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Study on the Influence of Western Planning Thoughts on the Airport Layout in China's Modern Urban Planning

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Abstract: This paper sorts out the evolution of airport layout ideas in major urban planning in Europe and the United States from the 1920s to the 1950s, and demonstrates the ideas of modern airport planning in Europe and the United States from the perspective of division of influence stages, and the impact of technical consultants on the impact of airport planning includes chapter style, airport layout, and airport station design. In terms of planning figures, the focus is on analyzing the planning examples of the American city engineer Ernest P. Goodrich, who was responsible for compiling the chapter of the airport in Nanjing's Capital Plan in 1929. In terms of the impact of planning works in Japanese occupation of land in China, the focus is on the analysis of the conceptual capital master plan of Addis Ababa, the Italian capital of East Africa, edited by Le Corbusier in 1935, and the planning of the North and South Axis of the Greater Berlin, Germany by developed Albert Speer in 1939. It also graphically analyzes the genealogical relationships between planning characters, planning ideas, and planning works that influence airport layout ideas in modern Chinese urban planning.

Keywords: airport; urban planning; air station; planning ideas

Introduction

In the 1920s before the commercialization of aircraft and in the 1950s before the emergence of jet aircraft, negative factors such as aviation noise, headroom restrictions, and operational safety have not yet constrained urban development. The relationship between airports and cities during this period was closely integrated. Coupled with the ideological trend of modern architectural movement and the prosperity of modern aviation technology, the urban airport location layout has gradually been incorporated into the large-scale urban planning as a traffic theme plan. At the same time, western modern architectural movements and modern aviation technology were introduced into modern China, and examples of modern Chinese urban planning and design have gradually been incorporated into airport elements.

1 Airport layout ideas in modern urban planning in European and American countries under the trend of modern architectural movement

1.1 Airport Elements in the Ideal Model of Urban Planning in Western Countries

Since the rise of air traffic at the beginning of the last century, driven by the trend of modern architectural movements, architects have generally hoped that air traffic as a new mode of transportation will have a profound impact on cities in the future like railway stations, and try to

integrate the airport into the city center Among the composition elements of the district design. The Utopian ideal model of the city and the ideal airport model blended with each other during this period, resulting in many classic urban planning and design works. For example, the Nuova Tendenze exhibition, which opened in Milan, Italy on May 20, 1914, exhibited a masterpiece of futuristic style-Antonio Sant'Elia drawing "City of the New" (La Citt à Nuova) perspective painting, the core area is named "Station for airplanes and trains ". Another example is the leader of the modern building movement, Le Corbusier, published the "Ville Contemporaine" (a modern city of 3 million inhabitants) in 1922. The top level of the hub is the city-central airport, followed by the expressway and the underground railway station. This design idea was later incorporated into the plan for the reconstruction of the city centre of Plan Voisin for Paris (1922-1925). In 1934, with the official publication of "The City of Tomorrow" translated by Lu Yujun who was an architect studying in France, Le Corbusier's ideal city idea gradually became known to the Chinese.

1.2 Multi-Airport System Planning Ideas in U.S. Metropolitan Area Planning

Early American planners explored airport layout ideas in both urban planning theory and practice. In the field of planning theory, George B. Ford (1927), U.S. Department of War urban planning consultant, Ernest P. Goodrich (1928), and municipal engineering expert John Nolan (1928) has written papers on airport layout and airport ideal design in urban planning. Among them, Goodrich's airport design schemes have been directly applied and learned from Nanjing's "Capital Plan" and "Tianjin Special City Material Construction Plan". The Harvard Airport Research Team, led by Henry H. Hubbard, published the report "Airports: Their Location, Management, and Legal Basis" in 1930, exploring the airport system of a major metropolitan area and air-rail intermodal mode with the main airports located in the Central Business District (CBD) as the core, a series of suburban airports as supplements, And its regional airport system layout ideas were applied to the report "Regional Planning of New York and Its Environs". In the same year, the regional airport system plan of the Philadelphia metropolitan area was also prepared by the local planning team, and it was sought to integrate it into the central position of the national air traffic network system, although the plan was ultimately not realized.

