 Slow-Movement System

(Source: https://worldlandscapearchitect.com/)

(2) Transformation of the First Interface Function and Cultural Activation

Through the differential protection and functional re-insertion of industrial buildings (such as the Mao Ma warehouse, tobacco company maintenance warehouse, etc.), the project enables the coexistence of multiple functions, such as cultural education, citizen activities, and exhibitions;

(3) Optimization of the Interior Industrial Structure and Integration of Life

The project promotes the transformation of production shorelines into living shorelines, introducing industries such as headquarters offices, technology R&D, and innovation incubation to maintain the employment base, enhance financial self-sufficiency, and avoid functional hollowing.

3) Spatial Expression of the Shared Mechanism and Innovation in Governance Mechanisms

In the practice of Yangpu Riverside, the concept of “sharing” is concretized through the dual-driven approach of spatial and institutional mechanisms:

(1) Spatial Mechanism

Building a system of “pocket parks + landscape platforms + micro-space nodes” to achieve the small-scale transformation of the first interface space and the integration of urban living scenes; using forms such as vertical river walkways, floating boardwalks, and pier wharfs to create a multi-directional accessibility system, expanding public accessibility; advocating for street-end governance, introducing the “shared block” model, achieving semi-closed management during specific time periods to activate community vitality.

(2) Governance Mechanism

Developing detailed control planning and unit planning, setting indicators such as the height-to-width ratio of waterfront buildings, the proportion of open interfaces, and the proportion of rental housing; guiding developers to provide shared facilities such as shared offices, co-working spaces, and community service facilities in public spaces, facilitating the transition from “ownership-based property” to “usage-based blocks”; drawing on the concept of the PO(P)S (Privately Owned Public Space) mechanism from New York, exploring the space supply path of “public-private shared” spaces.

As of 2019, the southern section of Yangpu Riverside has achieved full connectivity of a 5.5-kilometer-long shoreline, opened 216,000 square meters of public green space, and retained 260,000 square meters of historic protected buildings. The space has transitioned from being closed to open, and from industry to living, significantly enhancing social influence and public participation.

The insights for the renewal of the waterfront industrial heritage area along the Pearl River Back Channel are mainly reflected in the following aspects: a) From linear corridors to composite blocks: The shoreline is not only a spatial corridor but also a continuous band for social interaction and cultural display. b) From architectural heritage to shared platforms: Industrial heritage should not be a static monument but should become a programmable and operational shared carrier. c) From land economics to social value orientation: Renewal strategies should balance the sustainability of urban economics and the maximization of public interests. d) From government-led to multi-coordinated governance: Shared renewal requires the creation of a “co-governance platform” between government, enterprises, and residents at the mechanism level.

2.4 Chapter Summary

This chapter reviews the core theories and typical practices in the field of waterfront industrial heritage regeneration from a multidisciplinary perspective. It is found that the

conservation concept of waterfront industrial heritage has followed an evolutionary trajectory from 'static conservation' to 'living renewal' to 'sustainable regeneration', which integrates environmental and social values. The evolutionary trajectory of industrial heritage breaks the boundaries of the traditional definition of industrial heritage.

The renewal practice of waterfront industrial heritage has also shifted from the single physical space transformation in the early stage to the “multi-dimensional regeneration” path of ecological, social, cultural and spatial composite intertwining, focusing on the functionality from “production shoreline” to “public living shoreline”. It focuses on the functional leap from 'production shoreline' to 'public living shoreline'. This shift reflects a profound shift in the paradigm of urban regeneration in the post-industrial era, behind which the overarching goals of urban resilience, social sharing, cultural regeneration and environmental sustainability have been steadily reinforced.

This chapter argues that the regeneration of waterfront industrial heritage is not only a matter of reusing a single building, but also an important part of urban spatial governance and cultural identity reshaping. Future research and practice should pay more attention to multidisciplinary integration, multi-subject synergy and multi-scale coordination, and explore transformation pathways with local characteristics and international foresight. Based on this chapter, the next chapter will further focus on the characteristics and problem identification of the industrial heritage of waterfront warehouses along the back canal of the Pearl River in Guangzhou, and propose an innovative strategy system based on “sharing theory”.

Chapter 3 Basic Overview and Value of Sharing Analysis of the Pearl River Back Channel Waterfront Industrial Heritage

3.1 Formation, Current Status, and Spatial Characteristics

The formation of the Pearl River Back Channel waterfront industrial heritage is closely tied to the development of Guangzhou’s urban port functions. As an important commercial economic center and foreign trade port city, Guangzhou developed its warehousing facilities based on convenient water transport, which became a crucial foundation supporting its trade radiation and cargo transfer functions. These warehousing facilities played significant roles during different stages of the city’s development. However, with the adjustment of industrial structures and urban expansion, the productive functions of these warehouses gradually weakened, forming the unique waterfront industrial heritage of the Pearl River Back Channel today. These heritage sites not only witness the historical changes of Guangzhou’s port economy and the city but also serve as key evidence of the transformation of the Pearl River waterfront space from an early "commercial and trade waterfront" to a "productive waterfront". How to bring these "productive waterfronts" back to the public, reconstruct urban public spaces, and achieve urban revival, transforming them into "living waterfronts", is an important issue that urgently needs to be discussed..

3.1.1 Historical Development, Spatial Distribution, and Functional Evolution

The historical evolution of the Pearl River Back Channel waterfront industrial heritage profoundly reflects Guangzhou's transformation from an ancient trade hub to a modern industrial city, and later to the regeneration of stock spaces in the post-industrial era. The development of its industrial heritage can be traced back to the late Qing period. After the establishment of the "treaty port" system, Guangzhou gradually became a central hub for China’s foreign trade. A large number of foreign trading houses and shipping companies, attracted by the Pearl River Back Channel’s advantageous geographical location and convenient water transport, built docks and warehouses. These industrial warehousing facilities underwent several stages of development, including late Qing foreign trade warehousing, port expansion during the Republic of China era, nationalization and

modernization after the founding of the People's Republic of China, forming the unique waterfront industrial heritage cluster along the Pearl River Back Channel today.

1) Trade and Warehousing Function Period – Industrial Production Waterfront (Late Qing to Early 20th Century)

Guangzhou's geographical advantage of being at the confluence of the "three rivers" and bordering the South China Sea made it an important foreign trade port since the Qin and Han dynasties. During the Sui and Tang dynasties, the prosperity of the Maritime Silk Road, and in the Ming and Qing dynasties, the implementation of the "treaty port" policy strengthened Guangzhou's position as the only legal foreign trade port in China. After the Opium War, Western industrial technology and capital poured in, and the Pearl River Back Channel, with its excellent water transport conditions, became a key area for warehouse construction, gradually shifting from a commercial waterfront to an industrial waterfront. In the early 20th century, foreign companies, such as the British Taikoo Shipping Company, Jardine Matheson, and the Japanese Osaka Shipping Company, invested in building large warehouse industrial facilities, including the Taikoo Warehouse (1904), Jardine's Warehouse (1906), Osaka Warehouse (1919), and Nissin Warehouse (1920). These warehouse buildings adopted the most advanced warehousing management and architectural technologies of the time, supporting Guangzhou's role as a trade hub in the Far East..

Spatial Characteristics: Industrial spaces were mainly concentrated along the southern Pearl River, in areas such as Fangcun and Baietan, relying on the Shamian Concession and foreign trading houses (such as Swire and Jardine) to form a "dock-warehouse" logistics system. A preliminary "water-rail intermodal" transport system was established, closely linking the port and commercial areas, creating a highly concentrated logistics hub. Typical cases include the Swire Warehouse and Jardine Warehouse.

Functional Positioning: The warehouses during this period were primarily focused on foreign trade, with most being square warehouses led by foreign capital. They were generally single-story or low-rise structures, emphasizing large space and good ventilation to meet the needs of cargo loading, unloading, and storage for imports and exports. These warehouses reflected the characteristics of a specialized storage and transport system formed around the port waterways, supporting Guangzhou's position as an international trade transit hub.

2) Planned Economy Dominated Period, Industrial and Port Combined Complex Functional Area (Mid-20th Century - 1980s)

After the founding of the People's Republic of China, the industrial warehousing

facilities along the Pearl River Back Channel were incorporated into the national economic system, taking on important functions related to material reserves and economic regulation. In 1953, the Guangzhou Military Control Committee took over foreign-owned warehouses along the Pearl River Back Channel, such as the Taikoo Warehouse, Osaka Warehouse, and Nissin Warehouse. These warehouses were allocated to departments such as port administration, grain and oil, and petroleum, becoming part of the state-owned storage and transportation system. During this period, the warehouse space was mainly used for storing essential goods such as grain, oil, petroleum, and light industrial products. The architectural style became more standardized, with "Soviet-style warehouses", characterized by brick-wood structures and large-span roof trusses, becoming typical examples. In the 1954-1957 Guangzhou urban planning scheme, the warehouse area was located based on existing infrastructure, mainly distributed along the Pearl River and railway lines. With the improvement of transportation infrastructure, including railways and highways, the spatial layout of warehousing facilities moved beyond the traditional reliance on water transport, and the water-land intermodal logistics system became more evident, thus improving cargo circulation efficiency to meet the needs of national economic recovery and development..

Spatial Characteristics: In the early years after the founding of the People's Republic of China, the number of industrial warehousing facilities in Guangzhou was insufficient and scattered. The warehouses left over from the pre-liberation period were mainly concentrated in areas along the Pearl River, such as Baixian Shell, Fangcun Dachongkou, Huangsha, and Dashatou, with others scattered throughout the city. The architectural form was influenced by the Soviet Union, with the widespread use of Soviet-style warehouses (brick-wood structures with high side windows).

Functional Transformation: The function of warehouses shifted from simple storage of goods to supporting industrial production, serving as reserves for light industry raw materials and distribution points for finished products.

3) Functional Decline Period, Industrial Relocation, Reduced Utilization (1980s - 2000s)

After the reform and opening up, due to the acceleration of industrialization, the city’s functions shifted from productive industries to services and commerce, marking an important turning point for Guangzhou's traditional warehousing functions. On the one hand, innovations in transportation methods, such as the widespread use of container shipping, gradually phased out traditional warehousing facilities. On the other hand, the accelerated urbanization process in Guangzhou increased land value, prompting the transfer of

warehousing functions to the outskirts of the city. During this period, many traditional warehouses were abandoned or repurposed. While some were converted into light industrial factories or commercial warehouses, the overall utilization rate remained low.

Spatial Characteristics: Warehousing functions shifted from the original locations in the city center to the outskirts, showing a clear spatial transfer trend. The remaining clusters of warehouse buildings were still concentrated in certain areas.

Functional transformation: The city's industrial upgrading led to the obsolescence of the traditional warehousing function in the area.

4) Spatial Renewal and Reuse with the Development of Mixed Functions (2000-Present)

In 2004, the *Pearl River Back Channel Waterfront Area Planning* conducted a survey and classification of the Baietan industrial heritage, laying the foundation for future reuse. In 2008, eight modern foreign trading warehouses and dock sites, such as the Taikoo Warehouse, Osaka Warehouse, and others, were listed as protected cultural heritage sites by the city of Guangzhou. This marked the beginning of these declining warehouse facilities being re-recognized under their new identity as "industrial heritage". Some of the warehouses were subsequently transformed into multifunctional spaces, such as creative industry parks and art galleries, with the warehouse district along the Pearl River becoming integrated with waterfront public spaces, gradually emerging as a new area for urban leisure and cultural experiences. In 2009, urban design work began in the Baietan area, proposing strategies for industrial heritage reuse and protection. In 2010, with the straightening of the waterfront area through shoreline remediation, some warehouses were demolished, but dock work continued. In 2014, in-depth design for Baietan’s industrial heritage began to be implemented. By 2018, key waterfront zones, including Taikoo Warehouse, Guangzhi, Lijiao, and Haizhu Wetlands, were designated for comprehensive improvement, building a service economic corridor integrating cultural creativity, urban tourism, artificial intelligence, marine technology, and innovation office headquarters. By 2019, as the waterfront's functions gradually transformed, the memory of the warehouses remained, marking the entry of Guangzhou’s waterfront into a new era of mixed-function development.

Spatial Characteristics: The old industrial areas have been transformed into creative industry parks (such as the Xinyi Guildhall), with waterfront greenways linking the warehousing heritage, forming a "linear cultural heritage corridor".

Functional Challenges: Early, extensive development led to issues such as inefficient land use and environmental pollution. Due to complex property rights and the lack of

protection standards, warehouse buildings face risks of demolition and homogenized architectural styles.

5) Relationship Between Functional Evolution and Historical Development

The functional evolution of the Pearl River Back Channel waterfront industrial heritage is closely related to the industrial history of Guangzhou, primarily reflected in the following aspects:

Changes in the Economic Demand for Warehouse Space: The prosperity of Guangzhou's foreign trade in modern times drove the construction and expansion of warehouse space. During the planned economy period, warehouses became core facilities for national economic operations (Figure 3-1). After entering the market economy, warehouse functions declined, transitioning to integrated urban functions.

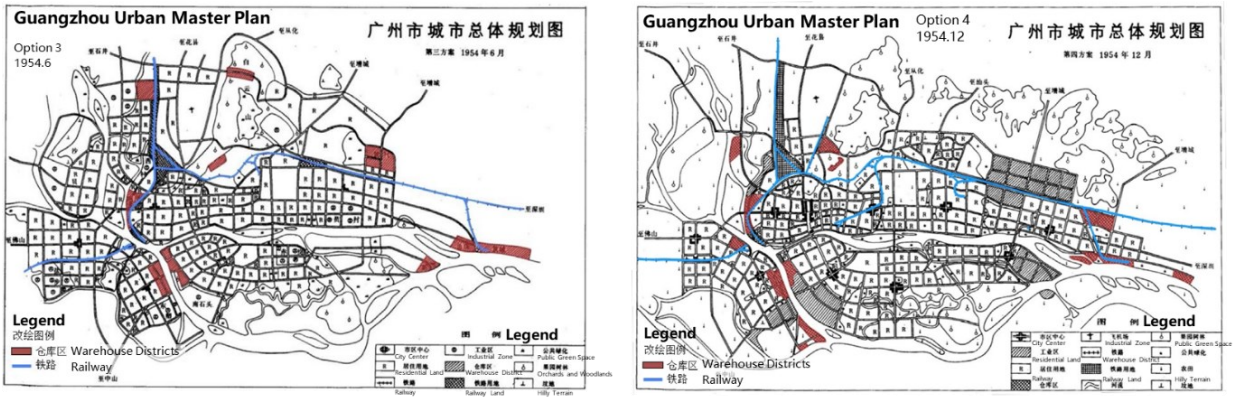


Figure 3-1 Warehouse Area Planning in the Third and Fourth Scenarios of Guangzhou Urban Planning (Source: Organized by Author based on Relevant Literature[1])

Evolution of Transportation Infrastructure: Early dependence on water transport concentrated warehouses along the Pearl River. With the development of modern transportation, road and railway warehouses gradually replaced water transport storage, leading to the decline of the Back Channel warehouse functions. After adjustments in urban planning, warehouse areas began to transform into commercial, cultural, and leisure spaces.

Changes in Urban Space: As old industrial areas were included in urban development plans through city renewal, warehouse districts were integrated with public waterfront spaces, becoming emerging areas of urban vitality. Protection and renewal policies have driven the diversified development of waterfront industrial heritage, forming a mixed-space structure.

The evolution of the Pearl River Back Channel waterfront industrial heritage reflects multiple changes in Guangzhou's economy, transportation, and urban space. In the future, these industrial heritages still have significant potential for renewal under the shared city concept, and can further integrate cultural, commercial, and tourism functions, becoming an

essential component of the waterfront urban landscape.

3.1.2 Distribution and Current Condition

1) Current Spatial Distribution

The "Back Channel" of the Pearl River is a comparative concept relative to the "Front Channel". The main watercourse of the Pearl River flows from west to east through the central urban area of Guangzhou. In the western part of the city center, spanning Baietan–Zhoutouju–Shamian, the river splits into the Front Channel and the Back Channel. The Back Channel flows through four districts—Liwan, Haizhu, Panyu, and Huangpu—and rejoins the Front Channel at the Changzhou Island–Hongshengsha area in the eastern part of the city, forming the main watercourse of the Pearl River, which then flows into the South China Sea via the Humen Estuary. Compared to the Front Channel, the Back Channel has a longer shoreline and better navigation conditions, capable of accommodating large ships and providing access to inland areas. It is a necessary route for oceangoing vessels entering the inner port.

As a major inner port of Guangzhou, the Pearl River Back Channel has an extensive shoreline that spans both the northern and southern urban areas of Liwan and Haizhu Districts. Thanks to its convenient water transportation conditions, the area has attracted a large number of docks and warehouses since the late Qing dynasty.

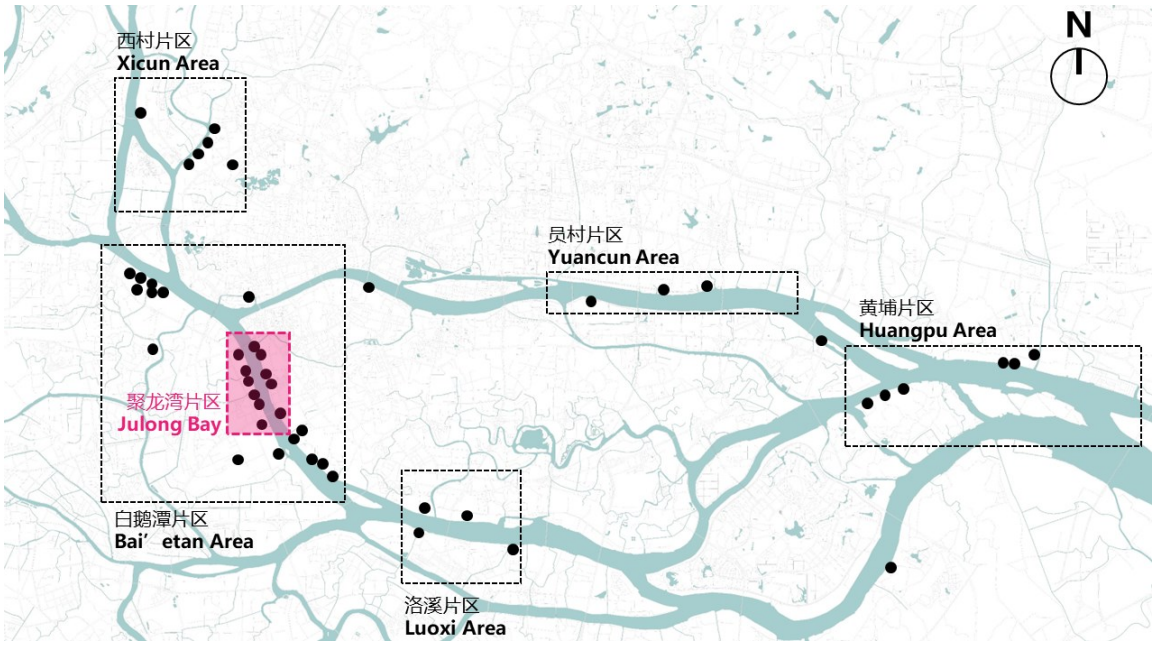


Figure 3-2 Distribution of waterfront industrial remains in Guangzhou

(Source: Drawn by Author)

The spatial scope of this research (Figure 3-2): North to Zhoutouju Tunnel, south to

Hedong Bridge, west to Fangcun Avenue, and east to North Gongye Avenue, covering one block on each side of the riverbank. The waterfront industrial heritage within this area is primarily distributed in a linear pattern along both sides of the Pearl River shoreline.

For the convenience of cargo loading, unloading, and transport, these warehouses were generally laid out along the Back Channel of the Pearl River, adjacent to ports or docks. The warehouses form a continuous waterfront interface; however, due to the closed state of some warehouses, the utilization rate of public space remains low.

2) Temporal Distribution

The time dimension of this study primarily focuses on the period from the late Qing Dynasty (1840-1950) to the modern industrial era (1950-2000) (Figure 3-3). Among the existing waterfront industrial heritage buildings along the Pearl River Back Channel, the earliest can be traced back to the Taikoo Warehouse, built in 1904. The later buildings include the Nissin Warehouse and the South District Grain Reserve Warehouse of Guangzhou Grain Group, which were constructed in the early years after the founding of the People's Republic of China.

Figure 3-3 Schematic diagram of the changing state of warehouse use along the Pearl River back channel (Source: Summarized by Author based on Research and Related Literature[1])

3) Current Survival Status

The industrial heritage along the Pearl River Back Channel is experiencing diversified development. Some warehouses, such as the Taikoo Warehouse and Osaka Warehouse, have been transformed into commercial and cultural spaces. These projects typically rely on

waterfront landscape resources and combine multiple functions such as dining, exhibitions, and offices to enhance land value. However, due to excessive commercialization, some transformation projects have deviated from the cultural value of industrial heritage, leading to the weakening of the original industrial characteristics. Other warehouses, such as Watson's Warehouse, have been long abandoned due to industrial relocation, poor management, and other reasons, lacking effective maintenance. Some of the building structures have been damaged, posing safety hazards. In addition, original industrial warehouse facilities such as the Asiatic Huadi Warehouse have been converted into residential or commercial projects in urban renewal and real estate development, which has led to the disappearance of historical industrial heritage and the gradual fading of industrial cultural memories.

Table 3-1 List of Survival Status of Industrial Heritage along the Pearl River Back Channel

(Source: Organized by Author based on Research and Related Literature[1])

No.	Name	Date of construction	Number of remains	Preservation status	Current use status
1	Taikoo Warehouse	1904	7 warehouse buildings, 3 piers, 1 water tower	**Complete preservation:** the form and materials of the building facade are basically kept in their original state	Have been renovated and reused
2	Osaka Warehouse	1919	4 warehouses, 1 office building	**Fully preserved:** the building is in good condition	Have been renovated and reused
3	Shing Chi Tong Warehouse	Republic of China period	1 warehouse	**Complete preservation:** the building is in a good state of preservation	Have been renovated and reused
4	Watson's Warehouse	1925	1 warehouse	**Basic preservation:** the building is in a fair state of preservation	Vacant
5	Changgang Road Oil Depot	1938	6 vertical tanks with protective facades, 4 individual tanks and fire breakwaters	**Complete preservation:** overall well preserved and still structurally sound	Vacant
6	Asiatic Petroleum Co. Huadi warehouse	1906	4 oil storage tanks, 2 office buildings, 2 warehouses	**Substantially preserved:** during the renovation and development process, the surviving buildings underwent some alterations: some of the metal tanks inside the storage tanks were removed, leaving only the outer protective walls, and doorways were cut out of the walls and tanks, etc.	Have been renovated and reused
7	Hip Tung Wo Engineering Works	1912	1 factory building, 1 warehouse	**Complete preservation:** the building is in a good state of preservation, and several pieces of equipment such as cranes, water towers, lathes, etc.	Have been renovated and reused
8	Chongkou Warehouse	1920	4 warehouses	**Complete preservation:** the buildings are in good condition	Have been renovated and reused
9	Nichiqing Warehouse	1920	1 warehouse	**Partially preserved:** originally a long row of warehouses, divided into five small warehouses. 2001 most of the warehouses on the south side were identified as dangerous buildings and demolished, and now only retains the northernmost 1 small warehouse. There was a dock, but now it is empty	Vacant

No.	Name	Date of construction	Number of remains	Preservation status	Current use status
10	Jardine's Warehouse	1913	6 warehouses	**Complete preservation:** the original appearance of the building is well preserved	Under Renovation
11	Mobil Warehouse	1906	2 warehouses	**Complete preservation:** the quality of the buildings is solid and the original appearance is well preserved	Vacant
12	Asiatic Petroleum Co. Longmak Warehouse	1906	2 warehouses, 1 office building	**Complete preservation:** the building is in a good state of preservation	Have been renovated and reused
13	Texaco Oil Depot	1924	18 oil storage tanks, 1 wharf	**Partial preservation:** the oil tanks are relatively well preserved, and the transmission pipelines in the core area of the oil depot (within the embankment) are also well preserved. Riverside Wharf remains basically intact	Vacant

In terms of renewal and reuse (Table 3-1), although the 9 modern foreign trading warehouses, docks, and industrial buildings that are listed as protected cultural heritage sites have retained a certain degree of their original layout and warehouse-style characteristics, most of the industrial warehousing facilities remain in a closed management state, disconnected from the surrounding urban space, making it difficult for the waterfront area to achieve public sharing. The original road system, which was primarily designed for industrial logistics, has not adapted to modern needs, and poor pedestrian flow has resulted in poor accessibility to the waterfront space. Some abandoned factories and warehouses, due to lack of maintenance, have deteriorated surroundings that affect the quality of the urban landscape.

However, with the advancement of the Guangdong-Hong Kong-Macau Greater Bay Area development, the geographical advantage of the Pearl River Back Channel area in the Guangzhou-Foshan economic circle has brought new opportunities for regional renewal. The *Baietan Area Development Plan (2020-2035)* proposes to build the area into a core demonstration zone of "new vitality for old cities," forming a composite ecological system integrating ecological leisure and industrial heritage. The *Guangzhou Lingnan Cultural Center District Development Plan (2019-2025)* also emphasizes integrating and utilizing industrial heritage along the river, building a distinctive urban spatial form that coexists with history and modernity, ecology and culture, and showcasing the style of Lingnan industrial culture. These policy directions provide a good development opportunity for the protection and renewal of the Pearl River Back Channel waterfront industrial heritage. These policies offer opportunities for the protection and renewal of industrial warehousing heritage, encouraging the proactive transformation and reuse of some warehouses, striving to achieve a diversification of spatial conditions. Today, the Pearl River shoreline, as a scarce public

resource and a hot spot for real estate development, has become an important area in urgent need of protection and renewal.

3.2 Policy Milestones and Evolution of Industrial Heritage Evaluation Standards

The waterfront industrial heritage of the Pearl River Back Channel, due to its favorable location, began its renewal and reuse practices relatively early in Guangzhou's industrial heritage renewal. Its reuse process, under the promotion of multiple policies, has gone through different stages, from "economic priority" to "balanced comprehensive value", and is currently in the stage of diversified exploration and development. This section will systematically review the driving mechanisms of its renewal and development from two dimensions: policy events and evaluation standards.

3.2.1 Policy Events

1) Early Exploration (Around 2000)

In the 1990s, Guangzhou began experiencing industrial suburbanization, with old industrial facilities in the city center gradually moving to the outskirts. The market-oriented reform of industrial land allowed enterprises to sell land for commercial development after relocation. Coupled with the rise of the real estate market, many waterfront industrial heritage sites in prime locations were transformed into real estate projects. The once continuous industrial shoreline was fragmented, and waterfront space gradually became privatized.

In the early 2000s, the renovation planning of the Pearl River Back Channel waterfront area in Haizhu District gradually began, marking the early exploration phase of the protection and renewal of waterfront industrial heritage. In 2004, the *Guangzhou Pearl River Back Channel Waterfront Area Development Plan and Urban Design* proposed the concept of industrial heritage protection and renewal, starting discussions on the publicization of waterfront spaces, and the social value of waterfront industrial heritage began to receive attention.

2) "Suppress the Second Industry and Develop he Third Industry" and "Three Olds" Renovation and Large-Scale Development (2008-2015)

Affected by the 2008 financial crisis, the Guangzhou government accelerated industrial structure adjustments and introduced a series of policy documents promoting "Suppress the Second Industry and Develop he Third Industry" and the "Three Olds" renovation (renovation

of old factories, old villages, and old towns). These policies provided a legal framework for the protection and renewal of industrial heritage, making the renovation of old industrial areas a key focus of urban renewal. Major policies include:

- In 2007, the third national cultural relics survey was carried out nationwide. In response to the call of the National Cultural Heritage Administration, Guangzhou also began to investigate and research industrial heritage as part of cultural relics.
- In 2008, the Guangzhou municipal government issued the *"Opinions on Promoting the 'Suppress the Second Industry and Develop he Third Industry' Work in the Urban Area" (Sui Fu [2008] No. 8)*, which required the relocation of high-pollution industries, encouraging industrial enterprises to leave the city center and transform old factories for the third industry (such as cultural and creative industries).
- In 2009, the *"Several Opinions on Promoting the 'Three Olds' Renovation to Promote Land Saving and Intensive Use" (Yue Fu [2009] No. 78)* was issued, proposing the "government-led, market-operated" principle and encouraging the introduction of social capital into industrial heritage renovation.
- The *Guangzhou Old Factory Renovation Special Plan (2010-2020)* passed in 2011 systematically planned the path for the renovation of old factories, dividing different zones and land types, and proposed "five types of renovation methods": full renovation, reconstruction and enhancement, functional update, environmental remediation, and ecological function maintenance.
- In 2012, the *Supplementary Opinions on Accelerating the Promotion of the 'Three Olds' Renovation* (Sui Fu [2012] No. 20) were issued, proposing a model of government storage as the main method and self-renovation as a secondary one, emphasizing the government's leading role and principles such as large-scale renovation and priority in supporting facilities.

During this stage, many industrial heritage sites in Guangzhou were transformed into creative industry parks, such as T.I.T Creative Park, Hongzhuan Factory, and Taikoo Warehouse Cultural and Commercial Street. However, due to an overemphasis on economic development in the policies and a lack of specific heritage protection guidelines, some important industrial heritage sites were demolished or excessively reconstructed, leading to heritage fragmentation, such as parts of Guangzhou Paper Factory buildings, some industrial facilities at Guangzhou Steel, and the demolition controversy at Hongzhuan Factory.

This stage of renewal and reuse was primarily driven by economic factors, allowing enterprises to renovate independently but prohibiting real estate development. It began to

explore the cultural and creative utilization model of industrial heritage. Additionally, the "Three Olds Renovation Office" was established to promote large-scale renewal (such as the Guangzhou Steel New Town), but issues such as the demolition controversies highlighted the contradictions between heritage protection and economic development.

3) From Economic Dominance to Cultural Revitalization (2015–Present)

Since 2015, as the "Three Olds" renovation entered deeper stages, urban renewal policies began to shift toward ecological restoration and cultural protection, emphasizing three main goals: improvement of living environments, industrial transformation and upgrading, and historical and cultural preservation. The Guangzhou Urban Renewal Bureau replaced the "Three Olds" Renovation Office and issued the *Guangzhou Urban Renewal Measures*, improving renewal principles and emphasizing the enhancement of living environments and the protection of historical and cultural heritage. Around the same time, the central government proposed the "urban double repair" concept, highlighting ecological restoration and urban repair, which provided new direction and policy support for the renewal and reuse of waterfront industrial heritage.

In 2020, the *Implementation Measures for Promoting the Reasonable Use of Historical Buildings in Guangzhou* expanded the functional scope of historical building renewal and reuse, encouraging the introduction of emerging business formats such as co-working spaces and cultural and creative industries. At the same time, it relaxed fire safety and floor area ratio restrictions, simplified approval procedures, and strengthened financial and policy support to improve the applicability of historical buildings and stimulate the enthusiasm of private investment. The *Guangzhou Industrial Heritage Management Measures* issued in 2022 became the first dedicated regulatory document on industrial heritage in Guangdong Province. It proposed activating industrial heritage through forms such as industrial museums, theme parks, industrial parks, specialty blocks (towns), and innovation and entrepreneurship bases, and encouraged private capital to participate.

This stage of practice has shifted from a single economic goal to a comprehensive approach that considers "social–ecological–cultural" benefits. Awareness of industrial heritage protection has increased. Some industrial heritage sites that faced demolition have been preserved, such as the Asiatic Petroleum Co. Longmark Warehouse, which has been transformed into the Guangdong Petroleum History and Culture Exhibition Hall. Multiple projects have entered integrated renewal models, such as the Guangzhou Iron & Steel and Guangzhou Paper Factory areas, which have been included in urban renewal plans and

comprehensively redeveloped with ecological green spaces and commercial development. At the same time, planning integration has been strengthened by constructing riverside greenways along the Pearl River to improve public accessibility. These policy innovations have enhanced the institutional flexibility of industrial heritage revitalization in Guangzhou and provided effective references and strong support for future practice.

3.2.2 Evolution of Evaluation Standards for Industrial Heritage in Guangzhou

The development of industrial heritage evaluation standards in Guangzhou has gone through three phases: initially lacking clear standards, then focusing on the evaluation of individual buildings, and ultimately forming a comprehensive value assessment system. At the same time, the evaluation concept has shifted from purely emphasizing "protection first" to a more diversified system that values both "protection and reuse."

1) Early Stage (Before 2008): No Systematic Evaluation Standards

In the early stages, the evaluation of industrial heritage in Guangzhou mainly relied on the cultural relics protection system. Some modern industrial buildings were included as cultural relic protection units, but most industrial heritage sites were not recognized. In 2008, Guangzhou for the first time designated eight warehouse buildings, including the Taikoo Warehouse and Osaka Warehouse, as municipal-level protected cultural relics. This marked the initial attempt at industrial heritage protection in Guangzhou. Since then, the number of industrial heritage sites included in the lists of municipal-level protected relics and historical buildings has continued to grow.

2) 2014: Preliminary Formation of Industrial Heritage Evaluation Standards

In 2014, the *Guidelines for the Protection and Utilization of Industrial Heritage* issued by the National Cultural Heritage Administration proposed that the regeneration and reuse of industrial heritage should be assessed from multiple dimensions, including the environment, industry, and culture, enriching the value connotation of industrial heritage protection and regeneration in China. In the same year, Guangzhou conducted a cultural heritage survey, listing buildings, residential areas, and production equipment as survey targets, and incorporating factories, natural environments, surrounding factories, and transportation relationships into the scope of the survey. Currently, Guangzhou mainly investigates industrial heritage through the following methods: first, conducting cultural heritage surveys on "approved but unbuilt" land; second, carrying out a cultural heritage census; third, conducting

"project reviews" and formulating detailed planning protection chapters; and fourth, carrying out emergency surveys. In addition, a pre-protection mechanism has been established to address potential demolition and construction during the identification and research period.

3) 2018-Present: Dual-System Evaluation Standards

Currently, China has two parallel systems for industrial heritage evaluation: ① The *National Industrial Heritage List* (Ministry of Industry and Information Technology, 2017 onwards): Primarily based on enterprise and property owner applications, focusing on the integrity of the heritage (e.g., buildings, equipment, and archives), with an emphasis on owner-led revitalization, industrial value, and the sustainability of operations. ② The *China Industrial Heritage Protection Directory* (2018 onwards): Led by the Chinese Association for Science and Technology's Innovation Strategy Research Institute and the China Urban Planning Society, this list is based on self-selection based on historical value, focusing on the history of technology and social impact (e.g., the Hip Tung Wo Engineering Works in the Pearl River Back Channel area was included in the first batch).

In 2018 and 2019, the first and second batches of the *China Industrial Heritage Protection Directory* were announced. The listed industrial heritage sites in Guangzhou include the Cobai Dock Site, the Hip Tung Wo Engineering Works Site, the Guangnan Shipyard (later Guangzhou Shipbuilding Factory) built as early as 1914, and the Taikoo Wharf. Industrial heritage has increasingly received attention.

Based on this, Guangzhou further refined its evaluation standards and began developing a series of regional evaluation standards and methods: In terms of flexible policy support, the *Guangzhou Measures for Promoting the Reasonable Use of Historical Buildings* were issued in 2020, allowing mixed-use functions, floor area ratio incentives, and encouraging social capital participation. In terms of special management measures, the *Guangzhou Industrial Heritage Management Measures* were released, clarifying that the evaluation objects include buildings, infrastructure, production equipment, and socio-cultural spaces. The evaluation standards cover four dimensions: historical value, cultural value, economic value, and ecological value, and a "pre-protection mechanism" was established to prevent the demolition of industrial heritage that has not yet been evaluated.

Thanks to the formulation and issuance of these industrial heritage protection management measures, Guangzhou has achieved significant results in industrial heritage protection in recent years, with more than half of the waterfront old industrial areas receiving legal protection status.

3.2.3 Interaction Between Policies and Standards

The renewal and reuse process of the Pearl River Back Channel waterfront industrial heritage reflects the synergistic role of policies and evaluation standards. At the policy level, the "Three Olds" renovation special funds support heritage restoration and encourage more waterfront industrial heritage sites to be included in protection lists, such as the Osaka Warehouse, which was listed as a historical building in 2014. National industrial heritage recognition standards, such as the "integrity protection" requirement, have also driven local renewal policies to refine protection clauses. For instance, the *Guangzhou Haizhu District Urban and Rural Development Master Plan (2015-2030)* imposes strict controls on the height of waterfront buildings. This interaction has already shown results in practice. The Guangzhou Steel Site Park integrates industrial memory with public green spaces, while the T.I.T Creative Park achieves industrial-city integration through the "culture + technology" model.

This development process reflects the joint evolution of policies and standards: the policy orientation has evolved from "retreating from two to three" to "sharing orientation", gradually realizing the balance between economy and cultural lineage; the assessment standards have evolved from "list recognition" to "revitalization and innovation", continuously improving the interface between conservation and utilization. The evaluation criteria have evolved from "list recognition" to "revitalization and innovation", continuously improving the connection between protection and utilization. This evolution has pushed industrial heritage from the early "protection island" to the "sharing network". In the future, there is still a need to further strengthen policy flexibility and public participation, so as to promote the transformation of industrial heritage from a mere "stock space" to a vibrant "urban cultural asset".

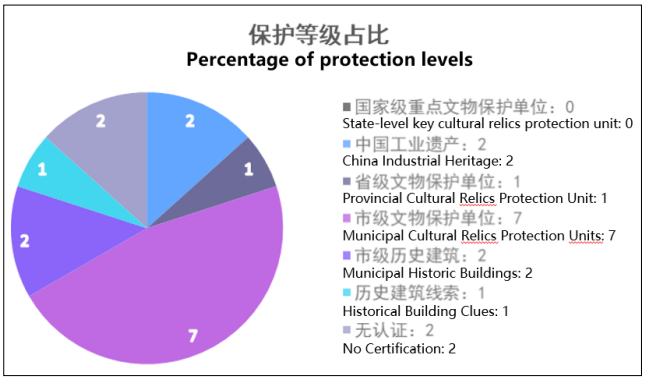


Figure 3-4 Pie Chart of Protection Level Proportions for the Pearl River Back Channel Waterfront Industrial Heritage

(Source: Drawn by Author)

3.2.4 Heritage Protection Level

According to the author's statistics, among the 13 waterfront old industrial areas along the Pearl River Back Channel, 10 have legal protection status, accounting for more than half, and 3 of these heritage sites have dual

protection status (Figure 3-4). These protection levels can be divided into two main categories: national and provincial/city-level.

At the national level, there are two categories: National Key Cultural Relics Protection Units and China Industrial Heritage. Within the scope of this study, there are no National Key Cultural Relics Protection Units, but 2 sites are listed in the *China Industrial Heritage Protection Directory*, organized by the Chinese Association for Science and Technology.

At the provincial/city level, the categories include Provincial Cultural Relics Protection Units, City-level Cultural Relics Protection Units, and City-level Historical Buildings. Within the scope of this study, there is 1 Provincial Cultural Relics Protection Unit, which was evaluated by provincial cultural heritage departments and announced by the provincial government; 7 City-level Cultural Relics Protection Units, which were reviewed and evaluated by municipal cultural heritage departments and announced by the Guangzhou municipal government; and 2 City-level Historical Buildings, which were identified by the municipal government after being surveyed and reviewed by district-level cultural and tourism departments. In addition, 1 site is listed as a "Historical Building Clue" (Table 3-2).

Table 3-2 List of Protection Levels for Waterfront Industrial Heritage in the Pearl River Back Channel

(Source: Drawn by Author)

Protection Level	Batch	Name	Contents of The Determination	Administrative District	Address
National Level	China Industrial Heritage Protection List (published by the Publicity Department of the Chinese Association for Science and Technology)				
	The 1st Batch (2018)	Hip Tung Wo Engineering Works	1 factory building, some equipment: 1 shearing machine (1940s), 1 vertical lathe (U.S.-made 1933), cranes and water towers, etc.	Laiwan District	North of Yuling Bridge, East Fangcun Avenue
	The 2nd Batch (2019)	Taikoo Warehouse	Taikoo Warehouse Pier (Former site of Taikoo Warehouse in Shell)	Haizhu District	No.124, Renovation Road, Longfeng Street
Provincial Level	Guangdong Provincial Cultural Relics Protection Unit				
	The 3rd Batch (2024)	Asiatic Petroleum Co. Longmark Warehouse	The former site of Longmark Warehouse	Laiwan District	No. 1 Xinmalu Road, Baihedong
Municipal Level	Guangzhou Municipal Cultural Relics Protection Unit				
	The 7th Batch (2008)	Taikoo Warehouse	Taikoo Warehouse Pier (Former site of Taikoo Warehouse in Shell)	Haizhu District	No.124, Renovation Road, Longfeng Street
		Osaka warehouse	Former site of Osaka Warehouse		No. 36 Xinmin 8th Street, Renovation Road
		Asiatic Petroleum Co. Huadi	Former site of Hanadi	Laiwan District	No. 33 Xinlian Road,

Protection Level	Batch	Name	Contents of The Determination	Administrative District	Address
		Warehouse	Warehouse		Fangcun Avenue,
		Nissin Warehouse	Former site of Nissin Warehouse		No. 110 Fangcun Avenue East
		Jardine's Warehouse	Former site of Jardine's Warehouse		No. 48 Fangcun Avenue East
		Asiatic Petroleum Co. Longmark Warehouse	Former site of Longmark Warehouse		No. 1 Xinmalu Road, Baihedong
		Texaco Oil Depot	The main body of the artifact is a riverfront pier		No. 1 Nanzhiwei Street, Baihedong
	Municipal Historic Buildings				
	The 1st Batch (2014)	Shing Chi Tong Warehouse	Former site of Shing Chi Tong Warehouse	Haizhu District	No. 46 Xinmin Street
	The 3rd Batch (2016)	Changgang Road Oil Depot	Guangdong Provincial Petroleum Company Changgang Road Oil Depot		Within the Compound of No. 1 Changgang West Road
	Historic Building Clues				
	/	Chongkou Warehouse	/	Laiwan District	No. 1 Xinghua Street, Xinghua Community, Fangcun Avenue Middle, Chongkou, Fangcun
Uncertified					
/	/	Watson's Warehouse	/	Haizhu District	No. 128 Renovation Road
/	/	Mobil Warehouse	/	Laiwan District	No. 1 Nanzhiwei, Baihedong

Although most of the heritage has been included in the protection system, some issues still exist: ① A small number of heritage sites have not yet received any legal protection status. ② In some historical building complexes, only a few buildings have been recognized for protection, while other buildings are still at risk of demolition. ③ Heritage sites that have received protection status may lose their qualification if protection is not properly enforced. For example, the protection status of Provincial Cultural Relics Protection Units requires ongoing supervision.

3.3 Evolution of Renewal Methods

The waterfront industrial heritage along the Pearl River Back Channel has undergone multiple rounds of industrial adjustments and urban renewal, resulting in diverse renewal methods. Of the 13 industrial heritage sites along the Pearl River Back Channel,

approximately 7 have been renewed or are currently undergoing renewal. Based on research and analysis, the renewal methods for the Pearl River Back Channel waterfront industrial heritage can be roughly divided into three categories: a) Adaptive reuse based on the architectural structure, b) Urban comprehensive development based on industrial landscape regeneration, c) Ecological and cultural protection combined with waterfront open space.

