

Protection and Utilization of Industrial Heritage under the Mode of Heritage Corridor-Take Chongqing's Two Rivers and Four Riversides as an Example

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Abstract: This article takes the industrial heritage of Chongqing's two rivers and four riversides as an example, through field research, historical data analysis, literature review, questionnaire survey and upper planning study, sorts out the four main research objects under the mode of heritage corridor, and analyzes the distribution, development status, characteristics and utilization of the industrial heritage of the two rivers and four riversides. Aiming at the core problems of the development of industrial heritage on the two rivers and four banks in Chongqing, on the basis of its typical characteristics and requirements, this article establishes planning objectives and strategies, constructs a heritage corridor system, proceeds overall protection, planning and management; embodies the characteristics of the heritage corridor focusing the function, space, transportation and culture. In order to provide methods and suggestions for the protection and utilization of the industrial heritage of Chongqing's two rivers and four riversides, promote the inheritance of industrial heritage culture, and stimulating the vitality of the two rivers and four riversides and the surrounding areas.

Industrial heritage is a special cultural heritage in China, which contains precious material cultural resources and intangible cultural heritage. Chongqing is one of the few cities in China that has preserved the industrial heritage of the port opening period, the Anti-Japanese War period, the "First and Second Five-Year Plan" period after the founding of New China and the "Third line" construction period, it has a long industrial history, and has particularity in the domestic industrial heritage. Chongqing attaches great importance to the protection and utilization of industrial heritage, from 2017 to 2022, Chongqing formulated 《Chongqing Industrial Heritage Protection and Utilization Planning》 and 《Chongqing's Implementation Opinions on Strengthening the Preservation and Inheritance of Historical Culture in Urban and Rural Planning and Construction》,

to explore, identify and develop all the industrial heritage (including storage) in the main city and suburbs of Chongqing, establish the value evaluation system of Chongqing's industrial heritage, analyze and evaluate the historical value, scientific value, social value, artistic value and scarcity value of each industrial heritage. Under the policy background of "two rivers and four riversides" space improvement in Chongqing, in order to meet the new functional needs of the city, it is of great significance to review the overall situation of the riverside industrial heritage in the main urban area of Chongqing and study the strategic path of its protection and activation utilization.

1. Definition of Relevant Concepts

1.1 Two Rivers and Four Riversides

Chongqing's Two Rivers and Four Riversides refer to the Four bank lines of the Yangtze River and Jialing River, namely Nanbin Road, Changbin Road, Jiabin Road and Beibin Road[1]. The total length of the bank line is 394 kilometers, and the hinterland area along the river is nearly 231 square kilometers. The core area of the two rivers and four riversides is enclosed by Chaotianmen area, Jiefangbei area, Jiangbeizui area, Danzishi area and Longmenhao area in the intersection area of the Yangtze River and Jialing River. The overall improvement is of great significance for promoting the construction of Chengdu-Chongqing twin city economic circle and the construction of an internationalized, green, intelligent and humanized modern city.

1.2 Heritage Corridor

Corridor is a strip of land that is different from the substrate on either side. Corridor is a linear narrow landscape unit different from the matrix on both sides, which plays the dual role of passage and barrier[2]. All landscapes are divided and connected by corridors, and their structural features have a strong impact on the ecological processes of a landscape. The first American scholar Little put forward the concept of Heritage Corridor in his paper 《Green Way for America》 and defined it as four types, among which the second type of green way features, That is, the open space connecting parks, nature reserves, historical and cultural relics and cultural concentration areas is close to the connotation characteristics of the heritage corridor [3]. Later, Charles A Flink proposed that heritage corridors are linear landscapes with special cultural resources, usually with obvious economic centers, booming tourism, adaptive reuse of old buildings, entertainment and environmental improvement [4].