2 Stages of influence of foreign planning ideas on China's modern airport planning

Since the end of the Qing Dynasty and the beginning of the Republic of China, with the competitive introduction of aircraft and their aviation technology and airport construction ideas from western countries, the priority development of China ’s military aviation industry and civil aviation industry has had corresponding impacts on urban planning in all regions. The impact of China's modern urban planning is reflected in many aspects, such as the spatial layout of regional airports, airport selection, and airport design schemes.

From the perspective of technology dissemination, the influence of foreign planning ideas or technical consultants on modern Chinese typical urban planning are concentrated in the two stages of the early days of the establishment of the Nanjing National Government and the victory of the Anti-Japanese War. In the early days of the establishment of the Nanjing National Government, airport elements were mostly included in the urban planning or central area design plans of major cities. However, in the context of national disasters, the implementation plan of airport location layout in these urban planning works often stayed on paper. In fact, the airports actually built are often military airports established in accordance with military operational requirements; in the early period of the

Anti-Japanese War and during the Anti-Japanese War, the planning, construction and management of all airports in the KMT area were led by the National Aviation Administration or the Aviation Committee. A small number of urban planning works during this period were generally not included in the air traffic or airport layout. Category), and even the first urban planning law in modern China, the Urban Planning Law, promulgated and implemented by the Ministry of Internal Affairs of the National Government in 1939, did not involve airport layout； After the victory of the War of Resistance Against Japan, due to the needs of enemy-foe operations, a large number of airports coexisted in the surrounding areas of large cities. With the large-scale advancement of urban planning in various places, the layout of airports in this period was generally incorporated into modern urban planning.

2.1 Early days of Nanjing National Government

After the establishment of the Nanjing National Government in April 1927, government departments in the three major cities of Guangzhou, Nanjing, and Shanghai have hired American architects and municipal experts as technical consultants for urban planning. For example, the Nanjing Municipal Government hired Schubart, J. Heinrich F. as a consultant to the Capital Construction Commission from the German Military Advisory Group in China in 1929. From November to December 1929, the Shanghai Municipal Government invited municipal expert Asa Emory Phillips from Washington, DC, and Carl Edward Grunsky, a municipal engineering expert who was the chairman of the American Society of Civil Engineers, to visit Shanghai to guide "Greater Shanghai Plan". Later, Hermann Jansen, a professor at the University of Berlin, and Jacob Leslie Crane, a Chicago planning consultant specializing in mutual assistance and self-built housing, also consulted on the plan. Grunsky put forward constructive opinions and suggestions on the areas of Greater Shanghai zoning planning, road network structure, commercial port design, and railway rerouting, but did not involve the aviation field.

In October 1928, the National Government Council decided to specially hire American architect Henry Killam Murphy and municipal engineer Ernest P. Goodrich for the capital planning and the design of the Huangpu Port in Guangzhou. In March of the following year, Murphy, Goodrich, and Moller arrived in Guangzhou and assisted in the preparation of the Guangzhou City Plan and the Pearl River Remediation and the Huangpu Port's preliminary port planning. In 1933, drawing from the "Guangzhou Port Opening Plan" (1926) proposed by G.W.Olivecrona, the chief engineer of the Guangdong River Governance Division, and the proposal of Goodrich's Huangpu Port, Li Wenbang, an engineer from the United States of Guangdong River Governing Council "Outline of the Huangpu Port Plan of Guangdong River Governing Commission". The plan is a large-scale comprehensive development plan that integrates housing, education, and transportation in and out of the port. It is speculated that it borrowed from the Dashatou Air Terminal Plan designed by the German consultant in 1926. In September 1936, the "Huangpu Port Plan", which was designed by Li Wenbang, was officially published. Later, based on the review and revision of the "Huangpu Port Supervision Office" of the Nanjing National Government, combined with the re-guidance of American consultant Goodrich, it took another five months to formally release the more ambitious Huangpu Port Opening Plan on October 15, 1937. The book has a total of 26 chapters, including road traffic layout and the design of terminals, stations, and air stations. Among them, the airport is set up 10 kilometers east of the port in accordance with the American model, which can realize sea, land and air transport.