In the process of waterfront industrial heritage renewal, almost all projects involve adaptive reuse of the architectural structure. There are 4 sites that involve urban comprehensive development based on industrial landscape regeneration, and 1 site that combines ecological and cultural protection with waterfront open space (Table 3-3). Additionally, during the more than 20 years of renewal and transformation from the late 1990s to the present, the Taikoo Warehouse Cultural and Creative District began its Phase II renewal in 2022.

Table 3-3 Renewal Approaches of Waterfront Industrial Heritage along the Pearl River Back Channel

(Source: Drawn by Author)

Renewal Type	Renovation Start Time	Name of Industrial Heritage	Post-renovation Name	Functional Type	Site Area	Developer	Market Operation Status & Evaluation
Urban Mixed-Use Development Based on Industrial Landscape Regeneration	2008	Osaka Warehouse	Osaka Warehouse 1904 Creative Park	Cultural & Creative Park /Community	5,160㎡	Guangdong Bochen Investment Co., Ltd.	• Initial clustering of creative industries is emerging, supported by basic commercial amenities; • The site exhibits strong spatial distinctiveness, yet lacks integration with the riverfront interface
	Phase I: 2008 Phase II: 2022	Taikoo Warehouse	Taikoo Wharf	Phase I & Phase II：Commercial	55,000 m²(Phase I); 23,000 m²(Phase II)	Guangzhou Port Authority & Guangzhou Port Group Co., Ltd.	• The site attracts a large number of visitors; however, the diversity and innovation of commercial offerings are insufficient; • The infrastructure's carrying capacity during peak hours needs to be strengthened; • Despite its high visibility within the region, the site's nationwide impact has yet to be fully realized
	2012	Asiatic Petroleum Co. Huadi warehouse	Julong Bay Zhenyi Resort Hotel	Hotel & Business Office	33,000㎡	Guangzhou Yiniancheng Industrial Co., Ltd.	• High-end business formats with a narrow target demographic; • Closed-off management results in limited spatial openness
	Creative Park: 2009 Museum: 2016	Hip Tung Wo Engineering Works	Hongxin 922 Creative Park & Hip Tung Wo Engine Museum	Cultural & Creative Park /Community	30,000㎡	Guangzhou Hongxin Creative Park Investment Co., Ltd.	• Creative enterprises are concentrated, but the industrial chain lacks depth; • Basic services are well-established, yet commercial amenities remain weak;

Renewal Type	Renovation Start Time	Name of Industrial Heritage	Post-renovation Name	Functional Type	Site Area	Developer	Market Operation Status & Evaluation
							• Accessibility is moderate
Adaptive Reuse Focused on Building Body	2018	Shing Chi Tong Warehouse	Taikoo Xinlei Kindergarten	Education	865㎡	Guangzhou Taikoo Xinlei Education Development Co., Ltd.	• The combination of river views and historical landscape is highly unique, but the spatial layout is constrained; • Serves as a model case for the revitalization of historic buildings
	Training Center: 1970 Exhibition Hall: 2020	Asiatic Petroleum Co. Longmark warehouse	Guangdong Petroleum Training Center & Historical Exhibition Hall	Office & Cultural	2,790㎡	Guangdong Petroleum	• The functional program is limited, and commercial development remains in its early stages; • While the site offers rare spatial character, supporting facilities are yet to be fully developed
Ecological and Cultural Conservation with Waterfront Open Space	2022	Chongkou Warehouse	Guangzhou Julong Bay Exhibition Center	Cultural	4,252㎡	Pearl River Industrial Investment Co., Ltd.	• The site benefits from a sound market-based operational model; • It features strong spatial distinctiveness and comprehensive service infrastructure; • Excellent overall accessibility

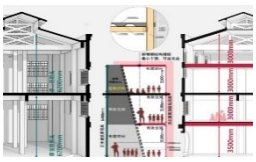
3.3.1 Adaptive Reuse Focused on Building Body

The protection of industrial heritage differs from the protection of historical monuments. Its core lies in adaptive reuse, enabling compatibility with contemporary urban development while preserving original spatial characteristics and historical information as much as possible, thereby maintaining the sense of place of industrial heritage. For the waterfront industrial heritage along the Pearl River Back Channel, the renewal and reuse of the architectural structure is the most fundamental means of protection and also the most widely adopted renewal method at this stage. This form of adaptive reuse primarily involves three aspects: spatial layout adjustment, architectural façade restoration, and functional replacement. Spatial layout adjustment mainly concerns redefining vertical or horizontal space—such as optimizing the spatial configuration through mezzanines or partial additions. Architectural façade restoration focuses on preserving the original appearance of industrial buildings. Functional replacement is the core strategy of adaptive reuse.

Most industrial heritage renewal projects along the Pearl River Back Channel involve all three aspects mentioned above (Table 3-4).

Table 3-4 Adaptive Reuse Focused on Building Body

(Source: Drawn by Author)

Name	Before Renovation	After Renovation		
		Spatial Form Adjustment	Façade Restoration	Functional Transformation
Chongkou Warehouse				Grain Storage Warehouse ↓ Urban Exhibition Center
Osaka Warehouse				Warehouse ↓ Creative Industry Office
Asiatic Petroleum Co. Longmark warehouse				Warehouse ↓ Training Center & Exhibition Hall
Shing Chi Tong Warehouse				Warehouse ↓ Kindergarten

During the renewal of the Chongkou Warehouse, the original “three-vertical-one-horizontal” spatial layout was preserved. Through the addition of steel structures and a fully sloped glass curtain wall, the gaps between the originally separate three warehouse bodies were transformed into interior space, forming a multifunctional urban exhibition hall integrating exhibition, office, conference, and leisure functions. In terms of architectural façade restoration, Chongkou Warehouse retained its original red brick walls, wooden truss roofs, and gabled end walls, restoring the historical appearance of the building. For functional replacement, the original grain storage warehouse was converted into an urban exhibition center, giving it a new public function.

In the transformation of the Shing Chi Tong Warehouse into a kindergarten, the design team used interior layering methods—such as adding steel columns, installing steel beams, and setting up floor slabs—to re-divide and adjust the originally 6-meter-high single-story space with a large span. This cleverly transformed the open height of the original building into a scale more suitable for children's use. At the same time, new corridors, staircases, and other vertical and horizontal circulation spaces were added to improve internal functional flow and enhance fire evacuation capacity. In addition, the renovation fully utilized the inner courtyard and rooftop terrace spaces to create playful outdoor activity areas. By reasonably stacking vertical functional spaces, a three-dimensional courtyard-style playground was built, thereby

improving land use efficiency. Regarding the building's exterior, the project followed the principle of “minimum intervention,” repairing the Flemish-style rubbed red brick façade through the removal of later-added finishes, cleaning surface pollutants, and partial brick replacement and joint repair. This approach maximized the preservation of original building materials and historic character.

In the early phase, the architectural transformation of the waterfront industrial heritage along the Pearl River Back Channel was influenced by the SOHO model of New York, emphasizing the use of large warehouse spaces to create LOFT-style creative offices or art studios. For example, during the renovation of the Osaka Warehouse 1904 Creative Park, horizontal and vertical space was redefined, converting the originally tall warehouse into multiple small independent office units while preserving the original steel trusses and façade appearance. This reflected an architectural strategy that blended old and new.

3.3.2 Urban Complex Development Based on Industrial Landscape Regeneration

Currently, there are two urban complex regeneration projects along the Pearl River Back Channel waterfront industrial heritage that are based on industrial landscape regeneration. This method involves incorporating old industrial plots into comprehensive urban development and achieving spatial renewal through multifunctional integration. It is closely linked to urban renewal, historical environment protection, and industrial transformation, and typically integrates commercial, office, cultural, and residential functions.

In this type of comprehensive development, the industrial heritage buildings serve as the spatial organizational core, around which new buildings are planned, making the historical heritage the main element of the site’s spatial structure.

Phase II of the Taikoo Warehouse Cultural and Creative District strengthens spatial organization based on the original warehouse cluster. New commercial facilities have been constructed around the main warehouse buildings. After the renewal, Phase II will introduce new functions such as art galleries, bookstores, and theaters, forming a commercial pedestrian district in conjunction with the old building cluster to the west (Figure 3-5).

In the development process of the Julongwan·Taikoo Li Project (Nissin Warehouse heritage area renewal), great emphasis was placed on the protection and revitalized utilization of historical buildings. For example, industrial heritage sites such as the Chongkou Warehouse, Yuling Bridge, and the former site of Hip Tung Wo Engineering Works were preserved and transformed, being integrated into new urban functions.

Figure 3-5 Rendering of the Taikoo Warehouse Phase II Development Project
(Source: https://m.thepaper.cn/newsDetail_forward_26003598)

At the same time, the project includes the planning of a large number of new buildings, including Grade A+ office towers, high-end commercial complexes, and apartments. Under this model, the spatial relationship between historical buildings and new constructions is relatively balanced. Together, they form an overall spatial layout that both retains historical and cultural elements and introduces modern functions, realizing a development model that blends the old with the new (Figure 3-6).

Figure 3-6 Rendering of the Julong Bay Taikoo Li Project
(Source: SOM, Guangzhou Bai'etan Julong Bay Urban Design)

Figure 3-7 Julong Bay Urban Exhibition Hall (Former Chongkou Warehouse)
(Source: SASAKI, Guangzhou Bai'etan Julong Bay Area Landscape Master Concept Design, Exhibition and Pilot Zone Landscape Design)

3.3.3 Ecological and Cultural Protection Integrated with Waterfront Open Space

In the renewal process of the Chongkou Warehouse along the Pearl River Back Channel, the site was also incorporated into the waterfront public green space. Through the transformation of the public green space, it has become the “urban living room” and has been embedded into the riverside waterfront greenery as a public art space. This approach preserves its historical value through landscape-based protection. At present, this type of renewal is mainly seen in government-led waterfront ecological projects, where some old industrial facilities undergo rescue-level restoration and display, in conjunction with riverbank redevelopment (Figure 3-7).

3.4 Value of Sharing Evaluation

This section selects 13 waterfront industrial heritage sites along the Pearl River Back Channel, focusing on the evaluation of their value of sharing. The analysis is carried out from the perspectives of evaluation dimensions, indicators, the construction of an evaluation system, and its applicability. Based on these, shared renewal strategies for Guangzhou’s industrial architectural heritage are proposed through case-specific analysis.

3.4.1 Research Framework under the Concept of Sharing

1) Interpretation of Renewal Focus Dimensions under the Shared Concept

In the renewal process of industrial heritage, value of sharing is a key indicator in determining its success. This is especially true for the waterfront industrial heritage along the Pearl River Back Channel, where reuse must balance urban functional integration, cultural sustainability, and spatial openness. This section, based on the five dimensions of value of sharing proposed in *“Shared Waterfront: The Industrial Heritage Chronicles of Suzhou Creek”* (Figure 3-8)—namely: Penetrability, Diversity, Time-sharing, Diachronic, and Daily activity—combined with on-site investigations of relevant waterfront industrial heritage in Guangzhou, provides an in-depth interpretation of how the Pearl River Back Channel area performs across these five dimensions.

Figure 3-8 Five Dimensions of Waterfront Industrial Heritage Renewal and Reuse Concerns under the Sharing Concept

(Source: Redrawn by Author from the Literature[4])

(1) Diachronic

Diachronic refers to the temporal evolution of types, emphasizing the demonstration of the long-term transformation of urban landscapes on the basis of respecting the original site characteristics. It focuses on the continuity of spatial time while maintaining the dynamic and inclusive nature of ecological restoration. It reflects not only how to inherit the cultural value, functional evolution, and social significance of space, but also ensures the sustainable development of industrial heritage through the coordinated development of old and new functions, presenting the accumulation of historical information and the layering of culture.

In the evaluation and investigation of waterfront industrial heritage renewal and reuse projects, diachronic value can be analyzed through the following four aspects:

a. Multilayered representation of historical information: Preserving and showcasing key components of warehouse buildings (such as docks, lifting equipment, freight tracks, etc.), displaying the overlay of textures and spatial forms from different historical periods, and using digital interactive means to evoke industrial memory and provide users with an interactive experience.

b. Integration of contemporary spirit: Translating traditional spatial functions into modern uses, facilitating dialogue between old and new interfaces, and embedding sustainable development concepts.

c. Attention to ecological restoration: Restoring natural environments damaged by industrial activities, constructing sustainable ecosystems, emphasizing the gradual and dynamic nature of ecological restoration, and focusing on ecological connectivity with the surrounding environment.

d. Addressing uncertainty: Maintaining flexibility and adaptability in spatial functions,

reserving possibilities for future development, adopting incremental renewal strategies, and responding to the dynamic changes in user needs.

This renewal and reuse strategy based on the dimension of diachronic not only reflects the historical value of industrial heritage but also meets the needs of contemporary development, while reserving space for future evolution, thus enabling the sustainable development of industrial heritage.

(1) Penetrability

The concept of Penetrability (Durchdringung) was first proposed by Sigfried Giedion in 1928. Jan Gehl further emphasized in *"Life Between Buildings"* (1971) that flexible boundaries are transitional spaces between the fully private and the fully public, highlighting the importance of spatial transitions and connections[105]. Based on these theories, penetrability mainly assesses the openness and accessibility of landscape infrastructure and open waterfront building interfaces in industrial heritage. It focuses on whether a highly accessible pedestrian network is provided to the public and whether there is connectivity between heritage spaces and the urban fabric, aiming to ensure that waterfront spaces are not isolated by industrial heritage but become an extension of the city's public activity zones.

In the evaluation and investigation of waterfront industrial heritage renewal and reuse projects, penetrability can be analyzed from two dimensions:

a. Urban-scale penetrability: Accessibility perpendicular to the waterfront, continuity of the riverside walkway system, integration of urban slow-traffic systems, and connectivity of the overall landscape infrastructure.

b. Building-scale penetrability: Openness of the ground-level interface, transparency of building façades, accessibility of public spaces, and the interaction effect between buildings and the external environment.

Renewal and reuse design that considers the dimension of penetrability can effectively improve the openness and accessibility of landscape infrastructure and waterfront building interfaces of industrial heritage, providing the public with a highly accessible pedestrian network and enhancing the relationship between the city and the waterfront space.

(3) Time-sharing

The concept of "Time-sharing" originated from the field of computer science in the 1960s. It refers to improving resource efficiency through reasonable temporal allocation. When applied to the evaluation of shared urban spatial resources, Time-sharing assesses how adaptable a space is to different time periods. For example, the complementarity between

daytime commercial activities and nighttime cultural events can enable the same space to be open and multifunctional at different times through dynamic scheduling, thus avoiding resource waste.

Single-function areas are often used only during specific time periods, whereas mixed-function areas can accommodate activities across different time frames, allowing space to be used more continuously and diversely [106]. Time-sharing is not only a way of managing time but also an extension of spatial sharing, enabling staggered access to the same space by different groups. In the evaluation and investigation of waterfront industrial heritage renewal and reuse projects, Time-sharing can be analyzed from three aspects:

a. Spatial organization strategies: "Using time to gain space", enabling the same space to serve different functions at different times; accommodating multiple spatial scales and identity demands; achieving flexible functional transitions.

b. Temporal allocation strategies: All-day open spaces, staggered-use spatial organization, planning for seasonal events, and multi-period composite utilization.

c. Time-sharing among user groups: Transition between working and leisure periods, differentiated use on weekdays and holidays, and complementarity of daytime and nighttime functions.

Renewal and reuse strategies based on the Time-sharing dimension help avoid the inefficiency of space being used only during specific periods and enhance spatial vitality, achieving optimal allocation of resources.

(4) Diversity

Diversity focuses on functional hybridity, user variety, and the diverse needs of multiple stakeholders. It aims to accommodate varied usage scenarios and attract participation from different social groups. The renewal of industrial heritage should not be limited to cultural exhibitions; rather, it should involve a mix of commercial, cultural, educational, and other formats to build an inclusive and interactive shared space. This enhances space utilization and helps industrial heritage integrate into everyday urban life.

The Diversity of waterfront industrial heritage can be examined from three levels:

a. Diversity of user groups: Different user groups—local residents, workers, tourists, and occasional users—bring diverse spatial demands.

b. Mixed urban functions: The hybrid function of industrial heritage regeneration and urban complexes is a crucial component of urban renewal. Revitalizing industrial landscapes can activate underutilized land in urban centers and create mixed-use developments with

unique market advantages. This also provides funding and channels for heritage maintenance, restoration, and cultural promotion, thus driving urban revitalization, job creation, and increased tax revenues, achieving a win-win between protection and development.

c. Functional hybridity of heritage buildings: Organic integration of cultural creativity, commercial services, public leisure, residential communities, office space, new manufacturing/innovative technologies, and educational spaces grants heritage buildings multiple roles, further stimulating their social and economic value.

The dimension of Diversity not only promotes functional layering and hybridity but also emphasizes the needs of diverse user groups, resulting in functionally rich and inclusive urban spaces.

(5) Daily Activity

The Daily activity dimension evaluates whether a space can be integrated into the everyday lives of local community residents, facilitate public activities, and meet urban living needs. It focuses not only on preserving the historical value of industrial heritage but also on transforming it into a shared space with a sense of belonging, making it part of citizens' daily life. As Peter Latz once stated, the development of humanized places requires the integration of real-life needs with respect for tradition and culture. The renewal of industrial ruins should follow this principle as well. The renewal of industrial heritage should not stop at museum-style displays or elite cultural events. Instead, it should be embedded into daily urban life and create shared spaces with a strong sense of belonging.

In the evaluation and investigation of waterfront industrial heritage renewal and reuse projects, Daily activity can be assessed from two levels:

a. Creation of everyday scenes: Through open spatial layouts and alley-style designs, a public space system is built for community activities, leisure, and neighborhood interactions. Key street nodes are identified and scattered micro public spaces are integrated to not only provide convenient living services for residents but also introduce cultural exchanges and street life exhibitions, fostering a strong everyday atmosphere.

b. Integration into community life: With the goal of mixed-use development and community revitalization, services, cultural spaces, public facilities, and daily amenities are introduced into heritage spaces, making them part of residents' lives. While retaining formal functions such as art and office spaces, facilities for daily needs like cafés and gyms are added, or some industrial buildings are converted into residential spaces, thereby attracting frequent use by nearby residents.

Renewal and reuse strategies based on the Daily activity dimension enhance the sustained appeal and convenience of space across different time periods, avoid single-function design, and allow industrial heritage to move beyond static museum-like displays to become truly embedded in urban life—realizing the organic integration of historical legacy and contemporary living.

2) The Significance of Creating Value of Sharing in Industrial Heritage Renewal

Creating value of sharing in industrial heritage renewal carries multiple layers of significance. It not only optimizes the utilization efficiency of waterfront spaces, but also promotes the organic integration of the city and its industrial heritage, stimulates public participation, enhances cultural identity and sustainability, and provides strong momentum for urban socio-economic development. Specifically, its significance is reflected in the following four aspects:

(1) Enhance the quality of waterfront space

By improving accessibility and openness along the waterfront, the penetrability of waterfront industrial heritage is strengthened, allowing for better integration with the urban fabric. At the same time, optimizing pedestrian networks and introducing diverse formats such as cultural creativity, tourism, and commerce can achieve functional hybridity, enrich waterfront activities, and enhance landscape experience and ecological adaptability. Furthermore, the integration and optimized allocation of public space resources—such as warehouses, docks, factory buildings, waterfront zones, and greenery—can maximize the efficiency of spatial and facility utilization.

(2) Enhancement of social benefits

The establishment of diversified shared spaces (e.g. art exhibitions, cultural bazaars, community activity centers) helps to promote community integration and public participation, and enhances the citizens' sense of identity towards industrial heritage. The open public space transforms the originally closed industrial area into a place for citizens' activities. At the same time, the public opinion is fully adopted during the renewal process, which promotes community interaction and integration, and further enhances the cohesion and sense of belonging of the residents.

(3) Promoting economic sustainability

By improving the composite utilization rate of space and reducing operating costs, the

renewal model can introduce cultural and creative industries, leisure businesses and other sectors, enhance rental income and commercial value, and create a cultural industry agglomeration, thus promoting the development of the creative economy and tourism industry, driving local economic growth, and realizing a win-win situation for both conservation and development.

(4) Promote the inheritance of urban memory

Shared design can not only maintain the recognizability of historical places and continue the urban cultural lineage, but also enhance the cultural influence of the heritage by displaying historical information and organizing cultural activities, stimulate the inheritance and innovation of industrial culture, make the industrial heritage become an important part of the city's cultural genes, and provide a window for posterity to learn about the history of Guangzhou's industrial development.

3.4.2 Assessment of the Shared Use Value

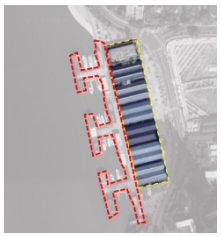
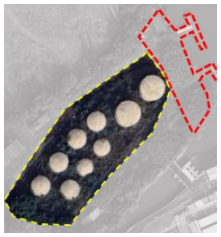
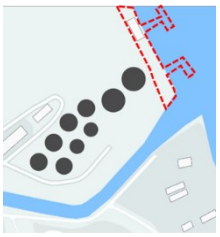
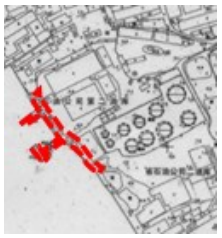
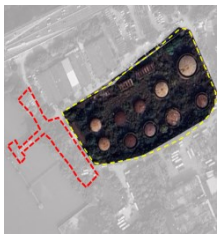
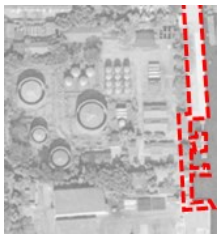
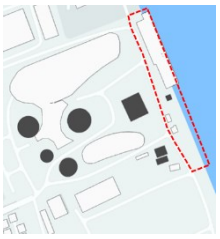
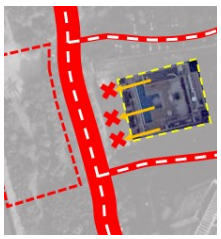
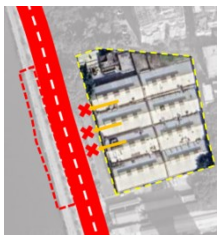
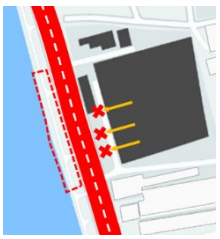
At present, there are a total of 13 representative industrial heritage buildings in the Pearl River Back Channel area, of which 7 have undergone renewal, while 6 remain unimproved. The shared use evaluation first focuses on the overall waterfront characteristics of the area and the composition of its heritage buildings, followed by a value assessment. On this basis, three completed renewal projects are selected for in-depth investigation and comprehensive analysis: the Taikoo Cultural Tourism and Art Creative District (formerly Taikoo Warehouse), the Guangzhou Julong Bay Exhibition Center (formerly Chongkou Warehouse), and the Taikoo Xinlei Kindergarten (formerly Shing Chi Tong Warehouse). These cases are used to explore renewal design approaches and post-renewal spatial issues across different scales—from the regional to the architectural level.

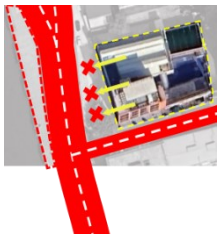
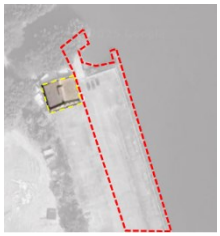
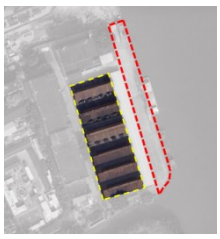
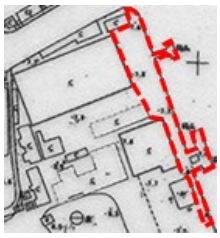
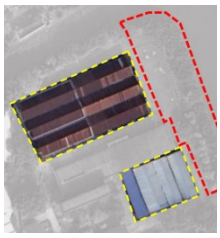
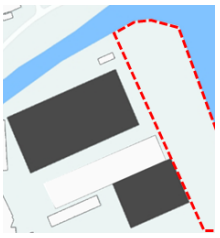
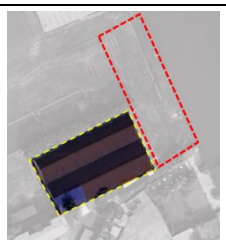
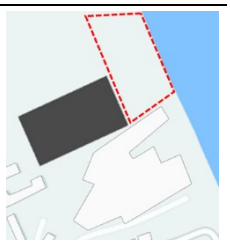
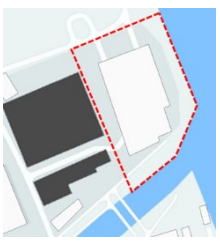
1) Waterfront Spatial Morphology

Due to the early functional demands of shipping, the waterfront industrial spaces along the Pearl River Back Channel were mostly equipped with docks and cargo yards along the shoreline, resulting in an overall linear spatial morphology, with widths generally ranging between 15–25 meters. However, with the decline of shipping functions, the rise of urban embankment construction driven by safety and flood control requirements, and the development of municipal roads, many dock facilities in the heritage areas were demolished. The waterfront spaces became increasingly separated from the industrial relics, leading to the predominance of linear-shaped waterfront spaces in the remaining heritage parks.

Table 3-5 Waterfront Spatial Typologies of Industrial Heritage along the Pearl River Back Channel

(Source: Drawn by Author)

Waterfront Space Morphological Characteristics	Retention of remains	Name	Topographic map (1978)	Aerial Photo Status Map (2025)	Characterization of waterfront spatial patterns
linear spatial form	Preserved Wharf Renovated Wharf	Taikoo Warehouse			
	Preserved Wharf Unrenovated Wharf	Texaco Oil Depot			
		Changgang Road Oil Depot			
		Asiatic Petroleum Co. Huadi warehouse			
	Demolished Wharf Road Interruption	Watson's Warehouse			
		Osaka Warehouse			

Waterfront Space Morphological Characteristics	Retention of remains	Name	Topographic map (1978)	Aerial Photo Status Map (2025)	Characterization of waterfront spatial patterns
		Shing Chi Tong Warehouse			
	Demolished Wharf	Nissin Warehouse			
		Jardine's Warehouse			
		Mobil Warehouse			
		Asiatic Petroleum Co. Longmark warehouse			
Originally a linear spatial form Planar Space Introduced During Redevelopment		Chongkou Warehouse			

Among the existing waterfront industrial spaces, the following sites display typical characteristics: ① **Taikoo Warehouse** still retains its original three T-shaped docks, and the waterfront space remains strongly hydrophilic (water-accessible). ② **Osaka Warehouse** and **Shing Chi Tong Warehouse**, influenced by urban road construction, lost their original docks, resulting in a clear spatial disconnection between the waterfront and the industrial heritage.

Notably, the Shing Chi Tong Warehouse has completely lost its waterfront space, with only the building structure remaining and surrounding activity spaces severely limited. ③ **Chongkou Warehouse**, during its renewal process, reorganized the waterfront space by introducing planar landscape space, thereby improving public accessibility.

Currently, no full-scale planar cargo yards have been preserved in the Pearl River Back Channel waterfront industrial heritage. Most waterfront spaces still maintain a linear form (Table 3-5). The spatial disconnection between the waterfront and the urban fabric results in relatively monotone spatial layering, with only a few parks having improved the accessibility and functional integration of their waterfront space through renewal and transformation.

2) Waterfront Spaces and Urban Transportation Networks

This research focuses on the waterfront area of the Pearl River Back Channel, stretching approximately 2.0 kilometers from the Zhoutouju Tunnel to the Hetong Bridge. The transportation network in this area consists of water transport, road traffic, rail transport, and pedestrian systems. Water transport facilities include a yacht pier and a water bus terminal (Baixianshe Pier). Although Baixianshe Pier provides public water transport services, its connection with the urban transportation network is weak. Some historical piers, such as those in the Julong Bay area, still have the potential to restore water transport functions.

Due to historical development, functional positioning, and urban development processes, the east and west banks of this area display different transportation network characteristics. The street network on the east bank, in Haizhu District, follows a largely grid-like layout, with block sizes controlled around 300m×200m, high road density, and good connectivity. The well-developed pedestrian system allows pedestrians to quickly reach the waterfront space through multiple side streets, making the connection between the waterfront space and the urban core smoother. In contrast, the waterfront street network on the west bank in Liwan District has larger block sizes, sparse roads, and many dead-end streets. It is difficult to directly access the waterfront area from major roads such as Fangcun Avenue East, and there is a lack of pedestrian systems, which limits the accessibility of the waterfront space. Furthermore, the western shoreline interface is fragmented overall, with no systematic planning between the old production waterfront sections and scattered piers, leading to a loose spatial structure that lacks organic connections (Figure 3-9).

In recent years, the construction of cross-river passages such as the Zhoutouju Tunnel and Hetong Bridge has enhanced transportation connections between the two banks of the Pearl River Back Channel. The opening of Metro Lines 2 and 8 has also improved the overall

accessibility of the area, but it has not directly served the waterfront industrial heritage area. In the future, further optimization of the transportation organization in the waterfront area is needed, enhancing the connection between land and water transport, and improving the pedestrian system to strengthen linkage with the waterfront space, reinforcing the urban waterfront characteristics and improving the overall connectivity and accessibility of the area.

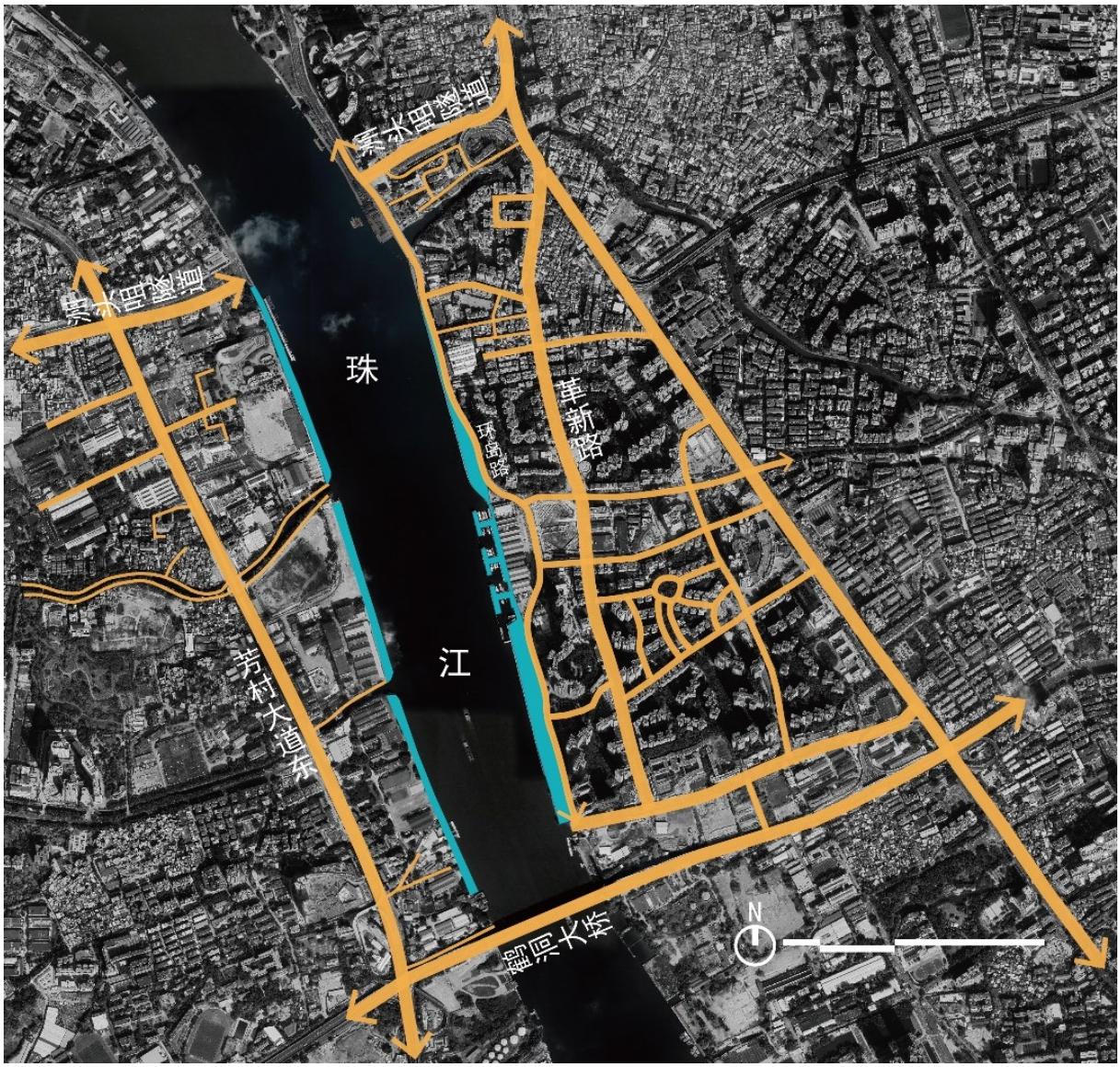


Figure 3-9 Spatial Organization and Transportation Networks

(Source: Drawn by Author based on Baidu Map)

Through spatial syntax analysis, it is evident that the spatial accessibility of a block directly affects the density of pedestrian flow and the actual utilization of the space, which in turn relates to the level of participation in various activities. Integration reflects its ability to support commercial and service functions, while choice measures its potential to attract traffic flow.

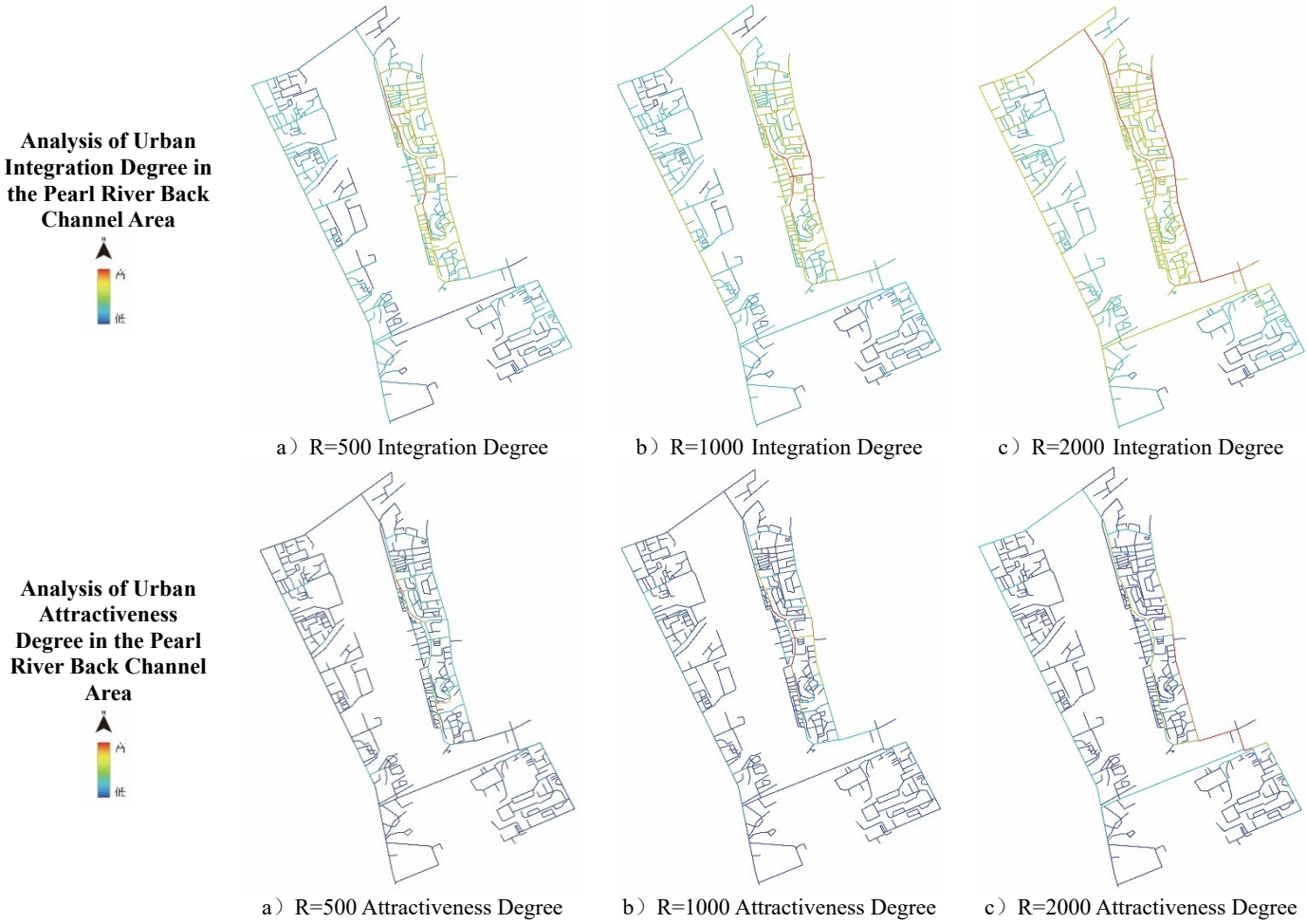


Figure 3-10 Pearl River Back Channel Waterfront Industrial Heritage Waterfront Neighborhood Selectivity and Integration Analysis Map

(Source: Drawn by Author)

In the eastern waterfront district, the integration and choice of urban secondary roads such as Huandao Road, Taikoo Warehouse Road, and Gexin Road are relatively high, providing the district with good accessibility and a relatively balanced potential for activity aggregation (Figure 3-10). However, the east-west accessibility within the district is weak. Despite the dense network of side streets, accessibility is still constrained by large residential areas. Additionally, the renewal of industrial heritage sites such as the Taikoo Warehouse and Osaka Warehouse has resulted in slightly higher integration and choice values compared to the district average, indicating a certain level of local attraction and external draw potential.

On the west bank, the spatial accessibility is significantly lacking. Only major peripheral city roads such as Fangcun Avenue East, Zhoutouju Tunnel, and Hetong Bridge show relatively high integration and choice values, while internal roads near the waterfront have poor integration, with sparse road networks. This leads to generally weak accessibility in the topological structure (Figure 3-10). This structural deficiency means that the closer one gets

to the center of the district, the lower the spatial participation becomes, and the probability of citizens passing through or staying decreases accordingly.

Figure 3-11 Ancient Banyan Tree Clusters Along the Dachongkou Stream
(Source: https://www.sohu.com/a/544246237_121123914)

3) Status of the Ecological Landscape

(1) Ecological Base Conditions

The Pearl River Back Channel is located in a subtropical monsoon climate zone, characterized by warm and humid weather with favorable conditions for vegetation growth. Some areas have preserved greening systems from the industrial heritage period, such as large tree shading systems, which enhance the foundation for landscape formation. Since the region was primarily used for warehousing and light industry, pollution was relatively light, allowing the ecological environment in certain areas to be preserved and fostering a favorable symbiotic state of natural vegetation. Along Dachongkou Stream near the Chongkou Warehouse, ancient banyan tree clusters have been preserved (Figure 3-11). During its renewal, the Huadi Warehouse retained native banyan trees and original factory greenery, integrating them into the landscape planning. This fusion of industrial heritage with the natural environment has laid a solid foundation for the subsequent development and shaping of the waterfront landscape.

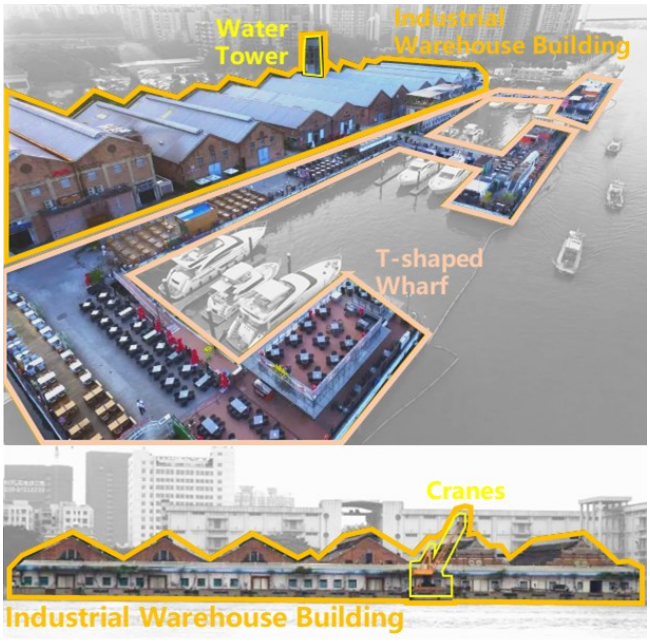


Figure 3-12 Visual Landscape Experience of the Pearl River Back Channel Waterfront Industrial Heritage
(Source: Drawn by Author)

(2) Landscape Accessibility and Visual Experience

The Pearl River Back Channel offers excellent landscape permeability, exhibiting a significant dual characteristic of both “viewing” and “being viewed.” As a horizontal axis in Guangzhou’s urban development, this area not only connects the old city, central city, and new

development zones, but also provides a solid foundation for diverse city image displays due to the concentrated distribution of waterfront industrial heritage and the wide vistas it offers.

In terms of landscape node formation, old industrial elements such as the Taikoo Warehouse T-shaped dock, industrial warehouses, and silos, with their unique structural aesthetics, have become important post-industrial landscape elements (Figure 3-12). These buildings are not only witnesses to history but also focal points of the city's visual identity. The European-style fusion in the West adds rich cultural connotations to the riverside landscape. Effective renewal design will significantly enhance the spatial rhythm of the waterfront interface.

With the integration of the area into the “Central City Corridor” theme walking route through Guangzhou's “Greenway Routes” construction and the continuous improvement of the Pearl River tourism route, the industrial heritage features of each waterfront section will be further strengthened. Through the careful shaping of post-industrial landscapes, these historical remains will form unique visual focal points, breaking the monotony of the riverside urban interface, and enhancing the overall quality of the waterfront space and the city's recognizability. In the future, landscape revitalization strategies combining industrial heritage and ecological elements will further enhance the landscape value of this area in urban development.

