



The Land Reclamation Along the Hai-Ho River and the Birth of Modern Tianjin (1897-1937)

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Within the early decades of the twentieth century, the city of Tianjin transformed from a traditional trade terminal to a modern city. The size of settlement expanded more than 10 times during these years which made Tianjin the second largest city in China at that time. For the special natural environment, the topography cannot be neglected in this process. By analyzing of the aquatic environment and topographic condition along the Hai-Ho River, comparing Chinese traditional attitude to water and modern concept of hygiene, and reviewing urban development of concessions before 20th century, this paper argue that land reclamation was a vital and necessary work in building a modern city. Using archive of land filling of Hai-Ho Conservancy Commission, the paper explores the process of land reclamation along the Hai-Ho River and examines the important role of the commission, new filling method and technology in this process. It then focuses on the development of the concessions on the west bank of the river and examines how the land filling evolved in the complex relationship and played an important role.

Keywords: Hai-Ho River, modern Tianjin, Hai-Ho Conservancy Commission, land reclamation

Introduction

As an agriculture-based society, China, in its long history, saw water control a fundamental means to rule the empire. This concept, which was rooted in Chinese Confusion traditions, constructed a centralized state power that guided public works in the process of transforming water environment. The massive constructions of canals were used to support the expansion of agricultural production and to maintain the complex and subtle relationships among navigation, irrigation and flood control.¹ The Grand Canal, which connected the capital and *Jiangnan*(江南) area, was vital to the safety of purveyance. The routes of the canal altered with the locations of capital. Since the capital moved to Beijing in Yuan Dynasty, the settlement of Tianjin emerged for the sake of its location, which is the intersection of the Grand Canal and the Hai-Ho River, and played a role of trade terminal that providing transportation by canal or by sea.

In order to reduce the large amount of manpower and resources in maintaining the canal transportation system, the Beijing court tried to improve the irrigation condition in the Hai-Ho Plain to gain self-sufficient for several times. But the occasional harvests around the capital could not replace the purveyance from *Jiangnan*.² Hence, the rulers of Beijing implemented a policy called *Bao yun ji cao* (保运济漕), means the irrigation and water control had to subject to navigation of the Grand Canal. The plain, especially low-lying cities such as Tianjin, Hejian, and Baoding, had been flooded frequently.³

Within this natural environment, Tianjin and its rural area have formed particular morphological features. *Jinmen Baojia Tushuo* (津门保甲图说), which published in 1846, shows 3 features of the city form in mid-late Qing Dynasty (Figure 1).

(1) The area around the intersection of the Grand Canal and the Hai-Ho River, which was called *San cha he kou* (三岔河口), was the most densely populated area in the city. It was also the key place that plays the role of trade terminal. To the southwest of *San cha he kou* located a walled city, which had been built in 1404 in Ming Dynasty to ensure the safety of the canal transportation system. These two areas constituted the main body of the city and also occupied the biggest highland of the region. There were two ponds in the south of the walled-city, which connected with city moat and wetlands in the southern suburbs through the water gates on the wall. There were no clear boundaries between nature and man-made environment, which shows Chinese traditional philosophy of moderation and harmony.

(2) Most of the villages and buildings located along rivers. On one hand, due to the sediments brought by the rivers and perennial levee constructions, the terrain along the rivers was relatively high. On the other hand, rivers provide fish and transportation to villagers.

(3) The villages those relatively far from rivers were located on many platforms, which were surrounded by marshlands and ponds. These wetlands would become flood discharge areas when summer is coming.