2. Present Situation and Characteristics of Industrial Heritage of Two Rivers and Four Riversides

2.1 Distribution and Development Status of Industrial Heritage on Two Rivers and Four Riversides

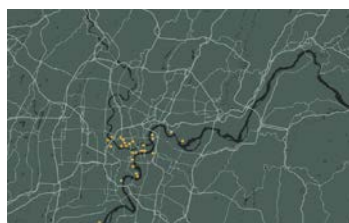


Figure 1: Industrial heritage distribution of two rivers and four riversides

Table 1: Industrial heritage directory of two rivers and four riversides

Serial number	Name	Category	Build time	County
1	Chongqing Special Steel Works	Metallurgy and Processing	1919	Shapingba District
2	Chongqing Asbestos Products Factory	Building materials	1939	Dadukou District
3	Wangjiang Manufacturing Factory	Machinery and weapon	1938	Jiangbei District
4	Jiangling factory	Machinery and weapon	1936	Jiangbei District
5	The medical factory complex moved during the war	Light industry (pharmaceutical industry)	1938	Jiangbei District
6	Shunchang Iron Works	Metallurgy and Processing	1938	Jiangbei District
7	Chang 'an Precision Instrument Factory	Machine manufacturing	Early years of the new nation	Jiangbei District
8	Chongqing Papermaking Factory	Light industry	1939	Jiangbei District
9	Chongqing Dongfeng Shipbuilding Industry Company	Shipbuilding industry	1928	Jiangbei District
10	Tianyuan Chemical Plant	Chemical engineering	1938	Jiangbei District
11	White Cat Daily Chemical Factory	Chemical engineering	—	Jiangbei District
12	Daxigou Power Plant	Infrastructure production and supply industry	1938	Yuzhong District
13	Chongqing Textile Warehouse	Else	1956	Jiangbei District
14	The First Printing Factory	Books and periodicals	1960	Yuzhong District
15	The Second Printing Factory	Light industry	1950s	Yuzhong District
16	Chongqing Cannery	Light industry	1960s	Jiulongpo District
17	Chongqing Prospecting Machinery Factory	Machine manufacturing	1964	Shapingba District
18	The former site of the Asia Petroleum Company	Chemical engineering	1918	Jiangbei District
19	Changjiang Electric Factory	Machinery and weapon	1905	Nanan District
20	Tie Ma Factory	Machinery and weapon	1941	Jiulongpo District
21	Tank's Warehouse of Chongqing	Machinery and weapon	1970	Jiulongpo District
22	501 Warehouse	Else	1965	Jiulongpo District
23	Dadu Village Grain Warehouse	Else	1940	Dadukou District
24	Historical Building Complex of Chongqing Tea Factory	Light industry	1910	Nanan District
25	The former site of the Danzishi printing factory	Light industry	1920	Nanan District
26	Baishatuo Yangtze River Railway Bridge	Else	1958	Dadukou District

Chongqing is a famous old industrial city, under the influence of special natural conditions and historical background, there are a large number of industrial heritages gathered along the Jialing River and the Yangtze River, which have important values and distinctive characteristics. But the overall protection and activation utilization process of Chongqing lags behind other industrial cities.

As of November 2021, Chongqing has added more than 140 industrial heritage sites to the industrial heritage protection list. There are a total of 59 industrial heritages in the main urban area of Chongqing, including 6 industrial heritages in the category of district protection, 52 industrial heritages in the category of building protection, and 1 industrial heritage in the category of element protection. There are 10 first-class industrial heritages, 19 second-class industrial heritages, and 30 third-class industrial heritages, mainly distributed along "two rivers and four riversides"(Figure. 1, Table 1).

According to the current situation of the distribution and industrial basis of Chongqing's industrial heritage, combined with the development orientation of Chongqing and the actual development of each district and county, the planning layout diagram of "one heart, three belts and multiple points" for the protection and utilization of industrial heritage was further defined (Figure 2). It mainly includes three aspects: overall spatial planning and layout, core protection and utilization of industrial heritage agglomeration in central urban area, and industrial heritage preservation and utilization in agglomeration belt [5]. Create a "life show belt", form an industrial heritage corridor with Chongqing characteristics, let people feel the charm of the city's industrial heritage, at the same time, continue the historical context, improve the city function, stimulate the vitality of the city.

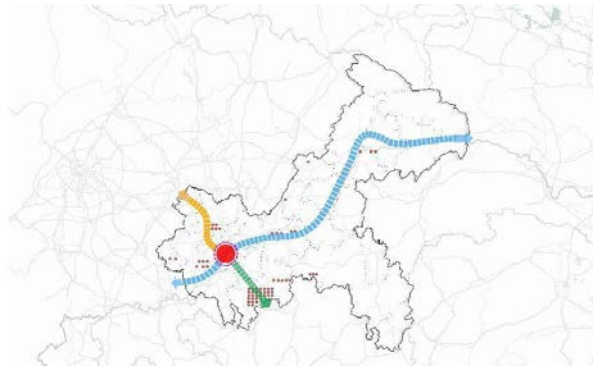


Figure 2: Planning layout diagram of Chongqing Industrial Heritage protection and utilization -- "One heart, three belts and multiple points"