Figure 3-13 Cross-Section Types of Waterfront Spaces in the Pearl River Back Channel Industrial Heritage Area (Source: Drawn by the author based on Baidu Maps)

III. Relationship between Landscape and Urban Fabric

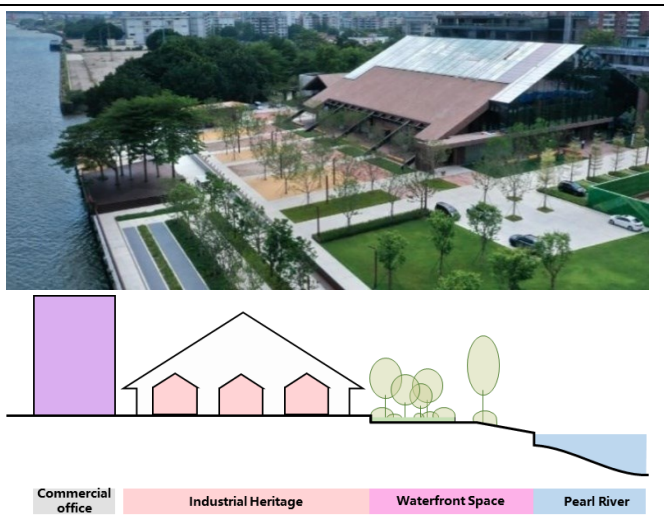
Although the area is partially equipped with green spaces, the overall layout of waterfront green spaces is fragmented, lacking systematic planning, which weakens the continuity and integrity of the landscape. At the same time, high-intensity commercial development has caused issues such as the disconnection of the landscape and the

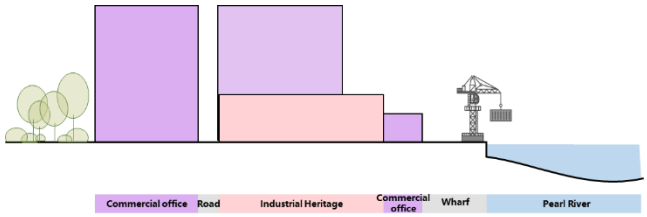
fragmentation of spatial structure in some heritage areas, further intensifying the sense of fragmentation in the waterfront environment.

The relationship between the landscape and urban fabric in this area can be divided into three typical categories (Figure 3-13, Table 3-6): ①The waterfront space is separated from the industrial heritage by urban roads. ② The waterfront space and industrial heritage have formed an organic post-industrial landscape through renewal design. ③ The waterfront space is still industrial land with no well-developed urban landscape.

Table 3-6 Current Use of Waterfront Spaces in the Pearl River Back Channel Industrial Heritage Area

(Source: Drawn by Author)

Survey Section	Current Characteristics	Current Photo / Waterfront Section Diagram
①	• **Spatial relationship between waterfront space and industrial heritage:** The waterfront space is separated from the industrial heritage by a vehicular road. • **Current activities:** Residents, tourists, and other users are currently unable to access the area. • **Strengths:** A slow-traffic system is planned for the waterfront space, though not yet in operation. • **Weaknesses:** The space has a single function and low utilization efficiency	
②	• **Spatial relationship between waterfront space and industrial heritage:** The waterfront space and industrial heritage are organically connected through a series of forecourt plazas, riverside greenways, river-viewing platforms, and waterfront terraces, forming a continuous post-industrial landscape. • **Strengths:** The slow-traffic system and landscape space are well integrated, with high-quality visual character and a strong sense of use. • **Current activities:** Leisure, recreation, and urban exhibitions.	

③	• **Spatial relationship between waterfront space and industrial heritage:** The waterfront space functions as a 24-meter-wide industrial wharf, containing only transport space and equipment such as cranes. • **Weaknesses:** Still in use for industrial functions, with no renewal carried out and no accessible public space for citizens. • **Current activities:** Wharf operations.	 

4) Space Morphology of Waterfront Industrial Heritage Buildings

The waterfront industrial heritage along the Pearl River Back Channel is an important witness to Guangzhou's modern industrial civilization and foreign trade development. These heritage buildings not only showcase the architectural techniques and aesthetic characteristics of different historical periods but also contain rich urban memory and cultural value. As a crucial resource for urban renewal, the study of their architectural space and style types has important guiding significance for contemporary industrial heritage building renewal practices.

This section, through field research and literature review, systematically analyzes the architectural characteristics of the Pearl River Back Channel waterfront industrial heritage from three dimensions: architectural style, spatial type, and spatial morphology, exploring their potential and value in shared renewal. These heritage buildings reflect Guangzhou's open nature as a modern commercial port and its unique adaptation to the Lingnan regional environment.

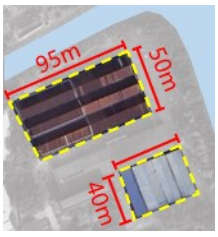
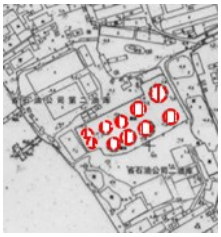
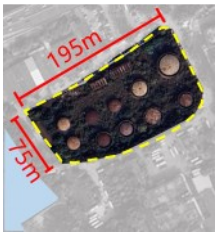
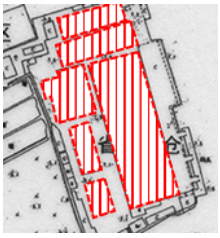
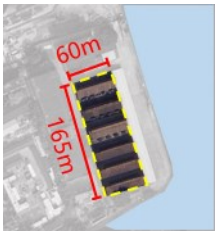
(1) Spatial Morphology

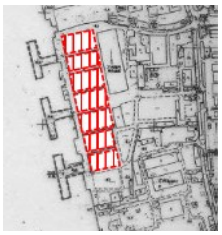
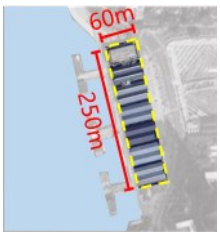
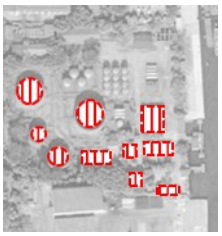
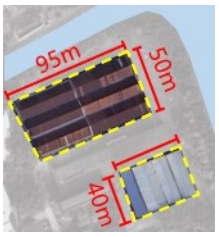
The spatial depth structure of the waterfront industrial heritage along the Pearl River Back Channel is influenced by multiple factors such as the industrial warehousing functional requirements, urban development process, and planning strategies. From the perspective of architectural form, the flow of the river, and the spatial relationship with urban streets, the existing building layouts can be categorized into four typical types: ① "Vertical waterfront" type: For example, the Texaco Oil Depot, Changgang Road Oil Depot, and Asiatic Longmark Warehouse. This type requires more attention to the permeability of the waterfront interface towards the hinterland due to the extended depth, especially in the context of shared renewal. ② "Array layout" type: Warehouses arranged parallel to the waterfront, forming uniform

corridors, with stronger spatial permeability, such as the Taikoo Warehouse. ③ "Courtyard cluster" type: Buildings surround courtyards of different scales, offering a more enriched spatial experience, such as the Taikoo New Leaf Kindergarten (former Shing Chi Tong Warehouse site) and Julongwan · Zhenyi Resort Hotel (former Asiatic Huadi Warehouse). ④ "Scattered layout" type: For example, the Watson's Warehouse and Nissin Warehouse, where the buildings are dispersed and present a scattered layout (Table 3-7).

Table 3-7 Spatial Layout Structures and Depth Scales of Waterfront Industrial Heritage Sites along the Pearl River Back Channel

(Source: Drawn by Author)

Building Spatial Layout Type	Name	Topographic map (1978)	Aerial Photo Status Map (2025)	Current Photo of the Waterfront Interface
"Perpendicular to waterfront" layout	Asiatic Petroleum Co. Longmark warehouse			
	Texaco Oil Depot			
	Guangzhou Julong Bay Exhibition Center (Chongkou Warehouse)			
	Changgang Road Oil Depot			
"Parallel array" layout	Jardine's Warehouse			

Building Spatial Layout Type	Name	Topographic map (1978)	Aerial Photo Status Map (2025)	Current Photo of the Waterfront Interface
	Taikoo Warehouse			
	Osaka Warehouse			
"Courtyard cluster" layout	Julong Bay Zhenyi Resort Hotel (Asiatic Petroleum Co. Huadi warehouse)			
	Mobil Warehouse			
"Scattered" layout	Nissin Warehouse			
	Taikoo Xinlei Kindergarten (Shing Chi Tong Warehouse）			
	Watson's Warehouse			

There is a clear correlation between spatial depth and spatial perception. Smaller-scale

parks, with their shallower depth, have higher urban visibility; whereas larger-scale parks, with deeper depths, have relatively lower urban accessibility to their waterfront spaces. This difference in spatial depth directly affects the degree of integration of waterfront spaces within the urban fabric and their performance in shared use.

These spatial forms exhibit three common characteristics in their design: Firstly, Function-driven spatial organization: The building plans are arranged in regular rectangular layouts with large spatial scales, which can meet the needs of storage efficiency and transportation convenience, with loading and unloading spaces closely linked to storage areas. Secondly, Active adaptation to the Lingnan climate: For instance, external corridors are provided locally, and appropriate storage environments are created through architectural construction and spatial design. Thirdly, Traffic-driven spatial layout: Most warehouses are located near water transport terminals, focusing on smooth water-land transport connections and internal logistics organization, while also reserving surrounding areas for temporary storage. The internal design features circular circulation routes to enhance transportation efficiency.

These characteristics collectively shape the unique spatial quality of the Pearl River Back Channel waterfront industrial heritage, providing an operable spatial foundation for the future shift from “material” to “human” use in its development.

(2) Spatial Types

Based on building function and spatial form, the spatial types of the Pearl River Back Channel waterfront industrial heritage buildings can be divided into four typical categories (Table 3-8):

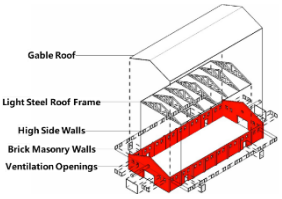
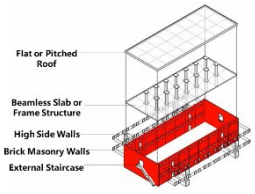
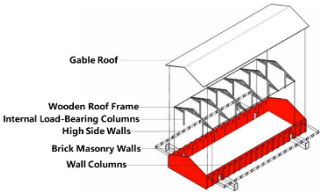
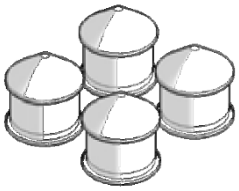
a. Single-Story Warehouses

As the earliest origin and the largest stock of warehouse space type, the single-story warehouse reflects the basic characteristics of early industrial building layouts. Its space is primarily characterized by single-story, deep rectangular plans with masonry walls and large-span roof truss structures to meet large-scale storage needs. For example, Taikoo Warehouse adopts a single-story double-span frame structure, with a single span reaching 15 meters. The steel beam frame and triangular light steel trusses create a spacious storage area, which also improves internal ventilation. Similar buildings include Nissin Warehouse, Asiatic Huadi Warehouse (with two barrel oil storage warehouses), Asiatic Longmark Warehouse, and Jardine's Warehouse. These buildings are widely used in the warehousing field due to their open internal spaces and adaptability.

With the development of construction technology and the increasing demand for warehousing mechanization, a special type of single-story warehouse—the high-rise single-story warehouse—gradually developed. Compared to single-story warehouses, high-rise single-story warehouses use arch-shaped or triangular full steel portal frames or reinforced concrete frames, achieving larger spatial spans and heights. This greatly increases storage capacity to meet modern warehousing demands and is better suited for equipment systems such as fumigation circulation systems, air conditioning, and cooling systems, as seen in buildings like Osaka Warehouse and Watson's Warehouse.

Table 3-8 Classification of Spatial Types of the Pearl River Back Channel Waterfront Industrial Heritage Buildings

(Source: Author's Compilation based on References[107])

Spatial Types / Specific Info.	Single-story Warehouse	Multi-story Warehouse	Soviet-style Warehouse	Special Function Warehouse
Typical Type Axonometric Diagram				
Current Photos of Industrial Heritage Interior Spaces	 Taikoo Warehouse, Nissin Warehouse, Asiatic Petroleum Co. Longmark warehouse, Asiatic Petroleum Co. Huadi warehouse	 Shing Chi Tong Warehouse	 Chongkou Warehouse	 Asiatic Petroleum Co. Huadi warehouse

b. Multi-Story Warehouses

Multi-story warehouses that emerged during the 1960s and 1970s represent the trend of vertical development in storage architecture. These buildings typically adopt reinforced concrete frame structures, featuring large volumes and spacious interiors. Some warehouses utilize flat slab systems without beams to increase storage capacity and optimize space utilization. Their design fully integrates functionality with structural logic, enhancing overall storage efficiency. Multi-story warehouses are equipped with comprehensive vertical transportation systems, including freight elevators, staircases, and chutes, enabling more efficient movement of goods and significantly improving land-use efficiency. In addition, the ground floors of these warehouses often include buffer loading and unloading zones to streamline the logistics flow and improve operational performance. The Shing Chi Tong Warehouse is a representative example of this model.

c. Soviet-Style Warehouse

The introduction of the Soviet Union in the early years of the founding of new China room warehouse type of storage buildings in China has far-reaching impact on the spatial form. It is characterized by the use of brick and wood structure, with double rows of columns, roof frame with a larger span of about 20 meters, external pilaster support and high side windows. Chongkou warehouse is a typical representative of this type of building, reflecting the technical characteristics of the building of a particular historical period.

d. Special Function Warehouse

Special Function Warehouses primarily include silos and oil depots, which are specialized storage facilities. These buildings are predominantly characterized by cylindrical structures, usually arranged in 2-3 rows to form a clustered layout, with multiple storage units creating a large-scale spatial community. Typical examples include the four large metal oil storage tank clusters at Asiatic Huadi Warehouse, the concrete silos at Changgang Road Oil Depot, and the silo tank groups at Texaco Oil Depot. Their unique cylindrical architectural form and compact layout create a distinctive industrial landscape feature, effectively reflecting the diachronic nature of the urban landscape.

(3) Types of waterfront building interface styles

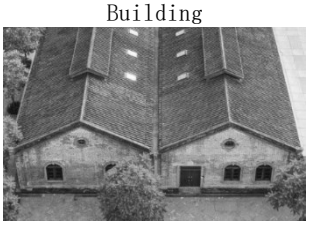
The architectural style of the Pearl River Back Channel industrial heritage is mainly influenced by the construction period, investment entities, and functional needs. It can be broadly divided into the following four types (Table 3-9):

a. Western Classical Style

Due to the rise of foreign trading companies in Guangzhou in the early 20th century, many of the waterfront warehouses along the Pearl River Back Channel were designed by foreign architects, showcasing distinct Western classical characteristics. A representative example is Jardine's Warehouse, designed by Australian architect Arthur W. Purnell and American civil engineer Charles Paget. The facade features Baroque-style elements, with red brick walls and black roof tiles, beautifully crafted gable walls, arched windows, and a clever combination of concrete window frames and horizontal cornices that enhance the depth of the facade. The office building of Asiatic Longmark Warehouse adopts a Western European classical style, with Italian stucco as the exterior finish, red brick walls, arched door and window openings, and ornate cornice decorations, reflecting the characteristics of Victorian industrial architecture and classical proportions. Asiatic Huadi Warehouse, built with brick and timber, features rhythmic continuous arched windows on the facade and triangular gable

ornaments at the top, showcasing the composition of Neoclassicism and the practicality of industrial architecture.

Table 3-9 Architectural Style Features of the Pearl River Back Channel Waterfront Industrial Heritage (Source: Drawn by Author)

Construction Period	Name	Architectural Style	Current Photo
Late Qing Dynasty	Shing Chi Tong Warehouse	Eclectic Style with a Blend of Chinese and Western Elements (Lingnan Traditional Dwelling Features)	
British-led Period (1900s-1930s)	Jardine's Warehouse	Baroque Style	
	Asiatic Longmark Warehouse	Western European Classical Style	
	Asiatic Huadi Warehouse	Neoclassical Style	 Office Building  Warehouse
	Taikoo Warehouse	Modernist Style	
	Watson's Warehouse	Modernist Style	

Construction Period	Name	Architectural Style	Current Photo
Japanese Expansion Period (1930s-1940s)	Osaka Warehouse	Japanese Castle Architecture Style, Japanese Modern Industrial Architecture Style	 Office Building  Warehouse
	Nissin Warehouse	Japanese Modern Industrial Architecture Style	
American Influence Period (Before 1940s)	Changgang Road Oil Depot		
	Texaco Oil Depot		
	Mobil Warehouse	Western Classical Style	
Early Years of the People's Republic of China (After 1949)	Chongkou Warehouse	Soviet-style Warehouse	

b. Modernist Style

Modernist thinking profoundly influenced the design of warehouse buildings in the Pearl River Back Channel from the 1930s to the 1970s. The buildings of this period emphasized functionality, and the façade was not overly decorated, but only through the division of the structure itself formed by the division of the walls between the windows, columns and corridors to achieve a harmonious division of proportions and a sense of scale, demonstrating

the concept of modern industrial architectural form following the function.

The buildings represented by Taikoo Warehouse and Osaka Warehouse fully embody the characteristics of this style, with simple and sharp architectural forms that emphasize functionality and practicality. The Taikoo Warehouse adopts a reinforced concrete frame structure, and the façade uses a large area of glass and horizontal ribbon windows. Osaka warehouse adopts Japanese modern industrial architectural style, its west side of the mountain wall style is concise, vertical compartmentalization, open arched window openings; the north side of the office building is characterized by the Japanese old castle architectural style, the façade is open with a number of arched and vertical windows, the material is Italian batch swings, the first floor is set up with a Doric colonnade, and the overall design is oriented by the functionality.

c. Eclectic Style Combining Chinese and Western Elements

Some buildings combine Western revivalist elements with local Lingnan architectural traditions, with Shing Chi Tong Warehouse serving as a representative example. This building skillfully integrates features of traditional Lingnan vernacular dwellings with Western construction techniques. Its façade adopts a distinctive “fire-basket” (huo'er) gable profile, incorporates solid wood door frames inlaid with colored glass, and features traditional Chinese couplet decorations on both sides of the main entrance. By combining preserved Chinese architectural details with modern warehouse functions, the building not only meets practical needs but also stands as a tangible testament to the cultural exchange between China and the West in modern Guangzhou. It reflects the creative adaptation and localization of foreign architectural styles within the Lingnan region.

d. Imitation of Soviet Style

At the early stage of the founding of New China, under the influence of the Soviet Union, a number of imitation Soviet-style warehouse buildings appeared in the area of the Pearl River Back Channel. The façade of these buildings is simple, regular, symmetrical and extremely practical, such as the Changgang Road Oil Depot and other buildings fully reflect the architectural characteristics of this period. These warehousing buildings not only met the urgent material storage needs at that time, but also reflected the social and economic conditions and construction technology level of a specific historical period, becoming an important stage in the history of China's industrial building development witness.

These spatial and stylistic features not only reflect the architectural technology and aesthetic orientation of different periods, but also show the openness of Guangzhou as a

modern trading port, providing rich spatial resources and cultural connotations for contemporary renewal and renovation.

5) Overall Value of Sharing Analysis of the Situation

Based on the survey data of the Pearl River Back Channel's two banks, the value of sharing of the overall situation of the Pearl River Back Channel waterfront industrial heritage has the following characteristics:

Spatial form has a significant impact on value of sharing. Industrial heritage with an array layout and courtyard cluster type have obvious advantages in value of sharing. These architectural complexes typically have a certain time span, exhibiting rich diachronicity, and can effectively demonstrate the accumulation of historical information through appropriate design methods. In contrast, individual buildings face greater challenges in renewal, as they are either subject to strict regulations on historical building protection or lose their industrial historical traces in the transformation, making the creation of value of sharing more difficult.

The construction of the Pearl River Greenway project has significantly enhanced the shared nature of waterfront industrial heritage. Take the Taikoo Warehouse on the east bank as an example, with the promotion of the construction of the "greenway routes", the quality of its waterfront space has been significantly improved. The previously broken links between the parks have been repaired, the closed waterfront space has been opened to the public, and the landscape view of the riverfront interface has been released, enabling the public to get close to the riverbank again. However, the progress of the "greenway routes" project on the west bank is relatively lagging behind, the waterfront walkway is not continuous, and the waterfront area in front of a number of waterfront industrial heritages is impassable due to the abandonment of the site or the construction is in progress, so it can only be bypassed to the city road.

Management models have a significant impact on spatial sharedness. According to the survey, public spaces account for approximately 11.1% of the total area within the waterfront district. However, more than half of these spaces are managed under a gated-access system, including sites such as Julong Bay Zhenyi Resort Hotel, Mobil Warehouse, and Jardine Warehouse. Due to their designation as high-end hotels or office parks, these industrial heritage sites—originally intended to be open to the city—have instead become "enclaves" that disconnect the waterfront walkway from the urban hinterland, thereby restricting the shared use of public space.

Sharedness is related to the time of renovation and renewal of industrial heritage; industrial heritage renewed in the last five years is better than that renewed in earlier years;

among industrial heritage renewed in recent years, community-oriented renewal is better than that based on cultural relics repair.

3.4.3 Difficulties and Opportunities for the Shared Renewal

1) Analysis of existing problems and influencing factors

(1) Insufficient value recognition

Although waterfront industrial heritage is closely related to urban development, there is a general lack of recognition of its cultural and spatial value. As these buildings were once mainly used as logistics and storage spaces, they are often regarded as “negative spaces” and are easily neglected or demolished in the process of urban renewal. In addition, most of the industrial warehouse buildings have a low-profile style and lack the iconic features of traditional historical buildings, resulting in low public recognition. Moreover, a large number of warehouses are left vacant and decaying for a long time after they are out of use, lacking community attention. This lack of value recognition not only leads to insufficient protection, but also reduces the social acceptance of renewal projects, resulting in the demolition of many buildings in pursuit of economic benefits.

(2) Complexity of property rights and difficulties in coordination

The land ownership of waterfront industrial heritage is complex, involving the government, state-owned enterprises, private enterprises and individuals, etc., and the unclear ownership and restricted nature of land use make it difficult to promote holistic transformation. For example, although some industrial warehouse buildings have been decommissioned, it is difficult to carry out unified planning because the property rights are still in the hands of state-owned enterprises or private enterprises. In addition, some warehouses have been leased for long periods of time or used as inefficient commercial space and lack development flexibility, further increasing the difficulty of coordinating renewal.

At the same time, economic feasibility challenges are prominent: the cost of renovating warehouse buildings is higher than that of building new ones and maintenance costs are expensive, and there are many uncertainties in the projects and unstable operation modes. It is common for creative parks to face the dilemma of “low rents to attract initial tenants, and then rising rents that make it difficult for original enterprises to continue”.

(3) Planning policy constraints

Although Guangzhou has introduced a series of policies to promote the rational

utilization of historical buildings in recent years, there are still problems such as restricted adjustment of land use functions, complicated approval processes and imperfect regulations. The transformation of some warehouse buildings is restricted by the existing land use and heritage protection laws and regulations, and the procedures for changing functions and adjusting land use are often cumbersome, making it impossible to transform them smoothly into cultural, commercial or public spaces. In addition, in the past, some projects completed their renewal and transformation with policy support, such as Taikoo Warehouse, but with policy adjustments, their subsequent functional changes are strictly limited, making it impossible to further optimize their mode of operation. This policy instability has also affected the confidence of developers and investors.

(4) Physical sharing bottlenecks

After the transfer of the original industrial functions, most of the heritage is still in a closed or semi-closed state, difficult to integrate into the urban public space system. In terms of accessibility, storage areas originally serving water transportation are often located in remote areas or isolated by infrastructure, with weak public transportation connections and poor accessibility, especially in Liwan District, where the waterfront space is fragmented by urban development and infrastructure, and part of the area is difficult to reach on foot, which affects the degree of sharing and public participation. In addition, in the design of waterfront embankments, most of the construction is one-sidedly pursuing “short, flat and fast”, oriented to the basic water conservancy function, and generally adopting a neat and tidy pattern and hard berms, with a single and dull form, and towering upright berms hindering the water-friendly function.

(5) The contradiction between excessive commercialization and spatial sharing

Some of the waterfront industrial heritage has been renewed, such as Taikoo Shrine Pier and Osaka Warehouse, but there is a clear trend of over-commercialization, which has resulted in limited sharing. For example, the main functions of Taikoo Warehouse are dominated by high-end commercial, catering and yacht clubs, with limited space for daily use by the public. The regeneration of waterfront industrial heritage needs to find a balance between commercial development and public sharing, so as to avoid the phenomenon of “commercial silos” and make it a real part of urban public life.

2) Renewal Opportunities from the Sharing Concept

(1) Policy innovation and support

In recent years, the Guangzhou municipal government has gradually strengthened its efforts to protect and renew industrial heritage. For example, the "*Guangzhou Measures for Promoting the Reasonable Use of Historical Buildings*" encourages the use of historical buildings for emerging industries such as cultural creativity, education, and technology incubation. It allows for adjustments in the use of building functions within a certain scope, addressing challenges such as difficult function conversion and complicated commercial licensing processes. The policy relaxes usage restrictions on historical buildings, provides funding and land incentives, and explores more flexible approval mechanisms, such as piloting adjustments to building areas and the addition of facilities during renovation. These policy adjustments have provided strong support for shared renewal.

(2) Location Advantage Enhancement

The Pearl River Back Channel waterfront is one of the core areas for urban renewal in Guangzhou. With the development of the city, the value of waterfront spaces has become increasingly prominent. In recent years, projects such as the Guangzhou "greenway routes" construction and the "Central Urban Axis" pathway plan have continually improved waterfront public spaces, enhancing the accessibility and overall attractiveness of the industrial heritage areas. This trend has provided an opportunity for shared renewal, enabling these areas to more effectively integrate into the public life of the city, becoming important nodes for waterfront leisure and cultural exchange.

(3) Potential from Urban Space Optimization

The renewal of waterfront industrial heritage can improve the quality of public spaces, enhance the city's waterfront interface, and achieve the goal of "returning the river to the people." Many of the warehouses along the Pearl River are located adjacent to the riverbank. Comprehensive redevelopment can not only release the regional economic value but also help shape a more beautiful urban landscape environment.

(4) Flexible Space Adaptation for Multiple Shared Models

Waterfront industrial heritage buildings are large in volume, open in space, flexible in structure, and adaptable to a variety of sharing modes, making them suitable for transformation into creative parks or public cultural facilities, and becoming a new vehicle for urban revitalization. Its tall and open interior space can be used for a variety of purposes such as exhibitions, art creation, conference exchanges, shared offices, etc., and has a high degree of adaptability. For example, the Tate Modern in London, which was converted from a power

plant, has successfully transformed an industrial heritage into an international cultural landmark. The industrial warehouse space in the Pearl River Back Channel also has the same potential, and can be combined with emerging modes such as shared office, cultural creativity and urban living room to realize the efficient use of resources.

(5) Shared Economy Model Drives Renewal

The development of the sharing economy has provided new operational models for the revitalization of waterfront industrial heritage. For example, models such as crowdfunded cultural spaces, shared offices and community activity spaces have emerged globally. These models can reduce the financial pressure on a single investor, improve space utilization, and enhance public participation and sense of belonging. For example, the Creative Factory model in Europe transforms industrial heritage into cultural and creative spaces shared by the public, and combines leasing, exhibitions, short-term activities and other diversified operational methods to realize sustainable development of the space.

The introduction of the creative economy injects new energy into shared use. Emerging industries such as cultural creativity and art design can organically combine with historical storage spaces, preserving the industrial cultural gene while giving the space new vitality.

(6) Architectural Style Diversity

The industrial heritage of the Pearl River Back Channel has a variety of architectural styles, ranging from the Chinese and Western architecture of the late Qing Dynasty to the modernized warehousing buildings of the Republic of China. These buildings are not only historical witnesses in material form, but also visual representations of the characteristics of Guangzhou's economic development at different stages of history. Through professional restoration and skillful integration into the modern cityscape, these industrial heritage buildings can attract the attention of the public from the visual aesthetic level and deepen their recognition of the value of industrial heritage from the perspective of the cityscape, thus enhancing the overall cultural confidence and sense of belonging to the city.

Rich practical cases confirm the aforementioned challenges and opportunities. For example, along the Suzhou River in Shanghai, old factory warehouses have been transformed into publicly accessible art spaces and museums (such as the M50 Creative Park and the Sihang Warehouse Memorial), significantly improving the openness and vitality of waterfront spaces. Along the Thames River in London, abandoned power plants and other industrial buildings have been updated into cultural landmarks such as Tate Modern, achieving the revival and regeneration of waterfront industrial heritage. In contrast, the existing Taikoo

Warehouse Dock in the Pearl River Back Channel focuses mainly on high-end commercial developments (yacht clubs, wine centers, etc.), with limited public shared spaces. Overall, the shared renewal of the Pearl River Back Channel's waterfront industrial heritage faces many challenges, but also possesses significant potential. With the combined effects of policy guidance, spatial design innovation, and industry integration, these heritage sites are expected to overcome these challenges, truly "return the river to the people," and breathe new social value and sustainable vitality into the city.

3.5 Chapter Summary

This chapter systematically reviews the formation, evolution, spatial characteristics, and current shared conditions of the Pearl River Back Channel waterfront industrial heritage, from macro to micro perspectives. Combining the renewal policies, protection mechanisms, and spatial types, it explores its unique value and challenges in the context of urban renewal. As an important inland port waterway in Guangzhou, the Pearl River Back Channel has gathered a large number of foreign-invested warehouses and docks since the late Qing Dynasty, becoming the core space for the city's transition from a "commercial waterfront" to a "production waterfront." Its historical development has gone through four stages: the foreign trade storage period, the planned economy period, the functional decline period, and the mixed-use period. The spatial form has evolved from a strip-shaped waterfront layout to a multifunctional composite renewal.

At present, there are 13 major industrial heritage sites in the area, most of which have the status of cultural relics or historic buildings above the municipal protection level, and the renewal method is based on the three categories of adaptive reuse of buildings, regeneration of industrial landscapes, and ecological and cultural integration of the waterfront. Typical cases such as Taikoo Warehouse, Osaka Warehouse and Chongkou Warehouse demonstrate the potential for reactivation of historic spaces, but also reveal common barriers such as over-commercialisation, spatial fragmentation and inadequate waterfront accessibility.

This chapter utilizes the five-dimensional framework of "Penetrability, Diversity, Time-sharing, Diachronic, and Daily Activity" to conduct a quantitative study of the waterfront industrial heritage in the Pearl River Back Channel area. The analysis reveals that the overall accessibility and shareability of the eastern bank of the Pearl River Back Channel are superior to those of the western bank, and its block structure better enhances public participation and activity density. The Pearl River Back Channel faces several challenges in its shared renewal, including weak value recognition, complex property rights, policy constraints, and physical

space bottlenecks. However, it also has significant opportunities, such as policy innovation, location advantages, spatial flexibility, and the shared economy model. Thus, this section concludes that the renewal of industrial heritage should emphasize the retention of historical information, integration with urban fabric, time-sharing and functional mixing, inclusivity of various groups, and embedding into daily life. Under the guidance of the shared space concept, this area is expected to transform from a “closed production waterfront” to an “open living waterfront, ” becoming an important carrier of public culture and ecological vitality in the city.

Chapter 4 Waterfront Industrial Heritage Renewal Design under the Concept of Sharing

Through the third chapter's research and evaluation of the shareability of the updated industrial heritage in the Pearl River Back Channel area, the study finds that the renewal of waterfront industrial heritage should involve three dimensions: firstly, the renovation and renewal of the industrial warehouse buildings themselves; secondly, the regeneration of the surrounding urban public spaces; and thirdly, the reconstruction of social spaces. Based on this understanding, this chapter will explore the concept of "sharing" from three directions: firstly, the goals of spatial renewal design. Secondly, the principles of design expression. Thirdly, the multi-layered, multi-dimensional renewal design strategies (including the five levels of zone, place, corridor, boundary, and node).

The study aims to guide the renewal practice of waterfront industrial heritage along the Pearl River Back Channel through this systematic renewal framework, promoting its transformation into a "shared" urban space that integrates historical value, cultural vitality, and diverse functions..

4.1 The Goals of Shared Space Renewal Design

Based on the research findings from Chapter 3, the goal of shared space renewal design for waterfront industrial heritage is to achieve a balance between historical preservation, enriching functional diversity, and enhancing public participation. This approach promotes the reproduction and comprehensive sharing of social culture and public goods, and aims to achieve collective commons for the multifaceted value of waterfront spaces. To achieve this, this section will clarify the specific goals of shared renewal across three levels: industrial warehouse buildings, urban public spaces, and social spaces.

4.1.1 Warehouse Building Dimension

1) Unearthing Historical Features of the Site, Continuing Industrial Cultural Memory

Continuing and highlighting the historical characteristics and industrial cultural memory of the site is key to avoiding the update of waterfront industrial heritage from falling into "one-size-fits-all" designs and spatial homogenization. As an important part of the cultural history of the Pearl River Back Channel, the industrial heritage in this area not only carries the historical imprint of Guangzhou's commercial and economic development but also features large spatial scales, solid structures, and strong adaptability, offering great flexibility for

updating and transformation. Therefore, the renewal process should deeply explore and showcase the industrial site characteristics of the Pearl River Back Channel, continuing the industrial cultural memory and creating a waterfront space rich in urban cultural heritage.

The distinctive characteristics of industrial heritage depend on holistic shaping. Its architectural style is made up of various elements such as materials, colors, layout, form, and skyline, reflecting the production and lifestyle patterns and regional cultural features of specific historical periods[106]. This holistic requirement calls for maintaining the overall style consistency of the park while keeping individual area characteristics. Therefore, heritage renewal should encourage innovation and context-specific designs while establishing a systematic style guideline to prevent fragmentation of the aesthetic due to phased updates, different businesses or tenants, and disconnection of industrial cultural memory. Specifically, the warehouse structures should be evaluated for their value, determining key preservation elements. Identifying distinctive characteristics such as external traffic spaces, vertical transportation elements (e.g., elevators, hoists, slideways), and heavy sliding doors is crucial. These elements convey the unique historical and functional significance of old warehouses, and in the renovation process, special care should be taken to retain these significant features.

2) Reshaping Building Layout to Enhance Adaptability

The internal spatial reshaping of industrial warehouse buildings is key to their renewal and determines whether the original space can meet new functional requirements. As the core component of waterfront industrial heritage, these buildings originally served as storage and logistics spaces, which were enclosed and singular in function, making it difficult to meet the modern urban complex demands. Therefore, the renovation process needs to restructure the space to enhance its openness and adaptability to multifunctional uses.

Industrial warehouse buildings typically have regular structures, large open spaces, and high ceilings, providing great flexibility for spatial renewal and reuse. During the renovation process, these features can be fully utilized to meet the demands of cultural creativity, exhibitions, office spaces, commercial areas, and community activities. Special attention should also be paid to showcasing the unique structural traits of the building to create a rich spatial experience.

The original spaces of industrial warehouses focused on the storage of “goods,” while the updated spaces should focus on the “human” needs[1]. Therefore, the renovation process needs to enhance traffic organization, spatial comfort, and energy efficiency to meet modern urban lifestyles and user needs. For example, by adding new transportation structures,

optimizing ventilation and lighting systems, and introducing sustainable building technologies, the building's modern adaptability can be enhanced. Through these strategies for spatial reshaping, the historical value of waterfront industrial heritage can be preserved while meeting the diverse needs of various industries, transforming a single storage space into a dynamic, multi-functional shared space that aligns with modern living styles.

4.1.2 Urban Public Space Dimension

1) Enhancing Space Openness, Strengthening Public Interaction

The update of waterfront industrial heritage involves not only the reuse of individual buildings but also the city scale, making it an essential part of the public space system. During the renewal process, the massive scale of industrial buildings can be mitigated, the closed boundaries of the park can be removed, and unused spaces can be repurposed. Strengthening the penetration of waterfront spaces into the urban fabric, optimizing the pedestrian system, incorporating the waterfront area into the city network, improving site openness, and enhancing citizen accessibility are all essential. These efforts help transform heritage spaces into parts of the public domain and introduce diverse interactive functions such as public relaxation areas, leisure plazas, cultural exhibition spaces, and community activity venues. This systematic multi-layered open strategy, moving from space to function, helps to turn originally closed industrial areas into vibrant urban public spaces and avoid them becoming isolated tourist attractions.

2) Integrating Modern Urban Landscapes, Shaping Unique Place Character

The entire warehouse area has created a unique layout of storage and logistics spaces and an industrial landscape, which carries Guangzhou's distinct regional cultural characteristics. Therefore, shaping the landscape environment of the site is an important step in the exterior space renewal of old industrial areas, directly affecting their environmental quality and renewal value. The renewal of waterfront industrial heritage should retain its industrial features while integrating modern landscape design, allowing the industrial heritage and urban public space to coexist and create a space with a unique character. As part of the city's existing land, the update of waterfront industrial heritage must align with the city's overall development plan, optimizing spatial layout, connecting surrounding urban functions, and avoiding the formation of isolated industrial heritage areas. While giving the public space new regional cultural landscape features, it is also important to rebuild the local connection of industrial heritage, turning it into part of the collective memory of the new generation,

strengthening residents' sense of place and belonging.

During the renewal process, it is essential to focus on the overall integrity and coordination of landscape design. While retaining industrial structures, equipment, and related historical elements, modern landscape elements such as greenery, ecological water systems, and interactive installations should be introduced to enhance environmental quality and strengthen the site’s character. At the same time, the site’s climate characteristics and the daily life habits of local residents must be taken into account. When optimizing public space details, residents' practical needs should be met to improve the space’s comfort and livability. The shaping of the site’s landscape environment is not only the continuation and expression of architectural style but also the transformation and bearing of the heritage building's functions. It is also the spatial link between the city and the architecture. Reasonable landscape design can give industrial heritage new vitality, making it a unique and iconic urban space.

4.1.3 Social Space Dimension

The core goal of updating waterfront industrial heritage is to promote the regeneration of regional economy and social vitality through functional mixture, turning it into a vibrant urban space integrating industries, culture, leisure, and residential functions. Functional mixing not only enhances space utilization efficiency but also promotes sustainable economic development and fosters community co-governance, creating a shared governance model. By creating a 24/7, multifunctional shared space, waterfront industrial heritage will be revitalized, continuously serving urban development and social needs.

The waterfront space of the Pearl River Back Channel is a valuable public asset in the city, not only carrying rare land value but also having the potential for public openness. Therefore, in the update of waterfront industrial heritage, it should be seen as a catalyst for the waterfront area, breaking physical barriers and eliminating spatial separation. The area will shift from a fragmented and closed water frontage to an open living waterfront line facing residents, communities, businesses, and the city. This spatial transformation not only optimizes the value of existing resources but also creates genuinely shared waterfront space accessible to all citizens, promoting the openness and inclusivity of urban space and giving waterfront industrial heritage new social significance.

4.2 The Principles of Shared Renewal Design

During the update of waterfront industrial heritage, shared design must adhere to five core principles: Diachronic, Penetrability, Time-sharing, Diversity, and Daily activity. These

principles not only provide the theoretical basis for shared updates but also serve as a key framework for guiding the renewal practices and spatial creation. This section will explore how to implement these principles in specific renewal practices, combining the actual situation of the heritage park and the needs of different stages of development. Through flexible creation strategies, the shared development of waterfront industrial heritage can be realized.

4.2.1 Principle of Diachronic

In the process of shared updating, the principle of Diachronic requires creating urban landscapes that reflect the accumulation of historical information across different periods, while showcasing the socio-economic and cultural characteristics of contemporary society. Space updates should not be a one-time intervention but should adopt phased transformation strategies, guiding space updates gradually according to the needs of urban development. As Christophe Girot states: “Any landscape design should consider an extended period during which only a few features may be clearly present, while most of the events are uncertain and cannot be quickly determined.[108]” At different stages, space should be adjusted based on the needs of different groups, ensuring that the heritage site maintains long-term vitality and adaptability[108].

As witnesses to urban development, industrial heritage buildings constantly evolve in terms of spatial form and function over time. Therefore, during the update process, it is necessary to respect the development context and avoid erasing the original industrial memories. For example, during renovation, some original architectural structures can be preserved, showcasing their historical evolution, and digital technologies can be used to recreate past production activities. This enhances the public's sense of cultural identity, allowing the industrial heritage to continue playing a role in the context of the new era.

4.2.2 Principle of Penetrability

The principle of Penetrability encompasses two key aspects: urban scale and architectural scale. At the urban scale, it focuses on enhancing the accessibility of space in the unique urban form of waterfront areas. By optimizing the pedestrian network, creating green corridors, and adding cross-river bridges, the connectivity between various parts of the city is improved, making the waterfront space part of the city's open system. At the architectural scale, it aims to enhance the spatial permeability of the waterfront building facades. This can be achieved through open corridors, terrace platforms, visual landscape designs, and other

strategies that promote interaction between the building spaces and the waterfront environment, enhancing the flow and accessibility of public spaces.

The ultimate goal of the Penetrability principle is to promote the spatial connection between the vertical waterfront and the waterfront neighborhood, improving the physical accessibility of the waterfront space. This allows the surrounding residents' living scenes to be introduced into the waterfront area, transforming the industrial heritage into a perceivable, usable, and shareable urban vitality space.

4.2.3 Principle of Time-sharing

The Time-sharing principle is especially important in the updating of waterfront industrial heritage. Due to the scarcity of waterfront resources, many heritage spaces suffer from low utilization efficiency due to their single-function orientation. For example, places with a focus on cultural or office functions are often only open during working hours and remain closed during the leisure hours when citizens are free, reducing the public nature of the waterfront space. To enhance space adaptability, the Time-sharing principle is primarily implemented through two strategies: ① Space Organization Strategy: Mix multiple functions in a limited space, achieving “space for time.” ② Space Usage Strategy: Increase functionality through complementary uses between day and night (e.g., exhibitions during the day, recreational activities at night) and seasonal conversions (e.g., outdoor markets in summer, indoor exhibitions in winter).

The Time-sharing principle is closely related to the principles of Penetrability, Diversity, and Daily Activity. It not only enhances space openness and usage efficiency but also acts as a catalyst for other shared strategies, promoting efficient operation of the site. This helps waterfront industrial heritage transition from its traditional industrial function to a space with greater sustainability and value of sharing, ultimately becoming an important part of urban public life.

4.2.4 Principle of Diversity

Currently, many industrial heritage sites, after renovation, are limited by a single dominant function, which leads to a narrow target audience, a lack of life, and idle spaces. In the updating of waterfront industrial heritage, the implementation of the Diversity principle can be expanded from three aspects: Firstly, Complex Functional Overlay: Space should accommodate a blend of functions, creating a shared place with interdisciplinary fusion. Secondly, Adapting to Diverse Demands: Providing flexible spaces for different groups such

as long-term residents, office workers, and tourists, including shared workspaces, social spaces, children's activity areas, etc., to meet diverse needs. Thirdly, Promoting Industry Integration: Encouraging the collaborative development of cultural creativity, technological innovation, sports and leisure industries, thereby increasing the economic and social value of industrial heritage, turning it into a vibrant urban hub rather than an isolated historical relic.

4.2.5 Principle of Daily Activity

The update of waterfront industrial heritage should not only consider commercial development but also focus on the daily needs of citizens. For example, essential public facilities such as cafes, small supermarkets, and family spaces can be introduced into the space design, making industrial heritage not only a tourist attraction but also a part of residents' daily life. Additionally, in the process of updating waterfront industrial heritage, it is essential to increase public facilities suitable for daily activities, such as pedestrian pathways, bicycle lanes, community markets, and small libraries, so that the waterfront space becomes a public place that carries historical memory while meeting modern living needs.