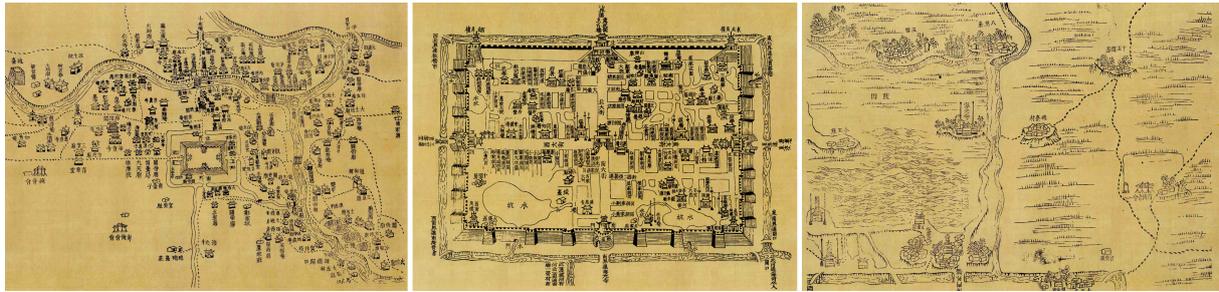


Figure 1: The urban form of Tianjin and its rural area, the walled city, and villages in southern suburbs. Portions of *Jinmen Baojia Tushuo*.

The First Opium War forced the Qing Dynasty of China to open its doors to the world. And Tianjin was opened as a treaty port after the Beijing Convention was signed in 1860. Up to 9 countries had designated concessions in Tianjin. The role of the city changed during era and the urban scale expanded unprecedentedly. Meanwhile, the human-nature relationship as described above also got a significant transformation. Existing research of urban history mentioned this course briefly while historic geography studied this from a macro perspective.⁴ But in the field of urban planning history, researchers rarely integrate water environment and topography of the city in their study. They see the transformation as neglect bearer of human activity and tend to treat the chaotic structure of the city as a reflection of the disorganized administration and the result of isolated planning on individual concessions.⁵ This paper emphasizes that natural environment and its transformation deeply engaged in the birth of modern Tianjin, and argues that the aquatic environment and topographic condition along the Hai-Ho River at that time limit any large-scale planning and construction to be formulated or implemented and the planning and construction of the concessions was made and carried out step by step after the reclamation of the land along the river.

The Designation of Concessions and their Development in the Early Years

Concession	British	U.S.	French	German	Japanese	Russian	Italian	Belgian	Austro-Hungarian
Phase 1	1860 460mu	1860 131mu	1861 360mu						
Phase 2	1897 1630mu			1895 1034mu	1896 1667 mu				
Phase 3	1902: 131mu (annex American concession) 1903: 3928 mu		1900 2300mu	1901 3200 mu	1900 400 mu	1900 5971 mu	1902 771 mu	1902 747 mu	1902 1030 mu
Total Area	6149 mu		2660 mu	4234 mu	2067 mu	5971 mu	771 mu	747 mu	1030 mu

Table 1: Three phases of the designation of concessions and their areas. Excluding illegal occupied areas.

Source: Tianjin local history editorial commission, <http://www.tjdfz.org.cn/tjtz/zjz/hdykz/index.shtml> (accessed Feb 12, 2018)

The designation of concessions in Tianjin includes 3 phases (Table 1). The first one began at the Anglo-French occupation of 1860 during the Second Opium War. British captain Charles G. Gordon cooperated with French Lieutenant de Vaisseau de Trèves investigated the areas outside the native city and selected a parcel of land at *Zi-zhu-lin* (紫竹林) on the west bank of the Hai-Ho River.⁶ The United State subsequently delineated its concession to the south of the British Concession. The Chinese defeat in China-Japan war in 1894 gave opportunities to Germany and Japan to establish their concessions in Tianjin and Great Britain to extend its concession zone. From the walled city on the north, Japanese, French, British, American, and German concessions, all adjacent to each other, occupied the west bank of the upper reaches of the Hai-Ho river. The designation of concessions got its culmination after the Boxer Rebellion in 1900. Russia, Italy, Austria-Hungary, and Belgium followed examples of Britain and France and measured land on the east bank of the river. And the existing settlements also extended their territories several blocks inland. By 1902, Tianjin had become a “fragmented city”⁷ with concessions up to 23629 mu in area, which was nearly 17 times that of the native walled city.