2.2 The period from the victory of the War of Resistance Against Japan to the founding of New China

As early as 1942, the Ministry of the Interior of the National Government established a new Construction Department, which is responsible for the overall management of urban planning, public works, and building management. After the victory of the Anti-Japanese War, in order to better the planning of post-war urban reconstruction, unlike the municipal governments of a few large cities before the war, each of which hired foreign consultants, the Construction Department of the Ministry of Internal Affairs of the National Government coordinated the appointment of foreign experts to assist in urban planning. Planning experts from the United States, the Netherlands, and Germany have been hired as technical consultants to participate in the preparation of major urban plans. For example, Norman J. Gordon, a former US Navy lieutenant who hired the United Nations Relief and Rehabilitation Administration's residential consultant at the time, directed the “Reconstruction of Wuhan City Center” (1946.3) and the “Ten Years Construction Plan of the Capital Draft "(1946.4) and" Nanjing Urban Planning Outline "(1947.6). Gordon emphasized in the preparatory plan of the draft capital plan prepared on April 28, 1946 that in the era of the industrial society, it was necessary to plan for cars, airplanes and railways, and for industrialization. In January 1946, Ha Xiongwen, the director of the Construction Department of the Ministry of the Interior, invited Goodrich, an American urban planning expert, to Shanghai to guide the "Greater Shanghai Urban Planning" and post-war construction work. On November 9, the same year, Hao Xiongwen accompanied the Dutch municipal engineering expert Dr. J.C.L.B.Pet who had drafted the reconstruction plan for Rotterdam and Australian construction expert Zhao Fali to Beijing to guide the planning work, involving road network structure and functional zoning And the construction of new residential areas. A particularly foreign expert was Richard Paulick, Germany, who was hired as a consultant to the Shanghai Urban Planning Commission's Technical Advisory Committee in 1946. He eventually participated in the preparation of the first, second and third drafts of the Greater Shanghai Urban Plan as a member of the design team, Which includes the civil airport layout plan in the traffic planning chapter. In addition, when he taught at Shanghai St. John's University, he also wrote a handout on transportation planning, covering the planning and design of railways, airports, ports and roads. After the victory of the Anti-Japanese War, Shanghai, Wuhan, Nanjing, Tianjin and other large urban planning generally discussed air traffic as a special chapter, and optimized the layout of the multi-airport system in the region. Wuhan, Tianjin and other places even proposed new civil airport plans.

3 Propagation Characteristics and Pedigree Analysis of Airport Planning Thoughts in Modern Chinese Urban Planning

From the perspective of the propagation path, the influence of foreign urban planning and airport planning ideas on China's modern urban planning mainly comes through three ways: First, government officials, local squires, architects, engineers, etc. who have received engineering education in Western architecture, planning, or municipality. They have directly studied or studied in Europe and the United States, or received typical urban planning works or related works in Europe and the United States by indirect impact of literature. These professional and technical personnel have always been the mainstream in the field of modern Chinese urban planning. Western urban planning ideas and their classic urban planning works have indirectly affected the modern Chinese urban planning works with their help. Its typical planning works are the “Special Construction Plan of Tianjin Special City” compiled by Liang Sicheng and Zhang Rui (1930)； Second, urban planning experts in Europe and the United States have been appointed to preside over the preparation of a special urban plan in a certain place or be employed as a technical consultant for the project, which has a direct and important impact on modern urban planning works, such as Nanjing "Capital Plan" hosted by Murphy and Goodrich and

