THE INFILLING AND RECLAMATION OF INLAND WATERWAYS IN TOKYO, 1945–1962

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ABSTRACT: As part of their reconstruction of the city following Allied bombing during World War II, the Tokyo Metropolitan Government infilled medium to small inland waterways (namely, canals and moats constructed during the 17th century) and utilised the resultant terrestrial strips for new purposes. Wartime damage reconstruction was conducted as part of the official city planning of Tokyo. During the 1940s, various waterways in Tokyo were infilled primarily with debris resulting from wartime bombing and, thereby, these landfills presented a model for the disposal of debris from disasters. In Japan, 115 municipalities were designated as war-damaged cities by the government, whose reconstruction was conducted as official city planning. The article examines how common the disposal of wartime debris via the in-filling of inland waterways was. The in-filling of Tokyo's inland waterways caused the loss of watery spaces that are nowadays regarded as cultural heritage assets with recreational potential. Studies have either criticised the infilling of waterways or else underscored opposition to the activity. How then was it possible for the authorities to decide on infilling and land reclamation as city planning? Was there any social support for this project? Relatedly, should the decision by the metropolitan government to infill inland waterways be regarded as inappropriate? This article considers these questions and evaluates the modification of such areas after WWII.

KEYWORDS: Infilling, reclamation, inland waterways, Tokyo, World War II, debris disposal from disasters

I. Introduction

This article explores the history and meaning of the infilling of Tokyo's traditional waterways. It focuses on this as a reconstruction activity after World War Two (WWII) and argues that although the activity aimed to dispose of wartime debris as part of a comprehensive project to enhance the city and its transportation capabilities, it left the impression that this comprehensive project was merely a landfill project, particularly in Sanjikkenbori, where the infilling raised serious political and social concerns and criticisms.

Tokyo initially developed as Edo, the seat of the Edo shogunate in the 17th century. During the Edo period (1603–1868), a number of canals were constructed, many of which emptied into the sea. These canals provided an important water transportation network and a wide variety of industries and commercial enterprises developed around them, creating a bustling space. Although the traditional framework of urban structure based on a water

transportation network remains important in Japan (Jinnai, 1995), the development of railroads since the Meiji period (1868–1912) has shifted focus to land transportation (Fujii, 1997) and many canals that lost their significance as transportation networks have been infilled and reclaimed as a result.

One of the best-known examples of such reclamation of waterways in Tokyo happened after the end of WWII, as a result of the need to dispose of debris produced by wartime air raids. While a few studies have investigated debris disposal in a war-damage reconstruction in an essentially neutral manner (e.g., Woolven, 2013), such reclamation activity has also been criticised. There are two main points of criticism. First, as Masao Suzuki and Akira Koshizawa, experts in Tokyo's urban history and planning history, have pointed out, such infilling and reclamation has resulted in the loss of valuable traditional waterscapes (Suzuki, 1989, pp. 238–9, Koshizawa, 1991, pp. 234–7). Second, there was a problem with how the Tokyo Metropolitan Government (TMG) proceeded with the reclamation and subsequent development. I have previously reviewed case studies of reclamation, including that of Sanjikkenbori, the former eastern border of Ginza, one of the most fashionable shopping areas in the country. In those cases, the TMG did not sufficiently consider the opinions of concerned metropolitan wards and citizens in the process of deciding on infilling and reclamation or implementing the development. Moreover, the developments were criticised by public opinion as concessions and profiteering (Hasegawa, 2015a, Hasegawa, 2018).

The infilling and reclamation of Tokyo's canal areas after WWII merits further consideration. First, it is necessary to situate the modification of canals in this period within a longer historical span than is usually indicated in the literature. The infilling and redesignation of canals in Tokyo has had a long history, with its own reasons and significance, and is related to the development of city planning in Japan. After the Meiji Restoration of 1868, Japan's new government strove to transform Edo, the capital of samurai society, into Tokyo, the capital of a modern nation. Tokyo's city planning was primarily a government initiative, representing the development of modern metropolitan planning in Japan. Initially, the government attempted to create a Western-style cityscape in the city centre. For example, after the Great Fire of 1872, Ginza was rebuilt as a Western-style brick district, and although it was never implemented, the government commissioned German architects Hermann Ende and Wilhelm Böckmann to draft the design for a Baroque style government office district in Hibiya. Commencing in 1888, the *Shikukaisei* (Urban Improvement Project), based on the Tokyo Urban Improvement Ordinance, was carried out over a 30 year period to improve roads and water and sewage systems. However, in 1923, the Great Kanto Earthquake caused tremendous damage to Tokyo, and the government established the *Teito Fukko-in* (Imperial Capital Restoration Agency), headed by Shinpei Goto, who also served as the minister of the interior. Although the large-scale reconstruction plan had to be substantially scaled back because of a budget cut of more than 50%, the urban framework of Tokyo's central core and eastern downtown area, including the street network, parks and public facilities, still eventuated as an outcome of the earthquake reconstruction (Ishida, 2004, pp. 13–140). Notably, the reclamation of canals and other landfills were also conducted as part of the Urban Improvement Project and the reconstruction after the earthquake.

War-damage reconstruction after WWII was another milestone in the development of city planning in Japan. Even during the reconstruction period, infilling and land reclamation was not approached indiscriminately. The infilling of canals with wartime debris was also part of broader structural restitution undertaken by the TMG, along with the opening and

widening of other canals, structural alterations to river courses and the construction of storm surge protection facilities. As discussed later in this article, the series of plans addressing these four items primarily emphasised water transportation and its expansion (see Shoji [1990] for a study of four of the nine canal projects). However, an overall survey of this series of plans or a re-examination of the position of the reclamation plan in the series of plans has yet to be conducted.

In addition, it remains unclear whether any other cities besides Tokyo utilised infilling and related land reclamation as a means of disposal of wartime debris. Tachikawa et al. (2014) outlined the situation of debris disposal in war-devastated cities across Japan by drawing on *Sensaifukkoshi*, an official governmental record of war-damage reconstruction compiled by the *Kensetsusho* (the Construction Ministry). Their study indicates the number of cities where debris was used to reclaim canals as one method of debris disposal and briefly introduces the cases of Tokyo and Fukuyama. However, no other cities that used reclamation as a means of disposal of wartime debris are named in their study. Moreover, in the reconstruction of Tokyo after WWII, many of the original plans were not realised, owing to budgetary constraints and the growth of unpermitted construction. How should this be evaluated? Is it possible to view the reclamation of Tokyo canals as a beneficial project despite the opposition and criticisms demonstrated in the literature?

Furthermore, it is important to contextualise the reclamation of the canals within a general discussion of the problems of reclaimed land. Land reclamation has a long history. In the cases of Calcutta and Mexico City, which were once colonial cities, the swamp delta of the Bengal and the Lake Texcoco in the Valley of Mexico were reclaimed and capitalised as dry land by the coloniser. Waterscapes with fluid types of ecosystems were transformed into speculative, property landscapes with the boundaries between water and land being starkly drawn in a process by which European laws, concepts, and scientific knowledge were imposed (Bhattacharyya, 2018, Candiani, 2014). Was there a similar sense of forced transformation from waterscape to dry land entailing the perception of loss of cultural heritage in the case of the reclamation of the canals in Tokyo immediately after WWII?