Although the scope was large, the topographic condition limited the development of the concessions. The riverbank area such as *Zi zhu lin* was originally less-developed area dotted with ponds, vegetable gardens, and a few huts.⁸ And the inland area was much lower, with immense shallow and swamp. An aerial view taken by the French military shows topography along the river around 1900 (Figure 2). On the east bank of the river (the site of Italian and Austria-Hungarian Concessions) stacks piles of salt, the villages inland are surrounded by a lot of



Figure 2: Terrain of Tianjin along the Hai-Ho River around 1900.

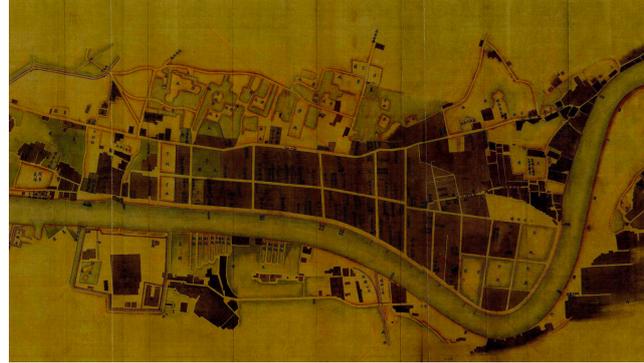


Figure 3: The construction of the original concessions in 1888 and the surrounding topography.

ponds. On the other side, where is the site of Japanese Concession and Nanshi Area, is full of boundless wetlands. Obviously, the terrain condition was not suitable to modern construction. Furthermore, the natural environment, which was against modern concept of hygiene, was considered unsanitary and threats to public health. Hence, the land, as an 1897 Japanese report depicted, need “a lot of projects to reclaim.”⁹

As soon as the concession was settled, British engineer Gordon made a grid plan with three roads parallel and four roads perpendicular to the river. The site was divided into 10 blocks and 35 pieces of land.¹⁰ This plan was undoubtedly based on the experiences and images of what a colonial city should be and had the advantage of quick rental and rapid construction. But how to deal with the muddy land was an unavoidable issue. In the prior years, the concession governments used the same methods as the Chinese did to fill land. The landowner entrusted a contractor to hire labor to dig and transport soil from land nearby. The mud was dumped on the construction site and left to dry.¹¹ But the cost of this method was high and efficiency was low. During the first 30 years, only 60% of the land had been constructed in the three original concessions. And most of them were in the British settlement (Figure 3). The condition of slow development had not improved even until all the concessions had been designated. A 1908 map shows that, the land has been built is less than a quarter of concession territories and is mainly concentrated on the west bank of the Hai-Ho River. Any construction and expansion would require parting the water from the land. The environment delayed the development of concession.¹² Meanwhile, the traditional methods, i.e. digging in nearby land, meant created a new pond while eliminating an old one. The concession governments had to prohibit digging in the concession.¹³ This dilemma only changed until the establishment of the Hai-Ho Conservancy and the introduction of new method and technology.

The Hai-Ho Conservancy Commission and the Land Reclamation Along the Hai-Ho River

The original intention of establishing a concession in Tianjin was to set a nearby base to cast influence over the capital of Qing Dynasty. After several decades of development, the city's trade status had become more prominent. The *Zi zhu lin* Port played a role to incorporate Tianjin and North China into a global market. The number of steamers that arrived at the port increased from 111 in 1861 to 688 in 1895. And the tonnage increased by almost 23 times.¹⁴ But Tianjin was not a natural port. The watercourse between the city and the sea was shallow and winding, which was not navigable to ocean-going steamers. And the course at times silted up in summer when flood brought large amount of sediment from upper reaches and distributaries. The navigation condition seriously deteriorated at the end of the 19th century.