the plan of "Central Political District Plan" drawn by Schubart (Germany); The third is the urban planning led by the Japanese in the occupied area during the Anti-Japanese War. They borrowed from European and America countries' garden cities, neighborhood units, and organic evacuation theories, and imposed colonial or fascist planning ideas such as Changchun's "An Outline of Design Paintings for the National Capital " (1932), led by Toshihisa Sato, Yoshinobu Orishita and others. In addition, after the victory of the Anti-Japanese War, many local governments, such as Beijing and Tianjin, which had been occupied, retained Japanese technicians to participate in local urban planning(Table 1). Generally speaking, the typical modern Chinese urban planning works are the result of the interaction between urban planning technicians, urban planning ideas, and typical urban planning works in different periods and regions. It is also generally the product of the exchange and integration of "introspection and externalization" of modern western urban planning ideas and traditional Chinese urban planning ideas.

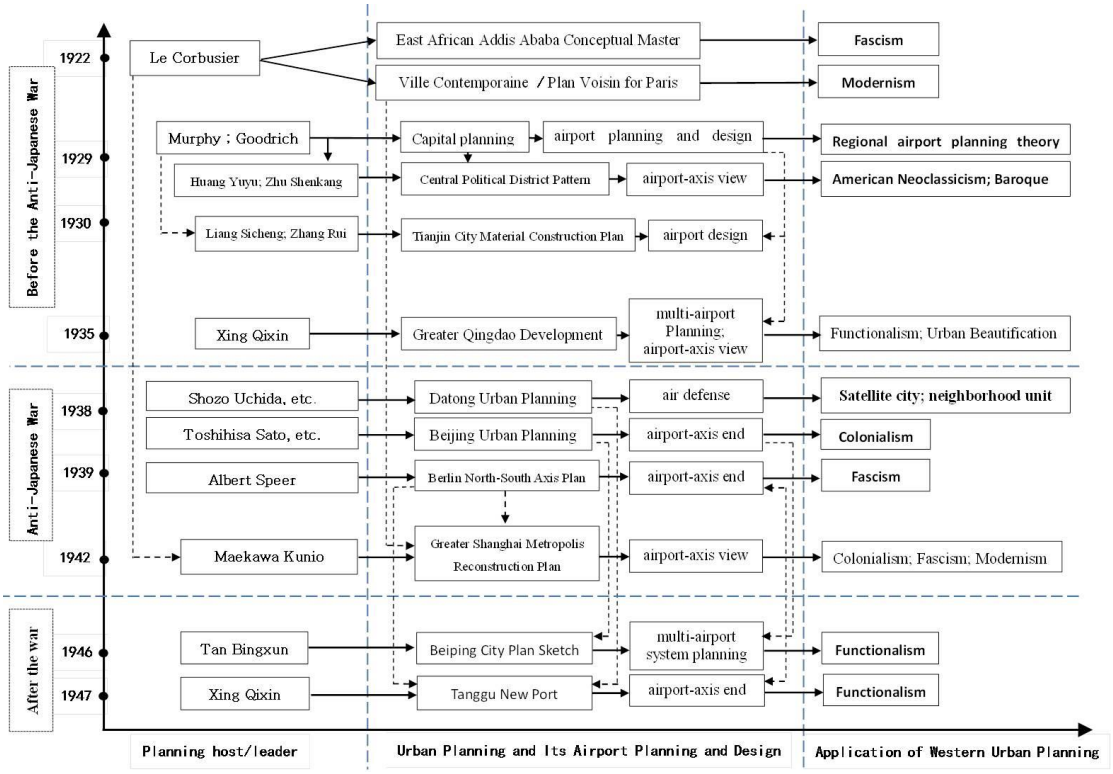

Table 1 Diagrams of the spread of airport planning ideas and their pedigree analysis in modern Chinese urban planning