In Japan, the concept of land reclamation played an important role in post-War economic growth strategy and urban policy development. In the 1960s and early 1970s, large-scale land reclamation proceeded at a rapid pace in coastal areas stretching through the national archipelago, from Tokyo Bay south-westward, to promote industrial growth. In particular, the development of Tokyo Bay, based on large-scale land reclamation, has been a concept that the government, the business community, architects and others have been working on since the late 1950s. Their efforts came to fruition in the form of mega-projects such as the Minato Mirai 21 urban centre and Tokyo Teleport Town in the 1980s. However, there have been persistent criticisms of the 1980s' projects' questionable market-oriented character and the fact that they were implemented with little regard for public response or demands (Pernice, 2007; Lin, 2007; Shiozaki and Malone, 1996; Seguchi and Malone, 1996; Hasegawa, 2023). Meanwhile, urbanisation proceeded at a rapid pace, and the need to dispose of garbage in Tokyo Bay led to plans for more landfill sites. The reclamation of coastal areas coincided with the development and exacerbation of water pollution, raised concerns about land subsidence and liquefaction, and transformed the natural waterscape. Coastal reclamation was seen as one of the key factors in the destruction of the natural environment (Hoshino, 1992, especially pp. 71–2, Totman, 2014, especially pp. 256, 266–8, 287–8). Were there similar concerns related to the reclamation of the canals in Tokyo immediately after WWII, particularly about matters related to environmental issues or profit-oriented development?

This article examines these points and questions by consulting the literature and various sources, including contemporary newspapers, records of war-damage reconstruction compiled by the Construction Ministry; minutes of the *Tokyo Chiho Toshikeikaku Iinkai* (Tokyo Local City Planning Committee) (TLCPC) (catalogued [but closed] at the Tokyo Metropolitan Archives)[1] – which authorised the TMG's comprehensive canal and river plan in 1947; the Sanjikkenbori reclamation plan in 1948), minutes of the National Diet,[2] and minutes of the Tokyo Metropolitan Assembly (TMA).[3]

In what follows, Section II places the reclamation of canals after WWII for the purpose of debris disposal within a longer historical span. Section III overviews war-damaged cities across Japan and those that used reclamation as a means of debris disposal. Section IV examines the TMG's comprehensive canal and river plan and the land reclamation proposals forming part of this plan and the discussions on them at the TLCPC. Section V examines the problems with the subsequent development on reclaimed land. The conclusion summarises the findings of this article and evaluates the reclamation plan based on those findings.

II. Canal infilling and reclamation before WWII

Canal infilling and reclamation in Tokyo has a long history. Sunaga (2014) reviewed the history of reclamation of canals and moats in the Nihonbashi and Kyobashi wards, which merged to become the Chuo ward. Land reclamation was performed during the Meiji period mainly for two reasons. First, it resulted from the previously mentioned Urban Improvement Project, a government-led, top-down city planning effort to transform the capital city into a modern city, with the reclaimed land being converted into new roads. Second, however, there were cases such as part of Nishihoridomegawa canal, where the residents' organisation applied to the City of Tokyo[4] to use the land for an independently financed elementary school and were allowed to reclaim it on this basis. Most of the waterways reclaimed in this period were *horidome* (closed ones, with dead ends) that were approximately 10 metres wide. During the reconstruction after the Great Kanto Earthquake in 1923, debris was used to reclaim coastal areas and infill canals. Canals such as Irifunegawa, Teppozugawa, and the remaining part of Nishihoridomegawa were reclaimed. Nishihoridomegawa and Irifunegawa were appropriated for the construction of a trunk road for a reconstruction and rezoning project nearby.[5] Regarding reclamation of the sea level, Toyosu (where the Tokyo Central Wholesale Market was relocated from Tsukiji in 2018), was created partly by reclaiming the sea surface using debris from the Great Kanto Earthquake (Toyosu ni/sanchome machizukurikyogikai, 2009). Similarly in Tokyo, debris was used to reclaim the seafront in front of the Shiba Rikyu Palace (now the Takeshiba Pier) and the Teppozugawa canal (Inamura, 2011).

[1] Thanks for permission to access the materials. Part of these materials are now reproduced in Tokyoto (2021, pp. 280–91).

[2] Accessed via a database system of the National Diet meetings: https://kokkai.ndl.go.jp/#/

[3] Held at the Tokyo Metropolitan Assembly Library.

[4] Tokyo Metropolitan Government was established in 1943 by abolishing the City of Tokyo, consisting of the current 23 wards, and Tokyo Prefecture, consisting of the surrounding municipalities.

[5] Irifunegawa and Teppozugawa were the first and third narrowest in the two wards, with widths of approximately 11–13 metres. Nishihoridomegawa, with an average width of 32 metres was *horidome*, as suggested by the part of its Japanese name (Sunaga, 2014).

Map 1 - Rivers, canals, etc. in Tokyo's ward area

With regard to the Nishihoridomegawa landfill, Shoji (1989) showed that it resulted from budget cuts for earthquake reconstruction. The City of Tokyo requested new canals and improvements, with the extension of either the Higashihoridomegawa or Nishihoridomegawa to Kandagawa being the most important request. The aim of the lattermost request was to complete the network connecting the Kandagawa and the Nihonbashigawa. For the movement of goods to and from railway stations that managed freight, namely, Shiodome, Akihabara, Sumidagawa, Iidamachi, and Ryogoku, and for the movement of goods once stored in warehouses along the rivers, the city's river network was often used because of its low transportation costs. However, the waterways south of Nihonbashi were networked, and the systematic waterways between Nihonbashigawa and Kandagawa were underdeveloped; thus, all cargo arriving at Akihabara Station had to bypass the Sumida River. By connecting either Nishihoridomegawa or Higashihooridomegawa to Kandagawa, Shiodome and Akihabara stations would be connected by a waterway, and cargo from Akihabara to the Kandagawa coast could be gathered at Nihonbashi. Another aim was that by connecting either Nishihoridomegawa or Higashihoridomegawa to Kandagawa, problems with these dead-end canals, such as muddy water and sediment accumulation, would improve. However, the City of Tokyo's initial request for the Nishihoridomegawa to be connected to the Kandagawa was rejected by the government because plans for new canal construction and renovation were scaled back due to reconstruction budget cuts. Consequently, a decision was made in accordance with the request from the Nihonbashi Ward Assembly that, if reaching Kandagawa was

not possible, Nishihoridomnegawa should be reclaimed because the dead-end canal was not good for sanitation (Shoji, 1989).