“During the summer of 1889 the Hai-Ho was said to be more difficult to navigate than during any season since the port had been opened...”



... 1896 was one of the worst in the history of the port. For more than seven months steamers were unable to come to the Bund, and the outlook was so serious that not only Foreigners, but even Chinese, began to take alarm.”¹⁵

The navigation of the Hai-Ho River vitally affected the dream of making Tianjin a modern treaty port and the general welfare of the city. Both foreigners and Chinese eager to find a satisfactory solution of this “chronic local trouble.”¹⁶ Along with the suspension of canal transportation, the focus of conservancy shifted from the Grand Canal to the Hai-Ho River. In 1897, the Hai-Ho Conservancy Commission established. It was an organization that bridge Chinese government, Customs, foreign concessions, and merchants. The Commission reorganized as the Hai-Ho Conservancy Board after the Boxer Rebellion. Its main task was to improve the navigation condition of the Hai-Ho River by modern methods and technology. The Commission’s jobs contained two parts, public works and routine maintenance. The former included the rounding off of many of the bends between Tianjin and the sea, and the building of a system of locks on the distributary canals to keep as much water in the Hai-Ho River as possible. The latter included ice breaking to realize winter navigation and dredging at the mainstream of the river. In the first few years, the dredged sediment was transported and dumped in the deeper part of riverbed. But this cannot reduce the total amount of sediment in the river, which increased the risk of silting in the near future. When HHCC suffered from the inability to dispose the sediment, the concessions that gradually developed from riverbank to inland were bothered by the lack of soil for land reclamation. In 1905, Commissioner T. T. H. Ferguson, Representative of Customs, saw the opportunity and proposed to sell sediment from the river to the concessions as fill for the low-lying lands. ¹⁷

“The Commission, during 1906, proposes to dispose of all spoil dredged within a convenient distance by bringing it in boats into the Canal leading from the old University to the *Hai Kuang Ssu*(海光寺) and selling it at any place on that canal to landowners for raising or filling in purposes.”¹⁸

This proposal, later named “Hinterland Filling Scheme,” implemented firstly in the British concession. A boat carrying sediment dredged from the river navigated through the Canal to a large pond at the end of Meadows Road. About 14,000 *fang* of earth was deposited. Half of the pond was reclaimed.¹⁹ In the following year, the HHCC introduced pumping stations to replace human labor. They built floating pumping stations and directed the dredged soil to the pond through pipes. Dredging, pumping, and filling, all cooperated with each other, worked according to the amount the foreign municipal administrations reported. From 1907 to 1909, all the dredged sediment had been pumped and filled into the ponds, which were mainly in the British and French Concession. This provisional pumping station kept in working until 1910 and was replaced by new pumping plants. In the test of filling in Deutsche Niederlassungs Gesellschaft property, 130 m³ of silt was discharged into the pond in 13 minutes.²⁰ The efficiency of filling was highly increased. The annual quantity of silt that dredged and filled in the following decades was several times that of previous years.

The filling first implemented in the British and French Concession and then spread to the German, Japanese Concession, and native areas. By Japan’s invasion in 1937, the land along the upper reaches of Hai-Ho was almost accomplished. And the focus of work gradually shifted to the downstream area of Tanggu. From 1902 to 1937, the total quantity of sediment dredged in the Harbour was 4,095,440 *fang* and 96% of that was filled in hinterland (Table 2). The altitude of land raised by an average of 1 to 2 meters. The work laid the foundations of road construction and land investment in the low-lying areas and directly connected the conservancy activities with urban development.