4 Examples of airport elements in modern Chinese urban planning

4.1 Nanjing's "Capital Plan" and "Central Political District Pattern Plan"

In August 1929, in the International Design Contest of the "Pattern of the Central Political District of the Capital" in Nanjing, the No. 9 proposal of the cooperation between Dong Dayou and his American classmate E.S.J.Phillips won the excellence award. No. 6 and No. 6 programs designed by Huang Yuyu and Zhu Shenkang both won the third prize (vacations for the first and second prizes). The two plans rarely use the "＋" axis general plane configuration. The aircraft-like aviation department building and its affiliated safflower airport are located at the southernmost end of the central axis of the Central Political District, and form the axis with the highest point of the Central Political District, the

Kuomintang Central Party Department. The design approach is unprecedented in the history of modern urban planning in the world (Figure 1). Huang and Zhu are the architects of the National Capital Design and Technical Commissioner's office, the preparation agency of the Capital Plan. It is speculated that Goodrich has a direct impact on the aviation theme. Goodrich is the first president of the American Society of Transportation Engineers. He proposed three round airport design plans as a consultant engineer in New York in 1928. In March of the same year, he published "Airport Factors in Urban Planning" in the supplement of National Municipal Review Article. Goodrich is responsible for the preparation of transportation and municipal engineering in the "Capital Plan", and in the "Position of Airport Stations" chapter, he pioneered the application of modern airport layout planning in China.

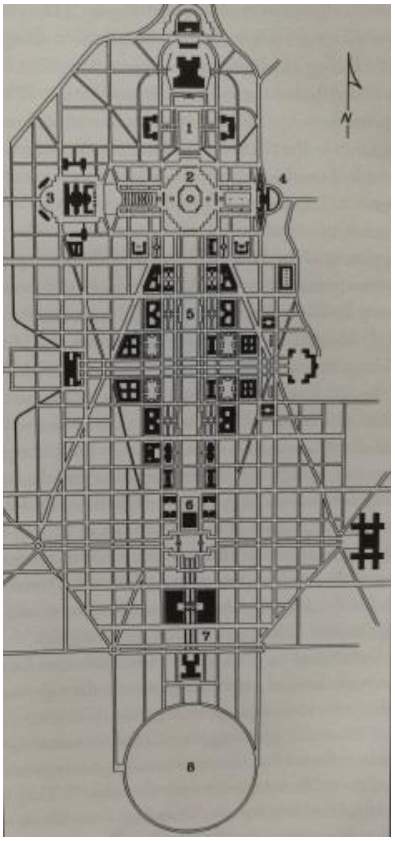

Figure 1 Plan No. 1 of the "Pattern Plan of the Central Political District of the Capital" designed by Huang Yuyu and Zhu Shenkang

The "Capital Plan" released in December 1929 was the first systematic urban planning document in modern China, and it was also the first time to set up an airport section chapter. On the basis of comprehensively drawing on the latest airport planning and design ideas in the United States at the time, the plan proposed a regional airport layout plan for the Nanjing Metropolitan Area ("one main and four auxiliary" airport system) and a new aircraft terminal design. It also realized that the site selection of the Honghuayu Airport reserved in the southern part of the Central Political District fits the landscape design of the aviation department and the round airport in the first plan of Huang and Zhu's "Plan of the Central Political District of the Capital". The airport layout ideas of the "Capital Plan" also have more or less, direct or indirect effects on the chapter system and planning schemes of modern urban planning documents in Shanghai, Guangzhou, Tianjin, Beijing and other places. For example, the Great Shanghai Plan Catalogue, which was formulated in 1930, and the Tianjin Special City

Material Construction Plan, which was prepared in cooperation with Liang Sicheng and Zhang Rui, had listed thematic chapters of the "airfield station" and "airfield station". The Hangzhou City Guide (1934) and the Qingdao City Plan for the Implementation of Urban Planning (Draft) (1935) also proposed multi-airport planning schemes, as well as the concept of terminal, water and land airports.