2.2 Industrial Heritage Utilization of Two Rivers and Four Riversides

With the development of urbanization, the areas where traditional industries are located have become the core areas of urban development after their original production functions disappear. Moreover, due to the reduction of available space within the city, industrial heritage areas have gradually become the main content of urban reconstruction and renewal [6]. In June 2020, the National Development and Reform Commission, the Ministry of Industry and Information Technology, the State-owned Assets Supervision and Administration Commission of the State Council, the State Administration of Cultural Heritage, and the China Development Bank jointly issued the 《Implementation Plan for Promoting the Protection and Utilization of Industrial Heritage in Old Industrial Cities》, actively encouraging and supporting the reuse of industrial heritage. In October 2021, the Municipal Development and Reform Commission, the Municipal Economic Information Committee, the Municipal State-owned Assets Supervision and Administration Commission, Municipal Commission of Culture and Tourism, City Planning and Natural Resource Bureau, Municipal Housing and Urban-Rural Construction Commission jointly issued 《Work Plan of Chongqing Municipality to Promote the Protection and Utilization of Industrial Heritage in Old Industrial Cities and create "Life Show Belt"》, accelerate the characteristic industrial culture protection and development, Further promote the protection and utilization of industrial sites and

cultural protection and inheritance, industrial innovation and development, urban function improvement and other synergistic progress, defined the specific measures and key tasks of the protection and utilization of each industrial heritage. The promulgation of these policies can also play a positive role in promoting the protection and utilization of the industrial heritage along the two rivers and four riversides of Chongqing. Through literature review [7-8] and field investigation, it can be seen that the transformation and utilization modes of industrial heritage in Chongqing's two rivers and four riversides include cultural and creative industrial park mode, industrial heritage park mode, industrial heritage-related museum mode, industrial leisure experience block mode and industrial tourism scenic mode (Table 2). The government, enterprises, developers or individuals as the main body of development, with individual development or joint development as the development mode of protection and utilization

Table 2: Main industrial heritage utilization patterns of the two rivers and four riversides.

Serial number	Utilization model	Representative building	Year built	Original purpose	Use after modification	Other similar transformation cases
1	Cultural and creative Industrial Park	Chongqing Asbestos Products Factory	1940	building materials	Yi Duchuang Light garden micro enterprises	Chongqing Sewing MachineFactory--S1938 Creative Industry Park White cat daily chemical--Miaoershi creative zone Jiangbei Textile warehouse -- Beicang Cultural Innovation Park
2	Industrial Heritage Park	Printing second factory	1950	paper making, printing	Cultural and Creative Park	Chongqing drive shaft factory -- C97 Cultural Innovation Park Jiangling Machinery Factory -- 1862 Foreign Artillery Bureau Chongqing Iron and Steel Factory -- Chongqing Industrial Heritage Park
3	Museum of Industrial Heritage	Chongqing Iron and Steel Works	1938	Metallurgy, processing	Museum of industry	The first Arsenal of the Ordnance Industry Department -Jianchuan Museum
4	Industrial leisure experience block	Chang 'an Machine Factory	1949	instrument and meter for automation	Unit on Ninth Street	Chongqing Iron and Steel Works -- Chonggang Cliff line Mountain City trail

2.2.1 Mode of Cultural and Creative Industrial Park -- Taking Beicang Cultural and Creative Park as an example

Beicang Cultural Innovation Park, formerly known as Chongqing Jiangbei Textile Warehouse, was built in the 1960s and used to carry the important logistics transfer function of Chongqing textile industry. At the end of the 1990s, the enterprise restructuring, the main city warehouse lost its function, repeatedly demolished, Chongqing Jiangbei textile warehouse has become a few industrial remains. The renovated Beicang Cultural and Creative Park has a base area of 10,000 m²

and a construction area of 4,600 m², consisting of a street, a warehouse, a garden and a community building. With the second renewal of urban cultural architecture, the demonstration of community harmony and integration is realized, and the warehouse of human documents and the Internet + cultural and creative experience store are built to create the cultural innovation base of youth talent community.