The core goal of the Daily Activity principle is to integrate into daily life and create a sense of community belonging. Space updates should enhance daily leisure functions through open green spaces, waterfront pathways, fitness facilities, etc., providing convenient public spaces for citizens. At the same time, community participation should be encouraged, allowing residents to determine how the space is used, thereby improving their sense of belonging. By fostering neighborhood interaction, a more friendly and shared urban space can be created, making industrial heritage an integral part of citizens' daily lives

4.3 Strategy for Shared Update Design: Zone, Place, Corridor, Boundary, and Node

Different scholars have systematically studied the spatial elements from the perspectives of architecture and urban design. At the architectural scale, Yoshinobu Ashihara emphasized that external spaces of buildings should "limit nature from nature," focusing on scale and texture to create "positive spaces"[109]. Eiki Shimizu proposed that external spaces consist of six elements: boundaries, places, entrances, corridors, landmarks, and surroundings[110]. At the urban design scale, Kevin Lynch's five elements—paths, edges, districts, nodes, and landmarks—are widely applied in the cognition and evaluation of urban spaces[111]. In small-scale research, Xiaowei Luo analyzed the preservation and renovation of Shanghai Xintiandi Plaza using elements such as the main lane (path), clear brick walls (edge), glass arcades

(node), South Lane and North Lane (district), and distinctive Shikumen (landmark), and argued that these elements can evoke the public's image of the city's culture[112].

Based on the analysis of shared-oriented renewal models in Italy, Singapore, and Shanghai in Chapter 2, as well as the study of the current status of the Pearl River Back Channel industrial heritage renewal, this section proposes that shared-oriented waterfront industrial heritage renewal should integrate spatial elements from different theoretical perspectives, creating a systematic spatial design strategy:

- View industrial heritage as an entire “zone,” not isolated individual units, and integrate it into the larger urban structure.
- Create “places” suitable for modern life, enhancing the livability and interactivity of the space.
- Use a “corridor” system to connect internal and external spaces, optimizing pedestrian and traffic flow.
- Use “boundary” to handle the relationship between old and new interfaces, achieving integration and transition.
- Set “nodes” to strengthen spatial characteristics, enhancing the sense of place and landmark value.

This integrated spatial design strategy focuses not only on the value of industrial heritage as a production site but also on the organic connection of various spatial elements, from individual units to the environment, from interior to interface, and from external to overall social space. At the same time, combined with the operational model, a systematic spatial layout is constructed to achieve the symbiosis of industrial heritage with modern society and promote organic urban renewal.

4.3.1 Zone: Overall Form and Functional Design of the Waterfront Area

Zone is a networked space formed by the interweaving of nodes, corridor, and places, applicable to the neighborhood or section of the waterfront industrial heritage, or the waterfront industrial zone integrated with the broader urban interior. The formation of a zone relies on the combination of industrial heritage, urban vacant spaces, and paths, thus constructing an open urban public network that facilitates the connection of waterfront industrial heritage with the city interior. Additionally, a region can be understood as a network layout consisting of nodes, where nodes and intersecting corridor together shape the overall form of the zone, and the three elements interact and influence each other.

From a spatial structure perspective, the formation of a zone depends on the interaction

between nodes and corridor, and the overall spatial recognizability is strengthened through the shared qualities of spatial elements. However, not all waterfront industrial heritage has the conditions to form a regional image, and its key lies in the connectivity of paths to the city interior and the construction of core nodes. Along the Pearl River Back Channel, small industrial neighborhoods and residential areas are interspersed, such as the Julong Bay area and Taikoo Warehouse, and this spatial characteristic provides a foundation for shaping a unique regional image. Therefore, it is important to make full use of the spatial characteristics of waterfront industrial heritage, enhancing its integrity and recognizability, and constructing a waterfront industrial heritage landscape with local characteristics.

Thus, renewal model of the zone can be built as: 1) coordinated, composite, complementary, and spatially flexible functions; 2) morphological integration, visual penetration.

4.3.2 Places: Site Flexibility and Spatial Integration Design

Place is distinct from space as it is a node where spatial and social interactions intertwine. In the context of waterfront industrial heritage renewal, place is relevant to old factories and warehouses, waterfront promenades and public open spaces, historic docks and port sites, as well as transportation nodes and connective spaces. Industrial heritage imparts unique landmark landscapes to a site, such as steps, low walls, and iconic structures that create a sense of place, making the space more suitable for public activities. Industrial elements such as factories, warehouses, chimneys, and oil tanks reinforce the place's identity, making it a distinctive shared landscape. Under the shared space concept, a place is first and foremost a physical space that requires clear boundaries, functional designation, and appropriate environmental elements and facilities. In the process of updating waterfront industrial heritage, a place needs to transition from a closed production space to an open public space, linking history with the present, production with life, and ultimately becoming an essential part of the urban shared system.

Therefore, the update model for place can be formulated as: ① Integrating the surrounding place fabric, emphasizing the landmark quality of the place; ② Introducing flexible spaces, elastic design, and reserving development space; ③ Embedding shared facilities to meet the demands of public activities.

4.3.3 Corridors: Diversified Design of Quayside and Surrounding Roads

A corridor is a linear space that provides spatial orientation, often linked to concepts like

goals and destinations[110]. In the context of waterfront industrial heritage, corridors can be divided into two types: waterfront paths parallel to the water's edge and streets leading from the waterfront into the urban interior. These corridors can either be streets formed by industrial buildings along the waterfront or paths connecting industrial heritage via promenades, creating a spatial link between the city and waterfront areas. Under the shared space concept, corridors are not only linear spaces connecting nodes, facilitating fast or slow movement, but also serve as public places for walking and social interaction, emphasizing spatial organization and experience. Therefore, shared corridors should possess the following characteristics: a) Continuity: Suitable for walking, enhancing accessibility and spatial permeability; b) Integration with the urban network: Building a diverse pedestrian system to enhance connectivity and variability; c) Narrativity: Incorporating narrative design through boundary permeability and spatial diversity, improving the readability and experiential quality of the place.

Compared to nodes, corridor design places greater emphasis on the organization of linear spaces and narrative elements. In the shared renewal of waterfront industrial heritage, optimizing corridor design is crucial to linking the functionality of spaces and activating urban vitality, allowing it to preserve historical memory while meeting the shared needs of modern cities. Thus, the update model for corridors can be structured as:① Serving as a linear spatial organization;② Serving as a multifunctional public space.

4.3.4 Boundaries: High-Interaction Design of Building and Plot Boundaries

In *The Image of the City*, Kevin Lynch defines boundaries as linear elements such as land boundaries, walls, and coastlines, which not only divide space but also facilitate spatial penetration[111]. Jan Gehl further emphasizes that building facades serve as boundary elements, demarcating indoor and outdoor spaces while visually linking the two[105]. In shared design, boundaries are no longer mere physical separations; they serve as transitional zones between private and public spaces. Therefore, shared boundaries should exhibit the following characteristics: Transparency and Interactivity: Enhancing visual permeability and potential for interaction between indoor and outdoor spaces; Appropriate Scale: Providing a comfortable outdoor experience to encourage people to pause and engage with the space.

Under the shared space concept, "boundaries" and "corridors" not only connect spaces but also help shape "places," with the creation of such places further strengthening public accessibility. Shared spaces converted from old industrial buildings can express the renewal of heritage through the shared spatial and communicative aspects of boundaries, allowing

industrial heritage to retain its original spatial features while integrating into contemporary urban life. In the renewal of waterfront industrial heritage, the reimagining of spatial interfaces is crucial. It requires the opening and softening of boundaries to merge with the surrounding urban space and the establishment of functional shared boundaries.

Thus, the update model for boundaries can be structured as:① Functional Sharing: Connecting urban areas with the waterfront heritage district;② Openness: Enhancing spatial permeability;③ Interactive Design for Flexible Interfaces.

4.3.5 Nodes: Interior Space Update and Diverse Utilization

A node is the most fundamental element in spatial relationships and can be related to landscapes, buildings, structures, or locations associated with industrial civilization. Nodes do not exist in isolation but are capable of connecting paths, forming places, or contributing to regional networks. Based on the scope of their influence, nodes can be classified into three categories: Nodes that radiate to the surrounding area, typically located outside adjacent industrial heritage sites with limited influence; Nodes within corridors or places, situated along transportation or pedestrian networks, serving as connectors; Nodes within regional networks, distributed across a larger urban system, having a more substantial impact on the surrounding space.

As urban sharing develops, the functions of nodes are evolving. Traditionally, nodes served as landmarks and guides, but these functions have partially been replaced by mobile navigation and virtual information flows. Modern nodes now emphasize their role in urban narratives, serving as narrative anchors and becoming places with distinctive identities through virtual and physical interactions. All elements of industrial heritage can be considered nodes, and their shared characteristics can be enhanced through the update design. In this case, linear and network nodes can strengthen their characteristics by integrating different spatial forms and exerting a radiating effect in the broader urban network. This connection of nodes ultimately creates continuous passage spaces, enriching the city's spatial layers.

Therefore, the update model for nodes can be structured as:① Transforming the interior of industrial warehouse buildings into shared functional nodes;② Introducing creative activities and cultural exhibition spaces;③ Designing linear connectivity for nodes.

4.4 Julong Bay Waterfront Industrial Heritage Area Renewal Design Practice

4.4.1 Project background

1) Julong Bay Area Overview and Development Positioning

The Julong Bay area exemplifies a typical transformation in urban space, shifting from the traditional “First Space” (residential) and “Second Space” (workplace) to a “shared space” that integrates experience, communication, creativity, and cultural fusion. As an important waterfront area at the junction of Guangzhou's city center and the Pearl River Back Channel, Julong Bay is undergoing a reconstruction process from a single industrial space to a composite social space.

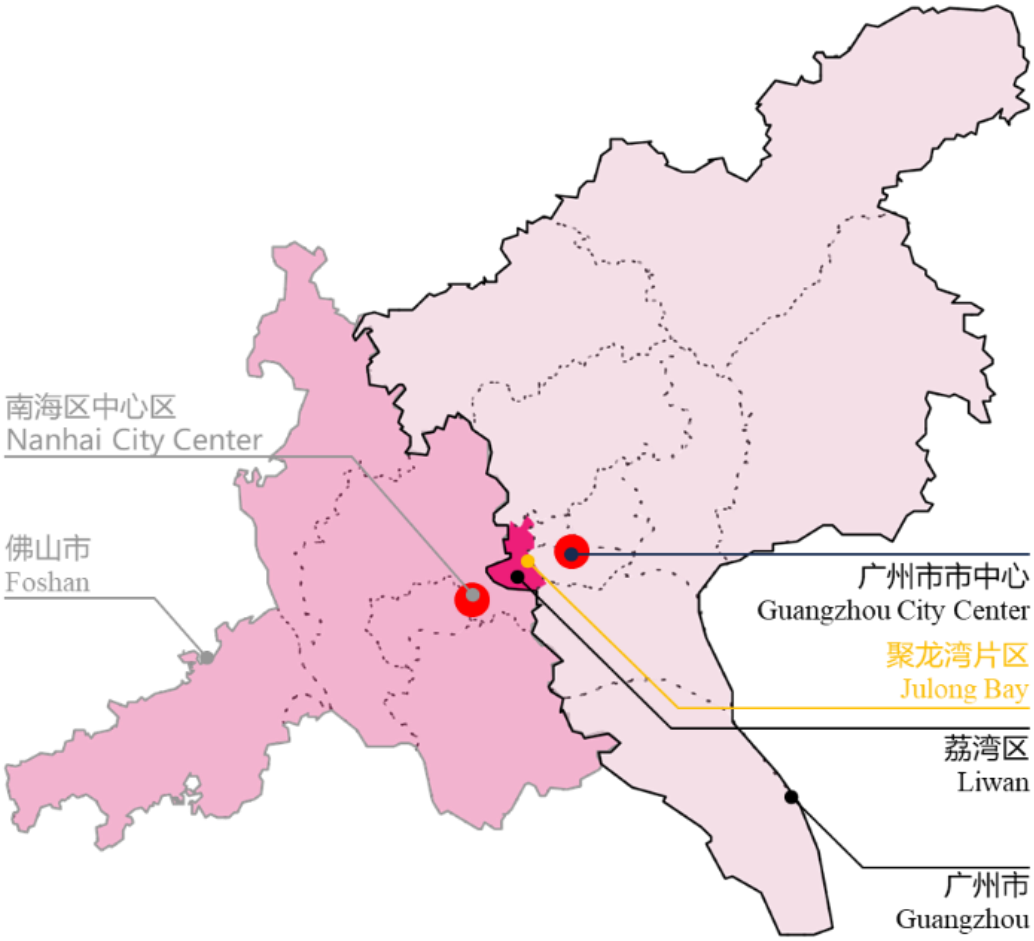


Figure 4-1 Diagram of the Geographical Center of Guangzhou–Foshan

(Source: Drawn by Author)

Located on both sides of Fangcun East Avenue in Liwan District, the Julong Bay area is bordered by the Pearl River Back Channel to the east, Huazai Road to the north, Huanhua Road to the south, and Sha Chong to the west. It is situated in the urban core of Guangzhou, at the convergence of the "One Belt and Three Axes" and the geographical center of the Guangzhou-Foshan metropolitan area (Figure 4-1). The area benefits from excellent transportation connectivity, with quick access to important ports, airports, and transportation

hubs within the Guangzhou-Foshan urban circle via the expressway system. Furthermore, as the intersection of the Baietan Central Vitality Zone and the Guangzhou-Foshan High-tech Zone, Julong Bay inherently holds the potential for multi-element integration and composite development, making it a typical “edge-center” fusion location.

Julong Bay derives its name from the traditional Xiguan settlement “Julong Village,” which was established by the Kuang clan during the late Qing Dynasty (between 1879 and 1889). To this day, 19 buildings in the distinctive Xiguan architectural style remain, serving as important carriers of Guangzhou’s regional cultural identity. In the early 20th century, leveraging the advantageous location of Bai'etan—with its riverine access to the sea and proximity to foreign concessions—numerous Chinese and foreign enterprises established factories in the area. Julong Bay gradually evolved into a hub of industry and port-based warehouse clusters, represented by sites such as Hip Tung Wo Engineering Works, Asiatic Petroleum Co. Huadi warehouse, and Jardine Warehouse, becoming a key logistics and storage center in Guangzhou. Between the War of Resistance and the founding of the People’s Republic (1937–1949), Hip Tung Wo experienced decline and restructuring, while many foreign-owned wharves and warehouses were converted into state-run grain storage facilities, marking a shift from market-driven to state-led spatial functions. After the reform and opening-up, with the relocation of port functions and the adjustment of the urban spatial structure, the industrial activity in the Julong Bay area gradually declined. Land use efficiency decreased, and large industrial zones fell into disuse and idleness. Under the “Suppress the Second Industry and Develop the Third Industry” policy, the Hip Tung Wo Engineering Works was transformed into a museum, commercial, or cultural leisure space, while some docks were filled and converted into riverside green spaces (Figure 4-2). These spaces, which are neither purely industrial nor traditional residential areas, are becoming an urban space with openness, fluidity, and multi-functional features, providing a solid historical and spatial foundation for the cultivation of its diverse public life.

Figure 4-2 Evolution of the Pearl River Back Channel Space

(Source: Compiled by the author based on the Julongwan Dachongkou Historical and Cultural Exhibition and Google historical satellite imagery)

At present, Julong Bay faces challenges such as industrial decline, inefficient land use, and fragmented spatial patterns, urgently requiring systematic urban renewal. The area has been incorporated into Guangzhou's "Integrated Redevelopment of Three Types of Old Areas" (Lian Pian San Jiu) initiative and designated as a demonstration zone for full-cycle urban renewal management, with a focus on spatial restructuring and functional transformation. According to higher-level planning documents such as *Outline Development Plan for the Guangdong–Hong Kong–Macao Greater Bay Area* and *Bai'etan District Development Plan (2020–2035)*, Julong Bay is positioned as a "Waterfront Innovation and Vitality Zone." Its development goal is to become an integrated urban district combining cultural creativity, technological innovation, headquarter economy, and eco-friendly residential environments (Figure 4-3). In 2022, the Julong Bay Headquarters Economy and Sci-Tech Innovation Zone was selected as one of Guangzhou's 12 Riverside High-End Industrial Parks, with a focus on the development of emerging industries such as the industrial internet and modern services.

Figure 4-3 Diagram of the Industrial Clusters in the Bai'etan Area and the Leading Industries in the Julong Bay Subzone

(Source: Bai'etan District Development Plan (2020–2035))

The development of the Julong Bay area focuses on three core pathways: First, cultural integration and social reconstruction: leveraging century-old warehouse heritage and the "greenway routes" system, creating cultural and creative incubators, public performance spaces, and waterfront open platforms, thereby activating social interaction and enhancing urban cultural identity. Second, technological innovation and industrial integration: introducing high value-added industries such as artificial intelligence, industrial internet, and

new media to establish an open production network where technology and creativity coexist. Third, headquarters economy and service networks: capitalizing on the Pearl River waterfront resources to foster an innovative ecosystem of service-oriented manufacturing, developing the area as an urban functional node oriented towards the Greater Bay Area. Thus, emphasizing the reassignment of spatial and social functions, transforming the area into a diverse, composite community integrating elements such as art, technology, finance, headquarters economy, and leisure culture, enabling seamless transitions between the scenarios of "work, life, leisure, and communication."

The renewal and development of Julong Bay is not only an important demonstration of the transformation and upgrading of Guangzhou's traditional industrial areas, but will also become a practical sample of urban renewal and high-quality development in the Guangdong-Hong Kong-Macao Greater Bay Area, and will help Guangzhou play a stronger radiation-driven role in the Guangzhou-Foshan metropolitan area.

Currently, the Julong Bay urban regeneration unit covers a total area of 156 hectares, with the initial sub-unit occupying 33.27 hectares (Figure 4-4). Due to adjustments in economic structures, most factories within this area have ceased production or are operating at reduced capacity. At present, a new waterfront leisure industry has been initiated within the core start-up zone as a catalyst for revitalizing the district. By integrating the spacious and lofty Soviet-style factory buildings dating from the 1960s located along Bai'etan, dozens of century-old banyan trees, waterfront wooden boardwalks, and the expansive Bai'etan waterscape, Julong Bay has become an urban highlight of Guangzhou.

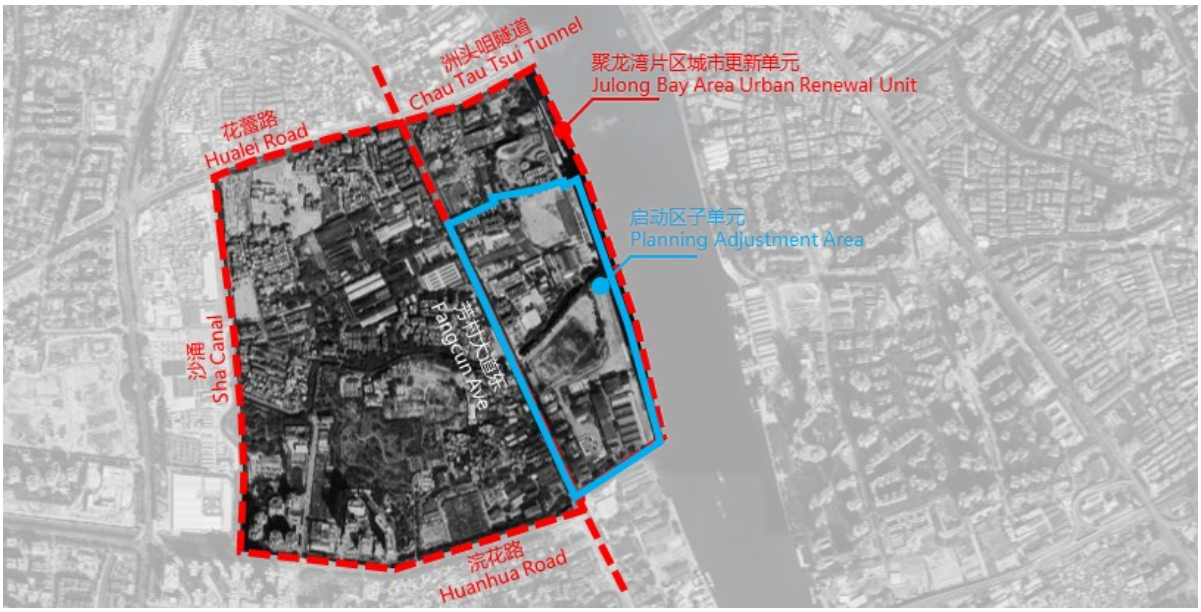


Figure 4-4 Diagram of the Scope of Julong Bay Urban Regeneration Unit and Initial Sub-unit

(Source: Drawn by Author)

2) Urban Spatial Form and Texture

The current situation of Julong Bay Area is dominated by residential and industrial land, and the spatial form is characterized by crisscrossing, mixed functions and broken texture due to historical evolution. A large number of waterfront factories and wharf storage facilities such as Guangzhou Diesel Engine Factory, Shipping Bureau Warehouse, Grain Bureau Warehouse, Pearl River Electrochemical Factory, etc. have been in an inefficient or idle, but most of them are included in the urban renewal plan. Among them, two commercial sites in the start-up area have entered the development stage; Chongkou Warehouse, as a renewed project, has obtained SITES platinum certification, becoming a typical sample of post-industrial landscape regeneration.

(1) Urban Texture and Site Layout

The area exhibits significant north–south disparity and spatial fragmentation in its structural composition. In the northern section, traditional dwellings represented by Julong Village and large-scale urban villages are densely distributed. These areas feature high building density, small spatial scale, and a lack of public spaces, with an absence of organic street fabric. Meanwhile, several gated industrial parks are interspersed throughout the area, further exacerbating the fragmentation of land use. The southern section is dominated by modern mid- to high-rise residential buildings and supporting factory structures. Although the layout is relatively orderly, there is a high proportion of inefficient land use, and the site as a whole presents a dispersed and low-efficiency spatial pattern.

To the west, along the Fangcun Avenue East urban arterial road, urban village buildings are densely clustered. Julong Village follows a “comb-shaped” layout, aligned along the stream, with the surrounding area extending into the industrial heritage zone of the former Diesel Engine Factory. Scattered high-rise residences and commercial facilities are found on the periphery, but the layout is loosely organized and lacks systematic planning (Figure 4-5).

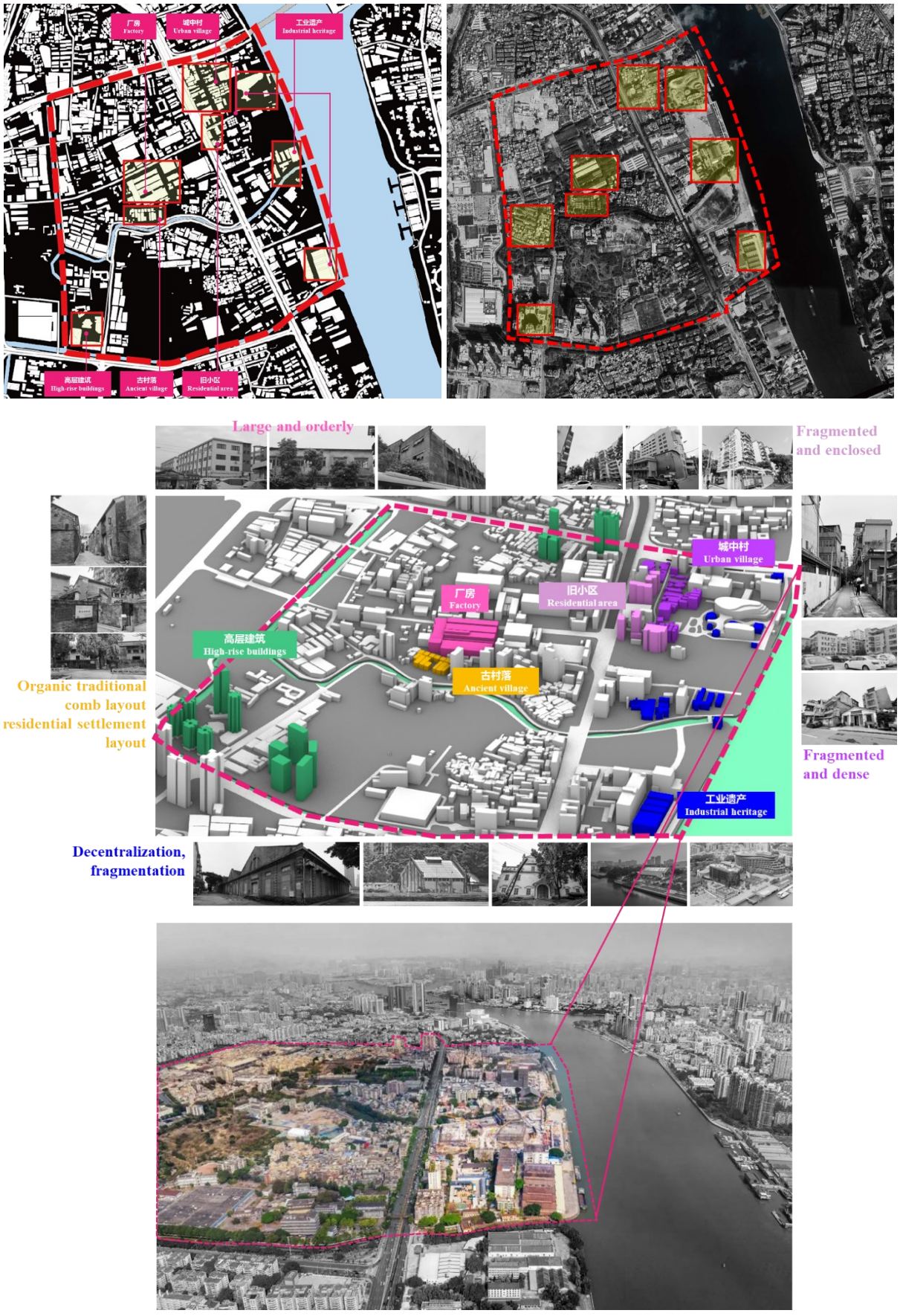


Figure 4-5 Spatial patterns and research photos

(Source: Drawn by Author)

(2) Typical urban interface patterns

The urban interface in the Julong Bay area can be categorized into five typical types as shown in Figure 4-6:

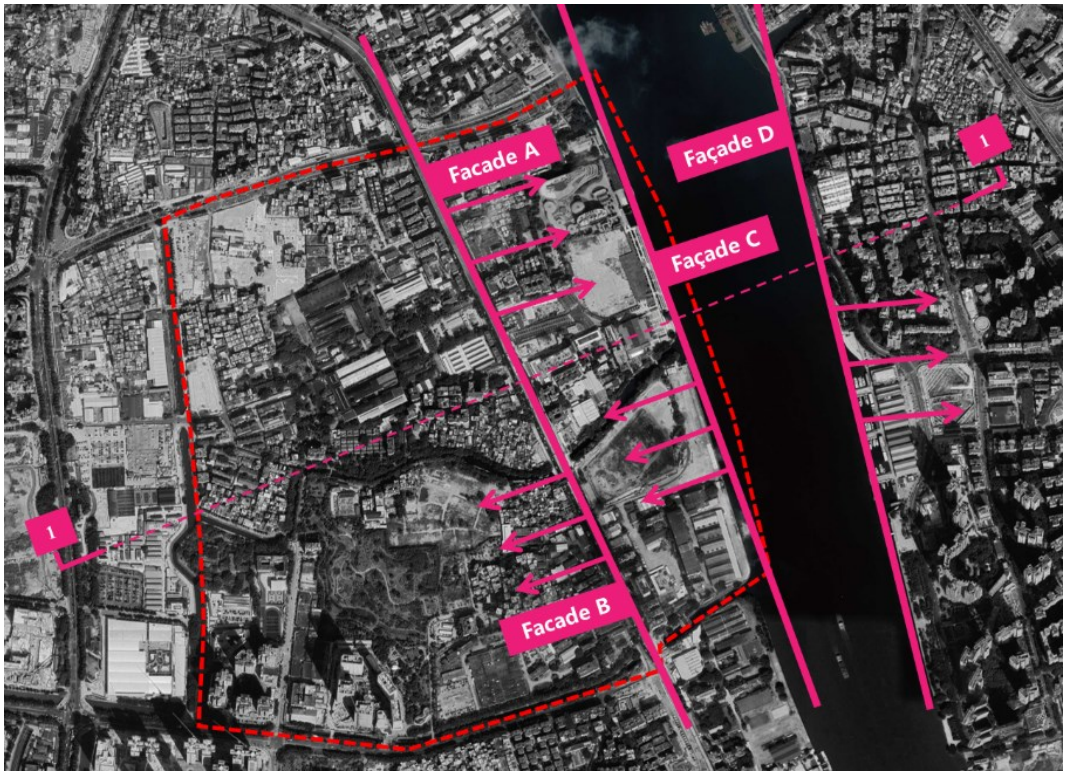


Figure 4-6 Spatial Extents of 5 Typical Urban Interfaces in the Julong Bay Area

(Source: Drawn by Author)

a. Urban Interface (Urban Facade A&B) on both sides of Fangcun Avenue East

The current situation is dominated by 2-5-story industrial, commercial, residential and urban village buildings, with a single function of land, low degree of vertical development, and the overall façade style is messy. With the renewal construction of the start-up area in 2023, the future façade A will present an urban silhouette of "high at both ends and low in the middle", forming a visual corridor that echoes the heights of Julong Village and the diesel engine factory (Table 4-1).

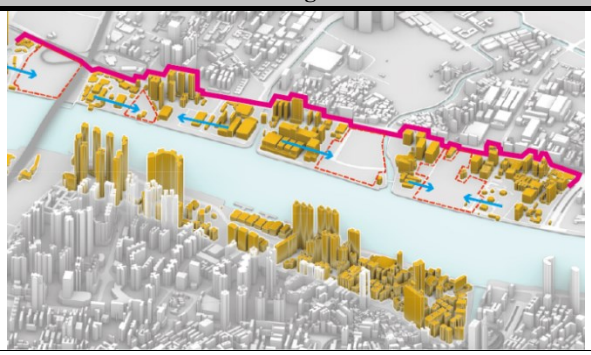
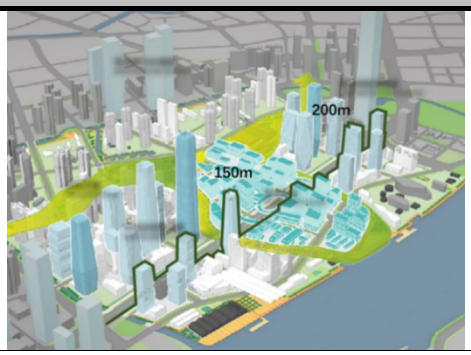
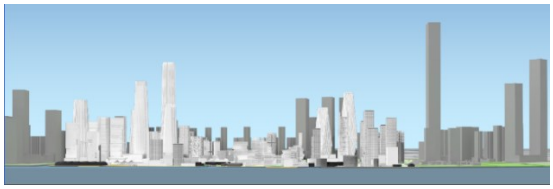
b. Waterfront Interface on the West Bank of the Pearl River (Urban Facade C)

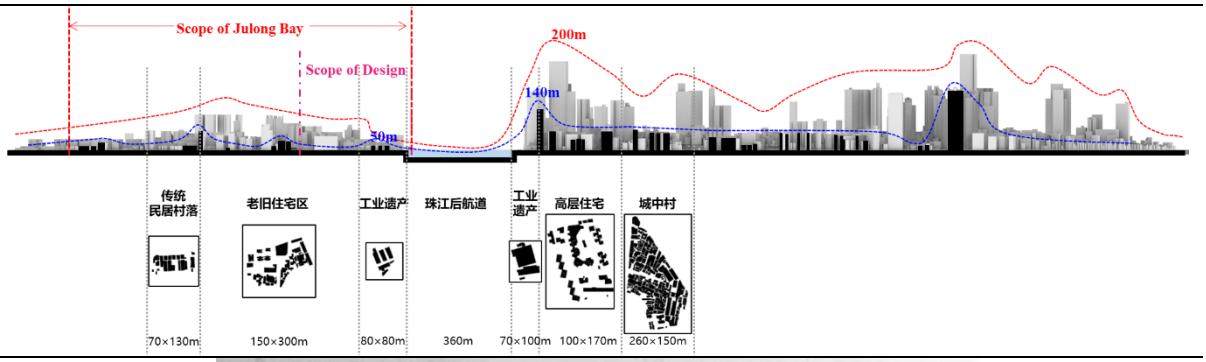
The current condition features a continuous vertical revetment, resulting in poor accessibility to the water and low ecological value. Most of the buildings along the riverfront are 1- to 4-story industrial structures, such as warehouses, many of which are obscured by riverside trees. As a result, the riverfront landscape is dominated by vegetation, with only taller residential buildings in the background visible, creating a monotonous and dim urban skyline. While architectural styles vary, the overall appearance lacks cohesion, leading to low

urban legibility. Numerous wharves and two tributary creeks are still preserved along the river, but the wharf guardrails and waterfront structures appear dull in color, and the streams are dilapidated, requiring restoration. The Chongkou Warehouse renewal project has reactivated the site's public function through the introduction of modern architecture and landscape redesign, making it a typical case of waterfront interface enhancement (Table 4-1).

Table 4-1 Summary of Typical Urban Interface and Section Patterns in Julong Bay

(Source: Drawn by Author)

Scope	Existing Interface	Planned Interface
Urban Facade A		
		
Urban Facade B		
		
Urban Facade C		

Scope	Existing Interface	Planned Interface
Urban Facade D		
		
		
城市剖面 1-1		
		

c. Pearl River East Waterfront Interface (Urban Facade D)

Except for Taikoo Warehouse, there are mostly high-density residential developments, making it difficult to show the industrial heritage. Taikoo Warehouse and Volunteer Park form a waterfront public space with good hydrophilicity, but there is still room for improvement in the landscape design, and some of the industrial symbols are not expressed (Table 4-1).

(3) Urban Section and Spatial Density Characteristics

According to the analysis of the urban cross-section (Section 1-1), there is a clear contrast between the two banks of the Pearl River, with lower density on the western bank and higher density on the eastern bank. On the western bank, buildings along the tributaries are mostly urban village structures, typically no taller than 25 meters, with a building coverage ratio of approximately 45% and a relatively low floor area ratio (FAR) of around 2. On the eastern bank, the riverfront is occupied mainly by residential communities and scattered industrial heritage sites, where high-rise buildings reach up to 140 meters in height, the building coverage ratio is about 64%, and the FAR is significantly higher, at approximately 7. Within the urban village areas in the interior, the building coverage ratio reaches as high as 81%, while the FAR remains low (around 1.8). These areas exhibit a strong sense of spatial compression and poor permeability (Table 4-1).

3) Transportation Network Characteristics

Julong Bay area is located in the hub of Guangzhou-Foshan junction, with strong internal and external transportation connectivity to Guangzhou city, and has a good foundation for development. However, there are still obvious shortcomings in the internal road system and waterfront accessibility of the area, which need to be optimized through the system to promote spatial integration and functional activation.

(1) External Transportation Network: A Regional Hub with Multi-Level Connectivity

The two major expressways surrounding the site—the Inner Ring Road and the Guangzhou Ring Expressway—form an efficient circular traffic system that connects Julong Bay with the city center and surrounding regions. Fangcun Avenue, as the primary east–west arterial road, runs through the site and intersects with two provincial highways, Hualei Road and Hedong Road, creating a multi-node, multi-dimensional transportation interchange system (Figure 4-7). The overall road network features a clear hierarchy and coherent structure, providing a solid foundation for future industrial integration, population clustering, and logistics coordination in the area.

(2) Internal Transportation System: Fragmented Structure and Disconnection from the Waterfront

In stark contrast to the efficient connectivity of the surrounding road network, the internal circulation system of the Julong Bay area is relatively fragmented, as shown in Figure 4-8. It primarily consists of neighborhood roads less than 6 meters wide, with unclear road

hierarchies and a lack of structural arterial routes. Accessibility across water bodies is poor—waterfront corridors are interrupted by gated industrial parks or factory compounds, resulting in a disconnection between the urban hinterland and the Pearl River waterfront. The waterfront walkway system is discontinuous, with weak supporting facilities and a lack of a comfortable pedestrian environment, making it difficult to meet the public's needs for convenient access and daily recreational use.

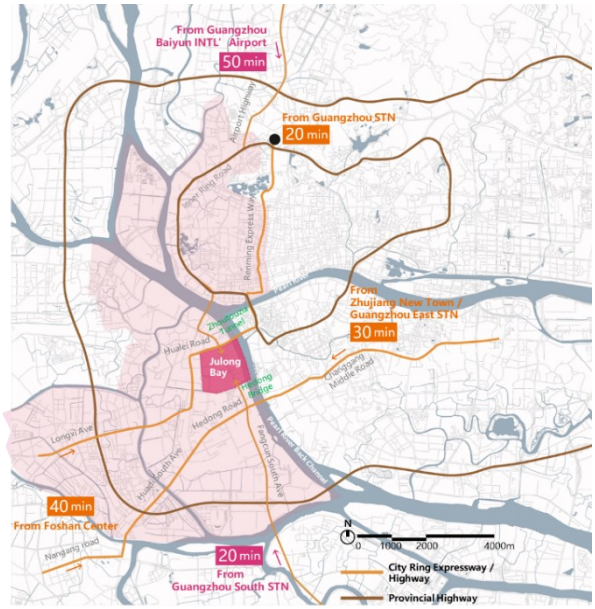


Figure 4-7 External Transportation Network of Julong Bay Area
(Source: Drawn by Author)

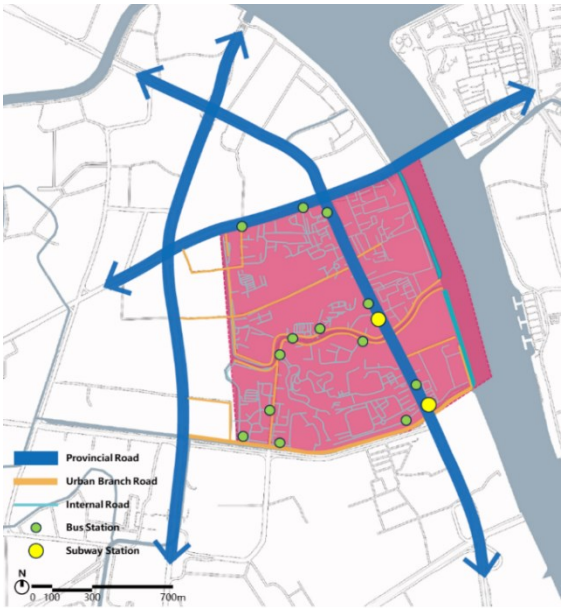


Figure 4-8 Internal Transportation Network of Julong Bay Area
(Source: Drawn by Author)

(3) Water Transportation Resources: Multifunctional but Unevenly Utilized

The Julong Bay site borders the Pearl River Back Channel and encompasses 8 wharf sites and 10 berthing facilities within its immediate surroundings (Figure 4-9).

The area includes several types of wharf facilities: a) Passenger wharves currently in operation: Baixianke Wharf (on the eastern bank of the Pearl River) and Baihedong Wharf (on the western bank), both located north of Hedong Bridge, serve partial public transportation functions. b) Wharves undergoing functional transformation: Three T-shaped reinforced concrete wharves at Taikoo Warehouse have been repurposed for landscape, sightseeing, and yacht docking, reflecting a multifunctional use approach. c) Industrial wharves still in operation: the wharf located on the east side of Jardine Warehouse (83m × 12.5m, reinforced concrete structure) continues to serve freight transportation purposes. d) Wharves in idle or closed condition: Yongxing Street Wharf and Guangzhong Wharf have ceased operations due to decreased passenger flow. Although Texaco Oil Depot and Changgang Road Oil Depot

wharves are planned for cultural and tourism functions, they currently remain in a derelict state. Currently, the only waterbus route in this area is Route S9, which runs between Baixianke Wharf and Baihedong Wharf. Despite the high potential of water-based transportation resources in the area, functional integration and adaptive reuse still require systematic planning and enhancement.

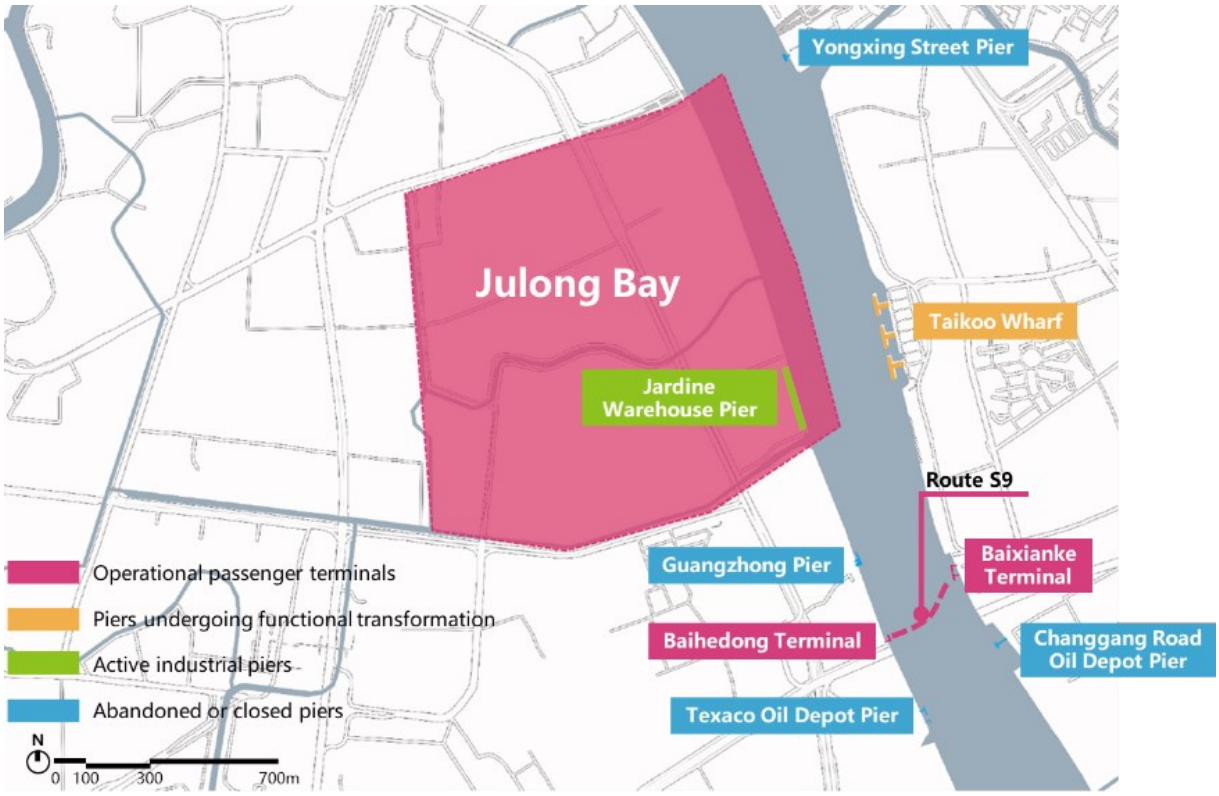


Figure 4-9 Wharf Distribution along the Pearl River Back Channel

(Source: Drawn by Author)

Guangzhou is actively promoting the optimization of a multi-modal transportation system, including the following aspects: In terms of rail transit, improvements are being made to the layout of Metro Line 2 and the Guangzhou–Foshan Line, with the addition of the circular Metro Line 11 to strengthen connectivity with the urban cores of Guangzhou and Foshan. For the slow-traffic system, efforts are underway to develop riverside walkways and green corridors, aiming to enhance accessibility to the waterfront and improve the pedestrian experience. In terms of integrated transport connectivity, the city is advancing the integration of surface public transport, non-motorized traffic, and water-based transit, in order to build a multi-level, citywide-accessible green mobility network. These initiatives will help address the historical issue in the Bai'etan area where transportation served merely as a pass-through function, rather than supporting local accessibility.