4.2 Airport Elements in "Tanggu New Port Project Plan Map" (1946)

In August 1946, the Tanggu New Port Engineering Bureau of the Ministry of Transportation of the National Government drew a series of drawings, such as the “Overview of the Tanggu New Port in April 1935” and other drawings. The "Tanggu New Port Project Plan Map" is a combined plan of the Tanggu New Port Three-year Construction Plan and the Expansion of Tanggu Urban District Plan. This half-moon-shaped urban spatial layout structure draws on the "Datong Urban Planning Project" compiled in October 1938 by Professor Shozo Uchida, Associate Professor Hideyama Takayama of Tokyo Imperial University in Japan, and Katsunori Takano, lecturer at Tokyo Academy of Fine Arts, and graduate student Yoshifumi Uchida. However, taking the ancient city of Datong as the core difference, the "Tanggu New Port Project Plan" is centered on the city government building, and stands diagonally with the main passenger terminal and Xinhe station on the diagonal. Forming a semi-circular radial road network structure with the north-south cross-sea river axis as its core and its spatial layout, and leading out four radioactive roads, among them, the north-south main axis across the Haihe River connects the city center and the south city center; the main axis of the Beijing-Tianjin Highway that runs from east to west connects Tanggu Xingang and Tianjin urban areas; a northeast-oriented oblique radiation axis connects to Beitang Port Area. The other north-west oblique radiation axis is connected to the reserved oval Tanggu Airport (Figure 2). This approach of using the airport as the axis and the shape of the airport scene borrowed from Greater Berlin North-South Axis Plan, Germany (1939), which the plan was designed by Albert Speer, the chief architect of Hitler, the head of Nazi Germany. The length of the north-south axis is 6.8 kilometers. The south end of the axis is the South Airport and the north end is the North Railway Station. On the south side of the Arc de Triomphe where the north-south axis and the east-west axis meet, is the Central Station, and to the east is the central airport of 450 hectares-Tempelhof Airport. The airport was redesigned by Ernst Sagebiel in 1935 and construction began in 1939. The "Tanggu New Port Project Plan Map" organically integrates the layout of Tanggu Airport with the planning of Tanggu's downtown area and the overall layout of Tanggu New Port. This approach is a rare example in the history of modern Chinese urban planning.

Figure 2 Tanggu New Port Project Plan Map (1947)

"Tanggu New Port Project Plan Map" (1947) rarely incorporates the airport layout into the urban central area planning plan. This approach is undoubtedly inextricably linked to Xing Qixin-the first director of the Tanggu New Port Engineering Bureau in 1946. Xing Qixin has rich aviation expertise and a long-term engineering department background. It is logical for him to pay attention to the airport element in the preparation of Tanggu urban planning. Considering that the plan still continues the formulation of the Tanggu Market Plan Outline (1940) and the location of Heilongjiang Hedong Airport, as well as the reference to the design method of the Datong Urban Planning Project hosted by Uchida Shozo and other factors, as well as the Anti-Japanese War After the victory, the construction of Tanggu New Port continued to employ a large number of Japanese technical personnel to participate, and it is not ruled out that they may participate in drawing the " Tanggu New Port Project Plan Map ".