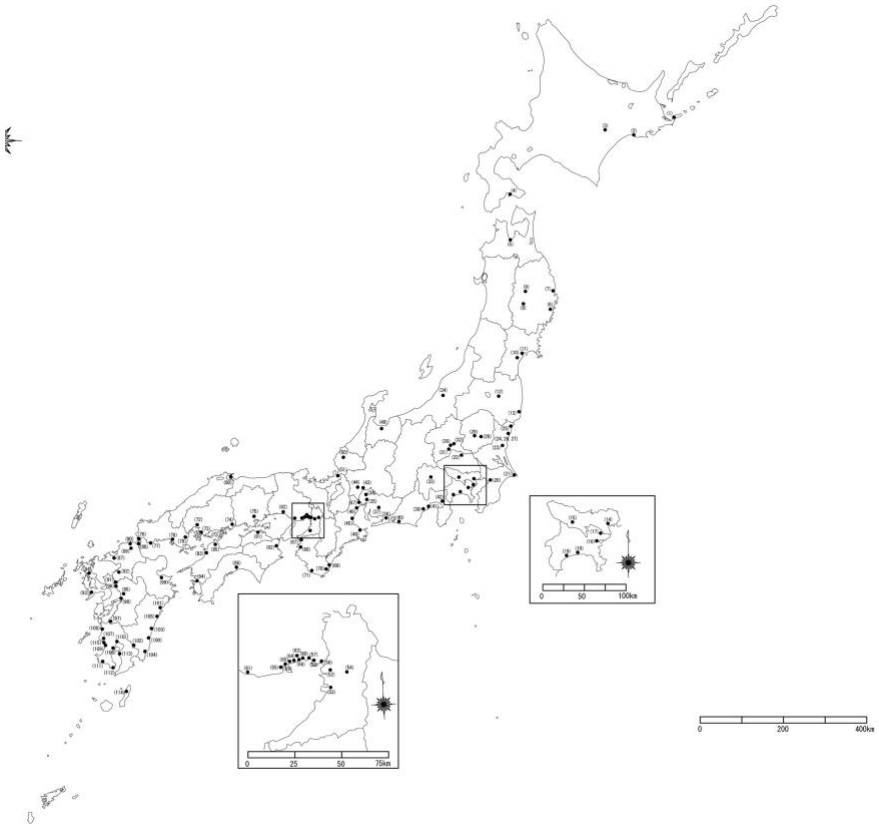
On the other hand, in areas along the Sumida River and to its east, and along the line extending from its mouth to the south, rivers and canals continued to be an important transportation route after the Great Kanto Earthquake and after WWII. According to a study on rivers and canals in the City of Tokyo (Kawada, 1931), the importance of the city's river canal network was not as a transportation route for goods moving in and out of the city but for localised small-scale transportation within the city. Of the total amount of cargo moved in from outside the city or shipped out in 1926, railroad cargo accounted for 63.61% of the total tonnage, and marine cargo 35.78%. By contrast, river freight accounted for 0.6% of the total. However, when the total amount of small-scale cargo within the city was compared by land and by water, 65.93% of rail cargo was then treated as small land cargos and 34.07% as water cargos; for sea cargos and river cargos, 20% of each were then treated as small land cargos and 80% as water cargos. As a result, regarding the total amount of cargo moving into and out of Tokyo, the percentage of small cargos transported by land was 49.22%, and that of small cargos transported by water was 50.78%. For small-scale transport, water transportation had the advantages of lower transport costs and higher transport capacity compared to land transport. The freight rates for 3 miles (c. 4.8km) per ton by various modes of transportation for major goods were compared: with barges at 1, rates were 1.3 for railroads, 2.0 for freight cars, and 2.2 for wagons. In the city's rivers and canals, barges had to wait for high tide to navigate; thus, there were demands for dredging and other measures to enable barges to navigate at all times (Kawada, 1931).

Barge transportation remained important after WWII. In Tokyo, as of July 1948, 6575 people resided on the water in 2146 households and were engaged in barge transportation (Yamaga, 1950). In Tokyo Bay, barge-dependent cargo accounted for more than 53% of the total in 1962. Several areas had a high concentration of cargo loaded and unloaded by barge. These barge-dependent areas were located along the waterways of the Sumida River, Old Nakagawa River, Onagigawa Canal, Shibaura Canal, Toyosu Canal, Shinonome Canal, and Shinonome North Canal, mainly handling industrial raw materials transported to the factory districts mostly in the Koto and Minato wards (Konno, 1965).

Map 2 - Rivers, canals, etc. in central core of Tokyo. (Rivers and canals indicated by dashed lines are those that vanished through reclamation or culverting.)

III. The reclamation of canals through debris disposal after WWII

More than 200 cities, towns, and villages in Japan were bombed by the US Airforce during WWII, of which 115 (of various sizes) were designated by the Japanese government as war-damaged cities after the war (Appendix 1).



Map 3 - Designated war-damaged cities in Japan (based on Kensetsusho 1959a, pp. 16–17).[6]

[6] Taga and Toyoura were later merged into Hitachi City in Ibaraki Prefecture. Shizuoka and Shimizu later merged into Shizuoka City in Shizuoka Prefecture. Ujiyamada in Mie Prefecture later became Ise City. In Hyogo Prefecture, Mikage, Uozaki, Motoyama, and Sumiyoshi were later merged into Kobe City and Naruo was merged into Nishinomiya City. Katsuura in Wakayama Prefecture later became part of Nachikatsuura Town. Sakae in Tottori Prefecture later became part of Sakaiminato Town which then became the city of the same name. Moji, Yahata, and Wakamatsu in Fukuoka Prefecture later became parts of Kitakyushu City. Uto in Kumamoto Prefecture later became part of the town of the same name and then the city of the same name. In Miyazaki Prefecture, Aburatsu later became part of Nichinan City and Tomishima became part of Hyuga City. In Kagoshima Prefecture, Sendai later became part of Satsumasendai City; Kushikino became the city of the same name and then part of Ichikikushikino City; Kajiki became part of Aira City; Yamakawa became part of Ibusuki City; Tarumizu became part of Tarumizu City, and Higashiichiki became part of Hioki City. The following towns also later became (parts of) cities of the same name: Nemuro and Hanamaki in Hokkaido,

How common or unique, then, was debris disposal via landfilling in Japan's post-War damage reconstruction? The first step in reconstruction, debris disposal, was psychologically significant and had practical significance in the sense that surveys had to be conducted first for city planning and development. To that end, the land had to be cleaned and levelled by disposing of the debris. Initially, debris disposal was delayed as securing equipment and, particularly, labour was difficult; however, in 1946, debris disposal was approved by the government as a clean-up method as part of the war-damage reconstruction project. General Headquarters, the Supreme Commander for the Allied Powers, also instructed the war-damaged local authorities to promote the cleaning of disaster-affected areas. Consequently, debris disposal was performed on a large scale. Local authorities endeavoured to promote debris disposal. In the two war-damaged cities in Fukui Prefecture, Fukui (number 50 in Appendix 1 and Map 3) and Tsuruga (number 51), a financial incentive was offered. In Fukui, 5 yen (when the dollar was at 15 yen) were paid for each *tsubo* (the basic unit in Japan, approximately 3.3 m^2; thus 5 yen for each tsubo meant 10 cents for 1 m^2) that was completely cleared of debris, and 1 yen was paid for each tsubo (2 cents for 1 m^2) where debris was collected at sites affected by fire (Tachikawa, et al., 2014, p. 689). The mayor of Fukui announced a "debris disposal incentive" system in February 1946, which substantially contributed to promoting reconstruction and city planning because 80% of affected areas were cleared within four months, by June 1946 (*Saigaikyokun no keisho nikansuru senmonchosakai*, 2011, pp. 169–70). In Hamamatsu (number 40), debris disposal was implemented as a project to help reduce unemployment and was considered beneficial in securing the labour force. In Aomori (number 5), Gifu (number 43), and Kagoshima (number 106), prison inmates worked in debris disposal, which substantially contributed to this task (Tachikawa et al., 2014, p. 689).

Debris disposal can be a costly undertaking when hyperinflation is observed. In Tokyo, for example, the cost of hiring a private civil engineering contractor to dispose of wartime debris could have been 3,000 yen per tsubo in March 1948 (when the dollar was at 50 yen; thus, 3,000 yen per tsubo was 18 dollars per 1m^2). The TMG offered to dispose of debris at an actual cost to those who wished to do so, but the price was unaffordable to the general public because it was at least half the market price (*Tokyo Shimbun*, 1948c); the initial salary for public servants in 1948 ranged from 2300 (USD 46 dollars) to 4863 yen (USD 97) (National Diet Library, 2016).

According to Tachikawa et al. (2014), the debris disposal methods for war-damage reconstruction in each city were divided into five categories:

1. For use as roadbed materials that formed the ground that became the foundations for roads and train tracks;
2. For use for other purposes, such as cobblestones for buildings.;
3. To build or level land;
4. Debris that was used to fill water bodies.;
5. Debris used in various applications, such as repairing lands that had become concave because of explosives, filling air raid shelters, and reconstructing land for elevated highways and train tracks.

Takahagi in Ibaraki Prefecture, Kanuma in Tochigi Prefecture, Minamata in Kumamoto Prefecture, Akune, Makurazaki, and Nishinoomote in Kagoshima Prefecture.