2.2.2 Industrial Heritage Park mode -- 1862 Foreign Artillery Bureau

The 1862 Cultural and Creative Park project of the Foreign Artillery Bureau is located at the bank of Jialing River in the second village of Dashiba, Jiangbei District, where the Tenth Arsenal Factory and the former Jiangling Factory were located during the Anti-Japanese War. It covers an area of about 215,000 m², with a planned construction area of 118,000 m². There are 29 district-level cultural relics in the project, and about 11,000 m² air raid shelter. With hong en temple theme park and the jialing river landscape dominance partition planning function, form the home stay facility area, cultural area, leisure area, military theme area, exhibition area, film photography, mountain trails, sparkling landscape area, eight theme function mutual impetus for energy, has become an important part of urban functions, It has become one of the driving forces for the development of Jiangbei District and even Chongqing Municipality.

2.2.3 Industrial Heritage Museum Model -- Chongqing Industrial Museum

Chongqing Industrial Museum, built on the industrial remains of Chongqing prototype steel mill, consists of the main exhibition hall, "Steel Soul" hall, industrial site park and other indoor and outdoor public space industrial exhibits installation display together [9]. The main exhibition area is about 8,000 m². The museum uses the columns, beams and foundations left over from the old factory building, and adopts the steel structure system to become the main carrier of the pan-museum. Centering on the 130 years of development of Chongqing industry since modern times, the exhibition hall comprehensively displays the revitalization of national industry after Chongqing opened its port to the outside world, and the great contribution Chongqing industry made to China's Anti-Japanese War, national economic recovery, Chongqing's urbanization process, and China's industrialization process.

2.2.4 Industrial Leisure Experience block mode -- A unit on the Ninth Street

“A unit on the ninth Street” is the predecessor of Chang 'an Machine Factory (456 Factory),it located between Guanyinqiao Business Circle and Jiangbeizui Financial Center in Jiangbei District of Chongqing, it covers an area of more than 40 mu, with a building area of 20,000 m² , and has more than 20 buildings with historical features. It retains the original Soviet architectural style and the largest sloped roof workshop with Siberian red pine wood structure in the main urban area of Chongqing. The whole block fully excavates the cultural connotation and regenerative value of industrial relics, takes into account "industrial memory" and "cultural creativity", revitalizes the existing space resources, and creates a new urban cultural space. It covers tourism and leisure, catering, entertainment, cultural innovation, immersive experience and other business formats.

2.3 The Characteristics of the Industrial Heritage of Two Rivers and Four Rivesides

After the completion of the historical mission, the industrial value of the industrial buildings on the two rivers and four riversides has been exhausted, but the rich historical and cultural value and social value still exist. Generally speaking, the industrial buildings along the two rivers and four

riversides in Chongqing have two typical characteristics: obvious environmental advantages, architecture and spatial form.

2.3.1 Obvious Environmental Advantages

Environmental advantages are divided into location environment and natural environment.

Most of the industrial heritage sites along the two rivers and the four riversides are located in the urban center, which has greater regional advantages and higher economic and social values. Some small-scale textile enterprises and printing enterprises are located in the core geographical location of the main city, such as the second printing factory in Guling, Chongqing Paper Factory in Maoershi, Danzishi Printing factory and so on. Industrial heritage is embedded in urban space, which has an important impact on the construction of urban infrastructure and the layout of urban functions. At the same time, the old industrial space has become an important target of urban renewal [10].

Chongqing is located at the intersection of two rivers, and industrial production needs a large amount of water, and the water transportation is convenient. Since the opening of port for trade, industrial enterprises mostly rely on the Yangtze River and Jialing River for development, and give birth to the industrial culture of the Yangtze River and Jialing River. The industrial buildings on the four riversides of the two rivers are mostly distributed along the river, occupying the main position of river landscape appreciation. For example, the copper bureau on the south bank of the Yangtze River, the Zhuanchuan Electric Lamp Company on the north bank of the Yangtze River, and the Chongqing Special Steel Factory on the Jialing River are all excellent locations near the river and view the river. The factories are built near the water, usually in a ribbon-like layout along the shoreline. Together with the scattered mountains, they form the external image of Chongqing's industrial characteristics.