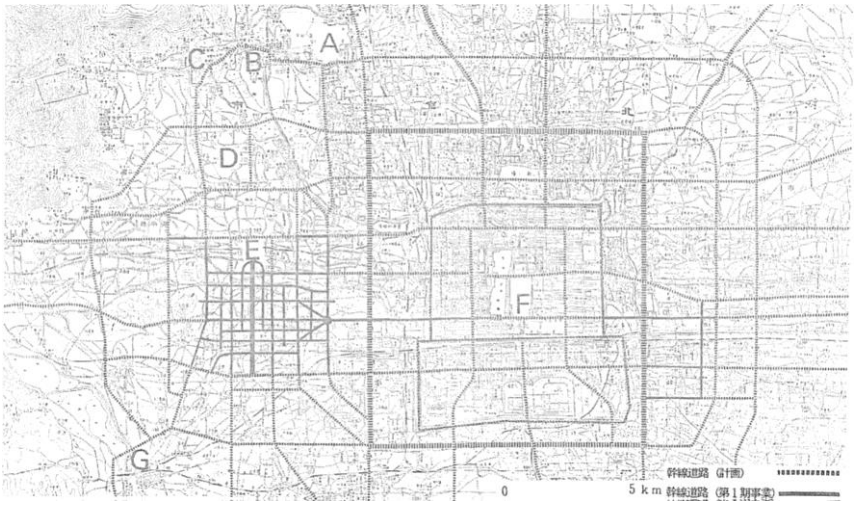

Figure 3 Central axis of the western suburbs of Beijing's urban planning road map

4.3 Elements of Airports in Japan's Occupied Urban Planning

4.3.1 Multi-Airport System in the Outline of Beijing Urban Planning

In the autumn of 1937, the "Beijing Urban Planning Committee" successively hired Japanese architect Toshihisa Sato, who was the director of the Harbin Special City Urban Construction Bureau, and Kiyoshi Yamazaki, who was the head of the Urban Planning Section, as urban planning consultants. In December of the following year, they completed the "Beijing Metropolitan Construction Plan Major Case". In 1941, the Puppet North China Administration Committee Construction General Administration promulgated the "Beijing Urban Plan Outline", which incorporated the US regional airport system plan and the Nanjing "Capital Plan" in 1929. The airport layout ideas in also adopted the "one city, four games" multi-airport system. That is to say, "In addition to the existing ones in Nanyuan and Xijiao, another four-kilometre large airfield is planned in Beiyuan, and one is scheduled in the east suburb." The layout of Xijiao Airport during the Japanese and Puppet Period was not only included as a transportation facility Incorporated in The Beijing Urban Plan is also an important composition element in the planning of the central axis of the new urban area in the western suburbs of Beijing. "Beijing Metropolitan Construction Plan" plans to add a new north-south axis parallel to the traditional central axis in the centre of the new western suburban new urban area. This axis is based on Xingya Road and its northern starting point is the Wanhe in the Summer Palace. Shoushan Foxiang Pavilion, the southern end is the Central Railway Terminus on the Jinghan Railway, so that the two major external transportation hubs, one south (station) and one north (airport), echo each other on the new axis, and

the core area on the axis is the invasion of China The Japanese North China Front Command is centered on the land of military and political institutions, while the western suburban airport site directly adjacent to it is located on the west side of the north central axis (Figure 3). The use of the airport as an important compositional element of the planning axis and the deployment of military airports within four to four of Beijing fully exposed the Japanese and puppet authorities' attempts to position Beijing as a so-called "political and military centre" and to satisfy the Japanese army's invasion of China. Military demand has a strong colour of militarism.

4.3.2 "Greater Shanghai Metropolis Reconstruction Plan" by the former Shanghai office of Maekawa Kunio Office