Year	No. of <i>fang</i> dredged in Harbour	Quantity disposed by dumping	Quantity for filling in Tianjin	Filling Areas	Filling Methods
1902	12,000	12,000 river	--	--	--
1903	43,800	43,800 ”	--	--	--
1904	59,000	59,000 ”	--	--	--
1905	48,500	48,500 ”	--	--	--
1906	14,000	--	14,000	British Concession	By boat
1907	11,000	--	11,000	British and French Con.	Pumped by Provisional Plant
1908	20,000	--	20,000	British and French Con.	”
1909	12,783	--	12,783	British Con.	”
1910	40,250	1,664 river	38,586	British, French and German Con.	Pumped by New Plant
1911	61,390	420 ”	60,970	French and German Con.	”
1912	63,720	9,835 ”	53,885	French and German Con.	”
1913	90,766	--	90,766	French and German Con.	”
1914	100,275	--	110,275	French and German Con.	”
1915	162,088	--	162,088	French, German and Japanese Con.	”
1916	302,605	--	302,605	British, French, German and	”



				Japanese Con.	
1917	115,412	--	115,412	British, German and Japanese Con.	''
1918	23,810	3,140 river	20,670	Japanese Con.	''
1919	252,137	8,152 ''	243,985	British and Japanese Con.	''
1920	198,525	500 ''	198,025	British and Japanese Con.	''
1921	170,712	1,775 ''	168,937	British Con. and Nanshi	''
1922	209,754	1,320 ''	208,434	British Con. and Nanshi	''
1923	85,779	680 ''	155,169*	British Con. and Nanshi	''
1924	171,465	680 ''	170,785	British Con.	''
1925	6,230	2,970 ''	86,480**	British Con.	''
1926	161,020	1,505 ''	159,515	British Con. and Tanggu Port	''
1927	209,000	--	209,000	British Con.	''
1928	140,000	--	140,000	British Con. and Tanggu Port	''
1929	179,422	62,035 ''	117,387	British Con. and Tanggu Port	''
1930	107,750	--	107,750	British Con. and Tanggu A. P.Co.	''
1931	139,162	4,195 ''	134,967	British Con. and Tanggu A. P.Co.	''
1932	168,520	16,215 ''	152,305	British Con. Chentangzhuang and Tanggu A. P.Co.	''
1933	101,445	13,445 ''	88,000	British Con. Chentangzhuang and Tanggu A. P.Co.	''
1934	108,255	3,640 ''	104,615	British Con. Chentangzhuang and Hezhuangzi	''
1935	184,615	4,135 ''	180,480	British Con., 1 st Special District and Chentangzhuang	''
1936	208,390	6,070 ''	202,320	1 st Special District and Chentangzhuang	''
1937	111,860	4,310 ''	107,550	1 st Special District	''
Total	4,095,440	309,986	3,938,744		

Table 2. Quantity of Material Dredged in Tianjin Harbour and Filled in Hinterland

* 70,070 were dredged at Tombs Bend Cutting ** 83,220 were supplied from dredging outside Harbor limits

1 Fang = 100 cub. Feet English = 2.83 cub. Meter

Source: HHCC Report for 1937. TMA. W0001-1-000113. and Zhang, Shuming, ed. *Tianjin Tudi Kaifa Lishi Tushuo (A pictorial history of land development in Tianjin)*. Tianjin: Tianjin Renmin Press, 1998. 88-89.

The Evolving Relationship among Site Selections, Planning, Land Reclamation, and Construction

For the special terrain condition along the Hai-Ho River, most of the land for construction was reclaimed. And there was not an administrative authority that had power to organize urban development of all districts, the general linear relationship among site selection, planning, land reclamation, and construction evolved into a complex interaction (Figure 4). The following session will focus on the concessions on the west bank of the river and examine the complex relationship and the role of topography and land reclamation played in the process of urban development.