The number of cities that used each method was as follows: 47 for roadbed materials, 8 for other materials, 44 for building and leveling the site, 22 for filling bodies of water, and 28 for other methods. Among the cities that used disposed debris to fill water bodies, in Fukuyama (number 74), canals built by the feudal lord were filled with debris to create approximately 11,750 m² of land later used for roads and land readjustment. As previously mentioned, apart from Fukuyama and Tokyo, Tachikawa's study indicated no other cities (Tachikawa, et al., 2014, pp. 690–91). Therefore, we identified the names of the other cities that used disposed debris to fill water bodies.

Yokohama (number 16), the sixth largest city in Japan in 1940, reclaimed canals with disposed debris to construct a road 27 m wide and proposed a square for the city's main station. In Osaka (number 52), the second largest city in 1940, disposed debris was used to improve irregular-shaped canals and infill a canal constructed in the 17th century (Kensetsusho, 1961, pp. 189–190 and 438). In Himeji (number 62), although it was unlikely that disposed debris was used, the outer moat of the Himeji Castle was reclaimed for housing land in the mid-1950s. In Akashi (number 61), disposed debris was used to reclaim an arm of the sea. Okayama (number 75) used disposed debris to reclaim an outer moat (Kensetsusho, 1960b, pp. 236–7, 283, 299, and 491).

In Nagaoka (number 34), wartime debris was disposed of in a pond northwest of the city centre. In Toyohashi (number 36), the empty moat of the old castle was infilled by disposed debris. In Gifu (number 43), at the request of the Allied Forces, the inner moat of the old Kano Castle was filled in with debris. In Uwajima (number 84), as part of the first phase of the Uwajima Port development project, 6,930 m² of the new inner harbor was dredged, the old inner harbour was reclaimed with dredged soil and debris in 1948–9, and the reclaimed land was transformed into an urban area. Also, in Kurume (number 92), debris was disposed of in the reservoir basin (Kensetsusho, 1958, pp. 6, 98, 117, 154, 482 and 566 and Uwajimashishi Hensaniinkai, 2005, p. 746).

In Mikage (number 59), debris was disposed of by reclaiming canals. In Akune (number 108), debris was used to reclaim the banks of the Takamatsu River and the coast (Kensetsusho, 1957b, pp. 491, 716). In Shizuoka (number 39), debris was used as fill for the renovation of the Abe River and the reclamation of the old castle moat (Kensetsusho, 1960a, p. 351). In Choshi (number 21), debris was used to backfill waste wells and abandoned sewage bedding depressions. In Ogaki (number 44), debris was used to fill a pond. In Toyama (number 49), debris was used to fill the pond and the moat. The northern side of the moat of the old Toyama Castle was filled with debris. Reclamation was followed by the eastern side of the moat to build a new road proposed in the war-damage reconstruction plan. The remaining sides were also reclaimed by 1962 to construct buildings, including the fire station (Kensetsusho, 1959b, pp. 167, 257 and 298 and Toyamashi Kyodohakubutsukan, 2006, p. 15).

Although not explicitly mentioned as reclamation by using debris, in Fukui (number 50), ponds and swamps in the war-damage reconstruction areas were infilled. In Imabari (number 85), large parts of the moats surrounding the Imabari Castle were reclaimed by debris to construct the road and the park. In Kochi (number 86), the eastern and western sides of the outer moat of Kochi Park, the former castle, were reclaimed with debris. In Kagoshima (number 106), debris was used for landfill projects near the Sakurajima Pier (Kensetsusho, 1959b, pp. 377, 653, 692, and 746). In Wakamatsu (number 90), debris was disposed of in the swamp. In Arao (number 96), debris was used to fill ponds and swamps proposed for land for public use. There were also cases of filling water-filled paddy fields

with debris for land preparation for housing sites, as in Toyoura (number 27) and Iwakuni (number 79) (Kensetsusho, 1957a, pp. 294, 524, 584, and 617).

From the descriptions in the volumes of the Construction Ministry's official records of war-damage reconstruction, specifying how many cities disposed of their debris by filling water bodies as landfill is difficult. Nonetheless, that approximately 22 of 115 war-damaged cities used disposed debris to fill water bodies seemed to suggest that this method was commonly used to dispose of wartime debris.

TMG's 1947 proposals for canals and rivers

At the TLCPC meeting on November 7, 1947, four types of proposals for a canal project, a river project, reclamation, and storm surge protection facilities were introduced by Hideaki Ishikawa, the principal planning officer of the TMG. These proposals showed the importance the TMG attached to waterways (Tokyo Chiho Toshikeikaku Iinkai, 1947, pp. 90–96). The reason for the proposals was to "contribute to the sound development of the city by ensuring its disaster prevention and the convenience of water transport in the future." A canal project was to be conducted on 9 canals, with a total length of 27.6 km (Appendix 2); a river project was to be conducted on 17 rivers, with a total length of 88.185 km (Appendix 3); and a reclamation project was to be conducted on 14 canals, with a total length of 6.762 km (Appendix 4). Regarding storm surge protection facilities, 3 coastal embankments (9.97 km) (Appendix 5), 13 river embankments (43.844 km) (Appendix 6), and 69 sluice gates (31 rivers and canals, including the 13 rivers for which river embankments were proposed) were to be constructed.

In the Koto area east of the Sumida River, comprising the Koto, Sumida, and Edogawa wards, the aim was to build a canal network that could be navigated by tugboats, running east-west and north-south through the center of the area. When all boats were rowed by hand, a narrow width was sufficient but as industry modernised, tugboats became necessary. For the east-west canal, the current Onagigawa and Shinkawa were to be widened to 80 m and 60 m, respectively, and for the north-south canal, the current Yokojikkengawa was to be widened to 80 m. In addition, the width of the Kitajikkengawa was to be widened to 60 m to connect it with the Old Nakagawa (Tokyo Chiho Toshikeikaku Iinkai, 1947, pp. 96–99). The plan was to substantially widen the actual width of the canals. For example, the width of Onagigawa in the early 20th century was 33 m (Inomata, et al., 2001, p. 336); and the average width today is 41 m for Yokojikkengawa, 18 m for Kitajikkengawa (Sumidaku, 2014) and 30 m for Shinkawa (Edogawaku, 2014). In the Kamata-Omori area of Oota ward, the current Nomikawa would be widened to 30–40 m and converted into a canal, and two new canals would be opened. The aim was to provide a valve for boat traffic and facilitate the removal of inland water from areas with poor drainage, such as Nomikawa. In the Minato ward, a 2 km stretch of the lower reaches of the Furukawa was widened to 30 m and converted into a canal to serve small and medium-sized industries (Tokyo Chiho Toshikeikaku Iinkai, 1947, pp. 99–101).

River projects

Apart from the Arakawa and Nakagawa, river projects were mainly concerned with the widening of small and medium-sized rivers running through the central and western parts of the ward area, which played an important role as trunk drainage channels in the

Yamanote area, the western half of the ward area (Tokyo Chiho Toshikeikaku Iinkai, 1947, pp. 101–3).

Reclamation

The reclamation proposals aimed to reclaim canals and rivers that were "no longer useful as rivers" and reclaim tributaries, such as the Heikyugawa tributary, for the revetment of the main river. The reclamation of Sotobori, the outer moat, was for the expansion of Tokyo Station. Because all these reclamations would be constructed from wartime debris, thus facilitating debris disposal, Ishikawa said, "It seems like killing two birds with one stone" (Tokyo Chiho Toshikeikaku Iinkai, 1947, pp. 103–104).

Photos 1 & 2 - Ryukangawa in 1948 and being reclaimed in 1949 (Courtesy of Chuo City Library).