2.3.2 Rich Architectural and Spatial Forms

The overall spatial form, architectural structure and architectural style of the building have a profound impact on the overall reconstruction and utilization of the building[11]. Chongqing is rich in industrial types, including ordnance manufacturing, machine manufacturing, ship manufacturing, mining and metallurgy, nuclear industry, chemical industry, textile industry, food and tobacco products industry, pharmaceutical manufacturing industry, paper and printing industry, etc. Based on this, various kinds of factories are formed, such as industrial plants, docks, wharves, storage buildings, and railway Bridges. Not only a wide variety of external modeling features also with obvious characteristics of The Times, architectural style is prominent, from the perspective of spatial form, there are regular structural buildings, such as square, column, irregular structural and large span buildings. As a workshop, the size of the opening, depth and height of the building are large, and the overall structure has good stability, robustness and durability, which provides convenient conditions for the later transformation and utilization. From the perspective of architectural style, there are Soviet architectural style, French architectural style and southwest characteristic architectural style. From the perspective of building structure, there are brick and concrete structure, frame structure, steel structure and other structural forms. It has high architectural and artistic value in terms of building itself or spatial form.

3. Promotion Strategies for the Protection and Utilization of Industrial Heritage along the Two Rivers and Four Riversides

3.1 Construct the Heritage Corridor System for Overall Protection, Planning and Management

The protection, planning and management of heritage corridors are much more complicated than "point" industrial heritage. The problem of "point" industrial heritage protection also appears in the process of heritage corridor protection, and the heritage corridor cannot be simply disintegrated into a single "point" heritage, and the linear dynamic relationship should be emphasized for its protection [12]. Secondly, corridor heritage is also a combination of many factors, including cultural and spiritual inheritance, ecological and environmental protection, economic development and other factors [13]. Therefore, for the protection and utilization of industrial heritage in the heritage corridor, the primary task is to improve the planning index system. With reference to the national heritage corridor pattern, its index system involves three categories of social, economic, ecological environment, politics, culture, population, production, transportation, services, facilities, environment, resources, 9 small classes, and should pay attention to the ecological, economic and social justice three aspects "3e" dynamic balance and interaction between, can guarantee the sustainable development of heritage corridor [14].

3.2 Reflect the Characteristics of the Heritage Corridor, Focusing on Function, Space, Transportation and Culture

In the process of industrial heritage corridor construction, focus on the industrial heritage buildings and the "fusion" development of corridor space, strengthening the relevance of industrial heritage corridor system as a whole, and the corridor space and architectural space transitional softer and nature, and fully consider the function of its internal combination, space, energy, transport links and culture, etc. Forming the characteristics of the industrial heritage of Chongqing's two rivers and four riversides.

In terms of function combination, the core industrial heritage area is taken as the center point, and other industrial areas that are transformed or not transformed are taken as the "radiation area". A main central area drives the development of the surrounding "radiation area" to form linkage development.

In terms of spatial vitality, the visitors' spatial needs should be taken as the starting point, and a comfortable, convenient and dynamic corridor space structure should be emphasized. Moreover, the construction of internal infrastructure and supporting facilities should be emphasized, and convenient and shared public service facilities and clear marking system should be provided to create an open and flexible heritage corridor space.

In terms of transportation connection, relying on the advantages of water proximity, the land and water transportation connection should be strengthened, the tour route of "Two rivers and four banks industrial heritage" should be planned, and the coastal tour trail should be established to strengthen the connection between the industrial heritage areas in the heritage corridor and enhance the intrinsic value of the heritage corridor.

In 2008, the council of monuments and sites (ICOMOS) the declaration of Quebec formally put forward the concept of "heritage site spirit", the declaration also stressed by heritage site integration and sublimation of tangible and intangible heritage, heritage site spirit shoulder protection, propagation, realize the heritage site spirit eternal inheritance and times mission for the sustainable development of human society [15]. Therefore, in terms of cultural composition, corridors, architectural transformation and historical memory, the development of The Times and intelligent

technology are organically integrated, and the surrounding cultural resources are integrated to reflect the beauty of the industrial heritage of the two rivers and four riversides.

4. Conclusion

To explore the protection and utilization of industrial heritage under the mode of heritage corridor. It provides a multi-dimensional model of the industrial heritage of two rivers and four riversides, its application of its heritage corridor mode makes the idle and declining industrial heritage systematic planning and management, at the same time, attention should be paid to the protection of the industrial heritage of the two rivers and the four riversides, the continuation of the industrial context and style, so that the designed industrial heritage can truly integrate into the urban space. The protection and utilization of the industrial heritage of the two rivers and four riversides will serve as a demonstration point of "one heart, three belts and many spots", then, several heritage corridor patterns are selected for linkage design around it to achieve the overall development of line and surface.

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