Julong Bay area has a good external transportation foundation, and is optimizing the

internal road network and public transportation layout, reconstructing the mobility and accessibility of the urban-waterfront space, providing a strong guarantee for the introduction of future composite functions.

4) Typological Distribution of Land Use Functions

As shown in Figure 4-10, Julong Bay Area presents a mixed industrial and residential land use characteristic, a pattern originated from the occupation and spread of low-cost suburban land during the early industrial expansion at the edge of the city. Although the current number of residences is comparable to that of the surrounding areas, there are obvious shortcomings in the layout of public service facilities and new industries, and the overall industrial structure needs to be optimized.

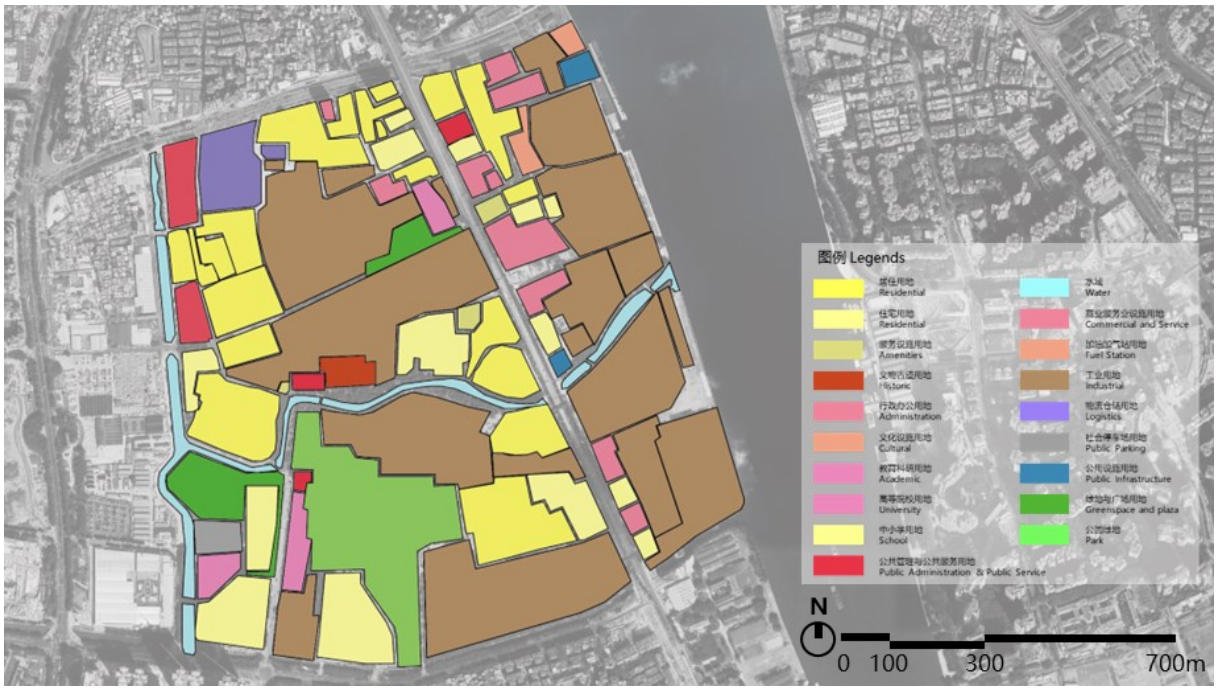


Figure 4-10 Current Land Use Distribution in the Julong Bay Area

(Source: Drawn by Author)

In recent years, two former industrial plots along the riverfront in the Julong Bay area—north of Chongkou Warehouse and west of Nissin Warehouse—have been undergoing redevelopment led by Swire Properties. The original land uses are gradually being transformed into a mix of commercial and business functions (B1/B2), cultural facilities (A2), and residential uses (R2) (Figure 4-11). This transformation trend signifies a shift in Julong Bay from a traditionally mixed and fragmented land-use structure toward a more clearly defined and functionally coordinated urban district.

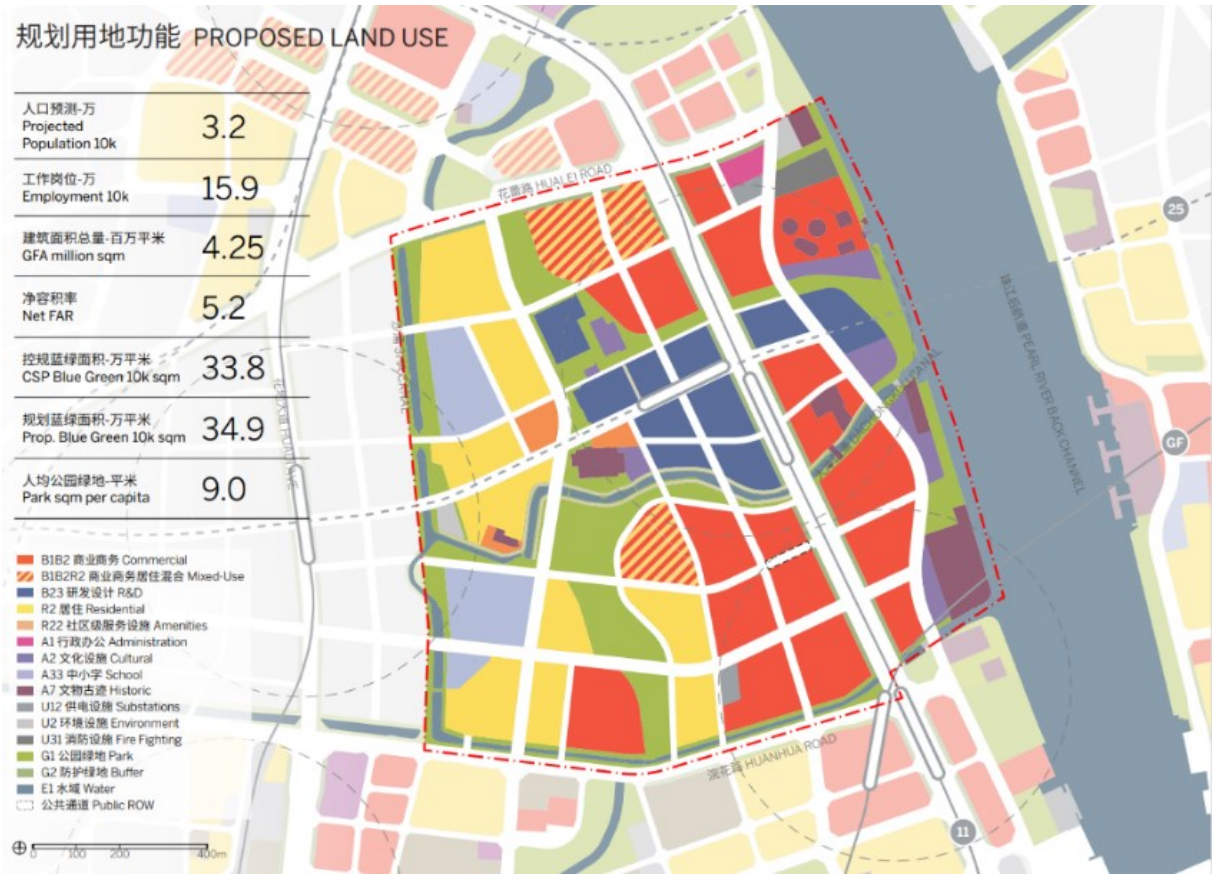


Figure 4-11 Planned Land Use Distribution of Julong Bay

(Source: SOM, Guangzhou Bai'etan Julong Bay Urban Design)

The evolution of land use functions in Julong Bay has been accompanied by a restructuring of land ownership and development mechanisms. Originally, most of the plots in the area were state-owned industrial lands, with usage rights scattered among various former factory complexes. During the renewal process, the government implemented a land acquisition and consolidation strategy, introducing a Public–Private Partnership (PPP) model. Under this mechanism, the state-owned Guangzhou Pearl River Development Group obtained land use rights and divided the land into residential and commercial parcels based on functional needs. Some commercial plots were then transferred to Swire Properties, a foreign-invested enterprise, for development and operation. The public facilities built in subsequent phases are to be handed over to the government for long-term management. This “public-led, market-participated” hybrid development approach has gradually improved land-use efficiency in the area, while also providing an institutional foundation for the optimization of functions and the spatial restructuring of the district.

5) Characterization of the Landscape Environment

The landscape environment of Julong Bay area has certain ecological and humanistic

potentials, but the current overall spatial system is still fragmented and fragmented (Figure 4-12), which is difficult to carry the communication, sharing and composite functions required for urban public life.

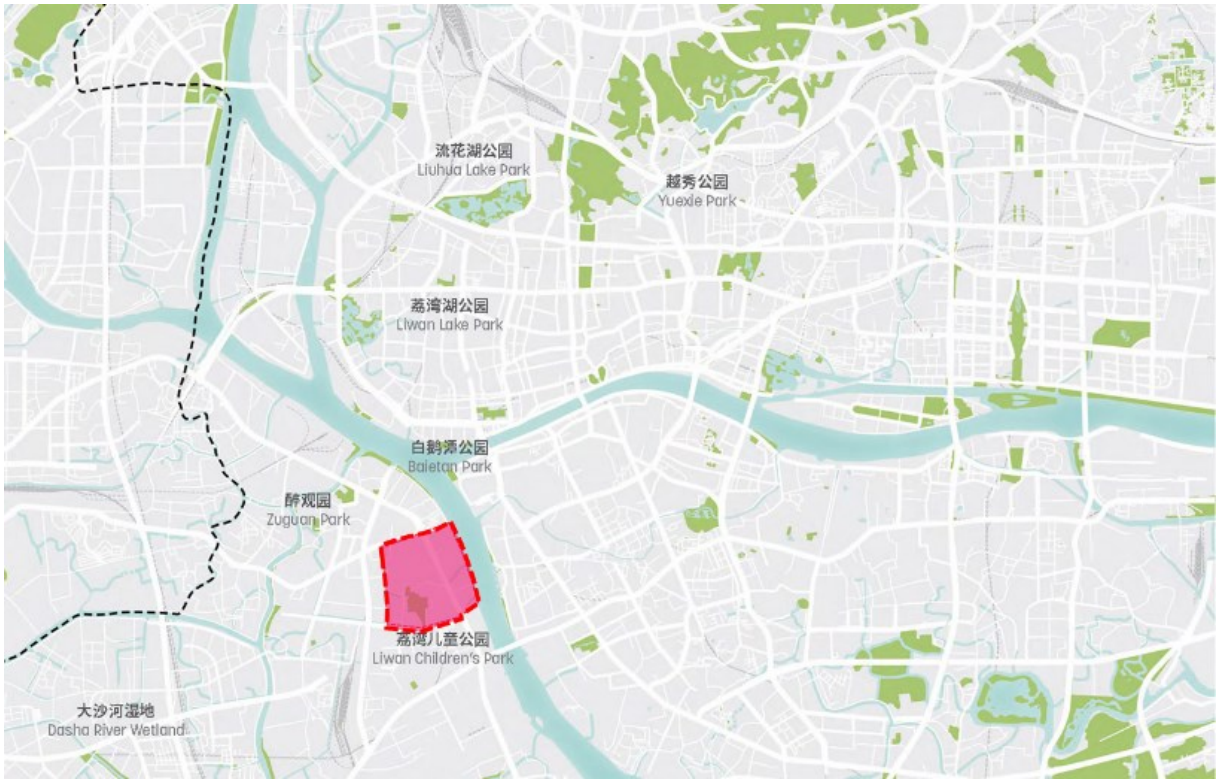


Figure 4-12 Overall Spatial and Landscape Features of the Julong Bay Area and Its Surroundings (Source: SOM, Guangzhou Bai'etan Julong Bay Urban Design)

In terms of spatial structure, the green space system within the area is notably marginalized, lacking overall cohesion and connectivity. Existing blue-green spaces include the Dachongkou Creek (10-25 meters wide, 1.27 km long), the Zhaocun Creek (12-27 meters wide, 1.17 km long), the 9-hectare Liwan Children's Park, and the eastern waterfront along the Pearl River Back Channel. Among them, although Liwan Children's Park is the largest green space in the area, it has not formed an effective ecological corridor with the riverfront landscape and the green corridors along the tributary streams. As a result, the green space system has failed to achieve integration at ecological, social, and spatial levels (Figure 4-13).

From the perspective of shared space, the publicness and accessibility of green areas and waterfront spaces in the area are relatively weak. The district lacks comprehensive public parks, with green spaces mainly consisting of scattered pocket parks or small plazas, which fail to form a continuous and open shared space network. Although the waterfront area possesses rich ecological resources, such as clusters of banyan trees and natural streams, it lacks effective pedestrian corridor connections, as well as vibrant nodes and accessible design features, resulting in very limited interaction between residents and the waterfront. This

condition of “visible but inaccessible” landscape resources restricts their potential to become a truly shared urban landscape.

Figure 4-13 Landscape Structure of Julong Bay Area

(Source: Drawn by Author)

In addition, the area lacks the construction of places centered on social interaction. At present, only the Chongkou Warehouse renewal zone has established a relatively organic landscape system. By activating industrial heritage and integrating cultural exhibition, pedestrian walkways, and waterfront landscapes, it preliminarily demonstrates a spatial prototype that blends “shared use + memory + public life”. In contrast, the rest of the area lacks a cohesive architecture–landscape system capable of supporting everyday social interactions, recreational experiences, and community connectivity.

Although Julong Bay possesses unique natural waterways and historical greenery resources, its landscape environment has not yet transitioned from being subsidiary green spaces attached to residential and commercial functions to becoming a truly shared platform. Future renewal efforts should focus on creating continuous green corridors, nodal public spaces, and an accessible spatial system, in order to enhance the shared, social, and everyday qualities of the landscape environment—transforming it into an organic space that connects city and residents, nature and culture.

6) Architectural Features

Julong Bay Area presents a spatial pattern of architectural space with complex functions and diversified styles, covering a wide range of types such as traditional residential buildings, industrial factories, warehouse facilities, urban village buildings, medium- and high-rise residential buildings, educational institutions, commercial offices and religious buildings (Figure 4-14). This spatial mixture is the result of historical development, and also provides the basic conditions for reconstructing an open, shared and multi-functional urban space in the district.

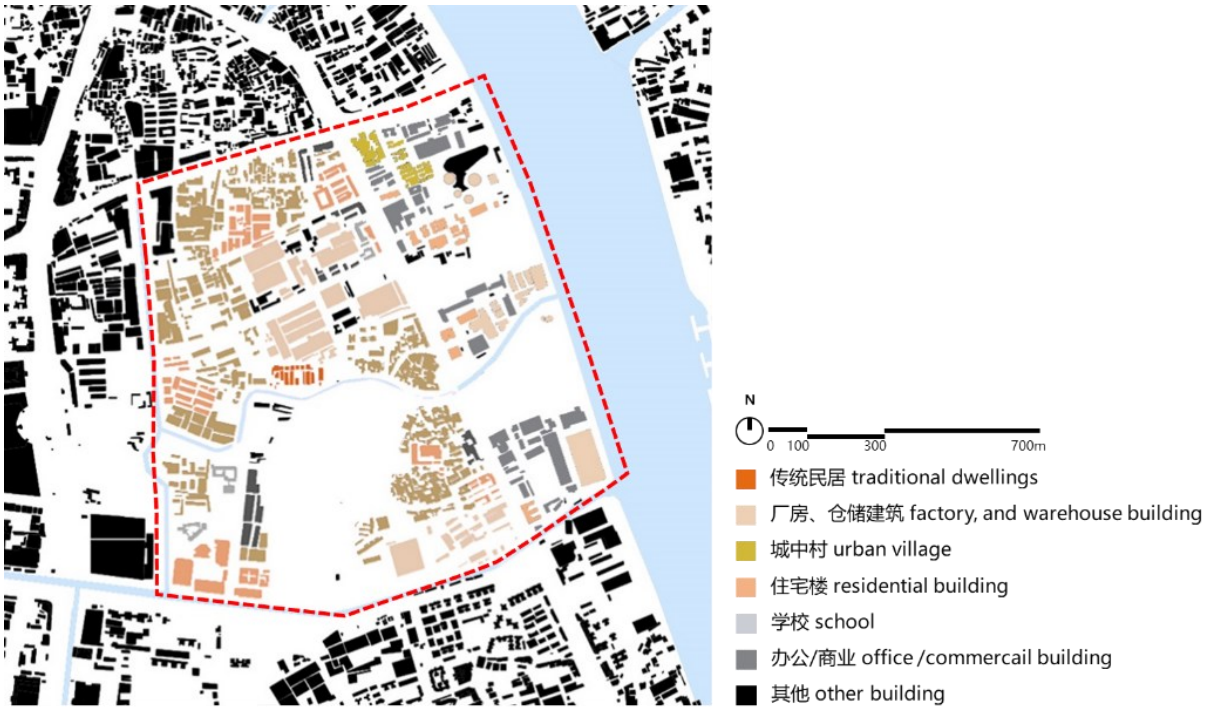


Figure 4-14 Functional Layout of Buildings in the Julong Bay Area

(Source: Drawn by Author)

The buildings in the area have renewal potential and spatial regeneration characteristics. A large number of industrial warehouse buildings in the area have well-preserved overall structures, high spatial scales and stable roof structures, which provide a good material basis for adaptive renewal and regeneration. By embedding modern structures and materials into the original framework, they can not only expand their functional possibilities, but also realize the transformation from “closed production space” to “open and shared space”. However, due to decentralized building ownership and independent management, most industrial buildings are still in a closed state, and the waterfront interface is difficult to be opened to the outside world, and the public space is lagging behind and lacks sharing vitality.

The existing states of key representative buildings are illustrated in Figure 4-15.

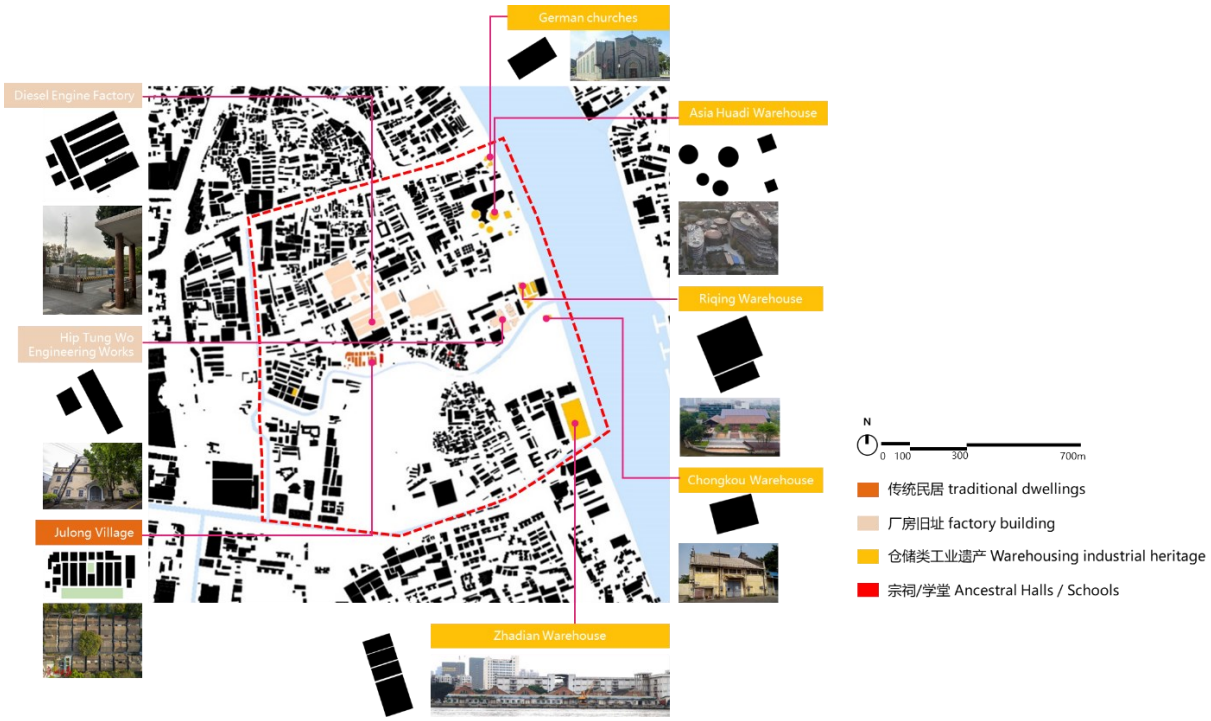


Figure 4-15 Current Status of Typical Buildings in the Julong Bay Area

(Source: Drawn by Author)

Jardine's Warehouse: Built in the 1906-1930s, the Jardine's Warehouse consists of 6 rows of red brick warehouses and 1 riverfront wharf. The existing building is in good shape, with distinctive Baroque and Early Modern style features. The internal space is a large span structure with steel frame and no columns, which has excellent ventilation and heat insulation performance, and has a high potential for spatial transformation. However, part of the riverfront façade has been damaged by the later ancillary office buildings, limiting the landscape value and requiring a combination of restoration and reconstruction.

Nissin Warehouse: Built around 1920, it was once a warehouse set up by Nissin Steamship Company of Japan. Originally a long row of warehouses, 115 meters long, 21.6 meters wide, about 13 meters high, divided into 5 small warehouses. In 2001, most of the warehouses on the southern side were identified as hazardous structures and subsequently demolished. Currently, only one small warehouse remains. There was originally one wharf on site, which no longer exists. The warehouse building features a steel beam structure with an asbestos tile roof.

Chongkou Warehouse: It consists of 4 traditional grain silos with double-slope tile roofs, red-brick facades and wooden trusses, which have been revitalized into the Julong Bay Urban Exhibition Center, a successful example of shared renewal of industrial heritage. It has realized the spatial transformation from a “closed space for production” to a “public communication platform”, reflecting the composite feature of “mixing functions+ daily

participation+ cultural display" in the construction of shared space. It embodies the composite feature of "mix of functions" in the construction of shared space.

Asiatic Petroleum Co. Huadi warehouse: Originally an oil storage base, the site retains 4 large-volume steel oil storage tanks, 2 office buildings and 2 warehouses. The structure of the oil tanks is a steel plate riveted system, with protective walls and oil drainage channels between the tanks, and a unique scale of empty space. This industrial heritage has been renewed and developed into a commercial hotel, which is at risk of losing the authenticity of the artifacts. Its unique spatial form has the potential to be translated into an exhibition, installation and immersive experience space.

Hip Tung Wo Engineering Works: One of the earliest diesel engine manufacturing plants in China, established in 1911. The building features red brick walls, pitched roofs, and arched doors and windows, embodying the typical style of modern industrial architecture. Part of the site has now been transformed into the Hip Tung Wo Power Machinery Museum, showcasing a fusion of technological memory and cultural reinterpretation.

Julong Village Historic Settlement: Built during the Guangxu period of the Qing Dynasty, the site currently preserves 19 grey-brick houses with "fire-basket" (Huo'Er) gables, representing a typical form of Cantonese vernacular architecture. As a municipal-level protected cultural heritage site, it is primarily maintained in its original form, with functions focused on residential use and heritage display. Although it does not have a direct spatial connection with the surrounding industrial heritage, it holds potential as an important node for cultural experience and community activation.

The architectural heritage of Julong Bay is not only a container of historical memories, but also a multi-dimensional shared space that integrates cultural display, community activities, and daily life. Under the framework of "Sharing Theory", these buildings need to be transformed from closed productive spaces to open units that are accessible, participatory and redefinable for the public. Through the integration of property rights, the opening up of space and the mixing of business forms, the value of social interaction and collective memory in urban renewal can be activated, and a new level of urban life can be constructed.

7) Area Values and Renewal Patterns

The Julong Bay area combines three key elements: industrial heritage, traditional settlements, and waterfront natural resources, giving it unique urban spatial value. From a historical and cultural perspective, the area preserves Julong Village, a Qing Dynasty-era settlement, modern industrial warehouse buildings, and a waterfront dock system, serving as a

physical testament to Guangzhou's modern port and industrial development. From a spatial structural perspective, Julong Bay lies at the transitional zone between the city's core and the water system, making it a typical "edge space" with both historical depth and structural reconstruction challenges. From a social and public perspective, the area's streets and alleys are of a comfortable scale, with strong water access, and it holds potential for fostering a "shared space" that blends diverse social interactions, cultural exhibitions, and daily life. From a value of sharing standpoint, its rich natural and cultural resources can be translated into diverse public activity platforms, addressing the dual demands of "redistributing shared spaces" and "reconstructing cultural identity" within the city.

Since the 1980s, urban renewal in Guangzhou has gone through multiple phases: the full demolition and reconstruction period (1980-1998), which focused on land clearance and rapid development; the urban beautification phase (1999-2009), which was government-led and focused on environmental improvement; the early phase of the "Three Olds Renovation" (2009-2015), primarily focusing on individual project renovations; and the large-scale renovation phase (2015 to present), which emphasizes overall planning and coordinated development, gradually moving toward a more systematic and structured approach. Before the launch of the Julong Bay project, the renewal of some old industrial sites in Guangzhou still had a "real estate-driven" tendency, commonly converting industrial land directly into residential areas and quickly replicating commercial residential development models. For example, on the eastern side of Julong Bay, Guangda Garden and Evergrande Jinbi Garden were built on the former sites of Guangzhou Battery Factory and Guangzhou Pesticide Factory. While some vegetation was preserved, the potential of the sites' spatial resources and historical context was not fully explored, significantly weakening the public value and cultural sharing potential. Currently, Julong Bay has entered the large-scale renovation phase of the "Three Olds Renovation," becoming a demonstration area for urban renewal in Guangzhou. Its renewal model, based on a "government-led + market participation" core mechanism, uses methods such as land storage, property coordination, and industrial transformation to systematically integrate inefficient industrial land. The development introduces industries such as innovation and technology, public services, and mixed-use development, with a focus on ecological restoration and spatial quality enhancement. In terms of implementation, Julong Bay adopts a phased construction and mixed-use operation strategy, focusing on creating a "technology headquarters + cultural, business, and tourism integration" urban waterfront complex. The current key construction project is the "Julong Bay Taikoo Li" commercial complex, which is expected to be operational in 2025.

4.4.2 Analysis of Key Issues in Shared-Oriented Urban Renewal Design

Despite its unique location and rich industrial heritage resources, Julong Bay is still facing multiple structural barriers in terms of spatial structure, social functions and public provision. These problems not only limit the effectiveness of urban renewal in the area, but also affect its potential as a place for generating “shared space” in the future.

On the spatial structure level, the area is rich in resources but suffers from an imbalance in utilization. The Julong Bay area has a mixed land use, with numerous undeveloped vacant lots and inefficient industrial facilities. Notably, the vacancy rate of historical buildings is as high as 60%. While these buildings possess strong industrial aesthetics and potential for adaptive reuse, they remain largely inactive due to land classification as storage or third-class residential land. The fragmented building forms, high density, and chaotic spatial organization hinder their activation, resulting in a structural stagnation where “tangible spaces remain unused.”

On the accessibility and mobility level, spatial fragmentation and a lack of publicness are evident. The area suffers from an inefficient transportation system, with issues such as dead-end streets and degraded connections along major roads. Specifically, the original industrial enclosure system has caused a severe division between the waterfront space and the urban interior. The lack of clear pedestrian flow lines and a slow-moving network limits public circulation and activity, rendering the waterfront space a city blind spot—difficult to access, unwelcoming, and incapable of meeting the openness and mobility required for a shared space.

On the services and shared space level, the public attribute is weakened, and social interactions are scarce. The area currently faces lagging infrastructure development and the privatization of public land. There is a lack of public facilities that meet the basic needs for daily living and social interaction, such as shared squares, communication nodes, and resting areas. The waterfront areas are mostly used for unit storage or logistics, with no truly public-facing spaces, preventing the formation of “shared scenarios” or “urban social stages.” Furthermore, the subject of large-scale redevelopment is unclear, leading to an uneven distribution of benefits in construction and operation.

From the perspective of “shared theory,” the renovation of Julong Bay should not only focus on physical transformation but also prioritize the social functional reconstruction of spaces and the creation of places for public activities. The renovation should combine industrial heritage, waterfront resources, and community interfaces in a comprehensive manner, establishing urban interaction spaces that feature diverse participation, flexible usage,

and cultural expression. This approach should strengthen equitable resource allocation, promoting the transformation of previously closed, monopolized private industrial land into open, shared public spaces. By bridging the “physical interface” and “social rights” barriers, the space can shift from a “production island” to a “shared network,” empowering the city’s daily life, publicness, and inclusivity.

4.5 Design Practice for Julong Bay Waterfront Industrial Heritage Renewal

The previous section systematically reviewed the concept of shared space, and through a comprehensive study of the Pearl River Back Channel waterfront industrial heritage, Julong Bay area, and their redevelopment practices, established an organic link between theory and practice. To effectively integrate waterfront industrial heritage with urban development, it is crucial to fully understand the site's unique natural environment, climate conditions, historical and cultural context, and socio-economic background. This understanding should inform the appropriate fusion of industrial architectural features and regional environmental elements to meet the demand for shared spaces in urban renewal.

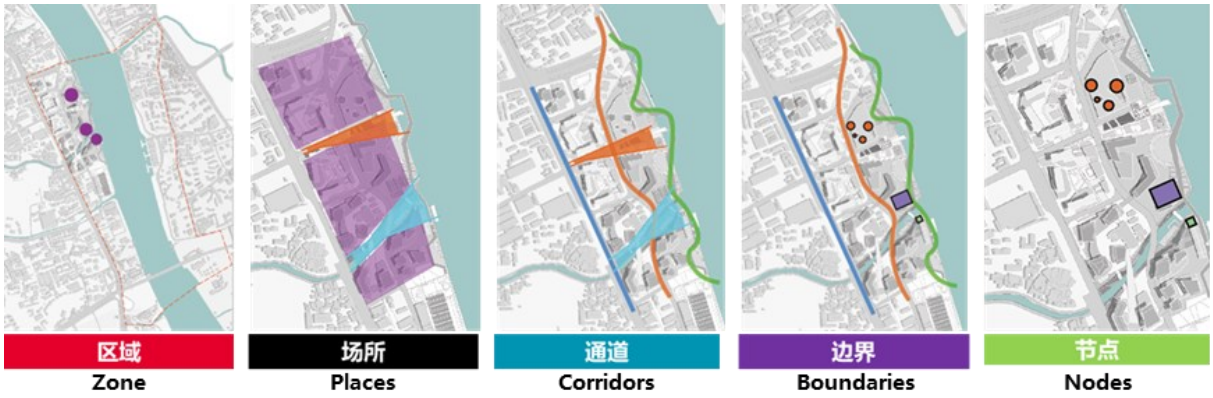


Figure 4-16 Five Strategic Dimensions of Shared Design

(Source: Drawn by Aauthor)

This section focuses on the Julong Bay waterfront area as a case study, exploring the spatial design practice guided by the concept of shared space, based on five dimensions: region, place, corridor, boundary, and node (Figure 4-16). The goal is to discuss the strategies for reshaping and enhancing the spatial value of industrial heritage.

Figure 4-17 General Plan

(Source: Drawn by Author)

4.5.1 Zone

As observed from the case studies of waterfront industrial heritage updates in Chapter 2, the renewal and reuse of waterfront industrial heritage are closely tied to the regional urban planning of the city. The update and reuse should be approached from a regional level, aligning with the city's development needs, clearly defining its characteristics, ensuring compatibility with the overall urban structure, and integrating into the area's development. Therefore, the update strategy and design at the regional level should consider the urban planning and development needs, combining factors such as the location, transportation, supporting infrastructure, and the inherent conditions of the waterfront industrial heritage. Moreover, attention should be given to the development of waterfront public spaces, and, while preserving historical and cultural values, the transformation should integrate modern urban functions to create a shared regional space, promoting the overall renewal and development of the waterfront area (Figure 4-18).

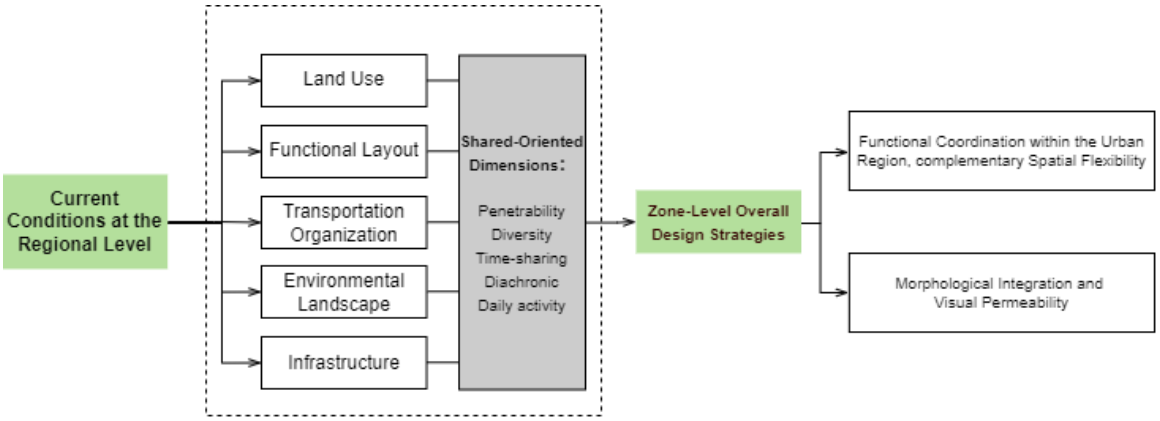


Figure 4-18 Framework Diagram of Renewal Design at the Zone Scale

(Source: Drawn by Author)

1) Functional coordination, integration, and complementarity within the zone, with spatial flexibility (Penetrability, Diversity, Daily Activity)

Based on the overarching planning of the Baietan area and the context of economic structural transformation, the Zhoutouju area, where the Julong Bay district is located along the Pearl River Back Channel, is primarily focused on modern productive service industries. With a focus on “intelligence,” “smart technology,” and “innovation,” it is positioned as a hub for corporate headquarters, aiming to create an industrial clustering effect. This section discusses the coordination, complementarity, and misalignment of functions, as well as spatial optimization, to integrate the resources of the Pearl River Back Channel industrial heritage and promote the regional revitalization and high-quality development (Figure 4-19).

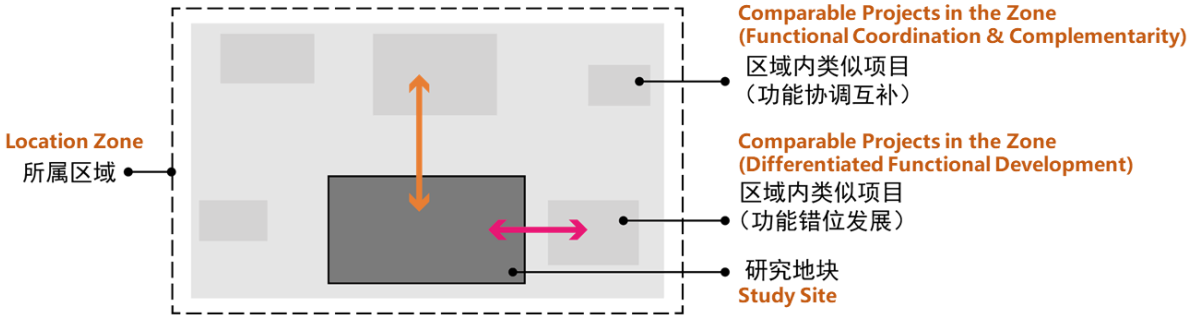


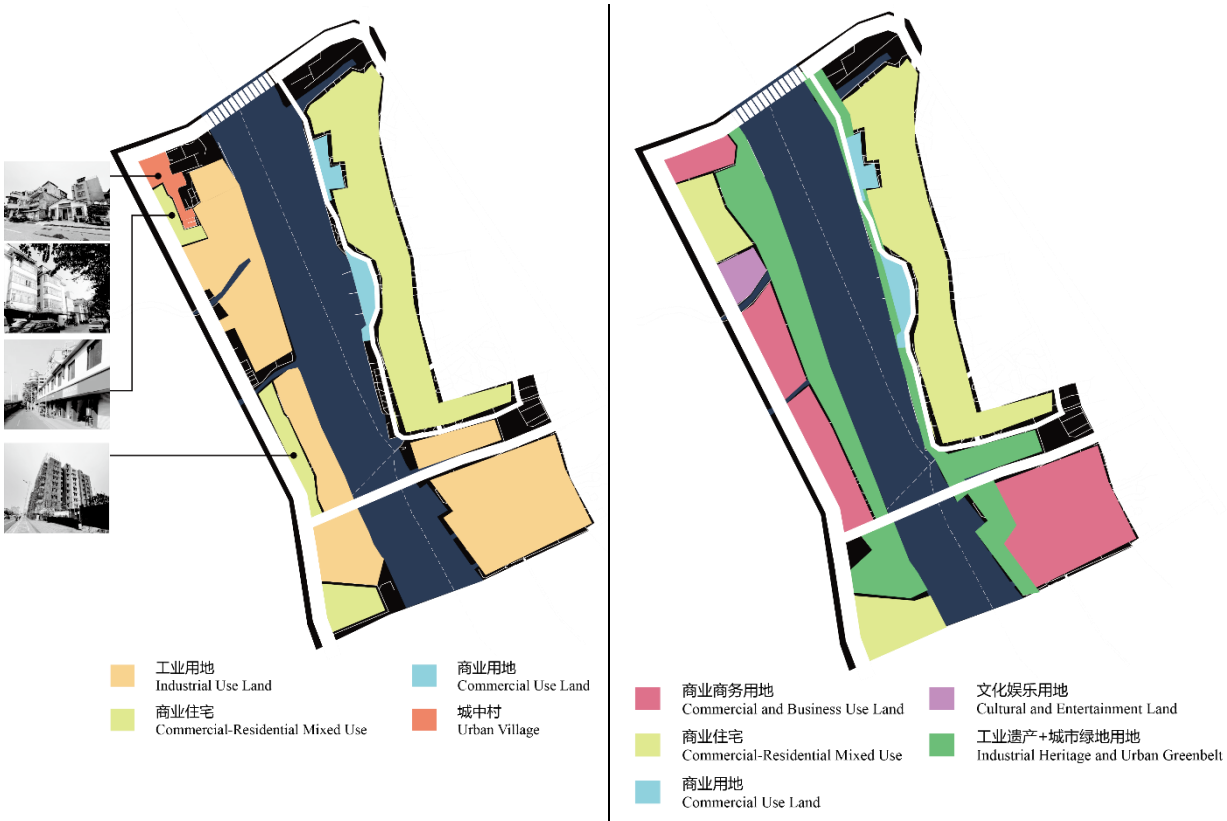
Figure 4-19 Functional Linkages Between Julong Bay and Adjacent Urban Zones

(Source: Drawn by Author)

(1) Functional Positioning and Regional Synergy

Therefore, based on the overall target positioning of the revitalization and transformation of the industrial heritage area of the Pearl River Back Channel, in order to maintain the original spatial pattern and characteristics of the old wharf warehouse area along both sides of the Pearl River and to reflect the overall appearance of the historical lot, the area should be

vacated and relocated out of the existing mixed residential, commercial and a number of urban villages as far as the functional strategy is concerned. Reasonably retain and utilize the industrial heritage resources in the waterfront area, integrate the dilapidated modern historical and cultural resources, reorganize the functions of the area, and transform the leisure environment along the river, so as to make it become a bridgehead that simultaneously displays the modern industrial civilization of Guangzhou, the modern culture of Guangzhou, and the cutting-edge innovative industries (Figure 4-20).



a. Prior to Renewal　　b. After Optimization

Figure 4-20 Zone-Level Functional Consolidation Diagram

(Source: Drawn by Author)

(2) Spatial Structure and Functional Layout

a. Spatial Structure: In the waterfront industrial heritage zone, a spatial pattern of "one axis, two corridors, three cores, and multiple nodes" should be established

By integrating the functional positioning of the four major industrial heritage sites—Huadi Warehouse, Chongkou Warehouse, Nissin Warehouse, and Jardine Warehouse—and linking them with heritage nodes on the right bank of the Pearl River such as Taikoo Warehouse, Osaka Warehouse, and Changgang Road Oil Depot, a "culture–tourism, industry, and community" composite functional network can be established. This approach enables more efficient allocation and value maximization of regional resources. Meanwhile, by

leveraging the open spaces of the waterfront industrial heritage, new green plazas can be introduced to form a spatial structure of "one axis, two corridors, three cores, and multiple nodes". This configuration balances heritage protection with regenerative development, injecting new vitality into the revitalization of waterfront industrial heritage in the Julong Bay area. The "One Axis" refers to a green cultural-commercial public service spine that integrates the Dachongkou Creek, Chongkou Warehouse, Nissin Warehouse, the Julong Village Conservation Area, and Taikoo Warehouse Park, linking Julong Bay with surrounding urban districts. The "Two Corridors" refer to the cultural-historical leisure belts along both banks of the Pearl River, forming a waterfront landscape system that combines historical-cultural scenes and natural riverside views. The "Three Cores" include: A core historic waterfront public space formed by Chongkou Warehouse, Nissin Warehouse, and Jardine Warehouse; A cultural-business waterfront district composed of Huadi Warehouse and Osaka Warehouse; An industrial heritage exhibition zone based on the Changgang Oil Depot and Texaco Oil Depot, together creating three different levels of scenic climax along the Pearl River Back Channel. In addition, through meticulous urban design, a system of significant historical waterfront landscape nodes will be formed, anchored by important modern industrial heritage sites including Taikoo Warehouse, Huadi Warehouse, Osaka Warehouse, Shing Chi Tong Warehouse, Jardine Warehouse, Nissin Warehouse, Longmark Warehouse, Texaco Oil Depot, and Changgang Oil Depot (Figure 4-21).

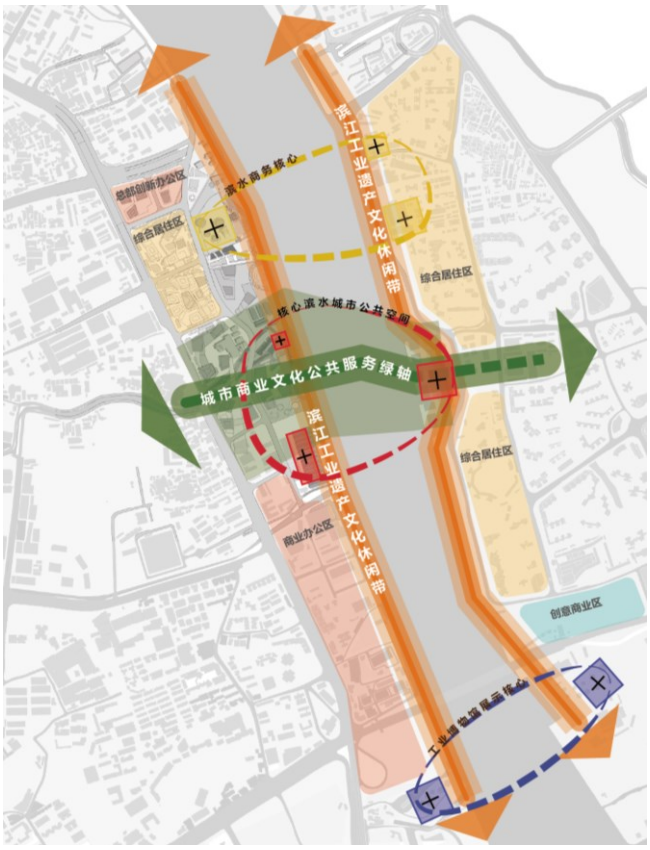


Figure 4-21 Diagram of Zone Functional Structure
(Source: Drawn by Author)

b. Main Functional Transformation Strategies for the Zone: For the four major industrial heritage sites within the area—Huadi Warehouse, Chongkou Warehouse, Nissin Warehouse, and Jardine Warehouse—the following functional transformation considerations can be made as shown in Figure 4-22.