Storm surge protection facilities

The plan for storm surge protection facilities was to raise the height of the coastal embankments and main river and canal banks to 4, 4.5, or 5 m, together with sluice gates, to provide complete storm surge protection in the Koto area, where land subsidence was ongoing and expected to continue. The coastal embankment defending the low marshy ground in the Kamata area was reinforced using the same method. The proposed coastal embankment was 2 km long and 4.5 m high in Koto ward, 5.01 km long and 5 m high in Edogawa ward, and 2.96 km long and 4.5 m high in the Kamata area. In Koto ward, the project was generally planned along the Arakawa River on the east side of the ward toward the Old Nakagawa River; in Edogawa ward, along the Arakawa River on the west side of the ward toward the Old Edogawa, facing it; and in Kamata area of Oota ward, on the north side of the Ebitorigawa River and across from Haneda Airport toward the north. The width of these banks and coastal embankments was 20 m (Tokyo Chiho Toshikeikaku Iinkai, 1947, pp. 86–90 and 105–7).

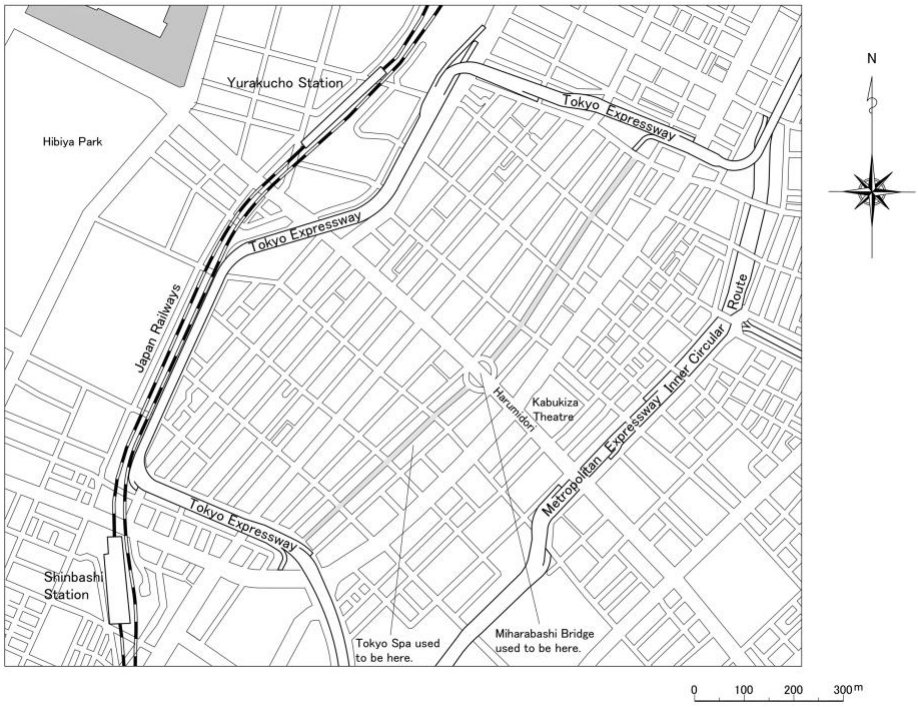
In the question and answer session that followed the TLCPC, concern was expressed regarding reclamation. The Chief Fire Officer of the Metropolitan Police stated that from a firefighting point of view, once the land was reclaimed, it would be very expensive to build infrastructure for a new water supply. Therefore, some type of water supply, such as a culvert, should be provided alongside the reclamation. The Director General of TMG's Bureau of Waterworks pointed out that even if a river's purpose as a river had disappeared, its purpose as a reservoir remained, with sewage flowing into it. He asked that adequate provisions be made for facilities to fulfill such a role. In response, Ishikawa said that although he was mindful of others' perspectives, what was important was to first devise an overall plan of the four types of projects so that work could begin. The whole plan was so complex that implementing it immediately was deemed infeasible. However, residents had to be reminded of the necessity of realising these plans. Particularly important was to plan that permanent buildings would not be haphazardly built in a manner that would prevent the proposed projects. Additionally, Ishikawa stressed his desire to start the reclamation part of the plan immediately. Citizens of Tokyo were becoming impatient regarding the delay in disposing of the debris. The TLCPC agreed to approve the proposals (Tokyo Chiho Toshikeikaku Iinkai, 1947, pp. 108–127).

Reclamation and subsequent development of Sanjikkenbori

At the TLCPC meeting in November 1947, attendees discussed comprehensive canal and river planning, especially regarding reclamation proposals as part of that plan. At the August 1948 TLCPC meeting, the reclamation of Sanjikkenbori was proposed as an addition to the reclamation proposal. Ishikawa's explanation of the proposal emphasised that 45% of the debris had been disposed of; thus, 55% was unattended and required disposal as soon as possible (Tokyo Chiho Toshikeikaku Iinkai, 1948, pp. 112–14). Authorities underscored that implementing the debris disposal had become extremely difficult because of the cost. In January 1948, the President of the Board of Construction (the predecessor of the Construction Ministry), who was in charge of war-damage reconstruction, appealed to the public via newspapers that the budget for cleaning and leveling work, such as debris disposal, was inadequate (*Tokyo Shimbun*, 1948a). The Land Readjustment Division of the TMG's Construction Bureau also begged citizens to understand that "both the national government and the metropolitan government were in

financially dire situations, and thus, they had to be selective"; cleaning major roads and downtown areas were prioritised; and "debris disposal in residential areas and narrow roads would be naturally delayed" (*Tokyo Shimbun*, 1948b).

The TMG had to find a financially practicable solution to dispose of debris. To facilitate this process, the TMG's high-ranking officials, including the Director General of the Construction Bureau, travelled to meet Toranosuke Shinohara, a veteran member of the TMA elected from the local Chuo ward, to ask for his support for the reclamation of Sanjikkenbori in February 1948. Asked to gather local opinion, Shinohara met with local ward councillors and chairpersons of the united neighbourhood associations to listen to their views. The locality used to be very active in renting out in connection with water transportation. However, the local representatives Shinohara met maintained that because now few tenants were available for warehouses, they would rather reclaim and redevelop the land. Thus, Shinohara, who was personally against reclamation, went along with this plan (Tokyo Metropolitan Assembly, 1949, pp. 369–70). Understandably, no questions or comments were observed at the TMA or the TLCPC meeting regarding the proposal for the reclamation of Sanjikkenbori, which was decided on as drafted (Tokyo Metropolitan Assembly, 1948, pp. 974–5 and Tokyo Chiho Toshikeikaku Iinkai, 1948, p. 115).



Map 4 - Reclaimed Sanjikkenbori in Ginza district. (Currently, Ginza is an area bounded by Tokyo Expressway and Metropolitan Expressway Inner Circuit Route. The road in grey is the one on the reclaimed Sanjikkenbori.)

Thus, there was virtually no evidence of concerns among stakeholders about the landscape impact of this landfill or the landfill site's geotechnical issues. There were newspapers published in the 1930s that reported on how Sanjikkanbori was blighted by household garbage, etc., while immediately after the war, the head of Chiyoda Ward repeatedly petitioned the TMG to reclaim the Ryukangawa with wartime debris (Hasegawa, 2018, pp. 45, 47). Worries about liquefaction and other reclamation ground issues were found with regard to sea-level reclamation, especially in the case of reclamation of the soft-soil alluvial seabed with sediments dredged there (Shimizu, 1997, pp. 13–18), but not with regard to canal reclamation within the urban area. In fact, the Sanjikkenbori had already been reclaimed by roughly one-third of its width in the 1820s during the Edo period (Suzuki, 2002, p. 576). However, the reclamation of Sanjikkenbori after WWII soon attracted severe criticism. Commercial interests in Ginza voiced their opposition and prevented reclamation workers from performing their work. They were concerned about losing their prosperity because commerce would shift to the new shopping street on the reclaimed Sanjikkenbori patronised by emerging newly rich, particularly third-country nationals (*Tokyo Shimbun*, 1948d and Tokyo Metropolitan Assembly, 1949, p. 370). Moreover, as Shinohara disclosed at the TMA meeting, the TMG's plan for the area of land to be reclaimed had been shown to some parties before it was published; plots of reclaimed land were so large in some parts that only the wealthiest people could afford to buy them. The TMG's planner, Ishikawa, defended himself by saying that the proposal in question was one of the proposals presented to the community and had been mistakenly circulated as an official proposal. He stressed that he did not intend to sell the landfill to the privileged classes or the masses but wanted to use it for something of public, international, and cultural significance. Shinohara further queried Ishikawa's views by stating that wealthy people were roaming around hoping to obtain allotments for the purchase of landfill sites and that there were rumours that one of them had met with Ishikawa and that some had come to see Shinohara. Ishikawa responded by saying that he was not aware of such a story and that he had no say in the matter because the Finance Bureau would be responsible for the actual sale of the landfill site; thus, he hoped to rectify any misunderstandings (Tokyo Metropolitan Assembly, 1949, pp. 374–7).