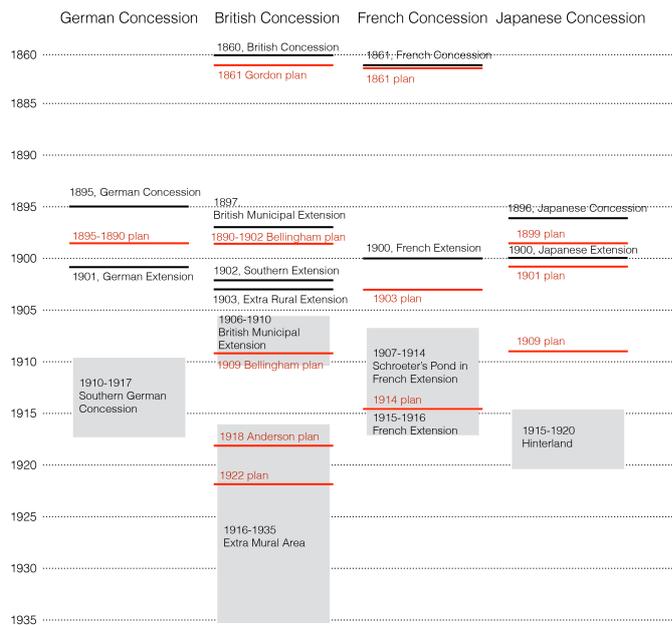


Figure 4: The complex relationship among site selection, planning, and land reclamation.

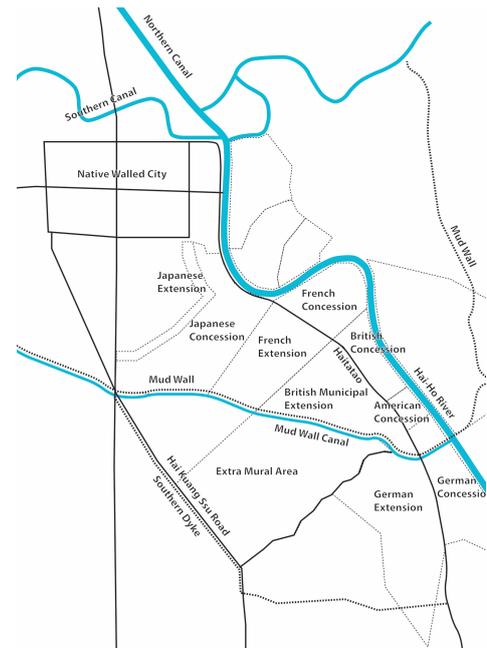


Figure 5: The terrain elements that defined the concessions boundaries.

The first mode that topography and land reclamation integrated in the process is that, the terrain defined the boundary of concession and affected its expansion. A conspicuous geographical element can be a reference for demarcation in a wilderness and also became a means for Chinese authorities to restrict the illegal expansion of the concessions. The elements in Tianjin case include the Hai-Ho River, *Haitatao* (海大道), Mud Wall Canal, and *Hai Kuang Ssu Road* (海光寺大道). *Haitatao*, which had existed from Ming Dynasty, connected the riverbank to the south of the walled city and *Taku* (大沽) by the sea. The road, together with the Hai-Ho River, defined the West-East boundaries of the original British, French, and American concessions. The Mud Wall and Mud Wall Canal were fortifications that built by General Sengge Rinchen (僧格林沁) in 1860. The Canal connected the Southern Canal and the Hai-Ho River to the south of the city. The Mud Wall Canal, as a solid element, defined the southern boundaries of the British Municipal Extension, the French Extension, and the Japanese concession for a long time. And its irregular path had profoundly affected the urban pattern of these concessions. As to the *Hai Kuang Ssu Road*, it was a means used by Chinese authorities to limit the further expansion of the concessions. It was originally a country path, and then in 1918 reconstructed into a dyke to protect the city from flood. In 1937, Mayor *Chang Tzu-chung* (张自忠) rebuilt the road and sent police to patrol to prevent the illegal cross-border constructions from Japanese and French Concessions.²¹ The scope of the concessions expanded from the river to the inland step by step. And the complex boundaries laid the foundation for a collage of urban patterns (Figure 5).