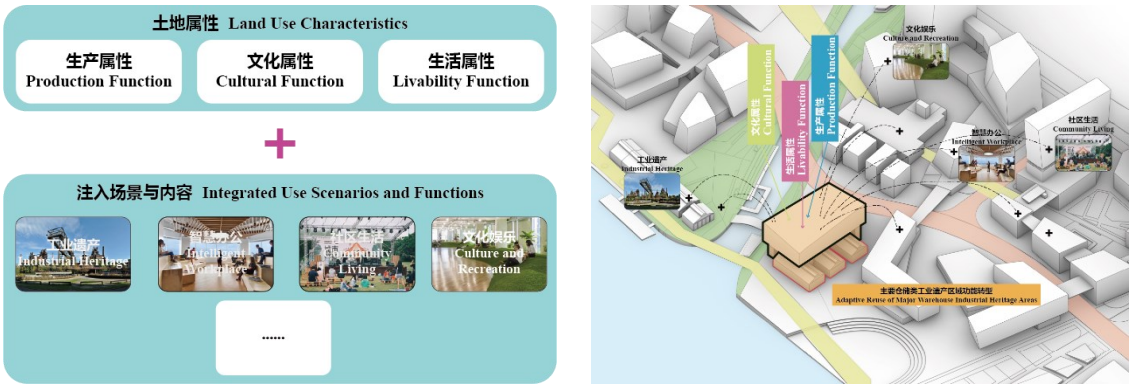


Figure 4-22 Functional Transformation Strategies for Key Zones

(Source: Drawn by Author)

Asiatic Petroleum Co. Huadi warehouse: Community Service Base

The area will be transformed into a "multi-generational shared living hub", concentrating community facilities such as community canteens, nursery centers, elderly universities, and shared libraries, providing shared services to the adjacent mixed-use residential and commercial district to the west (Figure 4-23).

Chongkou Warehouse and Nissin Warehouse: Industry Innovation Hub

The smaller-scale Nissin Warehouse and Chongkou Warehouse will be integrated and planned together, utilizing the century-old storage spaces, the riverfront interface, and the streamside interface to create an "Industrial Culture Experience Complex". This complex will incorporate public functions such as a waterfront theater, industrial museum, intangible cultural heritage workshops, and a city exhibition center, linking to the leisure and commercial area at Taikoo Warehouse across the river in a "cultural display - consumer conversion" synergy. Additionally, a "cloud storage" digital platform will be introduced to integrate the heritage exhibition resources along the Pearl River Back Channel, enabling real-time sharing of exhibition content and visitor flow data (Figure 4-23).

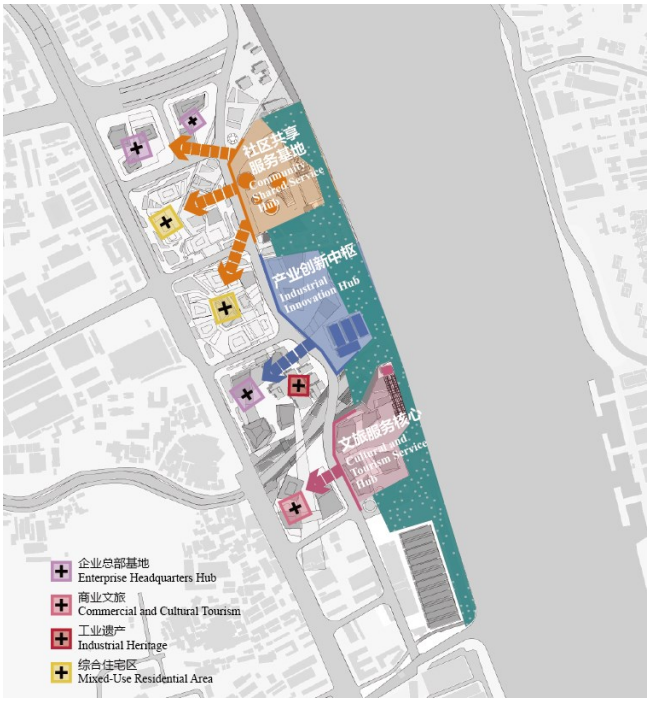


Figure 4-23 Diagram of Industrial Heritage Functional Transformation

(Source: Drawn by Author)

Jardine Warehouse: Cultural and Tourism Service Core

It has been transformed into a "Smart Sharing Workshop", focusing on intelligent manufacturing, culture and creativity, and other emerging industries; it takes advantage of the floor height to set up modular office units that can be disassembled, attracting small and micro-enterprises and freelancers to move in, and sharing laboratories for emerging industries.

(3) Spatial Flexibility and Functional Integration

In the functional optimization strategy of the zone, efforts should be made to promote mixed land use in both the vertical and horizontal dimensions of the waterfront area. This will enhance the functional integration of the land, encourage public interactions among different social groups, and foster the development of a shared economy model (Figure 4-24).

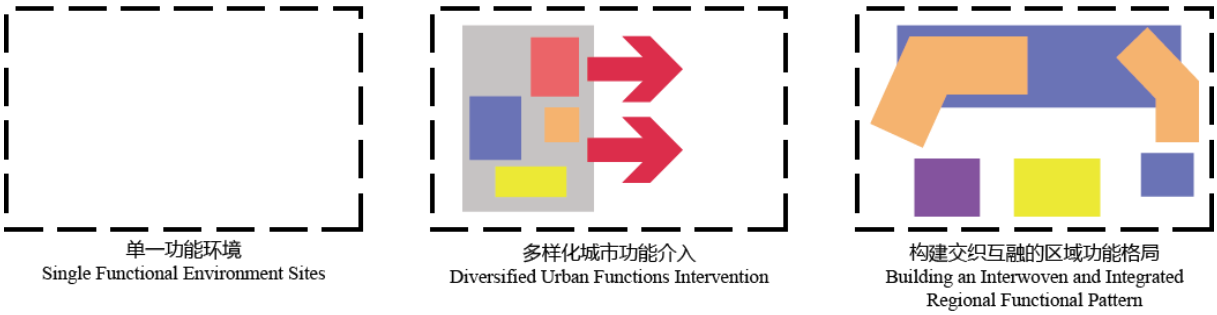
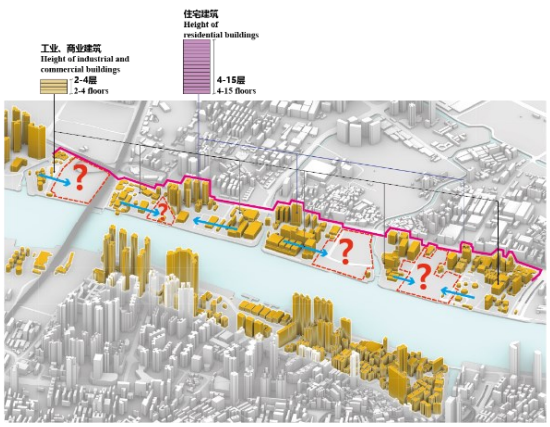


Figure 4-24 Functional Mix Strategy Diagram

(Source: Drawn by Author)

Currently, land compositing within the site is very low, and buildings are mostly spread out and arranged, with only the use of the horizontal dimension in mind, not fully utilizing the space in the vertical and horizontal dimensions. In the functional optimization strategy for the zone, efforts should be made to promote vertical and horizontal integration of land uses in the waterfront area. This approach aims to enhance land-use hybridity, facilitate public interaction among diverse social groups, and foster the development of a shared economy model. For example, the residential-to-commercial ratio within mixed-use parcels can be clearly defined to encourage functional blending. Functions with service-oriented characteristics—such as cultural experience zones, ecological leisure areas, and commercial service hubs—should be embedded into waterfront spaces as well as portions of commercial and business-use zones, forming a complementary, integrated urban district. Moreover, design guidelines for waterfront redevelopment should emphasize the provision of shared service facilities, including co-working spaces, shared kitchens, and innovative community infrastructure based on the principles of sharing. In street design guidelines, planning instructions for the distribution of various shared-use facilities should be incorporated, and integrated into the

neighborhood-level renewal guidelines for waterfront zones (Figure 4-25).

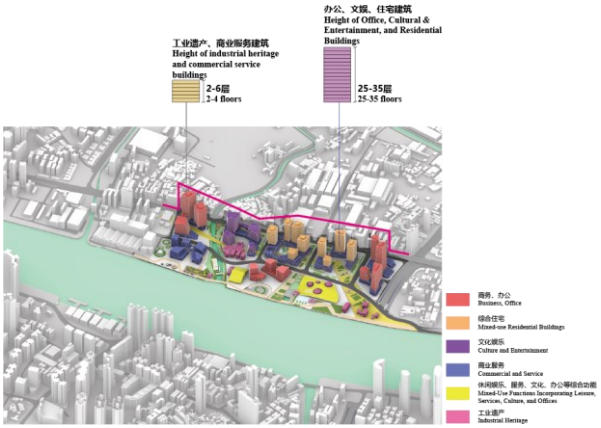


Before Renewal:

Low level of functional integration:

① Functions were singular, consisting mostly of industrial, commercial, and residential buildings;

② Most buildings only considered use in the horizontal dimension, with limited utilization of both vertical and horizontal spatial potentials.



After Renewal:

Enhancing Functional Integration of Land Use:

① Optimize the use of vertical space: Introduce high-rise buildings in areas closer to the urban core to accommodate a wider range of commercial, business office, cultural, and residential functions; strengthen horizontal connections between plots to enhance overall spatial integration.

② Embed commercial service functions into each plot through a series of continuous building volumes, thereby mixing land uses and fostering the formation of a shared economy model within the site.

Figure 4-25 Diagram of Functional Integration Within the Zone

(Source: Drawn by Author)

2) Morphological Integration and Visual Permeability (Diachronic, Penetrability)

As mentioned in 4.4.1.2, the three warehousing industrial heritage parks of Chongkou Warehouse, Huadi Warehouse and Jardine Warehouse in Julong Bay Area cover a large area (100m× 100m to 150m× 150m), and at the same time there are the problems of fragmentation of the industrial landscape and interface closure in its waterfront area. In order to realize the organic integration of industrial heritage and urban environment, the design is led by the concept of sharing, taking into account the structural characteristics of the surrounding urban environment of different reuse objects, combining with the scale, road network, interface and other spatial characteristics of the site, to build a composite system of “axis stitching - interface penetration - visual field linkage”, optimizing the spatial structure through morphological integration, and enhancing the spatial structure through visual field penetration. The spatial structure is optimized through morphological integration, and the openness and shareability are enhanced through visual penetrability, shaping a shared urban image of “readable history, accessible sight lines, and integrable scenes”.

The renewal of industrial heritage is not only a matter of functional reuse, but also an integral part of regional revitalization. The concept of shared space highlights the relationship between large-scale waterfront industrial heritage and the urban environment, requiring that transformation efforts be closely integrated with the urban context. On one hand, it is essential to break down the enclosed interfaces of industrial and warehouse heritage sites and establish seamless connections with the existing urban fabric—including transportation linkages and the dissolution of rigid block boundaries. On the other hand, renewal should aim to create a pleasant public environment for the city by releasing green open spaces and designing human-scale, accessible neighborhoods, particularly for large-scale storage and industrial complexes (Figure 4-26).

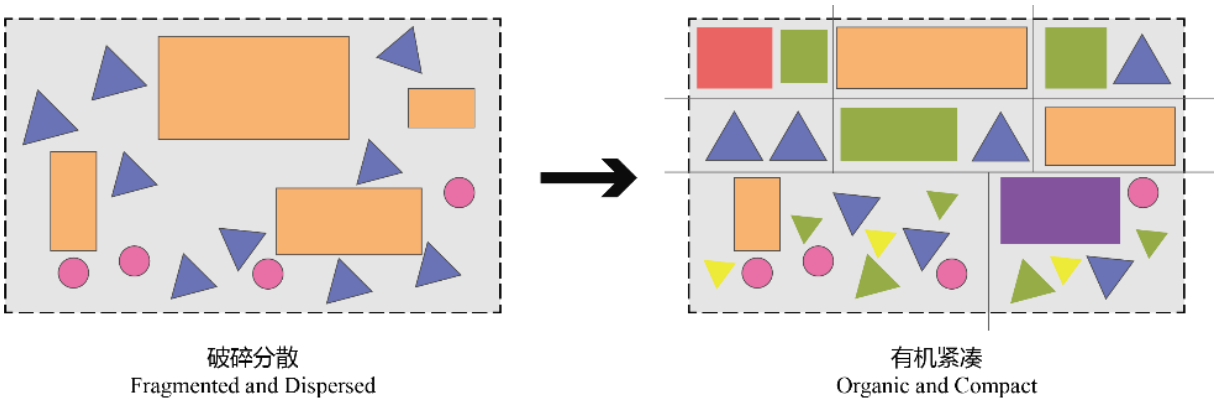


Figure 4-26 Morphological Integration Strategy for the Julong Bay Zone

(Source: Drawn by Author)

(1) Morphological Integration: Coordinating Space and Interface

In terms of morphological integration, the planning and design of the Julong Bay area should emphasize the coordination between the industrial heritage buildings and the surrounding urban morphology, so as to preserve the continuity of the historical features.

a. Spatial Morphology Optimization

The waterfront area needs to be controlled by building height and form to avoid overly high buildings blocking the view of the Pearl River water feature and historical heritage, and adopting a staggered high-low layout to create a richly layered spatial experience and enhance the charm of the landscape. Therefore, the area along the river can be divided into two major parts for spatial form optimization (Figure 4-27):

- **Within 30 meters of the riverbank:** This area is designated as waterfront landscape space, to be developed as public recreational spaces, ensuring the openness and continuity of the waterfront landscape.

• **Within 100 meters of the riverbank**: This area will feature low-density, highly open waterfront public spaces, with buildings limited to a height of 40 meters, ensuring both visibility of the riverfront and the quality of activity spaces. Existing waterfront industrial buildings will be developed and updated under the premise of preservation, with each building assigned a distinct theme to serve as a key spatial node within the area. A pedestrian system will connect these nodes, forming a continuous ecological waterfront landscape. By utilizing the high ceiling height of the warehouses, modular shared workshops will be created, attracting small and creative enterprises, thus empowering the commercial and business districts further inland.

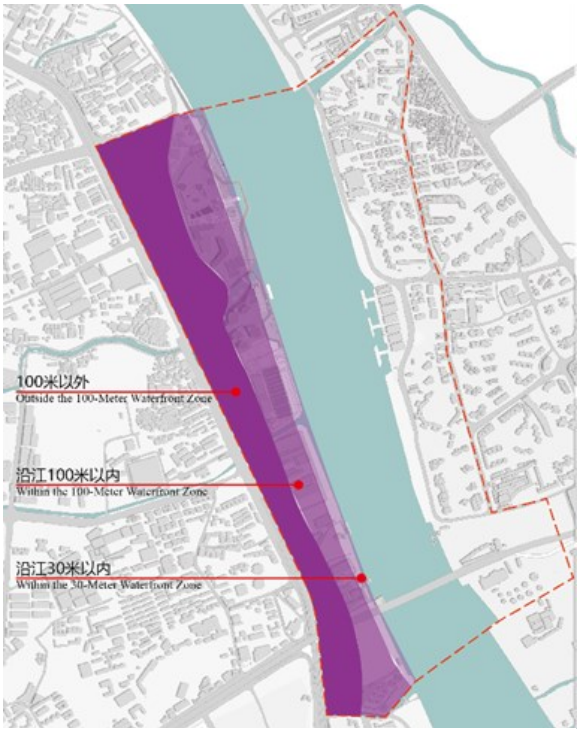


Figure 4-27 Diagram of the Three-Tier Spatial Morphology Zones

(Source: Drawn by Author)

• **Beyond 100 meters:** This area will leverage metro stations and other transportation hubs to form medium- to high-density development plots. New buildings and public spaces will be strategically arranged to create a distinct spatial hierarchy, supporting creative industries, high-tech industries, business offices, and mixed residential functions. This will provide essential public service support for the regional transformation and the core Bai'etan district.

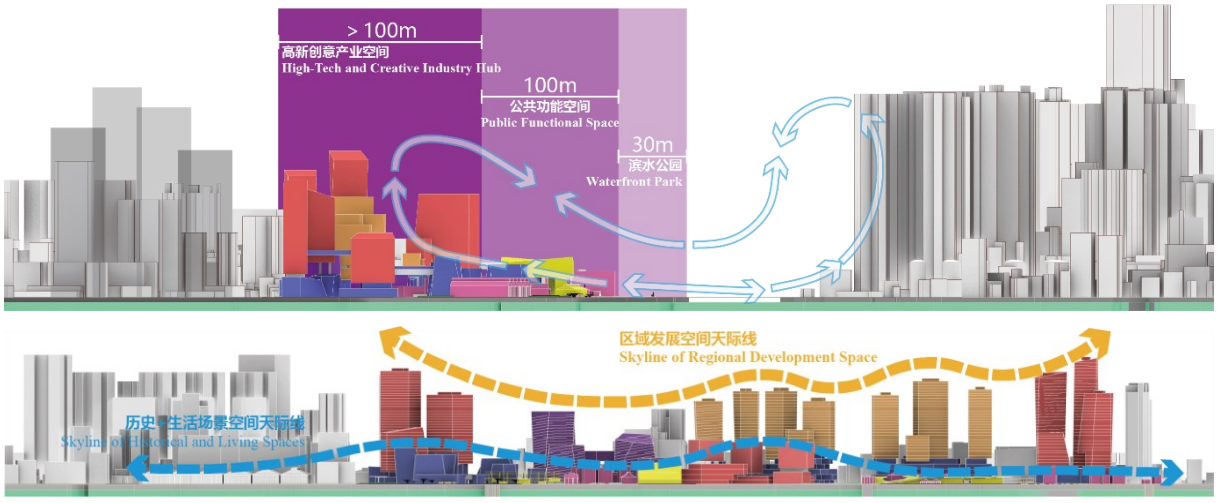


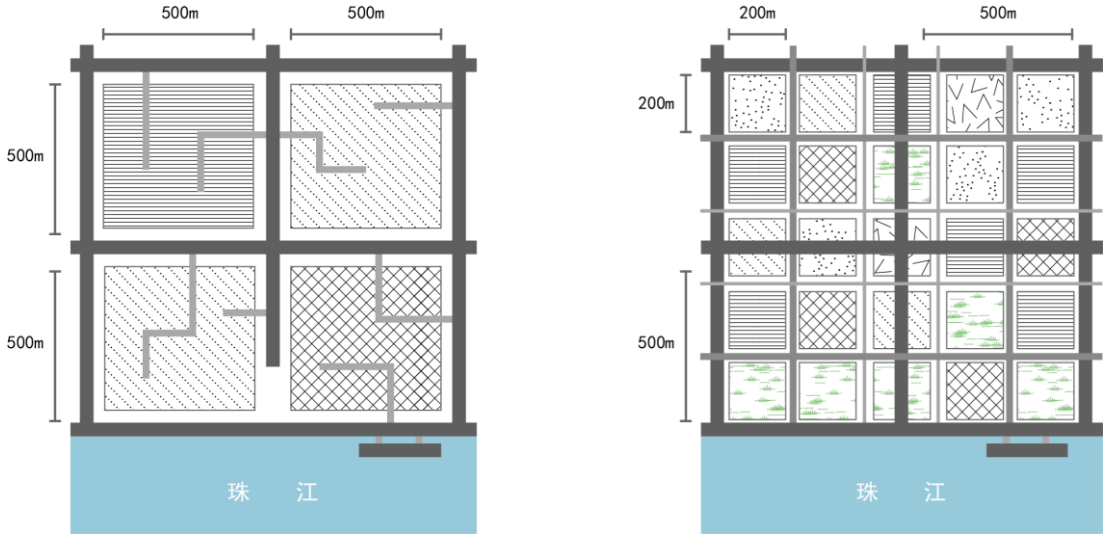
Figure 4-28 Diagram of Spatial Form Layout

(Source: Drawn by Author)

The overall building form within the Julong Bay zone decreases in height from both the north and south edges toward the center, and from the western side toward the eastern riverfront along the east–west axis, creating a harmonious and coordinated skyline (Figure 4-28).

b. Transportation Network Organization: Integrated Land–Water Shared Mobility Network

Large-scale neighborhoods are the main reason for the inefficient pedestrian environment in the waterfront. Therefore, the plot scale of the first block of the waterfront should be controlled, the large-scale interface of the former industrial land should be broken by encrypting the branch road network, and the height and width ratio of the plot should be reasonably controlled to create a pleasant street environment. The regional traffic follows the principle of "small block, dense road network" (Figure 4-29), controls the block scale of the waterfront interface, builds a pedestrian priority system, encourages green travel, and improves the efficiency of the shared space. Through the strategy of "transportation sharing", the separation between the waterfront and the city will be broken, and the accessibility and resource mobility of the heritage area will be improved.



a. Pre-Redevelopment: Industrial Parcel Scale
Big block / loose network

b. Post-Redevelopment: Mixed-Use Block Scale
Small block / dense network

Figure 4-29 Block Scale

(Source: Drawn by Author)

• **Internal–External Connectivity**: Establish connections between the urban hinterland and the waterfront area by enhancing the transportation network, optimizing the width, number, and density of roads within the zone to improve overall accessibility. At the interfaces between the site boundaries and the urban road system, transitional public spaces

such as entry plazas and street-facing green squares should be introduced to expand the contact surface between the site and the urban fabric, facilitating natural pedestrian flow and convenient access.

The vehicle lane runs through the site from north to south, passing through business offices, mixed residential areas, cultural and entertainment facilities, commercial and recreational spaces, and public areas. It serves as the main traffic route for the region, connecting the headquarters industrial cluster, with a backdrop of the waterfront landscape, and radiating towards the main traffic arteries leading to the core urban area of Baietan. The slow traffic network, consisting of the cycling, running, and walking lanes, traverses the entire waterfront space. The cycling lane extends into the city's bike network, the running path weaves through the waterfront landscape and the city, and the pedestrian lane immerses people in the ecological waterfront space. Throughout the area, the three pathways will integrate ecological, commercial, and traffic hubs, stimulating both the commercial and ecological vitality of the waterfront, connecting with the waterfront's historical and cultural heritage, and fully opening up the previously closed-off waterfront spaces. This will create a more livable and open shared public space along the waterfront.

Figure 4-30 Water-Land Transportation Coordination System Map

(Source: Drawn by Author)

• **Interweaving of water transportation and land slow-moving network:** A "Water Culture Bus" system is proposed, which will continue to operate at the Bai Xian Ke (White

Shell) and Bai He Dong (White Crane Cave) docks, while transforming and updating three abandoned docks—Yongxing Street Dock, Texaco Oil Depot Dock, and Changgang Road Oil Depot Dock. Additionally, a new dock at the Nissin Warehouse will be added, and the southernmost dock at the Taikoo Warehouse will also be integrated into the water bus system. The system will feature bi-directional service every hour, facilitating shared passenger flow. Furthermore, a "Post-Channel Industrial Heritage Passport" initiative is planned, where visitors who collect stamps from six key heritage sites—including Huadi Warehouse, Taikoo Warehouse, and Osaka Warehouse—will be able to exchange their stamps for shared boat tickets. This will strengthen the linkage of cultural IPs and create a more engaging and interactive experience for tourists (Figure 4-30).

(2) Visual penetrability: visual connectivity and landscape sharing

Through ecological restoration and sightline design, the visual connection between the Julong Bay area and the Pearl River back channel is opened up to enhance the openness and sharing of the waterfront landscape. The design of visual infiltration and amplification focuses on optimizing the traffic organization and pedestrian flow routes, while achieving dynamic balance in the intervention of space on both sides, coordinating the control of spatial boundaries, integrating the heritage area with the surrounding environment, and enhancing the overall spatial coherence and sharing.

a. Ecological Corridor

Demolish the hard revetment and transform it into an ecological gentle slope with shrubs, creating a continuous waterfront walkway connecting the industrial heritage. Set up a vegetated buffer zone along the river, using weather-resistant steel mesh boxes for soil stabilization and slope protection, achieving an intertwined blue-green ecological shared space (Figure 4-31).

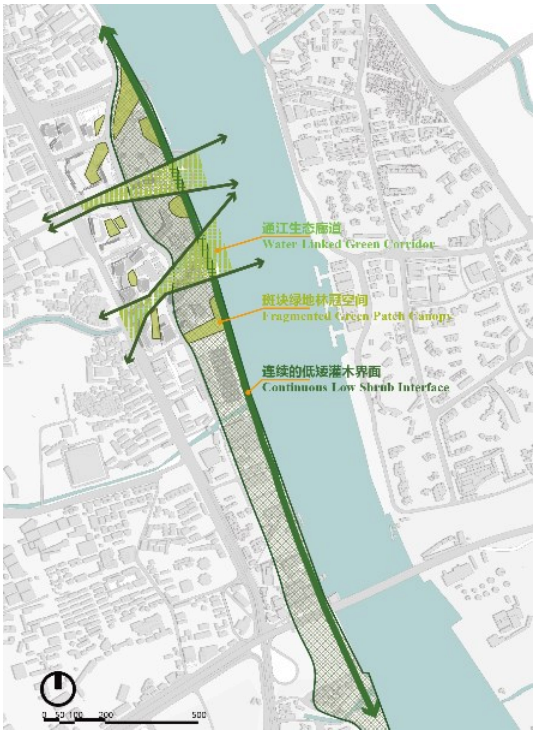


Figure 4-31 Ecological Corridor Layout Diagram

(Source: Drawn by Author)

b. Perspective penetration

The linear waterfront space along the Pearl River on both sides of the river will be connected, and open public spaces, landscape corridors and view corridors will be set up to enhance the visual

connection between the Julong Bay area and other areas along the Pearl River Back Channel, and to break the sense of fragmentation among the various industrial heritage clusters along the route.

• **Landscape corridor:** create a landscape corridor between the east main road of Fangcun Avenue and the riverfront space, locally widen the walking path, form a line of sight penetration and connection with the outside world, enhance the interpenetration between the public space inside the site and the urban hinterland, control and guide the public to enter the site for use, and improve the efficiency of site use.

• **Viewing platform:** A viewing platform is designed on the waterfront side to enhance the shared experience and interaction with the landscape activities on the other side of the river. Focus on maximizing the use of public space, avoiding the encroachment of public space, and providing sufficient activity venues for the public (Figure 4-32).

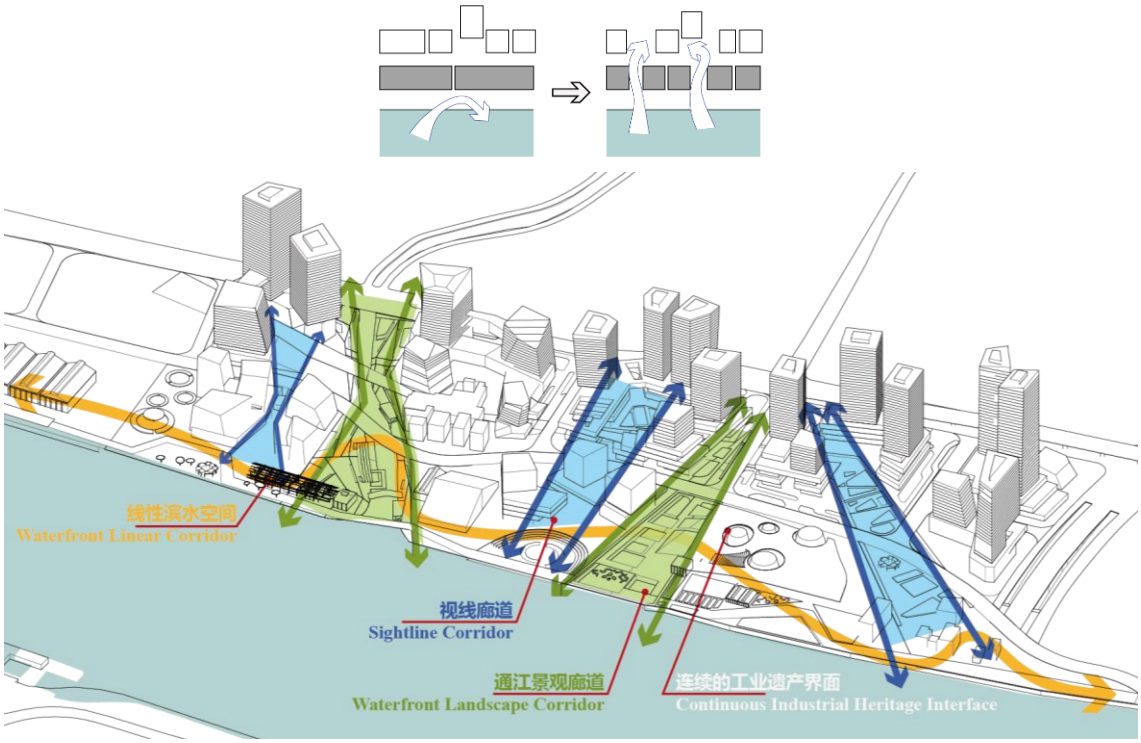


Figure 4-32 Visual Penetrability Design Diagram

(Source: Drawn by Author)

4.5.2 Places

Waterfront industrial heritage sites possess unique spatial structures, with the "production scale" of the industrial era contrasting sharply with the "living scale" of modern urban fabric. From the previous research on the Julong Bay area, it can be observed that the industrial sites, due to their large scale, single function, and closed form, create a stark contrast with the surrounding neighborhoods, lacking spatial transition and continuity. The

texture of these places reflects the two-dimensional relationship between architectural entities and the urban spaces enclosed, defined, or left blank by the buildings, and it is necessary to reshape the industrial heritage and continue the urban fabric through differentiated updates in architectural style, volume, and the organization of spatial structures.

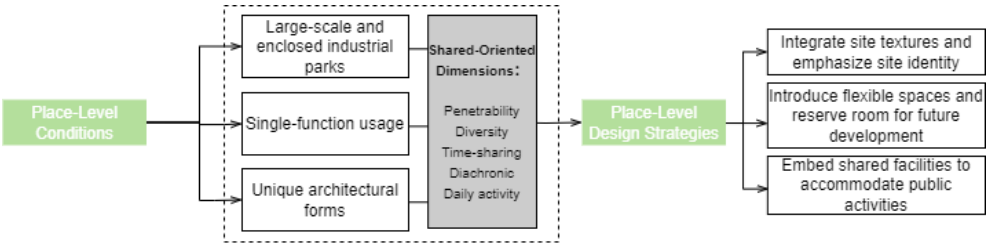


Figure 4-33 Place-dimension Renewal Design Structure Diagram

(Source: Drawn by Author)

Place-making goes beyond designing a single location; it is a systematic planning of the industrial heritage cluster network across the entire area, involving aspects of arrangement, connection, diversity, and discoverability. The definition of each cluster affects the tone and connectivity of the area, constructing a shared urban landscape logic through elements such as squares, corridors, boundaries, and nodes.

In this study, the Julong Bay area is divided into three places based on a large block scale of 500×500 meters. These places are centered around Asiatic Huadi Warehouse, Chongkou Warehouse, and Nissin Warehouse, and the design focuses on their arrangement, connection, and diversification (Figure 4-34).

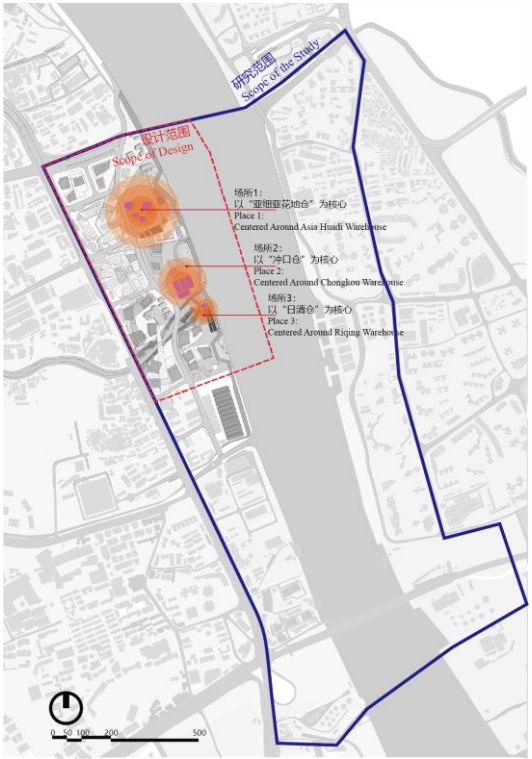


Figure 4-34 Diagram of Place Distribution

(Source: Drawn by Author)

1) Integration of the surrounding place texture, emphasizing place iconicity (Diachronic)

The relationship between figure and ground is the most direct reflection of urban fabric in spatial structure, revealing the macro significance of place spaces within the urban pattern. The renewal of industrial heritage sites involves not only adjustments to building form and volume, but also the configuration and interconnection of forms, as well as how the resulting external space affects the overall figure-ground relationship of the city and the continuity of street interfaces. The industrial heritage buildings in the Julong Bay

area vary in size, and the spatial forms of the places they occupy are relatively introverted and closed. Therefore, it is necessary to integrate the fabric and coordinate with the surrounding urban areas while highlighting the shared nature of the place (Figure 4-35).

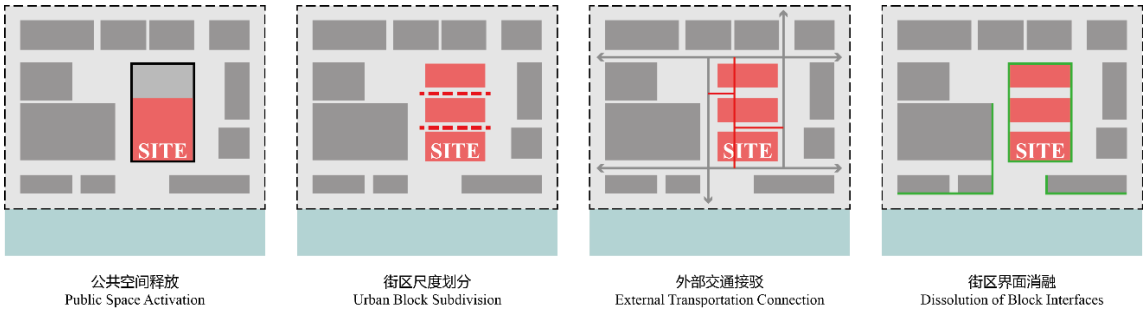
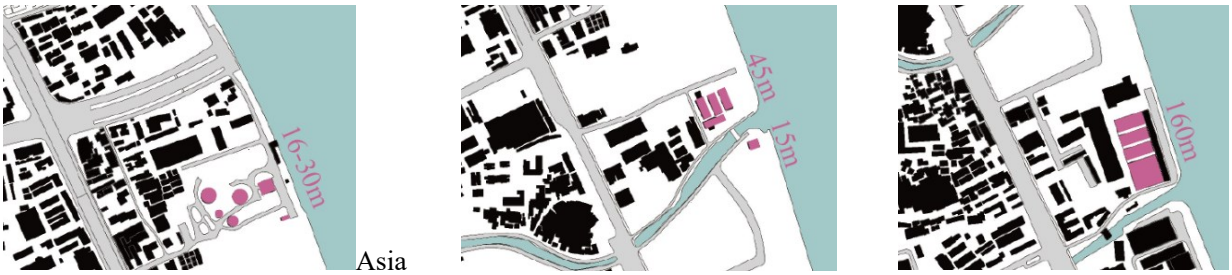


Figure 4-35 Schematic Diagram of Place Texture Integration Strategy

(Source: Drawn by Author)

(1) Integration and organization of place texture

As shown in Figure 4-36, the surrounding urban fabric of the Pearl River Back Channel waterfront industrial heritage area exhibits characteristics of low density and varying building volumes. The scale of Asia Huadi Warehouse, Chongkou Warehouse, and Nissin Warehouse is relatively well coordinated with the surrounding urban fabric, as some buildings have been demolished. The volume of newly constructed buildings should be analyzed based on the figure-ground relationship, extracting the features of the surrounding urban fabric. By controlling the building scale, volume, and form combinations within the site, the spatial layout that is inconsistent with the urban fabric should be adjusted. Especially in areas with significant fabric differences, refined design techniques should be used for transitional treatment to ensure the overall harmony between the district and its surrounding environment.



Asiatic Petroleum Co. Huadi warehouse　Nissin Warehouse, Chongkou Warehouse　Jardine's Warehouse

Figure 4-36 Schematic Diagram of the Street Block Scale of the Pearl River Back Channel Waterfront Industrial Heritage Area

(Source: Drawn by Author)

a. Building Volume Adjustment

Within each place, the buildings form continuous street interfaces through spatial

enclosure (Figure 4-37). By integrating architectural interfaces with functional areas such as urban parks, green spaces, and cultural and creative districts, a rich variety of street spaces can be created, enhancing openness and interaction.

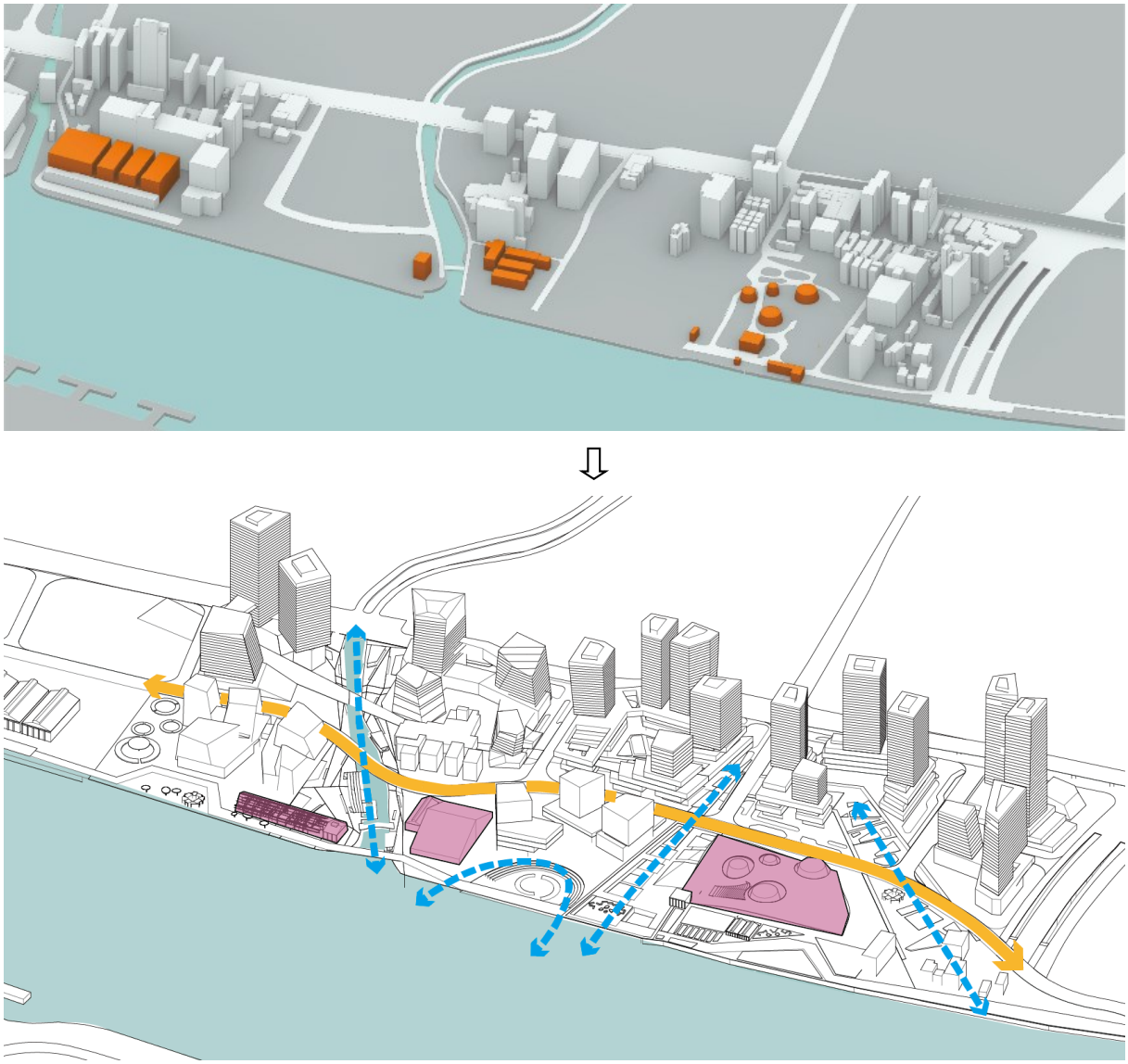


Figure 4-37 Building Volume Adjustment and Space Organization

(Source: Drawn by Author)

- **Asia Huadi Warehouse Site Area**: The storage and office building heritage in the area centered around Asia Huadi Warehouse is of moderate scale and has an orderly fabric, which is well coordinated with the overall urban fabric.

The left side of this area is densely populated with city villages and low-rise commercial and office buildings, while the east side along Fangcun Avenue is mixed with four mid- to high-rise residential buildings. The overall volume is chaotic, and the fabric is fragmented. The spatial organization of this area should be clarified through demolition and retention operations. The first step is to demolish the low-rise city villages and commercial office

buildings on the west and north sides to break the enclosed block pattern (Figure 4-38).