Such negative impressions of concessions, interests, and profiteering regarding the Sanjikkenbori landfill were amplified by the post-reclamation development. The most infamous of these were Tokyo Spa, which opened in April 1951 as the first building on reclaimed land, and the the Miharabashi Bridge site development, which spanned Harumidori, a principal street in Ginza. Tokyo Spa was an entertainment facility that included a sauna, high-class Japanese restaurant and dance hall. The presence of young women in bikinis washing the bodies of male customers in private saunas and the high prices charged for food and drink made it the epitome of decadence, opulence, and injustice in the newspapers. Eventually, Prime Minister Shigeru Yoshida declared in the Diet that he would consider taking action, as briefly mentioned in a previous study. (Hasegawa, 2015a, pp. 493–4) Notably, a detailed assessment of these events reveals a grave concern among politicians and top government officials that Tokyo Spa would become a major diplomatic issue.

Photo 3 - Tokyo Spa in 1957 (courtesy of Chuo City Library). (Tokyo Spa was the four-story building with a chimney and a signboard in four Chinese letters meaning Tokyo Spa.)

In the Diet there was incessant indignation because "considerable sums were being wasted on decadent enterprises such as Tokyo Spa," and there were concerns regarding overseas criticisms that "this might be going too far for Japan, which was required to pay for war reparations" (House of Representatives Construction Committee, 1951, p. 7 and House of Councillors Trade and Industry Committee, 1951, p. 3). The Japanese government had attempted to solve this problem amidst concerns within the government that the strength of the overseas opposition to Tokyo Spa, particularly from the United States, "was becoming a serious hindrance to diplomacy." One specific action by the government was a plan for Administrative Vice-Minister for Foreign Affairs Sadao Iguchi to recommend the closure of Tokyo Spa. Iguchi issued a comment that he might hold a discussion with the president of the Bank of Japan on restrictions on loans, but before that, he would "meet with either the management or the individuals who provided the capital to discuss and recommend the voluntary withdrawal of their plan" (*Yomiuri Shimbun*, 1951a). Within one week, the prime minister had to assure attendees of the meeting of the Budget Committee of the House of Councillors that "the 'excessive luxury' of a facility for pleasurable indulgence that we currently speak of has become a problem, and so the government will be considering taking measures toward it as well" (House of Councillors Budget Committee, 1951, p. 12). This statement was emphasised as Yoshida declared "his intentions for the first time" regarding the matter, in answer to which Kaneshichi Masuda, Secretary General of the Liberal Party, stated that "as the matter is a serious problem for the party as well, we would like to begin considering the matter as soon as possible" (*Yomiuri Shimbun*, 1951b).

Ultimately, the Health and Welfare Committee of the House of Councillors invited the management of Tokyo Spa to hear its recommendations. Tokyo Spa was firmly directed to change the nature of its operations to that of a health facility. Specific recommendations directed to Tokyo Spa included measures to (1) cease the operation of its cabaret and dance hall, (2) not have young female employees dressed in bikinis, (3) introduce the use of the hot spring baths as a form of welfare services, and (4) reduce prices. The management of

the spa was reported to have expressed its intentions to actively comply with the requests to close the cabaret, introduce the hot spring baths as part of welfare services, and reduce the prices. This compliance was supposed to "put a tentative end" to the issue (*Yomiuri Shimbun*, 1951c), although important elements of Tokyo Spa's services that had been regarded as problematic – for example, the young female employees dressed in bikinis – continued (*Mainichi Gurafu*, 1957 and *Shukan Shincho*, 1959).

On the reclaimed site of the Miharabashi Bridge, an underground shopping mall was to be built, and the above-ground area was to be used as a roundabout. Later, however, two two-story buildings facing each other were built in September 1953, to match the curvature of the roundabout, making it impossible for the roundabout to function. In addition, the underground shopping mall and the two buildings were supposed to be used for various facilities to promote tourism, such as stores selling local specialties, but they had been replaced by Japanese pinball *pachinko* parlours and cheap drinking establishments. Complaints about pachinko parlours were particularly strong (*Asahi Shimbun*, 1953) because the boom in pachinko had become perceived as a social problem by the 1950s and involved elementary school students (*Mainichi Shimbun*, 1951). Moreover, because the purpose of using the Miharabashi Bridge site was approved by the managing committee established in August 1951 to reflect the opinions of the community in the development of the reclaimed land, the community, including the Chuo ward government, was betrayed because the actual development was a violation of the promise (*Yomiuri Shimbun*, 1954).

Photo 4 - Miharabashi Bridge site in 2013 (author's photo). (The ceiling of the underground mall is a former bridge. The sign hanging from the ceiling is the name of the movie theatre called Ginza Cinepathos, which is shown on the right part of this photo. On the left side of the photo is a row of small food and drink establishments.)

The Miharabashi Bridge site was originally a piece of metropolitan government-owned land. The land was leased by the Tokyo Metropolitan Tourism Association (TMTA), an affiliate of TMG, and operated with subsidies from TMG, and the management of the land

was outsourced to New Tokyo Tourism Company (NTTC), a private for-profit company. NTTC went against the decision of the managing committee and leased the property to a pachinko parlour and bars. However, because the TMTA was an offshoot of the TMG, and its head was the metropolitan governor, there was strong criticism that the supervision by the TMG and the TMTA was inadequate. The outsourcing of the project from TMTA to NTTC was also regarded by the public as a sublease of metropolitan government-owned land, which was prohibited by regulations. The Miharabashi problem remained unsolved. As the TMG solidified its withdrawal policy concerning the Miharabashi underground mall, it attempted to sever relations with NTTC and ceased seeking land usage fees from the company that owned the facilities there. Notably, the site simply remained exempt from the collection of land rent for years (*Asahi Shimbun*, 1982) until the mall and the two buildings were eventually removed just before the Olympic Games scheduled in 2020.