In September 1942, Japan's "Architecture Magazine" held a design competition for the "Great East Asian Construction Commemorative Construction Plan". Under the guidance of the Japanese architect Maekawa Kunio's planning ideas, Maekawa Kuno's Shanghai office, The "Greater Shanghai Metropolis Reconstruction Plan" submitted by Tanaka Makoto; Domei Eiji, and Sashiki Osamu won the second prize. The plan is a conceptual plan for the subversive transformation of the center of Shanghai. It is planned to plan an east-west grand central axis across the Huangpu River in the central area of the former concession. The opposite side of Lujiazui in Pudong is a quadrangular pyramid-shaped "Rihua Comfort Tower" and a large airport composed of multiple cross-runways (Figure 4). This plan not only reflects the intent of the aggressor's political control and military aviation function, but also reflects the imprint of Makoto Kunio, who was heavily influenced by Le Corbusier's brilliant urban thought. He has been working in the Le Corbusier Architecture Office for two years since 1928, and is a follower of the Modernist Architectural Movement represented by Corbusier. In 1936, Le Corbusier took the initiative to outline a conceptual master plan for Addis Ababa, the Italian capital of East Africa at the time. The plan is a utopia-style modern city with the fascist headquarters as the core and the central axis as the main idea. The transportation area was centred on the airport and the station is located on the west side of the core of the axis. This radical planning solution that adopts commemorative design techniques and combines modernist and fascist ideas obviously has a direct impact on Maekawa Kunio. In addition, it does not rule out that the planning of the north-south axis of Greater Berlin hosted by Spear on the transformation of the Greater Shanghai Metropolis Impact. In short, the transformation plan of the former Shanghai Metropolitan Office of Maekawa Kunio is a mix of Fascism, Colonialism, and Modernism.

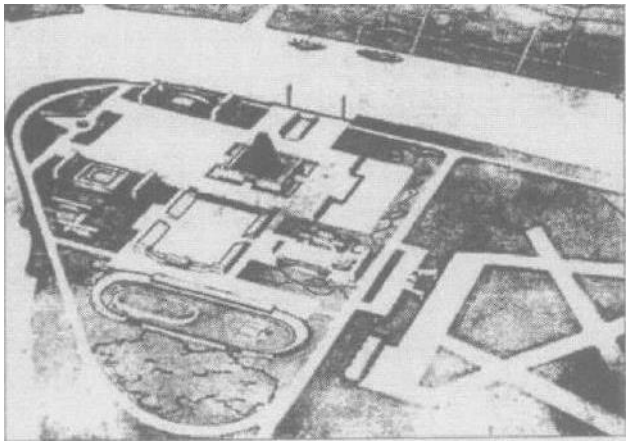

Figure 4 View of the central axis airport in the 1942 "Greater Shanghai Metropolis Reconstruction Plan"

Generally speaking, many modern Chinese urban center planning plans use the airport as the main perspective of the urban axis. This includes both the modern architectural movement and the advocacy of airplanes, and the “aviation to save the country” and “advocate aviation” pre- and post-Japanese War The dual ideology of technology makes airport elements more important in modern urban planning in China, such as Huang Yuyu, Zhu Shenkang's "Pattern Plan of the Central Political District of the Capital" No. 1 and No. 6 (1929), "Plan for Greater Qingdao Development Plan" (1935) prepared by Qingdao Municipal Engineering Bureau and so on. The application of the airport elements in the Occupied Territory's "Greater Shanghai Metropolis Reconstruction Plan" (1942) and "Beijing Urban Planning Outline" (1941) reflects the subconscious or explicit fascism and colonialism of the invaders.

Conclusion

With the stumbling development of modern China's military aviation industry and civil aviation industry, with the joint promotion of returnees studying abroad and foreign technical consultants, the typical urban planning works of modern China have used airport elements to varying degrees, a flash of planning The evolution of approaches and airport layout ideas is not only the product of the continuous introspection and externalization of China's modern urban planning circles, but also the result of the interplay of multiple factors such as the patriotic sentiment of "saving the nation by air", the advancement of modern aviation technology, and the trend of modern architectural movement.

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Table 1 : Author self-drawn

Figure 1: Remaking Chinese City, Modernity and National Identity, 1900-1950. University of Hawai 'i Press, 1999.

Figure 2: Archives of Tianjin Archives: Tanggu New Port Project Plan Map (J0161-2-002734), undergraduate Pang Yuewen assisted in drawing.

Figure 3: [Japan] Akira Koshizawa, Beijing Urban Planning under Japanese Occupation (1937-1945)

Figure 4: Zheng Shiling. Shanghai Modern Architectural Style. Shanghai: Shanghai Education Press, 1999