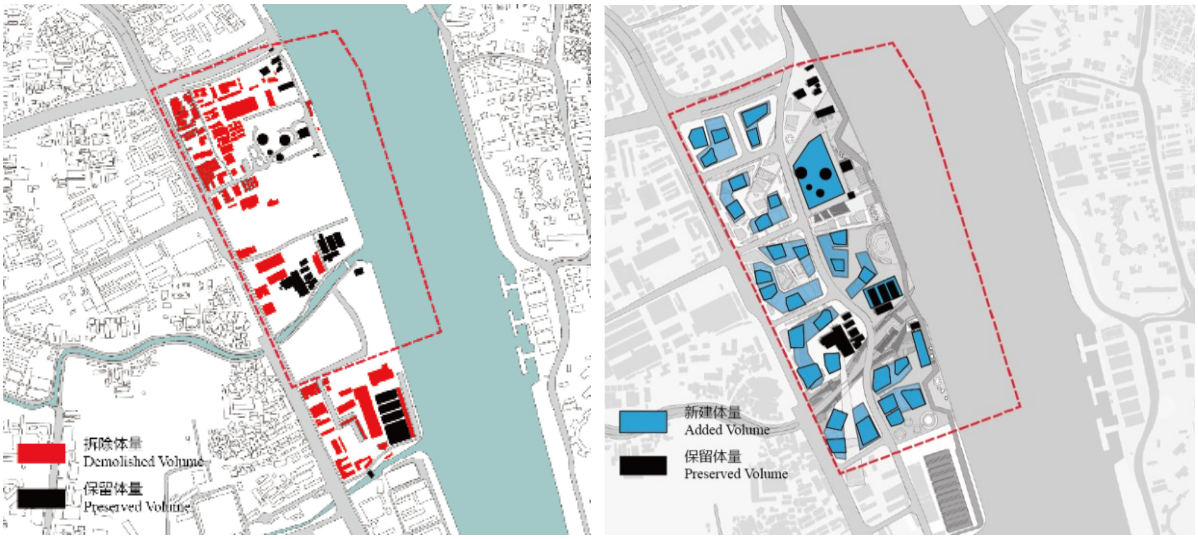


Figure 4-38 Schematic Diagram of Demolition, Retention, and New Building Volumes

(Source: Drawn by Author)

Develop a multi-functional, shared high-rise commercial-residential neighborhood unit and headquarters office unit (Figure 4-39), which includes seven high-rise residential buildings, three high-rise business office towers with ground-level commercial service podiums. The building height gradually decreases from north to south, forming two visual corridors facing the river view (Figure 4-40).

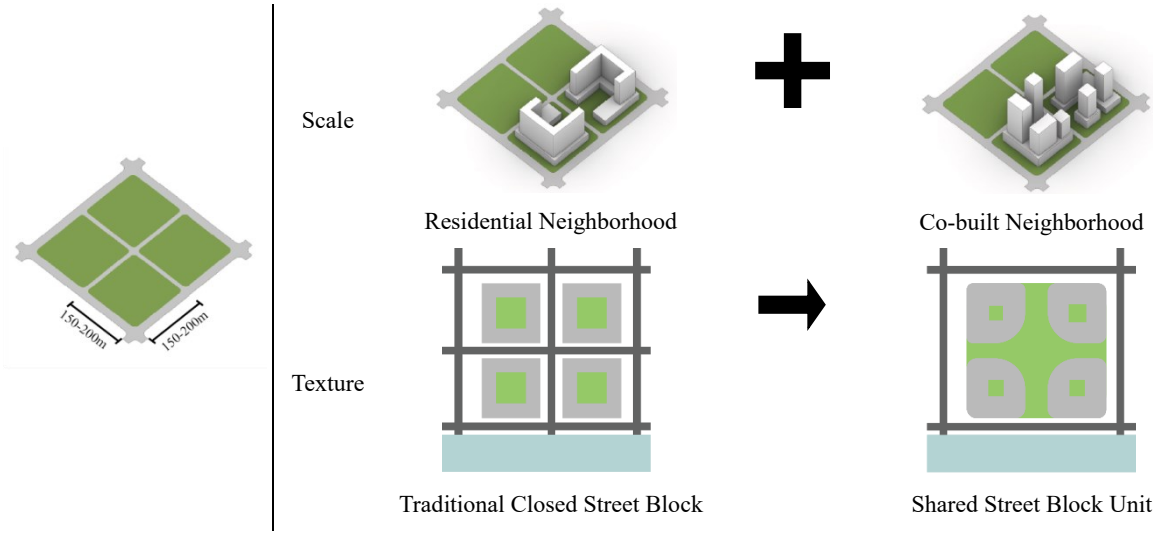


Figure 4-39 Schematic Diagram of Scale and Texture of Shared Units

(Source: Drawn by Author)

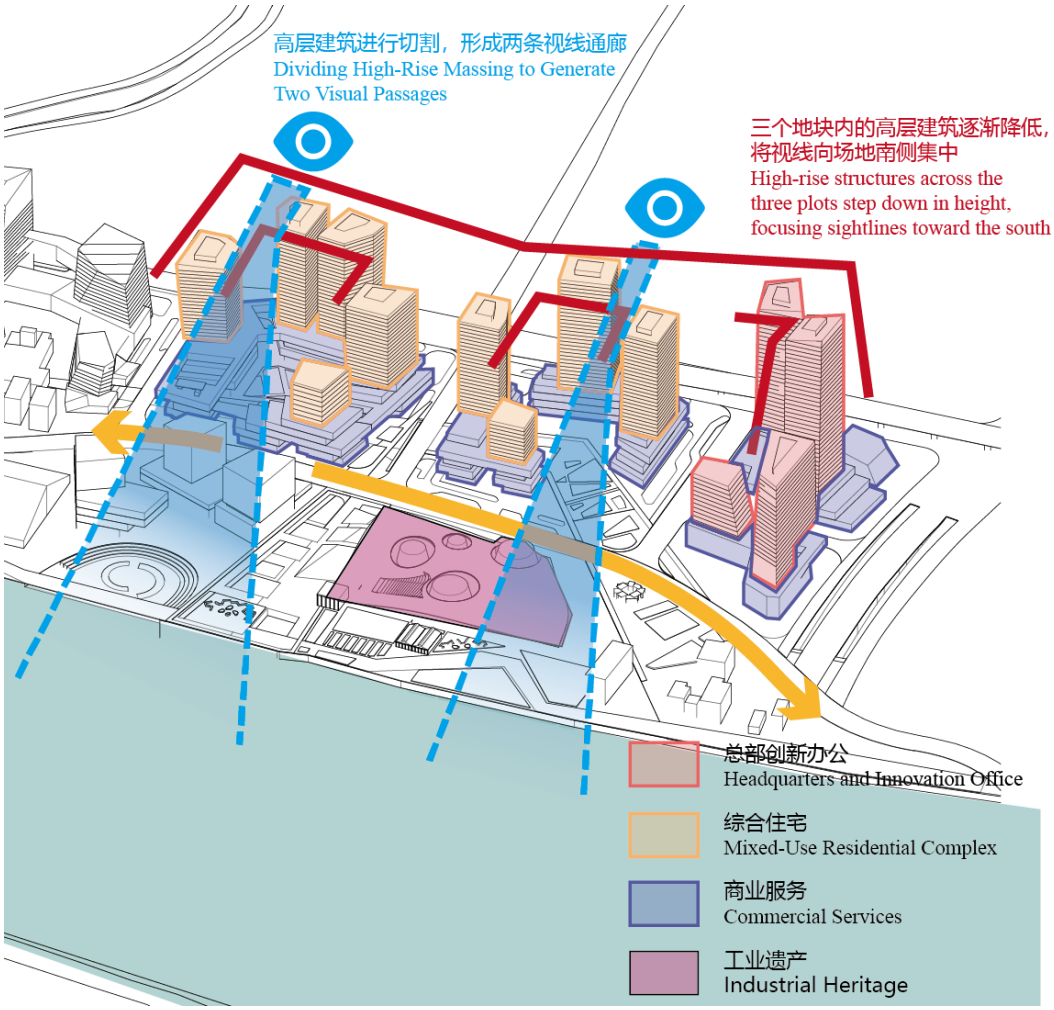


Figure 4-40 Architectural Volume Design Diagram for the Site of Asiatic Huadi Warehouse

(Source: Drawn by Author)

When carrying out the urban fabric restructuring for this site, efforts should be made to minimize interventions in the existing warehouse building volumes, maintaining the independent characteristics of each building. Simultaneously, a “super volume” should be constructed to connect the four oil pipes, creating a large outdoor space that serves as a shared space for the city, various industries, and the public (Figure 4-41). This space, bounded by the Pearl River and urban roads, will be framed by the unique cylindrical oil tank structures, adding a distinctive landscape to the place. Public parks will be planned on both the northern and southern sides of the heritage buildings. The northern side will interact with the Xinyi Hui Fangcun Tang historical building, while the southern side will engage in dialogue with the Chongkou Warehouse industrial heritage.

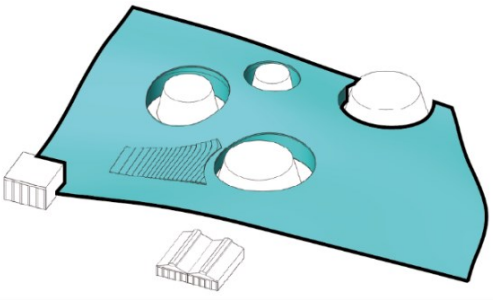


Figure 4-41 Architectural Volume Adjustment for the Site of Asiatic Huadi Warehouse

(Source: Drawn by Author)

• **Site of Chongkou Warehouse and Nissin Warehouse:** The site, centered around Chongkou Warehouse and Nissin Warehouse, includes the existing warehouse heritage buildings and the post-industrial creative community transformed from the site of Hip Tung Wo Engineering Works. The architectural scale of this site is generally moderate, naturally forming comfortable street and alley spaces.

According to the higher-level planning for this area, the western part of the site is designated for cultural entertainment and commercial use. Based on this, the northern side of Chongkou Warehouse and the Hip Tung Wo Engineering Works site will be planned as a courtyard-style cultural park. The height of the new buildings along the riverside will be controlled to match the height of the original warehouse buildings, while other buildings will gradually increase in height from south to north, forming a landscape space that connects the two industrial heritage sites. On the west side of Nissin Warehouse, a low-density, open commercial district will be developed, serving as a transitional space between the northern and southern areas, promoting the integration of the overall urban fabric (Figure 4-42).

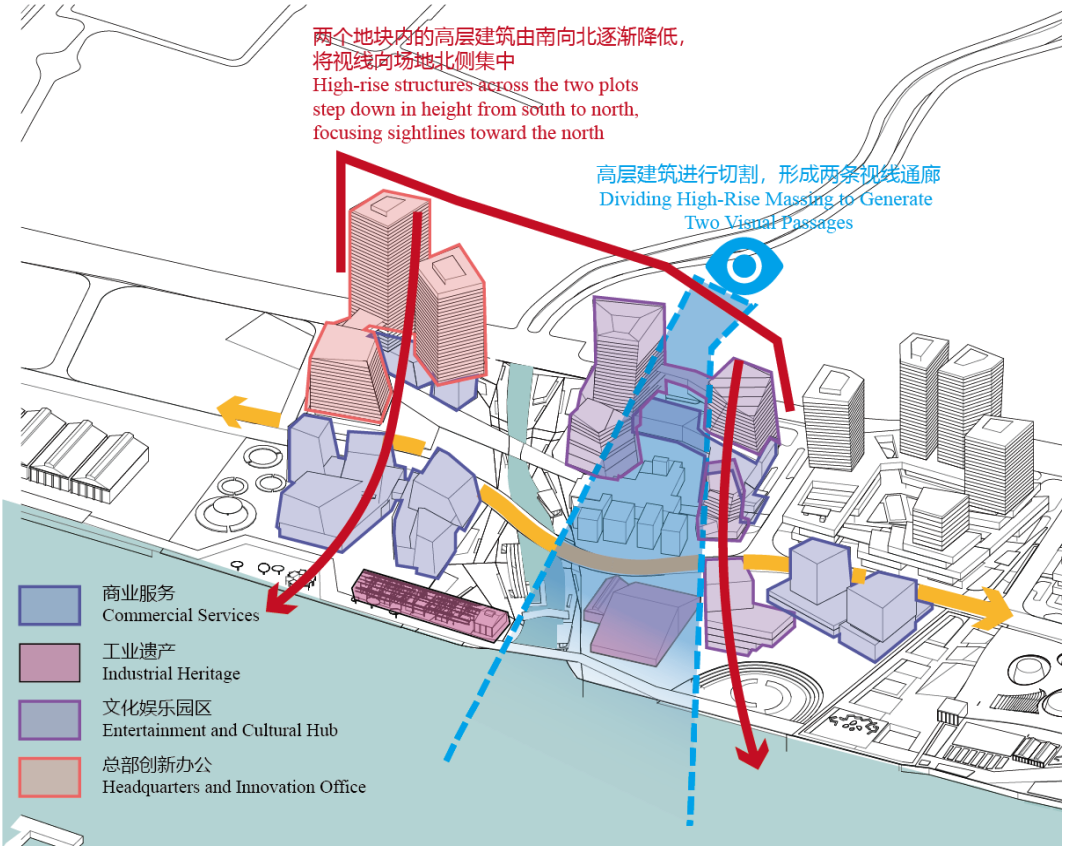
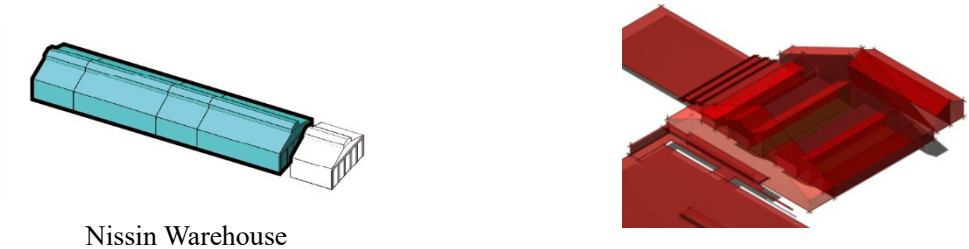


Figure 4-42 Architectural Volume Adjustment for the Site of Chongkou Warehouse and Nissin Warehouse (Source: Drawn by Author)

The industrial heritage at the site of Chongkou Warehouse is well-preserved and can be expanded with new volumes based on its restoration to accommodate greater functional

demands. For the site of Nissin Warehouse, only part of the original buildings remain, and plans are in place to restore its historical form using a metal framework, which will both highlight the site's diachronic value and serve as a multi-functional outdoor activity space (Figure 4-43).



Nissin Warehouse　　Chongkou Warehouse

Figure 4-43 Adjustment of Architectural Volume for the Nissin Warehouse and Chongkou Warehouse Sites (Source: Drawn by Author)

b. Public Space Scale Control

The design focuses on small-scale, decentralized public spaces. Through partial demolition, extension, and addition, the space is adjusted and divided into smaller, scattered organizational forms (Figure 4-44). By changing the paving, building colors, materials, or adding scale references (such as greenery, seating, or lighting equipment), the three-dimensional length-to-width ratio of the space is altered. This approach enhances people's perception of the public space, increasing the sense of layers and interest, while meeting the psychological and activity needs of individuals.

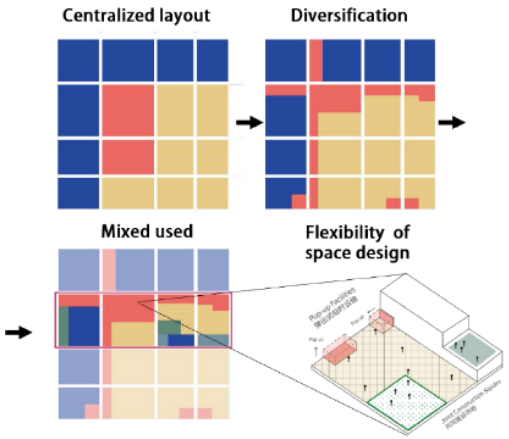


Figure 4-44 Spatial Hierarchy Illustration (Source: Drawn by Author)

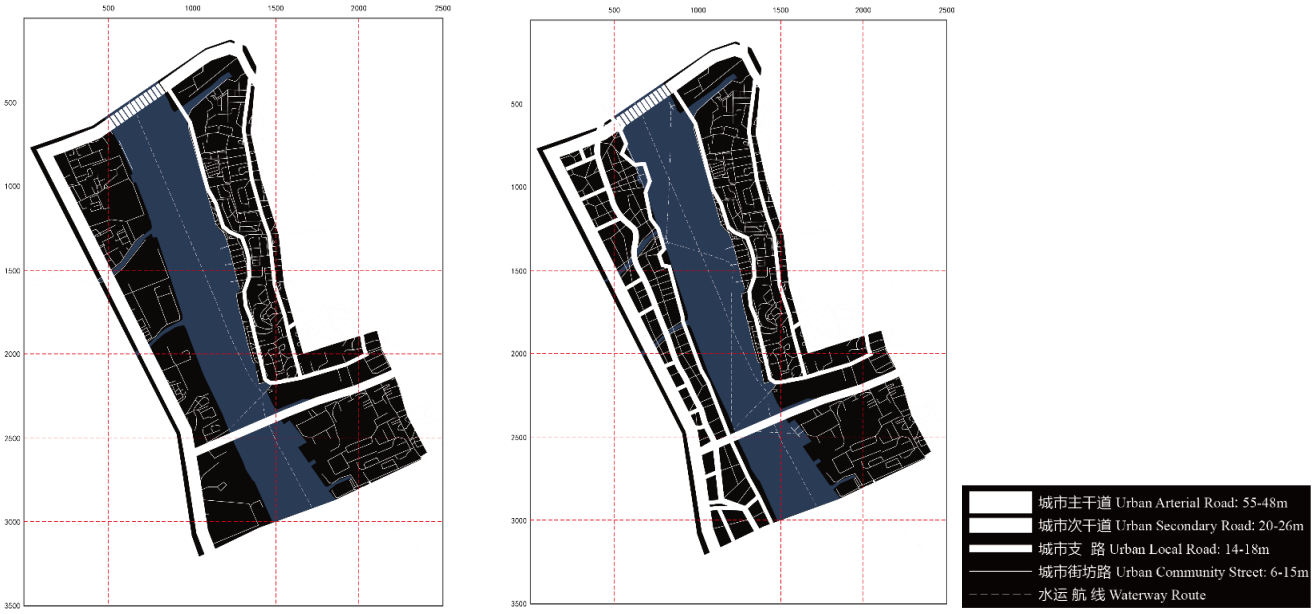
(2) Traffic and Functional Flow Optimization

a. Traffic Integration

Within the site, four levels of roads are planned. The main road within the site is 6.5 meters wide and runs east-west, connecting the traffic of the Julong Bay area with the surrounding region's road network. The secondary roads within the site, 3.5 meters wide, link the various nodes of the area. Smaller roads and pedestrian walkways, 1.5 meters wide, enhance the visitor experience. Additionally, local roads are expanded at both ends to improve permeability between the site and its surroundings, forming a cohesive transportation network for the area (Figure 4-45).

b. Functional Integration

On the riverside, urban public buildings are planned. The entire plot transitions from residential to mixed-use commercial-residential and public buildings. Chongkou Warehouse and Nissin Warehouse are envisioned as a multi-cultural creative hub, driving the joint development of the Hip Tung Wo Engineering Works and the cultural spaces to the north of this area. Asiatic Petroleum Co. Huadi Warehouse is planned as an open urban park and cultural arts community serving the public, forming a dual-core development with the nearby German Church site. Jardine's Warehouse site will serve as a comprehensive commercial and cultural hub. Each of these areas will have diverse functions integrated within the core features of the site, including restaurants, entertainment, culture, and industry, promoting multi-dimensional development both within and around the site.



a. Original Industrial Land Scale: Big Block / Loose Network

b. Refined Mixed-Use Block Scale: Small Block / Dense Network

Figure 4-45 Road Network System Optimization Design Diagram

(Source: Drawn by Author)

(3) Creating the Place's Iconic Character

a. Differentiated Architectural Forms

To shape the uniqueness of the site, the update of the warehouse heritage buildings needs to be differentiated in form, achieving a harmonious transition with surrounding new buildings while blending modern and historical elements. The industrial structural beauty and modern features should be showcased. Traditional industrial elements should be abstracted, transformed, and reinterpreted using modern materials, colors, and styles. Specific

adjustments to the building appearance will integrate the old industrial buildings with their surroundings.

Jardine's Warehouse, with its large scale, will undergo partial adjustments to its appearance, retaining industrial elements while integrating modern styles to soften its mass and achieve harmony with surrounding buildings. Asiatic Petroleum Co. Huadi Warehouse's unique form will involve adding low-rise buildings on a raised platform, complementing its functions and enhancing its visual distinctiveness. With fewer remnants at Nissin Warehouse, new materials will be used to restore the original texture, contrasting with the old texture, thereby enhancing the site's iconic character (Figure 4-46).

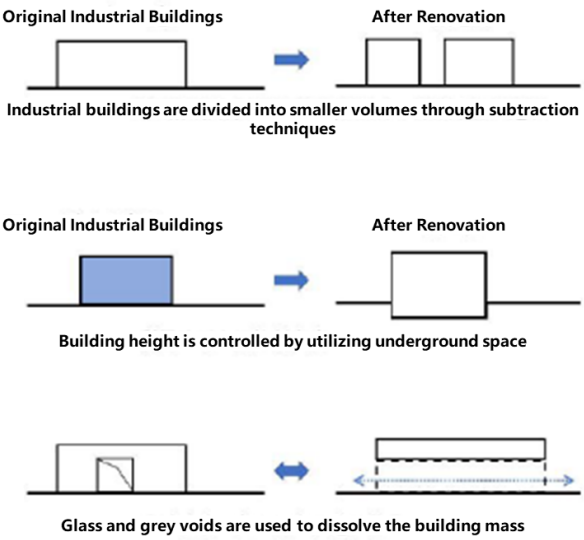


Figure 4-46 Architectural Form Differentiation

(Source: Drawn by Author)

b. Preservation of Industrial Storage Elements

To enhance the industrial cultural atmosphere of the waterfront space and highlight the theme of industrial heritage, it is essential to preserve and update iconic elements of the waterfront area (Figure 4-47). Site-specific elements such as dock cranes and flood control walls, as well as architectural elements like the southern gable of the Jardine warehouse with its downward-sloping ventilation openings for air circulation and rain shielding, can be incorporated into the design as industrial features or sculptures, emphasizing the historical character of the waterfront industrial heritage. The oil tanks at the Asiatic Huadi warehouse site are already a vivid expression of the industrial culture of the place. Their distinctive circular shape makes them highly recognizable. By preserving and updating these tanks, the site's industrial cultural significance can be further articulated and integrated into the modern development of the area.

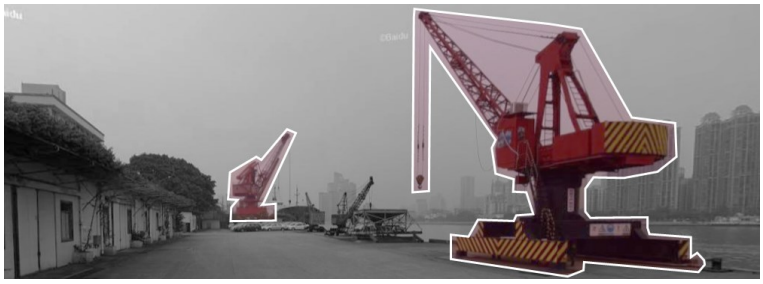


Figure 4-47 Preservation of Industrial Storage Elements

(Source: Drawn by Author)

2) Introduction of Flexible Space, Elastic Design, and Reservation of Development Space (Diversity, Time-sharing, and Daily Activity)

By incorporating flexible space design, the adaptability and variability of the site can be enhanced. Utilizing flexible functional layouts, detachable modules, and time-sharing designs, the site can accommodate future diverse needs and adapt to the changing demands of various social groups and activities.

(1) Fully Exploit Public Space

To enhance the public nature of the site, existing resources should be fully utilized and development space reserved. Transform the industrial storage yards and large empty spaces of the heritage warehouses into public space nodes, converting industrial functions into public space functions. Utilize the site's corner areas and irregular plots to create small activity spaces or landscape areas within the site. Use the open spaces formed after building demolition as supplementary outdoor public spaces. Additionally, explore underground and rooftop spaces, or repurpose industrial equipment as public spaces, creating leisure plazas, sports fields, or gardens to meet the diverse activity needs of users. During the design phase, certain future development space should be reserved to ensure that the site can adapt to urban renewal and industrial changes (Figure 4-48).

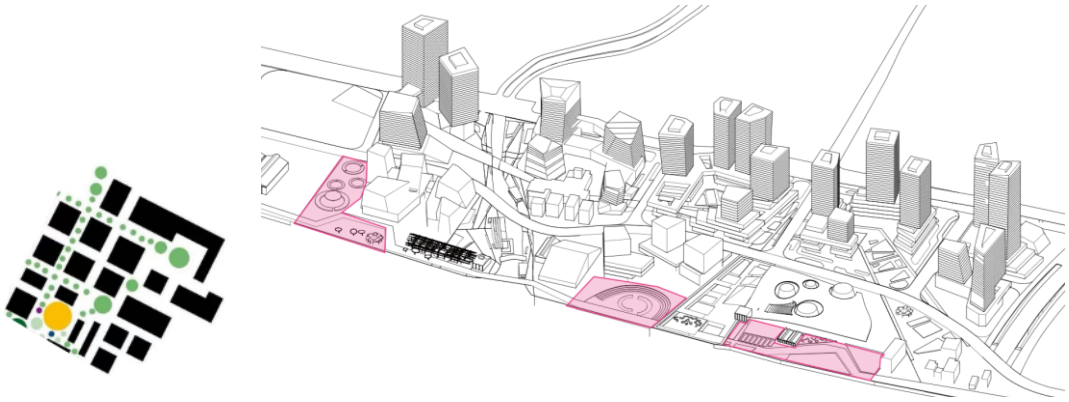


Figure 4-48 Exploration and Utilization of Public Space

(Source: Drawn by Author)

(2) Flexible Landscape Design for Waterfront Spaces

Waterfront areas can enhance their appeal and usability through flexible and user-friendly design. Within the 30-meter range along the river, large open lawns are reserved, providing expansive views and flexible spaces for activities such as sightseeing, healthy exercises, and social entertainment..

The design incorporates steps, flowerbeds, tree rows, and streetlights, offering diverse

leisure facilities and increasing the number of resting facilities in the waterfront area. For instance, steps can serve as viewing points, while tree rows or large lawns could feature stepped benches under trees or on the grass, recreating some of the dock spaces and transforming them into outdoor theater stages. These facilities face the river and are surrounded by plants, attracting activities such as outdoor movies and running parties.

Resting facilities are placed around squares, along streets, and within landscape spaces, prioritizing sunny, sheltered, high-foot-traffic areas with wide views. They are spaced according to pedestrian density and distance, ensuring the fulfillment of sightseeing and social interaction needs, enhancing the human-centered experience.

(3) Setting Flexible Spaces to Support Multi-functional Transformation

Ample flexible space should be set up to meet the needs of different types of activities, groups, and time periods, offering possibilities for flexible use and promoting resource sharing and social interaction within and outside the area.

a. Outdoor Spaces

Through new structures or landscape design, different scales of activity spaces are created, such as small performance squares, pop-up market areas, everyday leisure picnic zones, and green shared office spaces, to accommodate activities for different group sizes and functions (Figure 4-49).

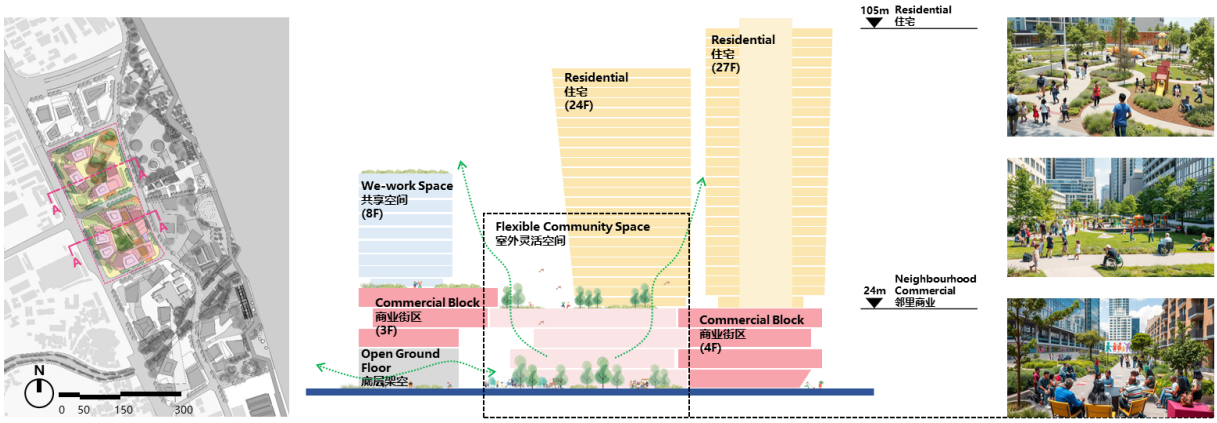


Figure 4-49 Flexible Space Diagram

(Source: Drawn by Author)

b. Architectural Space

Utilizing the high ceilings and open structures of warehouses, adjustable shared office spaces can be created by splitting and combining areas, attracting small businesses and entrepreneurs. The design includes variable spaces such as exhibition areas and public reading zones. New buildings should consider raised ground floors, providing shared commercial,

business, cultural, and living spaces (Figure 4-50).

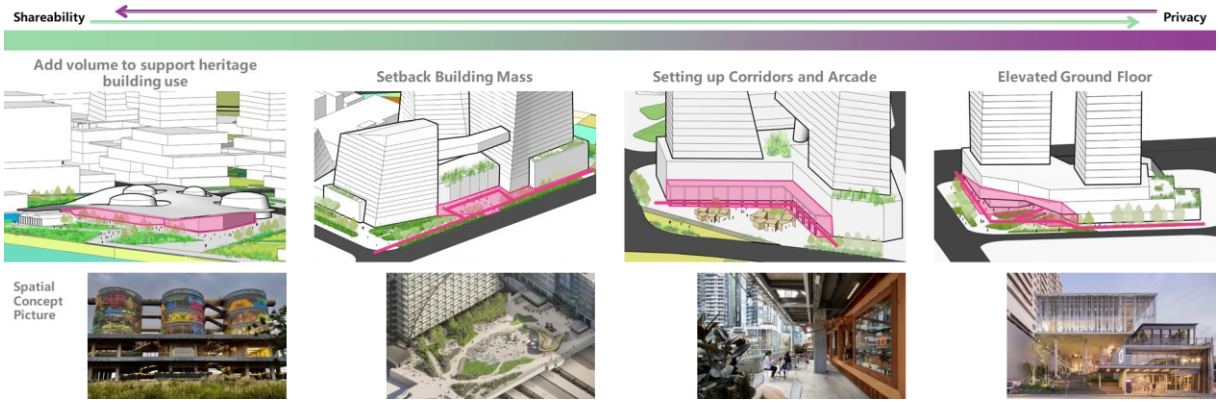


Figure 4-50 Flexible Architectural Space Diagram

(Source: Drawn by Author)

c. Modular and Reconfigurable Layout

In public spaces, movable partitions or multifunctional furniture with distinctive site characteristics can be arranged to enable quick spatial transformations, supporting various functions such as creative industry parks, cultural activity centers, commercial office spaces, or residential communities.

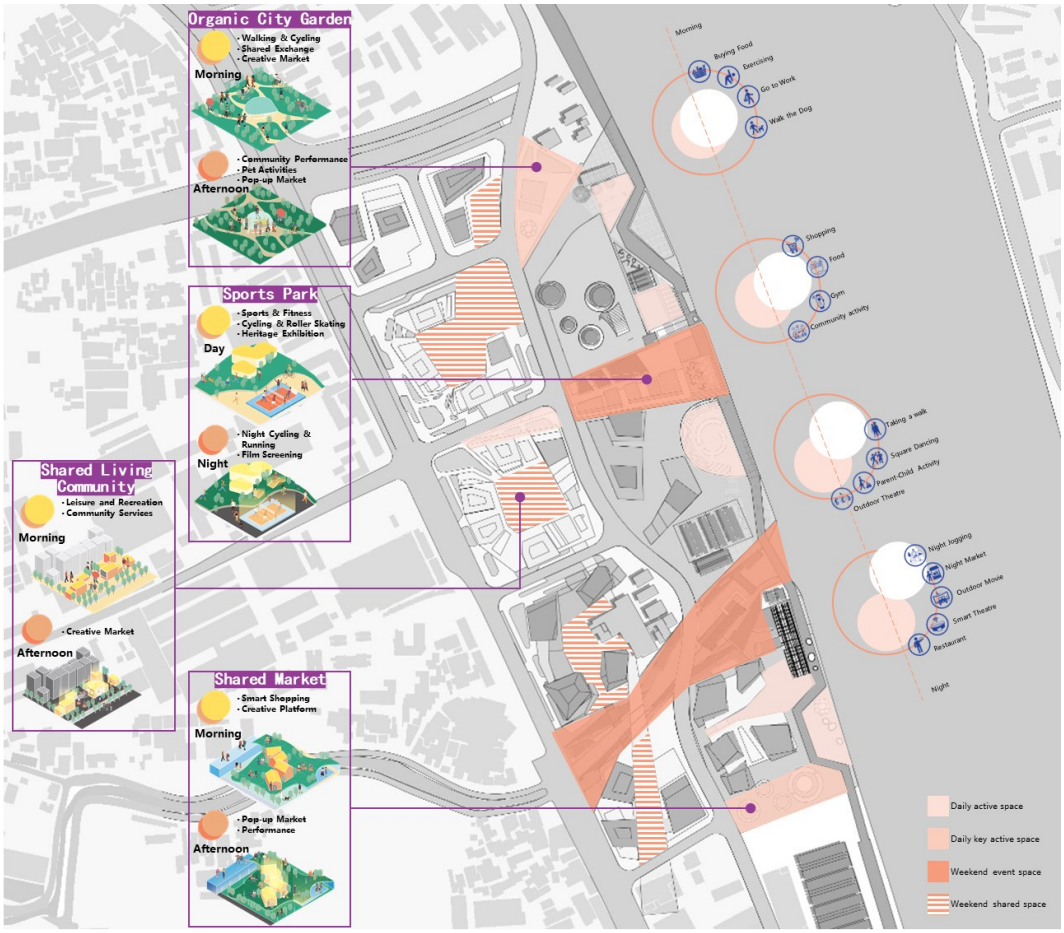


Figure 4-51 Multi-Time Period Mixed and Complementary Use Diagram

(Source: Drawn by Author)

(4) Functional multi-session mixed complementary use

The site design of the Zhoutouju area implements mixed and complementary use across different time periods, achieving efficient use of space and sustained vitality (Figure 4-51). Through careful planning, spaces can be flexibly transformed based on time and demand. For example, during the day, the space may be used for cultural exhibitions or creative offices, while at night, it transforms into markets, performance venues, or social spaces. This time-sharing design extends the usage cycle of the space and enhances its utilization efficiency. In the cultural experience zone and the waterfront vitality area, activity nodes like waterfront plazas, skywalks, creative markets, and family-friendly parks are set up. These nodes serve different functions at different times, such as providing office spaces and activities for families during the day and hosting markets or performances at night, ensuring the park remains vibrant throughout the day. Regular events like film festivals, music festivals, and creative markets can maintain public interest, generating city-wide conversations. This year-round event programming ensures that the Zhoutouju area retains its attractiveness and liveliness.

3) Embedding Shared Facilities to Meet Public Activity Needs (Penetrability, Daily Activity Intervention)

Under the shared concept, the convenience of embedding shared facilities is especially important. By integrating diverse, intelligent shared facilities, the convenience and service level of the space can be enhanced. The layout of these facilities should match the needs of the crowd and the primary functions, satisfying the demands for living, industry, and culture, while promoting penetration and daily activity engagement.

(1) Systematic Layout of Shared Facilities

Based on the shared concept and the functional needs of the place, a three-level facility system is established: “Basic Services + Smart Upgrades + Composite Sharing.”

a. Public Service Facilities

- **Basic Service Facilities:** Covering essential services such as public restrooms, medical aid points, and information kiosks, with a focus on increasing the density of facilities in special areas like waterfront spaces. These facilities should also include integrated modules for convenience, such as storage services and wireless communication.
- **Smart Service System:** Utilizing technologies like the Internet of Things (IoT) and big data, a smart system is created, featuring facilities such as smart stations, unmanned

convenience stores, and other cutting-edge services. Examples include driverless electric vehicles and smart walkways in Haidian Park, Beijing, and VR experience zones and unmanned smart stores in Shanghai's Pudong waterfront, which improve service efficiency.

• **Composite Sharing Centers:** Set up shared centers in each location, ensuring that there are shared stations within a 5-minute walking distance. These centers should integrate "Material Sharing Spaces + Slow Traffic Connection Points," "Community Workshops + Urban Libraries + Open Activity Areas," and "Daily Intervention Facilities: Shared Kitchens, Fitness Corners, Family Cafes," to meet the needs of various public activities (Figure 4-52).

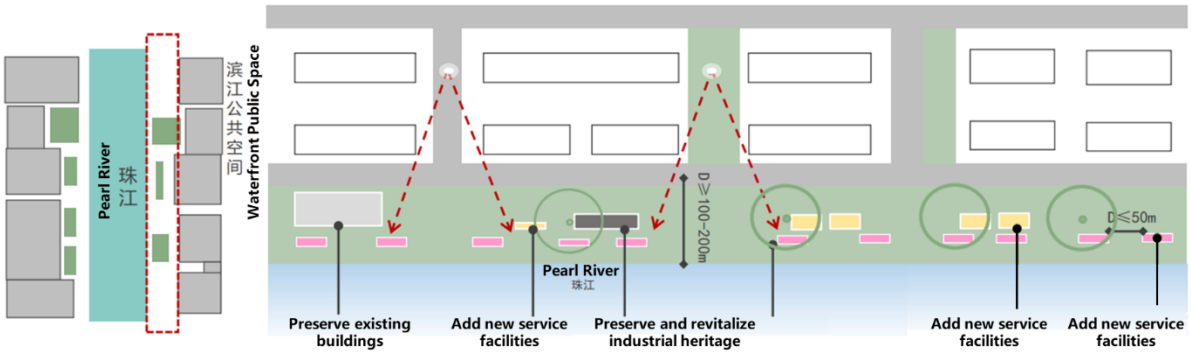


Figure 4-52 Public Service Facilities Diagram

(Source: Drawn by Author)

b. Rest and Entertainment Facilities

Rest and entertainment facilities are key to enhancing the vitality of public spaces. Properly arranging seating, table-chair combinations, and sheltered areas helps to meet needs for sightseeing, rest, and social interaction. The design of these facilities focuses on functionality and environmental integration, offering a variety of choices. Small facilities are placed around or in the corners of activity spaces to create multi-functional spaces, enhancing interest and attraction. Larger facilities such as sports courts should be placed in centralized areas, equipped with supporting services such as restrooms and storage, to make health-related activities more convenient. Activity facilities should be adapted to different demographic groups, such as outdoor fitness equipment for the elderly and fun exercise facilities like slides and climbing frames for children, making the space more inclusive (Figure 4-53).

Figure 4-53 Rest Facilities

(Source: https://www.richter-spielgeraete.de/de/spielraeume/)

(2) Technological Promotion of Shared Use of Spaces

a. Smart Technology and Shared Spaces

Technology plays a significant role in enhancing the cultural diversity and inclusivity of urban spaces. By leveraging media and digital platforms (such as social media), the voices of marginalized groups can be amplified, encouraging residents to participate in cultural projects and public space planning. For example, through innovative civic technology and smart city solutions, the commuting convenience of individuals with mobility impairments can be improved with real-time tracking, on-demand transportation services, and wheelchair-friendly facilities.

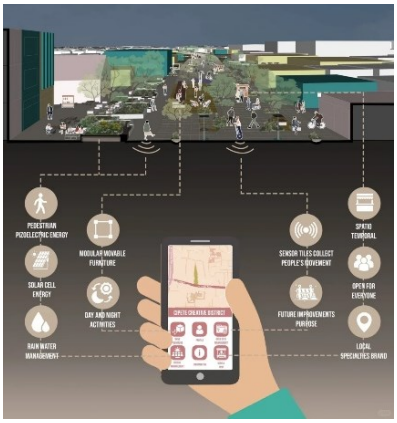


Figure 4-54 Digital Tools

(Source: Reference)

b. Digital Tools and Community Participation

Digital tools provide greater inclusivity in community planning and design. By using digital tools to promote community involvement in planning and design, diverse needs can be integrated into decision-making processes. Combining technology with inclusive design ensures that urban spaces can meet the varying needs of all residents, fostering social cohesion. Through the application of smart city technologies, the development of a more vibrant, shared, and equitable community in the Zhoutouju Bay area can be promoted (Figure 4-54).

4.5.3 Corridors

As the city's understanding of the function of corridors continues to evolve, corridors are no longer just a service for traffic flow, but can become multifunctional spaces for socializing, creativity, and experimentation. In waterfront industrial heritage areas, the design of corridors should integrate both transportation functions and social interaction functions, becoming a key element in promoting regional vitality and sharing. The roles that corridors can play in the

Julong Bay area include: corridors as living rooms (a "third space" for community integration), corridors as canvases (spaces for creative expression), and corridors as testing grounds (public space experiments with new technologies). This approach connects the regions, places, and nodes in the area into an organic whole, improving the integrity and accessibility of industrial heritage spaces, waterfront spaces, and the urban interior, enriching spatial layers, enhancing spatial quality, and strengthening the overall connection with surrounding spaces.

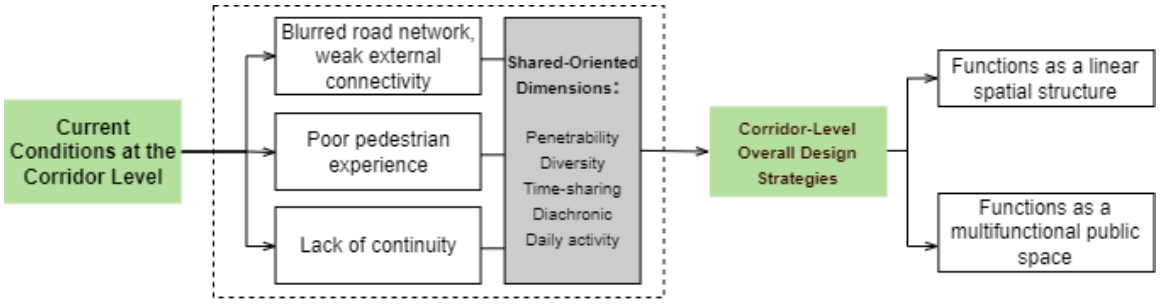


Figure 4-55 Corridor-Dimension Update Design Structure Diagram

(Source: Drawn by Author)

1) Corridor as a Linear Space Organization (Penetrability, Diversity, Time-Sharing, Daily Activity Intervention)

As a linear space connecting nodes, corridors should serve both transportation and social functions. In the Julong Bay area, the design of the corridors should be updated from the following aspects to enhance shared usage, accessibility, and spatial experience:

(1) Integration with Urban Network, Enhancing Coordination with Surrounding Roads

Public transportation in the Julong Bay area is concentrated on the west and north sides, and the internal roads are unclear. The industrial heritage is surrounded by barriers with little direct access, which limits pedestrian and vehicular access to the site. Therefore, in the planning and design of the road network in Julong Bay, it is important to enhance the connection with the surrounding transportation system and improve integration with external roads.

a. New and Expanded Roads

To break the isolation between external roads and the site, new roads need to be added and expanded within the area. This will improve connectivity between the area and the city's transportation system, providing more access points for pedestrian and vehicular traffic. The existing transportation network on the west and north sides provides sufficient pedestrian flow,

but the east and south sides need design strategies to guide traffic. Thus, a new 18-meter wide north-south road will be planned, connecting with the eastern waterfront landscape belt development, linking the urban interior with the riverside and facilitating the development of the urban and waterfront areas. By expanding the existing road network, the waterfront area and heritage nodes will effectively connect with surrounding roads, improving connectivity with the city and making it easier for external visitors to access. Additionally, vertical transportation (such as elevators and ramps) and horizontal connections (such as bridges and boardwalks) will be added to improve the link between the waterfront space and other areas of the city (Figure 4-56).