The reclamation led to two problems, especially for Sanjikkenbori. First, only the landfill plan for debris disposal, a highly urgent issue, was implemented, and the remaining proposals of the comprehensive canal and river plan, with its emphasis on water transportation, were difficult to realise. Specifically, all the proposals to construct a canal network based on nine wide canals were abolished by 1964 because of the development of land transportation (Shoji, 1990, pp. 115–16). In Tokyo Bay, the importance of barge transportation did not completely disappear after WWII, although it has been in constant decline. Moreover, it was predominantly related to factory districts, handling mainly industrial raw materials (Konno, 1965, pp. 19–23, Wano, 1991, p. 285) and thus had little interaction with thriving commercial districts in the central areas such as Chuo ward, notably Ginza. These factors leave the impression that the canal project in Tokyo's war-damage reconstruction was a landfill project, particularly that of Sanjikkenbori, even though the majority of the canals proposed for reclamation were, as in Appendix 4, in the industrial Koto Ward. Second, landfill development, particularly that of Sanjikkenbori, raised diplomatic concerns, as high as the National Diet level, because of Japan's impending re-independence and serious criticisms against the TMG's governance, which made positive evaluation of the landfill difficult. Japan had just signed the San Francisco Peace Treaty in September 1951, which promised to restore its independence in 1952. As one Diet member stated in 1951, considering the situation caused by Tokyo Spa, individuals should be "forced to think very hard about the future of an independent Japan… and how necessary it is to consider draconian measures and impose financial restrictions specifically for this sort of thing" (House of Councillors Budget Committee, 1951, p. 12). Regarding the development of the reclaimed site of the Miharabashi Bridge, the matter was discussed at the National Diet in 1954, where the deputy metropolitan governor – as a witness – apologised for the TMG's mismanagement (House of Representatives Local Government Committee, 1954, p. 2). In 1955, the newspaper company specialising in the affairs of the TMG published a pamphlet criticising the TMG's governance. It described the development of the Miharabashi Bridge site as "the concession issue injuring Ginza," in which the situation was caught in the mire and "getting deeper and deeper" (Ozaki, 1955, pp. 29, 31).

Conclusion

Reclamation of water bodies as part of city planning and development was reasonably common before WWII, including reclamation using debris from the disasters such as the Great Kanto Earthquake. In the war-damage reconstruction after WWII, there were many

cases of reclamation of water bodies as a means of debris disposal. Moreover, although there is no mention in the Construction Ministry's official records of war-damage reconstruction, there are the cases of Kuwana and Tsu (both in Mie Prefecture), where the debris was disposed of by reclaiming the moats of the old castles to construct new roads, parks, housing, and public facilities. In addition, since the Meiji period in the late 19th century, both cities have been actively reclaiming watery areas such as moats for urban development (Yoshimura and Seguchi, 1991, pp. 67–72). A study in 1990 based on a questionnaire survey of 104 former castle cities across Japan shows that moats and other waterfront spaces have been converted into land through land reclamation and culverting, and are now being used as roads, housing lots, parks, and so forth. (Yoshimura and Seguchi, 1990, pp. 403–8). These findings indicate a possibility that there may be other cases not mentioned in the Construction Ministry's official records in which the reclamation of moats and other water surfaces was used to dispose of debris in war-damage reconstruction. Additionally, the case in which reclamation of canals was proposed as part of a comprehensive canal and river plan seems to have been rare per the Construction Ministry's official records. In this sense, the case of Tokyo was unique. For its industrial areas, water transportation based on canals was emphasised, and its expansion was proposed. By contrast, another idea was to reclaim canals considered unnecessary. Reclamation of Sanjikkenbori, where opposition to land reclamation had become a social issue, was favoured by the locals, whose water transport-based warehousing industry was in decline. Neighbouring merchants opposed the landfill, fearing that their prosperity would be threatened by the new commercial district. When the TLCPC approved a comprehensive canal and river plan in 1947, questions on landfills were raised but were meant to call attention to the role of canals for purposes other than water transportation, such as in firefighting and sewage, and were not against the reclamation. Geotechnical concern or the sense of loss of cultural heritage around the landfill sites was indiscernible. As aforementioned, when the same committee decided to reclaim Sanjikkenbori in 1948, there were no questions or comments.

Thus, canal reclamation as a means of disposal of wartime debris as part of a comprehensive canal and river plan was not entirely inappropriate as a concept. However, according to the aforementioned survey of 104 former castle cities, city planners in Japan have recognised that the loss of water bodies due to urban development has had a negative impact on cities (Yoshimura and Seguchi, 1990, pp. 405–7). The use of waterfront space is now positioned as an important part of city planning, and efforts have been made, for example, regarding the canals in Tokyo's Koto ward, to plant trees and develop promenades to encourage daily visits by citizens approximately from the 1970s on (Inomata, et al., 2001, p. 337). As shown, in Tokyo, immediately after WWII, city planners proposed a comprehensive project to enhance the function of a network of water transportation based on canals. Reclamation of canals was part of this proposal, and the aim was to implement the urgent need for wartime debris disposal. Planners did not seem to intend to destroy the cultural heritage of water bodies and there was little prevailing social concern about this. There was however one exceptional case in which the public opposed the reclamation of traditional water scenery. The proposal was to reclaim Shinobazunoike pond, a place of scenic beauty in central Tokyo from the Edo period, and it was vigorously opposed by the public; thus, the TMG was forced to abandon the idea. The reclaimed canals in the comprehensive canal and river plan were thought to have little aesthetic merit, as shown, for example, in the case of Ryukangawa, with the head of the local ward repeatedly asking the TMG to reclaim it before the TLCPC's decision in 1947 (Hasegawa, 2018, pp. 39–42, 47 and 50). However, because only the reclamation projects among the comprehensive canal and river plan were sufficiently realised and because the

developments of the reclaimed Sanjikkenbori caused serious diplomatic concern and acute criticisms against the TMG, the negative impression of Sanjikkenbori as a prime example of reclamation was underscored. Land created by reclaiming the canals with wartime rubble was, compared to 240km^2 reclaimed in the Tokyo Bay between 1868 and 1990 (Kankyosho, n.d.), a mere 245,663m^2 by 1951 (Tokyoto, 1953, p. 536). At the same time, the case of Sanjikkenbori was negative enough to underline the questionable profit-oriented character of reclamation.

Despite the above, the TMG did not value the canal in the landscape in these reclamation projects, lowering the bar for the cursory treatment of canals from the late 1950s on. The construction of highways in urban centres in the high economic growth period was such that the canals were either filled in or covered by roads, owing to the emphasis on using publicly owned land to reduce costs. Ginza, in particular, was encircled by motorways. Tokyo Expressway opened to traffic in 1959 and a part of the Metropolitan Expressway Inner Circular Route opened in 1962, built on land created by reclaiming the canals despite the opposition (Hasegawa, 2015b, *Yomiuri Shimbun*, 1962). In 2021, the expressway undergrounding project in the Nihonbashi area was started in order to revive traditional water scenery (Shutokosokudoro Kabushikigaisha, n.d.). In this area, Nihonbashigawa canal has been covered by the expressway over it, which has been regarded as an example of how *not to* build an expressway over a canal. However, any attempt to revive traditional water scenery is pointless when it comes to the cases of canals that vanished through reclamation, because reviving them is not a practical option.

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Appendix 1 Designated War-damaged Cities in Japan

Name of Prefecture	Number in Map 3	Name of the city (or town or village) at the end of WWII	Population based on 1940 census
Hokkaido	1	Nemuro (town)	22,010
	2	Kushiro	63,180
	3	Honbetsu (town)	10,956
	4	Hakodate	203,862
Aomori	5	Aomori	99,065
Iwate	6	Kamaishi	42,167
	7	Miyako	32,879
	8	Hanamaki (town)	16,953
	9	Morioka	90,051
Miyagi	10	Sendai	255,363
	11	Shiogama	35,890
Fukushima	12	Koriyama	57,402
	13	Taira	30,126
Tokyo	14	Ward area (former City of Tokyo)	6,778,804
	15	Hachioji	75,186
Kanagawa	16	Yokohama	968,091
	17	Kawasaki	300,777
	18	Hiratsuka	43,148
	19	Odawara	51,838
Chiba	20	Chiba	92,061