The procedure of site selections, planning, land reclamation, and construction implemented in the original concessions of Great Britain, France and Germany. Although the traditional method of filling slowed the speed of construction, the concessions all developed according to the plans that made at the time when concessions established. The filling of southern area of the German Concession followed the new method. From 1910 to 1917, about 155,400 *fang* of sediment pumped into the ponds according to the original plan.²² Urban construction started accordingly. These concessions, adjacent to each other within a limited scope, all had clear boundaries as reference to make plans. And these plans also had sufficient time to be implemented. Therefore, although belonged to different administrative authorities and developed in different time, these concessions formed a clear, well-organized and interconnected urban pattern.



Figure 6: Map of 1895 shows the pattern in the later B.M.E.



Figure 7: Map of 1913 shows the pattern of B.M.E. and Bellingham's sketch plan for E.M.A

The third mode that topography and land reclamation integrated in urban development is that, scattered cross-border constructions deeply affected by terrain condition and these constructions then as fait accompli affected the following planning. The development of British Municipal Extension applied a typical example. The land within original British Concession had been fully developed in 1880s. Custom Commissioner Gustav von Detring led British merchants and British Municipal Council to buy land outside the concession. When the B.M.E was granted by Chinese government in 1897, half of land had been occupied and developed.²³ This kind of construction, which was dispersed and in small-scale, was not able to carry out large-scale transformation of the land. Hence, the construction of roads and buildings must follow the texture of the site, which was the most convenient way to purchase and reclaim land. The comparison of maps of 1888, 1895 and 1913 (Figure 3, Figure 6, Figure 7) shows that the road system of B.M.E. had been formed before 1895 and the structure continued the pattern of tombs, vegetable gardens, ponds, and paths depicted in the 1888 map. Researcher indicates that British Municipal Council engineer A.W.H. Bellingham made the B.M.E plan between 1890 and 1902.²⁴ Obviously, this plan was deeply affected by topographical condition and existing constructions but not followed the road system, which parallel or perpendicular to the river, of the original settlement.

The last mode, which is the most significant one, that land reclamation influence urban development is that, the original plan that based on topographic condition modified after the land had been reclaimed. Mr. Bellingham made a sketch plan for the Extra Mural Area in early 1900s. Different from his plan for B.M.E., which was made based on status quo, the E.M.A plan was an idea ahead of any actual construction. The plan, on its northeast part, continued the grid structure that of B.M.E., and gradually rotated the grid to achieve North-South orthogonality. Due to the lack of detailed topographic map of the E.M.A., it is difficult to tell if his design was based on consideration of topographic condition, like the former one did. But obviously his plan applied a possibility that break through the concession's boundaries to formulate a structure that shifted from the riverbank to hinterland. But this plan also had obvious shortcomings. The conflict between the ideal grid and irregular border created lots of triangular blocks, which were difficult to develop (Figure 7). The filling of the E.M.A. started in 1916 when the technology was mature enough to reclaim a land as large as the E.M.A. It is also hard to tell whether the



advanced technology made the B.M.C. have the ability to ignore the status quo or they just gave up the previous idea of building a city beyond the boundaries. The Council proposed a plan in 1918 and another modified one in 1922, which guided urban development of E.M.A. in the following decades.



Figure 8: Plan for French Extension, 1903.



Figure 9: Map of French Concession in 1928.

There was similar case in the French Concession. The French Municipal Council proposed a version of plan in 1903 after the French Extension granted by Chinese government. This was a compromised plan that connected existing roads in B.M.E. and roads in Japanese Concession's riverfront area. The sparse roads bypassed the big ponds in the site as much as possible (Figure 8). This plan had been overturned after the Schroeter's Pond had been filled in 1914. The new plan, with denser road network and higher developing intensity, laid the foundation for building this area into a commercial center in the future (Figure 9).