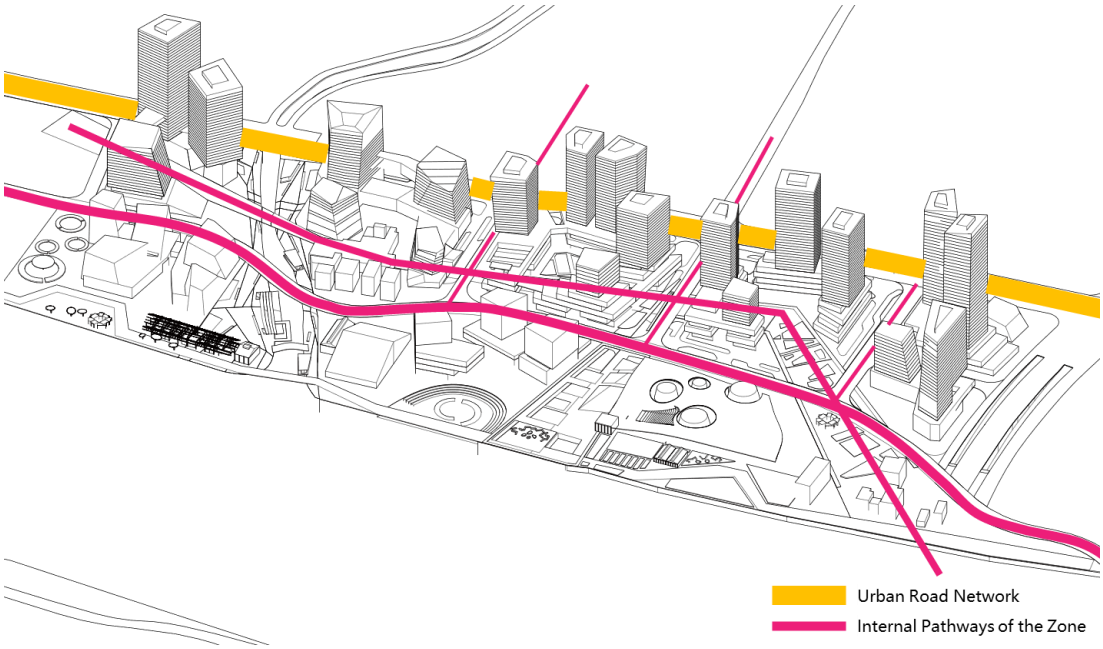


Figure 4-56 Integration of Corridor and Urban Network in Julong Bay Area

(Source: Drawn by Author)

b. Optimizing the Internal Pedestrian Traffic System

Within the Julong Bay area, the traffic system should be designed with pedestrian-vehicle separation, prioritizing walking. The periphery of each place should have a vehicle circulation loop to ensure smooth pedestrian and bicycle flow. The pedestrian paths should have diverse forms, such as ground roads and elevated walkways, enhanced with landscaping and small decorative elements to improve the comfort of the space and enhance the walking experience. By optimizing the walking system, the shared use and accessibility of public spaces are improved, encouraging interaction between different social groups.

The streets within the Julong Bay area are designed as pedestrian-priority streets. Additional rest and entertainment spaces should be added, allowing vendors to operate on the sidewalks. Cyclists can pass through the streets at low speeds. The loading and unloading

times for local merchants should be regulated to ensure a 3.5-meter emergency vehicle exit. The system should ensure that public transport and cycling routes can reach the pedestrian-priority streets.

c. Enhancing the Openness and Guidance of Entrances

Designing open and easily guided entrances will attract more foot traffic, increasing the accessibility and recognizability of the site. Open square-style entrances should be added, with striking pavements and guiding elements to lead people in, enhancing the openness of entrance spaces. The openness and guidance of the entrance will increase the permeability of the area, allowing visitors and residents to easily access and use public spaces, promoting regional vitality.

d. Adding Shared Transportation Points

Set up public bicycle and shared bike rental stations to improve connections with surrounding transportation.

(2) Continuity Design: Building a Diversified Pedestrian System

To enhance the accessibility and permeability of the waterfront area, the design of the corridors should ensure continuity, eliminating gaps within the region and forming a pedestrian system connecting the waterfront with the urban interior. Specific strategies include:

a. Increasing the Slow Movement Network, Enhancing Accessibility

Increase the subroads, alleys, and internal roads between waterfront plots, adding waterfront slow corridors to enhance the connection between the waterfront space, the Julong Bay area, and the urban interior. Add pedestrian bridges, boardwalks, and other facilities to eliminate gaps in the waterfront walkways and enhance public space access. Add slow access points to the waterfront public green spaces and squares to improve the accessibility of the waterfront public spaces. Strengthen the accessibility and permeability of the pedestrian system to conveniently connect different functional areas and historical heritage nodes, promoting social interaction within and outside the area.

b. Hierarchical Design of Traffic Function Corridors

The sections of the corridors serving traffic functions can incorporate various road forms, such as ground roads, canopies, and boardwalks, with color variations, creating a layered and complex traffic system to enhance the visual appeal and walking experience for users.

Optimize the walking and cycling conditions of the waterfront corridor, such as by laying dedicated pedestrian paths and cycling lanes, and setting up resting nodes to provide users

with convenient and comfortable experiences (Figure 4-57).

Figure 4-57 Hierarchical Design of Traffic Function Corridors

(Source: Drawn by Author)

c. Scale Adjustment of Traffic Corridors

Too wide or too narrow road spaces can make pedestrians feel uncomfortable and uneasy, reducing the likelihood of stopping and other activities. Therefore, for narrower roads, the spatial scale can be adjusted by changing the surrounding objects' transparency, colors, etc., to reduce the feeling of oppression in the space. For broader road spaces, the space scale is typically adjusted using paving, seating, small installations, and landscaping elements to create layers in the space, visually reducing the width of the street and bringing the boundary closer to people.

2) Corridors as Multifunctional Public Spaces (Diachronic, Penetrability, Diversity, Time-sharing, Daily Activity Integration)

Under the shared space concept, corridors are not only traffic flow lines but also public activity and social spaces. They connect places, spaces inside and outside buildings, and provide citizens with opportunities for communication, relaxation, experience, and creative expression. Corridors should not only serve the purpose of passage but also function as a link between spaces of different functions. In addition to fulfilling their transportation role, they should also promote social interaction and public activities within the area.

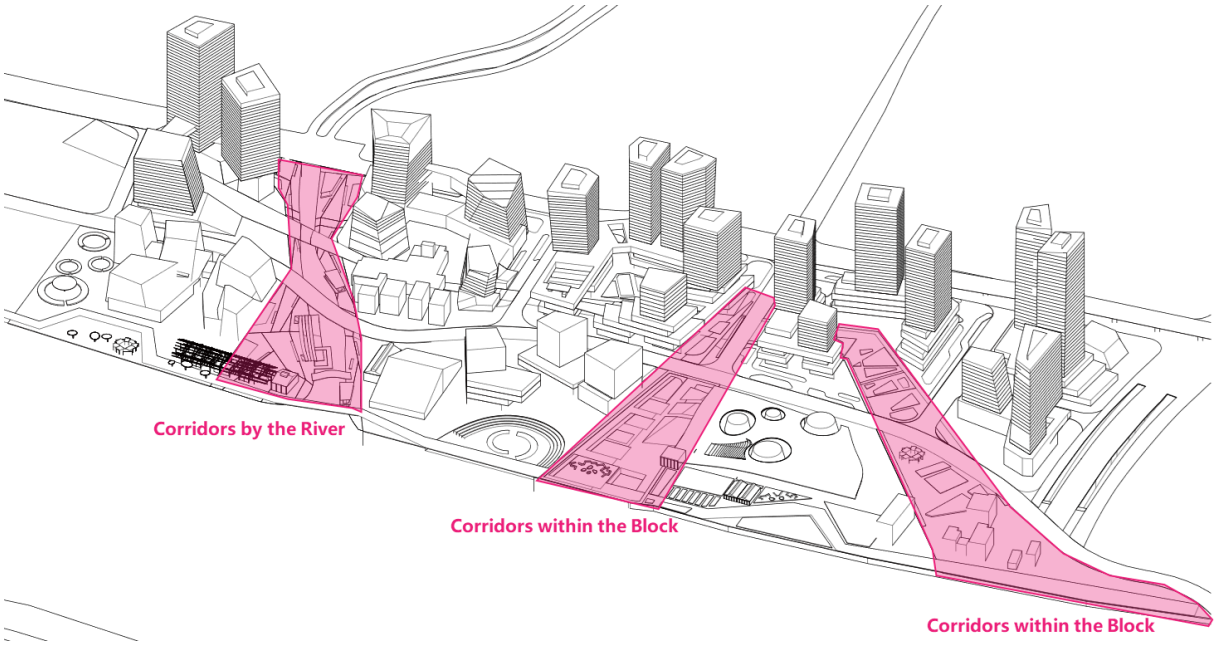


Figure 4-58 Corridor as a Multifunctional Public Space

(Source: Drawn by Author)

(1) Corridor as a Living Room: "Third Space" for Community Integration

a. Corridors within the Block

By setting up different functions within the corridor, social interaction can be stimulated. For example, placing shared workspaces, community activity rooms, and cultural exhibition areas along walking corridors transforms the corridor into a multifunctional space for socializing, working, and relaxing, promoting communication and interaction between different social groups. In some areas, expanding the corridor space and adding tactical plazas, car parks, and sidewalk cafes can create infrastructure conducive to social interaction. These elements support interpersonal communication within the block, fostering connections among community members and promoting harmonious neighborhood relationships.

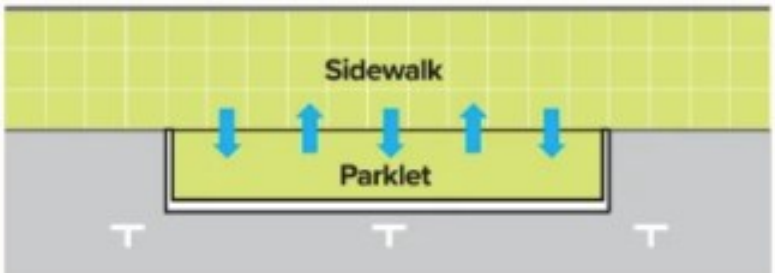


Figure 4-59 Corridor within the Block

(Source: Drawn by Author)

b. Corridors by the River

The corridors in the waterfront area should fully consider water-friendly designs, allowing citizens to enjoy water views while participating in public activities and social

interactions. These water-friendly designs not only provide scenic views but also enhance the interactivity and shared use of the space.

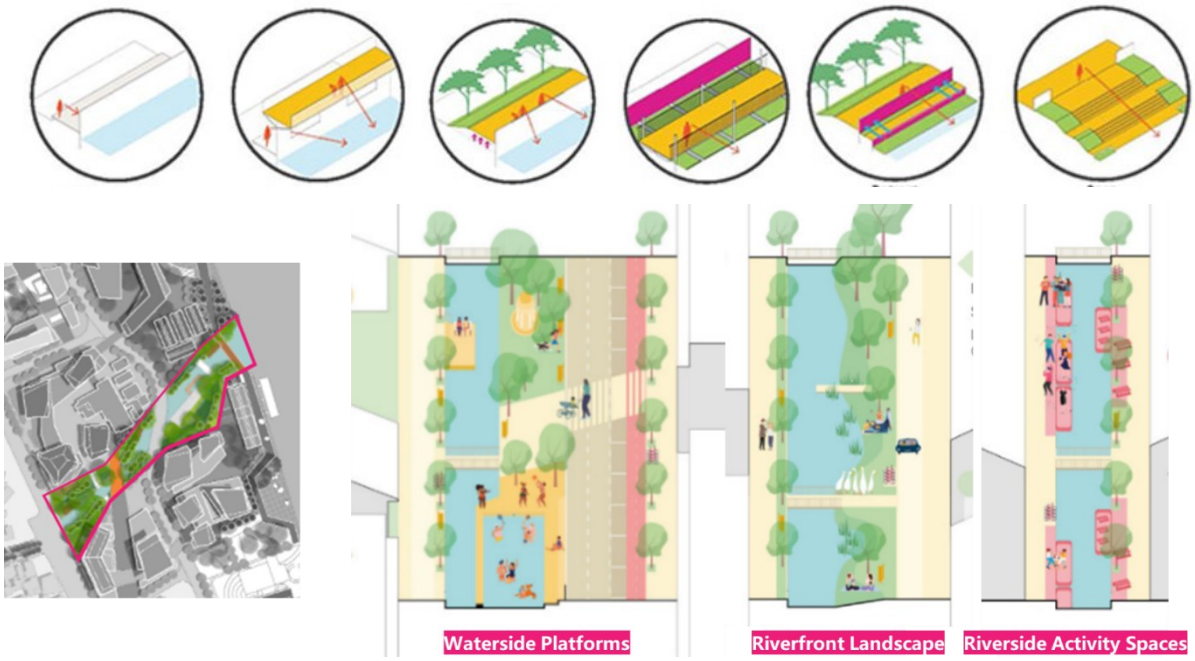


Figure 4-60 Corridor by the River

(Source: Drawn by Author)

The corridors along both sides of Dachongkou Creek will be transformed into spaces for daily traffic, social gatherings, weekend markets, or special events. The hard riverbank will be replaced with soft ecological embankments, restoring the river ecosystem while reshaping the natural landscape. In addition, water platforms, landscape walkways, and public rest areas will be added along the riverbank. Vehicular roads will be concentrated on one side of the river or partially diverted to achieve pedestrian-vehicle separation; a greenway system will be designed, with pedestrian overpasses connecting public green corridors divided by urban roads, ensuring the continuity and safety of riverside pedestrian routes. The river corridor will integrate leisure functions such as cultural exhibitions, children's entertainment, citizen relaxation, and ecological science education, forming sectioned spaces with different themes and functions. Activities such as lantern festivals and outdoor movie screenings will be organized to enrich residents' entertainment life while stimulating commercial vitality.

(2) Corridor as a Canvas: A Place for Creative Expression

The design of the corridor can integrate creativity and cultural expression into public spaces through methods such as street art, artistic installations, and interactive art exhibitions. In the corridors near industrial heritage, the combination of historical buildings and modern designs can incorporate street art, temporary art installations, cultural guidance systems,

information display screens, etc., enhancing the historical significance of the place and the cultural identity of local residents, workers, visitors, and occasional users. By incorporating creative expressions, the corridor not only serves as a functional space for movement but also becomes a visually appealing art gallery with cultural depth, further enhancing its diversity.

(3) Corridor as an Experimental Ground: A Space for New Technologies and Innovation

Introducing new technologies and innovative designs in corridor spaces provides a platform for public space experimentation. For example, smart benches, interactive displays, and intelligent parking systems can enhance the functionality and interactivity of the corridor, increasing public usage of the space. By innovating with technology and shared public spaces, we can enhance the experience of citizens while contributing to the sustainable development of urban spaces. In the road design of the area, experiments can be made with self-driving lanes and shared, adaptable lanes, utilizing these technologies to optimize underutilized road spaces, reshape the site's texture, and improve street scale.

4.5.4 Boundaries

Under the guidance of the shared space concept, boundary design is no longer just about physical separation but needs to create dynamic interfaces through connection, penetration, and interaction. Especially in the reuse and renewal of waterfront industrial heritage in the Julong Bay area, the boundaries should not only dissolve the barriers between heritage buildings and the surrounding environment but also create transition spaces that protect history while integrating modern life. This transformation from "closed isolation" to "penetration and sharing" is key. The design and renewal of boundaries should meet the spatial needs of waterfront spaces, major urban roads, places, and buildings, enhancing visual permeability, functional complexity, and social interaction to increase the shared nature of the space.

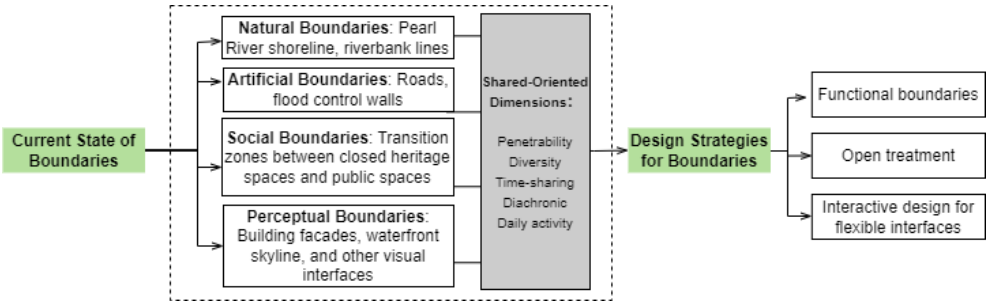


Figure 4-61 Boundary Layer Update Design Structure Diagram

(Source: Drawn by Author)

1) Functional Shared Boundaries: Connection and Integration between the City and the Waterfront Heritage Area

The boundary between the industrial heritage area and the urban space, especially the transition design of traffic and functional interfaces, is crucial. Through appropriate transitional designs, the sense of division between areas can be reduced and the integration of spaces can be enhanced. The left side of the Zhoutouju area is adjacent to the main road, Fangcun Avenue East, with frequent vehicle and pedestrian activity, and the public space quality is relatively low. Therefore, several strategies can be used to optimize the boundary space:

(1) Shaping Concave Public Spaces

Drawing from the “niche effect” proposed by Jan Gehl (where buildings, structures, or trees create concave spaces that attract crowds), concave public spaces can be designed between the urban road and the Zhoutouju area boundary. These spaces can be integrated with surrounding public transportation stops, residential areas, and commercial entrances, creating small expansion areas (Figure 4-62). These spaces can be equipped with resting facilities and landscape features, providing interactive functions, and using shared facades and functional spaces as boundaries to create places suitable for people to stay.

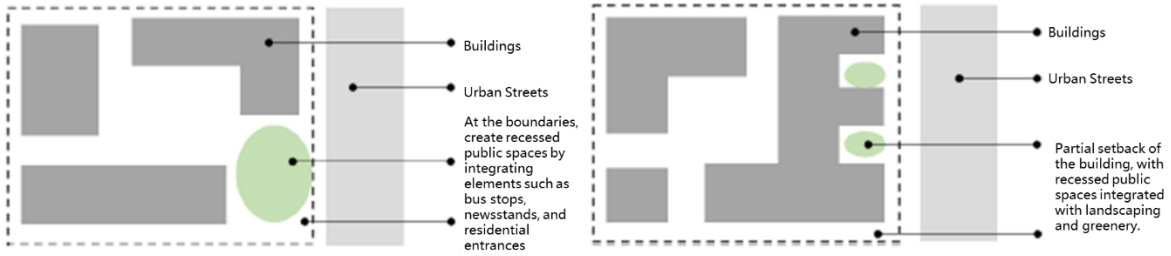


Figure 4-62 Concave Public Space

(Source: Drawn by Author)

(2) Adding Linear Parks

On the side of the area adjacent to the city's main road, part of the road and non-motorized lanes can be transformed into a linear park, incorporating bike lanes, sidewalks, play areas, and greenery. By enriching the street functions, sustainable modes of transportation can be encouraged, and the traffic network can be optimized.

2) Open Treatment to Enhance Spatial Permeability

Previously, the spatial interfaces in the Zhoutouju area were mostly closed forms, with many boundary areas employing closed walls or fences. Therefore, open treatment is required,

which involves removing obstacles, enhancing permeability, breaking down closed boundaries, and guiding the integration of the site with surrounding areas. This reduces physical and psychological barriers, enhancing the space's permeability and interaction.

(1) Ground Floor Interface Activation

When the boundary is made up of solid buildings, parts of the building can be set back or partially elevated on the ground floor, creating an open interface that breaks down the previous closed boundary. When the boundary consists of walls or fences, these can be demolished to create open entrances, allowing direct connections between the building or site and major city roads, improving accessibility and social functionality.

For street-facing commercial buildings, the interface can be enhanced through transparent facades and open ground floors, forming a combined market and promoting internal-external communication, reducing physical and psychological barriers. For waterfront buildings, observation platforms and transparent facades can be set up to strengthen the visual connection between the waterfront and enhance the relationship between the waterfront area and urban space (Figure 4-63).

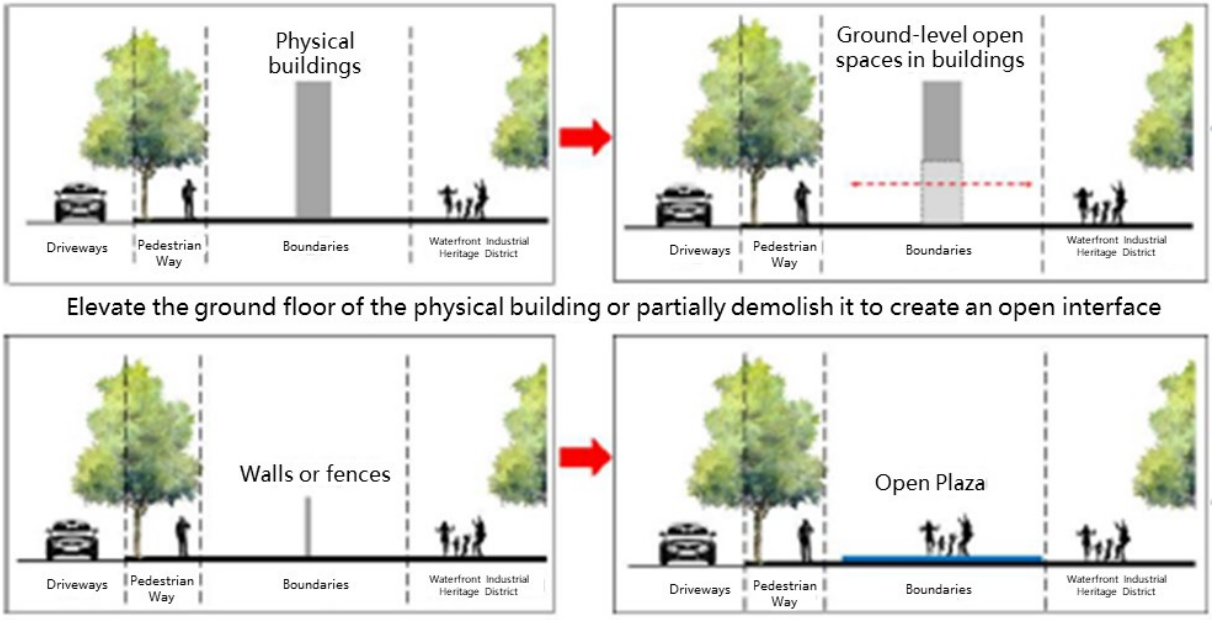


Figure 4-63 Ground Floor Interface Activation

(Source: Drawn by Author)

(2) Waterfront Embankment Shared Use

The previously rigid embankment fences will be transformed into accessible platforms and ecological embankments. Through step-type embankments or gentle sloping embankments, people will be able to get closer to the water's surface. At the same time, soft

ecological slopes will be used to enhance the natural landscape of the waterfront area, bringing the riverside living space back to the public, and realizing the shared use of the riverside for all citizens (Figure 4-64).

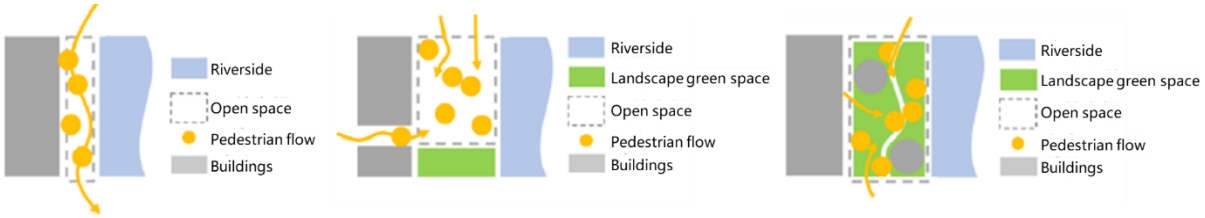


Figure 4-64 Waterfront Embankment Shared Use

(Source: Drawn by Author)

Additionally, the waterfront embankment interface space can incorporate shared offices, creative workshops, and cultural exhibition areas to create functional intersections and achieve facility integration. Smart terminals, shared bicycle parking areas, and modular stations (integrating inquiry/relaxation/retail services) can be embedded to provide supportive services.

3) Flexible Interface Interaction Design

For physical interfaces that are difficult to dismantle, flexible treatment through blurring and diversified design can help to obscure spatial boundaries, creating a more approachable and interactive environment. This approach enhances the appeal of pedestrian flow through visual permeability and spatial connection.

Figure 4-65 Facade Blurring

(Source: Reference)

(1) Physical Softening

a. Facade Blurring

Blurring the facade of physical buildings can be achieved by using transparent or hollow treatments in parts of the building, altering the visual scale of the facade and increasing visual permeability. Vertical greening or soft partitions can reduce the rigidity of buildings and attract more people to linger and use the space.

b. Transforming Physical Walls

Removing physical walls or using hollow designs, enhanced with greenery, landscape features, and open spaces, can boost visual permeability. This ensures that the boundary is no longer a barrier but a vibrant transitional space. This approach enriches the interface while enhancing its appeal and attractiveness.

(2) Digital Softening: Integration of New Media Technology

By incorporating digital media technologies into the media curtain walls of urban buildings, it is possible to include advertisements or brand effects (like the multimedia curtain wall facades of Victoria Harbour), thus increasing the visibility and cultural communication of industrial heritage.

Figure 4-66 Multimedia Curtain Wall Facade of Victoria Harbour (Source: https://std.stheadline.com/realtime/article/1848648/)

4.5.5 Nodes

As the core element of spatial organization, nodes not only connect different functional areas, but also assume the roles of cultural heritage, social interaction and historical expression. Especially in the process of reuse of waterfront industrial heritage areas, nodes are not only witnesses of history, they should be transformed into cultural carriers, social platforms and functional intersections of modern cities through innovative design. Therefore, the node design of Julong Bay area should focus on the concept of sharing, and enhance the sharing, social interaction and cultural value of the nodes through the following strategies.

1) Transforming the Interior of Historical Warehouse Buildings into Shared Functional Nodes

Historical warehouse buildings have high adaptability and spacious interiors, which can meet the needs for flexible working environments. These buildings are well-suited for transformation into multi-functional shared nodes through light-touch interventions and functional updates (Figure 4-67). This approach allows for the preservation of their historical value while accommodating modern uses, thus creating dynamic spaces that serve various community functions.

Figure 4-67 Transformation of Building Interior Space (Source: Drawn by Author)

(1) Functionally Integrated Design

a. Transformation into Innovation Space

During the update process, the flexibility of warehouse buildings can be utilized to create personalized work environments for technology innovation communities, catering to the needs for social interaction and knowledge sharing.

• **Asiatic Huadi Warehouse**: The circular architectural form is preserved, with large, landscape-oriented volumes connecting the original structure while adding substantial usable space. The newly built building on the left will integrate tech innovation spaces to serve the surrounding headquarters enterprises (Figure 4-68).

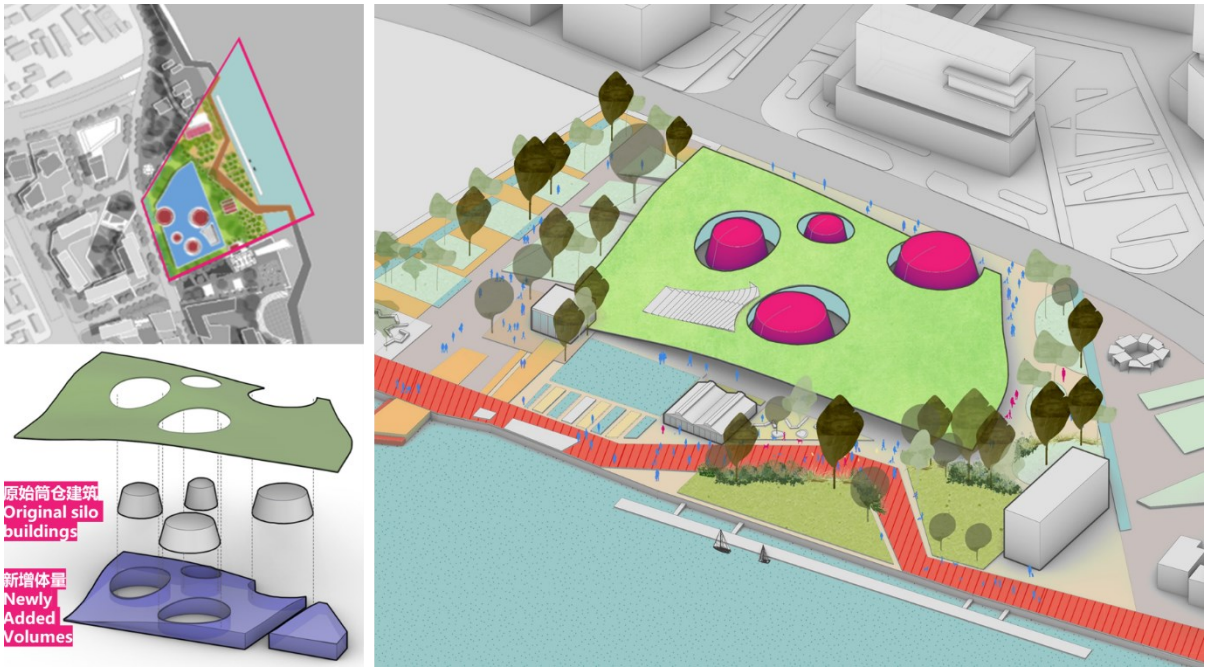


Figure 4-68 Functional mixed-use design for Huadi Warehouse

(Source: Drawn by Author)

• **Chongkou Warehouse and Nissin Warehouse:** The original structure and facade are retained, with modern glass frameworks added to the historic building. The open and structural advantages of this combined space allow the conversion of the former industrial spaces into new innovation spaces. These spaces will be used for flexible functions such as shared offices, exhibition spaces, and public reading areas, catering to industries with smaller space needs. These could be used for low-cost office spaces for online new economy industries, such as online education platforms, online research and design platforms, and online entertainment platforms. The space will integrate technological research and development functions, fostering a digital cultural cluster, leveraging collaboration with universities in Guangzhou to create a space for the transformation of research achievements. This will be an open, social, and collaborative public space designed to bring together cross-disciplinary tech communities for high-density, collaborative work.

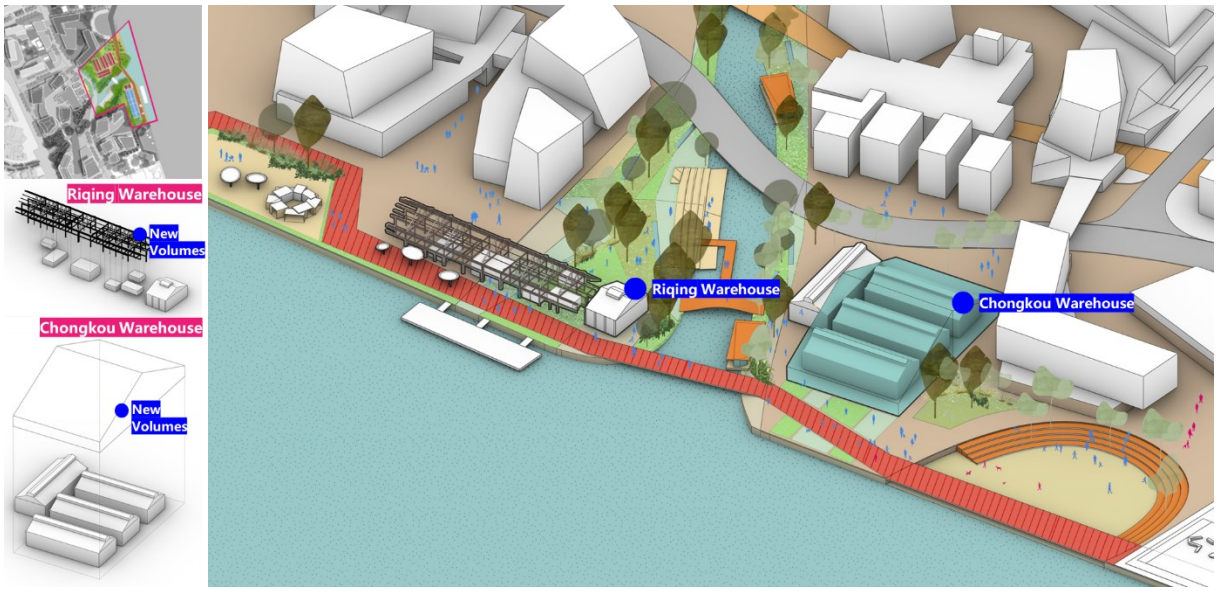


Figure 4-69 Functional mixed-use design for Nissin Warehouse and Chongkou Warehouse

(Source: Drawn by Author)

b. Integration of Culture and Commerce

Some warehouse spaces can still retain their original storage functions and be transformed into "front store, back warehouse" setups. These stores could sell items such as furniture, AI experience products, and 3C products, while also hosting pop-up events along the riverside. This would not only expand the display and usage areas of the store but also integrate commercial activities into the daily lives of residents and the community.

Figure 4-70 Diagram of Cultural and Commercial Integration

(Source: Drawn by Author)

(2) Flexible Space Layout

Through modular and adaptable designs, the space can support activities such as cultural exhibitions, creative markets, and temporary offices, improving space efficiency while preserving industrial elements such as high ceilings and steel frames. This helps to maintain the historical atmosphere and readability of the space (Figure 4-71).

Spatial Function	Shared Reading Area	Curation And Communication Area	Exhibition Area	
Spatial Form	Semi-outdoor	Transparent Indoor	Enclosed Indoor	Outdoor

Figure 4-71 Flexible Space Layout

(Source: Drawn by Author)

(3) Continuation of Construction Techniques

When restoring the historical form of the Nissin Warehouse site, the texture parameters of the preserved brick facade can be extracted, and 3D printing technology can be used to reconstruct a translucent concrete curtain wall, creating a dynamic interface of light and shadow.

2) Introduction of Creative Activities and Cultural Exhibition Spaces

In the process of updating and reusing, in addition to physical transformation of the space, integrating art and cultural elements enhances the social and cultural value of the nodes.

(1) Reproduction of Cultural Memory

Set up industrial heritage exhibitions in the node spaces, using information displays, interactive devices, and digital guides to narrate the history and development of the warehouse area, enhancing the public's understanding of the heritage's value. Art elements can also be introduced through installations, murals, and light projections to enhance the visual attraction and charm of the space.

(2) Community co-creation model

A key focus of the shared space concept is resident participation. Therefore, in the early stages of the update, it is important to collect feedback from residents and discuss the functionality of the public space with them to ensure the design meets their needs. In today's digital media age, establishing a digital sharing platform allows citizens to co-manage, reserve, and use the space, improving the operational efficiency of shared spaces. During the operation of each node, regular cultural activities such as markets, exhibitions, and forums can be held to stimulate community vitality and encourage social interaction.

(3) Creative and Cultural Spaces

Set up exhibition halls, creative workshops, and cultural activity centers in the warehouse buildings as platforms for cultural expression and artistic creation. Outside the warehouse buildings, design flexible event spaces such as open squares, cultural markets, and temporary exhibition areas, making these nodes adaptable to the needs of the community and citizens and promoting public activities (Figure 4-72).

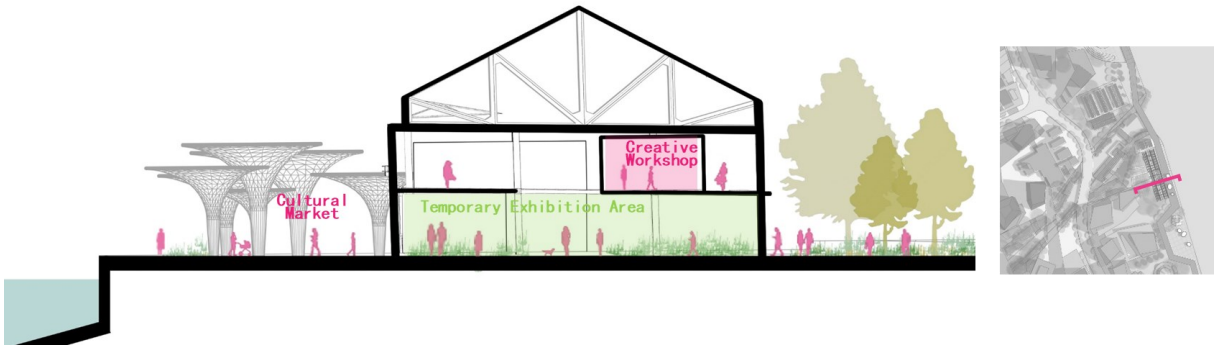


Figure 4-72 Diagram of Creative and Cultural Space Layout

(Source: Drawn by Author)

For example, the Asiatic Huadi Warehouse can incorporate its circular architectural form into the "Industrial Year Ring" landscape installation: converting the industrial heritage history of Huadi Warehouse and the Julong Bay area into concentric circular paving systems, combined with LED ground light strips to dynamically display historical data. On the southern side of this node, a "Tidal Theatre" can be set up, combining the entertainment function of the nearby plot, with a hydraulic lift stage to create two modes: everyday height +3.5m as a waterfront plaza, and during the wet season, it can be raised to +5.0m for performance stages.

3) Linear Connectivity Design of Nodes

Enhance the connectivity and accessibility of nodes with the waterfront space and the city center through pedestrian pathways and vertical transportation optimization.

(1) Pedestrian Pathways and Node Connectivity

Construct a three-level roaming loop system through semi-open corridors and green belts, connecting the waterfront with the interior to enhance spatial flow and landscape permeability: Heritage Inner Loop: Connect the core nodes of the warehouse via elevated corridors. Waterfront Mid Loop: Set up tidal-responsive floating dock walkways. Urban Outer Loop: Lay an intelligent night-glow running path along the waterfront area, integrated into the city's slow traffic system.

(2) Vertical Transportation and Independent Rooftop Terraces

During the renovation of industrial warehouse buildings, most of the space will be occupied by offices, entertainment, and other functions. This can create operational challenges where internal documents or assets need to be secured, limiting public access to the historical buildings.

Thus, during the renovation of historical buildings, vertical transportation (e.g., elevators, stairs) can be added to improve connectivity between different functional areas, especially for shared spaces like rooftop terraces. These vertical spaces not only enhance the flow of the area but also provide independent functional spaces, such as rooftop gardens and observation platforms, increasing the usage and attractiveness of public spaces. Rooftop terraces can be independently operated as spaces for social activities, leisure, or enjoying city views, thereby increasing the building's public functionality.

4.6 Chapter Summary

This chapter, based on the shared space analysis in Chapter 3, explores the shared space renewal of waterfront industrial heritage from three dimensions: design goals, principles, and strategies, and constructs a design framework for the renewal of waterfront industrial heritage with the core concept of “shared space.”

The goals section clarifies the direction of the renewal design, focusing on openness, complexity, cultural memory, and modern landscape creation. The principles section presents theoretical support for shared space design, such as historical continuity and permeability. The strategies section builds a multi-scale renewal model through the five spatial elements of “region-place-corridor-interface-node,” and, based on this, provides empirical design for the Julong Bay waterfront area. Specific design proposals are suggested, integrating factors such as waterfront landscape, traffic systems, industrial structure, and spatial form, and discusses the practical path for the transformation to shared space.

Compared to the existing renewal models, the shared space approach for the renewal of waterfront industrial heritage areas is more inclusive and sustainable. By opening up the barriers in waterfront spaces, expanding public property boundaries and spaces, and emphasizing the social positive effects of integrating natural, architectural, and cultural elements in the waterfront area, this approach promotes the social value of shared spaces.

Summary and Outlook

5.1 Research Summary

Starting from the “sharing concept”, this paper selects the warehouse area of the foreign wharf in the back channel of the Pearl River in Guangzhou as the core research area, and combines theoretical discussions, case studies, spatial analyses and design practices to construct a set of sharing renewal strategy system with theoretical depth and practical adaptability for waterfront industrial heritage. The specific research findings can be summarised as follows:

(1) Through the systematic analysis of the development of industrial heritage protection and the theoretical development of the concept of sharing, the core logic of shared renewal has been clarified, i.e., based on the spatial view of “from ownership to use”, the transformation of urban stock space into multifunctionality, openness, sharing and social participation has been promoted, which has enriched the theoretical dimensions of industrial heritage renewal.

(2) Through research and analysis of the historical evolution, spatial characteristics, and shared space conditions of 13 typical waterfront industrial heritage sites in the Pearl River Back Channel area, common issues in the current renewal process, such as “lack of value recognition, weak spatial accessibility, and single-function updates,” were identified. By using a five-dimensional shared space evaluation framework—“Penetrability, Diversity, Time-sharing, Diachronic, Daily activity”—and through classification and investigation, the spatial potential and usage bottlenecks were ultimately analyzed.

(3) A renewal strategy system was built based on shared space dimensions, incorporating five spatial elements: zone, place, corridor, boundary, and node. The system emphasizes multi-scale collaboration, functional complexity introduction, and the integration of shared governance mechanisms. A systematic approach was proposed, ranging from urban-scale planning to architectural-scale scene creation.

(4) Taking Julong Bay Area as the empirical object, the design model of shared regeneration is proposed and the multidimensional spatial strategy is practically verified, which reflects the design expression oriented by “place reconstruction + landscape continuation + shared embedding”, and preliminarily verifies the adaptability and operability of the research method.

5.2 Research Prospects

Although this study attempts to construct a systematic approach to the renewal of shared waterfront industrial heritage, there are still the following shortcomings and room for further research:

(1) The research sample mainly focuses on the area around the Pearl River Back Channel in Guangzhou, which has certain limitations in terms of representativeness. In the future, it can be extended to other types of waterfront industrial heritage sites or industrial heritage sites in other regions of the city to test the universality and adaptability of the policy system.

(2) The dimensions of the sharedness assessment in this paper are based on qualitative and partly quantitative analysis, and lack the support of systematic public participation and behavioural data. Future research can introduce big data, spatial behaviour tracking and survey research to deepen the evaluation system of sharedness effectiveness.

(3) The renewal strategies and design recommendations have yet to be deeply integrated with implementation mechanisms and policy frameworks. Future research should focus on combining industrial introduction mechanisms, spatial operation models, and multi-agent coordination systems to explore the full process of translation from “planning and design to governance and operation.”

(4) At the level of theoretical construction, it is still necessary to further integrate the results of urban sociology, behavioural geography and other interdisciplinary disciplines, promote the deepening of the expression of the concept of sharing in the renewal of urban stock, and establish a model of shared space evaluation and guidance for urban management.

Under the background of high-density urban development and space resource tension, how to realise the two-way coupling of “historical value and actual demand” for waterfront industrial heritage as the city's cultural gene and waterfront space carrier is an important proposition for urban design and renewal research. In the future, we should continue to explore the interactive way of “sharing-participation-governance” to provide more comprehensive and sustainable systematic solutions for industrial heritage activation.

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