The changes in the planning of the Japanese concession are even more significant. There were more low-lying lands and marshes in the hinterland of the Japanese Concession than in the British and French ones. For this reason, the original plan proposed to transform the low-lying land near *Hai Kuang Ssu* into big ponds, which could be used to irrigate and develop fisheries. The soil dug from the ponds could be used to fill the land in other area of the concession (Figure 10).²⁵ The land reclamation focused on the riverbank area by traditional filling method in the following few years. The HHCC's new method of land filling applied possibility to reclaim the hinterland. The Japanese municipal authority modified the plan in 1909. The new plan simply extended the existing roads to the Canal and Hai Kuang Ssu with no consideration of the ponds on the site (Figure 11).

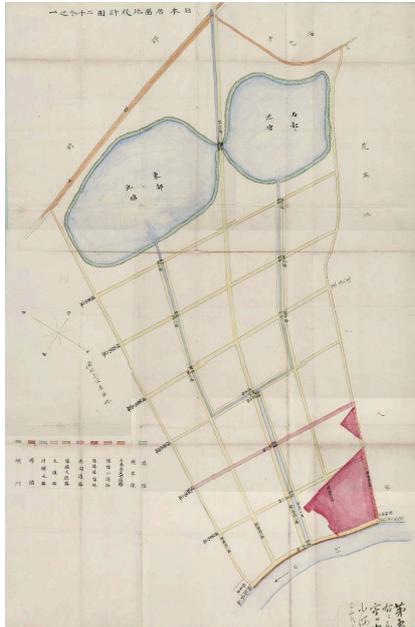


Figure 10: Original sketch plan of Japanese Concession.

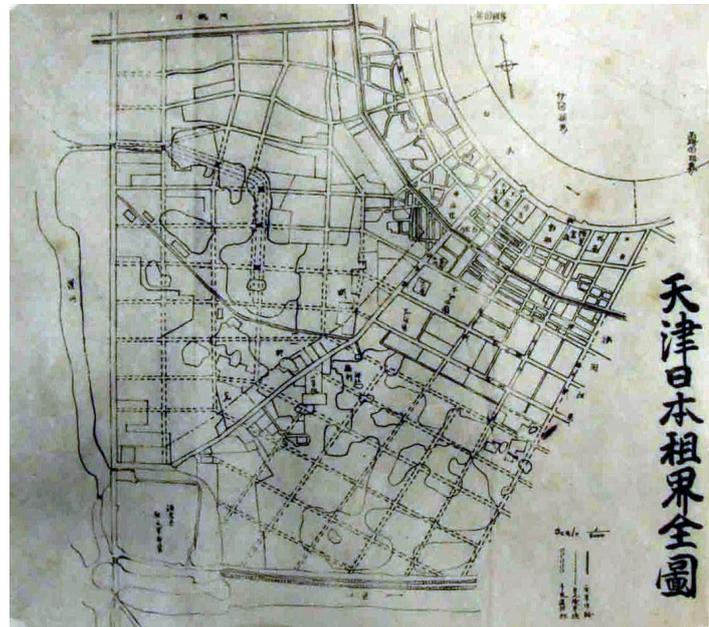


Figure 11: Map of Japanese Concession in 1928 shows the roads extended to the hinterland.

Conclusion

From 1860 to 1945, Tianjin had a history with concessions for more than 80 years. The driving force for designation and development of the concessions shifted from political deterrence to trade. For the sake of huge population poured into the city during different wars, the force then changed to real estate development. And the booming of modernization and construction occurred from that time, i.e. early decades of the 20th century. The terrain of Tianjin cannot fulfil the large-scale construction and the modern concept of hygiene. Hence, the land reclamation became precondition and foundation to the further development of the city. The establishment of HHCC and its introduction of modern method of land filling, which created lots of land, realized the need and the birth of modern Tianjin. The terrain condition of Tianjin made land reclamation a key role in the process of urban development. It significantly influenced the site selection, urban planning, and construction and produced a collage of urban patterns.

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Disclosure Statement

No potential conflict of interest was reported by the author.



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