	21	Choshi	61,198
Saitama	22	Kumagaya	48,899
Ibaraki	23	Mito	66,293
	24	Hitachi	82,885
	25	Takahagi (town)	13,305
	26	Taga (town)	20,010
	27	Toyoura (town)	3,810
Tochigi	28	Ustunomiya	87,868
	29	Kanuma (town)	23,781
Gunma	30	Maebashi	86,997
	31	Takasaki	71,002
	32	Isesaki	40,004
Yamanashi	33	Koufu	106,579
Niigata	34	Nagaoka	66,987
Aichi	35	Nagoya	1,328,084
	36	Toyohashi	142,716
	37	Okazaki	84,073
	38	Ichinomiya	70,792
Shizuoka	39	Shizuoka	212,198
	40	Hamamatsu	166,346
	41	Shimizu	68,617
	42	Numazu	53,165
Gifu	43	Gifu	172,340
	44	Ogaki	56,117
Mie	45	Tsu	75,966
	46	Yokkaichi	111,026
	47	Kuwana	41,848
	48	Ujiyamada	65,204
Toyama	49	Toyama	145,382
Fukui	50	Fukui	104,614
	51	Tsuruga	31,346
Osaka	52	Osaka	3,252,340
	53	Sakai	223,819
	54	Fuse	134,724
Hyogo	55	Kobe	990,374
	56	Amagasaki	257,966
	57	Nishinomiya	129,282
	58	Naruo (village)	34,261
	59	Mikage (town)	22,711
	60	Ashiya	39,137

	61	Akashi	59,786
	62	Himeji	104,259
	63	Motoyama (village)	19,260
	64	Uozaki (town)	13,360
	65	Sumiyoshi (village)	18,121
	66	Honjo (village)	13,739
Wakayama	67	Wakayama	206,883
	68	Kainan	29,091
	69	Shingu	32,403
	70	Katsuura (town)	5,498
	71	Tanabe	31,260
Hiroshima	72	Hiroshima	343,968
	73	Kure	276,085
	74	Fukuyama	59,381
Okayama	75	Okayama	163,552
Yamaguchi	76	Shimonoseki	196,022
	77	Ube	120,122
	78	Tokuyama	44,882
	79	Iwakuni	51,045
Tottori	80	Sakae (town)	7,044
Kagawa	81	Takamatsu	111,207
Tokushima	82	Tokushima	119,581
Ehime	83	Matsuyama	117,534
	84	Uwajima	52,101
	85	Imabari	55,557
Kochi	86	Kochi	139,754
Fukuoka	87	Fukuoka	332,549
	88	Moji	146,693
	89	Yahata	261,309
	90	Wakamatsu	88,091
	91	Omuta	177,034
	92	Kurume	92,734
Nagasaki	93	Nagasaki	252,630
	94	Sasebo	233,984
Kumamoto	95	Kumamoto	210,038
	96	Arao	39,068
	97	Minamata (town)	28,330
	98	Uto (town)	5,388
Oita	99	Oita	79,419
Miyazaki	100	Miyazaki	77,127
	101	Nobeoka	79,426
	102	Miyakonojo	58,819

	103	Takanabe (town)	14,434
	104	Aburatsu (town)	10,475
	105	Tomishima (town)	19,260
Kagoshima	106	Kagoshima	190,257
	107	Sendai	34,289
	108	Akune (town)	24,725
	109	Kushikino (town)	27,143
	110	Kajiki (town)	14,862
	111	Makurazaki (town)	29,057
	112	Yamakawa (town)	12,926
	113	Tarumizu (town)	20,805
	114	Nishinoomote (town)	21,804
	115	Higashiichiki (town)	14,811

Source: Kensetsusho, 1959a, pp. 16–17, Tokyo Shiseichosakai, 1945, pp. 9–12 and Sorifutokeikyoku, 1961, pp. 27, 28, 35, 69, 76, 193, 211, 214, 281, 285, 294, 295, 297, 298, and 299.

Appendix 2 Canal projects

Name of canal (ward)	Length of the project (m)
Kamata (Oota ward)	1,910
Nomikawa (Oota ward)	4,760
Uchikawa (Oota ward)	2,740
Furukawa (Minato ward)	2,000
Onagigawa (Koto ward)	4,760
Yokojikkengawa (Sumida/Koto wards)	7,070
Yokojikkengawa tributary (Koto ward)	0.585
Kitajikkengawa (Sumida/Koto wards)	1,480
Shinkawa (Edogawa ward)	2,880

Source: Tokyo Chiho Toshikeikaku Iinkai, 1947, p. 83.

Appendix 3 River projects

Name of river (ward)	Length of the project (m)
Nomikawa (Meguro/Oota wards)	4,480
Tachiaigawa (Meguro/Shinagawa wards)	7,021
Megurogawa (Setagaya/Shinagawa wards)	8,023
Jakuzuregawa (Setagaya/Meguro wards)	4,215
Karasuyamayosui (Setagaya ward)	1,510
Kitazawayosui (Setagaya ward)	1,320

Furukawa (Minato ward)	2,342
Shibuyagawa (Shibuya ward)	5,368
Kandagawa (Chiyoda/Chuo wards)	4,089
Edogawa (Bunkyo ward)	2,660
Kandajosui (Suginami/Shinjuku wards)	8,857
Zenpukujigawa (Suginami ward)	1,080
Momozonogawa (Suginami/Nakano wards)	4,320
Myoshojigawa (Nakano/Shinjuku wards)	4,570
Shakujiigawa (Itabashi/Kita wards)	3,180
Arakawa (Adachi/Koto wards)	19,740
Nakagawa (Sumida/Edogawa wards)	5,400

Source: Tokyo Chiho Toshikeikaku Iinkai, 1947, pp. 84–5. (Edogawa in Bunkyo ward is another name for a part of Kandagawa.)

Appendix 4 Reclamation

Name of canal (ward)	Length of the project (m)
Ryukangawa (Chiyoda ward)	1,152
Sotobori (Chuo ward, between Gofukubashi and Kajibashi)	830
Higashihoridomegawa (Chuo ward)	458
Shinkawa (Chuo ward)	565
Rokkenborigawa (Sumida/Koto wards)	909
Gokenborigawa (Koto ward)	153
Oshimagawa west tributary (Koto ward)	566
Aburahorigawa (Koto ward)	980
Aburahorigawa east tributary (Koto ward)	183
Heikyugawa tributary (Koto ward)	548
Kiyosumibori (Koto ward)	100
Sagabori (Koto ward)	106
Mutsumibori (Koto ward)	113
Takedabori (Koto ward)	99

Source: Tokyo Chiho Toshikeikaku Iinkai, 1947, pp. 85–6.

Appendix 5 Coastal embankments

Name of embankment (ward)	Length of the project (m)
Kamata coastal embankment (Oota ward)	2,960
Joto coastal embankment (Koto ward)	2,000
Nankatsu coastal embankment (Edogawa ward)	5,010

Source: Tokyo Chiho Toshikeikaku Iinkai, 1947, pp. 86–7.

Appendix 6 River/canal embankments

Name of river/canal (ward)	Length of the project (m)
Ebitorigawa (Oota ward)	1,040
Kitajikkengawa, left bank (Sumida ward)	920
Kitajikkengawa, right bank (Sumida ward)	900
Ooyokogawa, left bank (Sumida ward)	6,780
Ooyokogawa, right bank (Sumida ward)	6,670
Tatekawa, left bank (Koto/Sumida wards)	4,890
Tatekawa, right bank (Koto/Sumida wards)	4,910
Sendaiborigawa, left bank (Koto ward)	1,800
Sendaiborigawa, right bank (Koto ward)	1,930
Nijikkengawa, left bank (Koto ward)	770
Nijikkengawa, right bank (Koto ward)	770
Susakikawa, left bank (Koto ward)	1,060
Susakikawa, right bank (Koto ward)	1,060
Sumidagawahasen, left bank (Koto ward)	1,610
Shiohamagawa, right bank (Koto ward)	1,544
Nakanogawa, left bank (Koto ward)	780
Nakanogawa, right bank (Koto ward)	710
Heikyugawa, left bank (Koto ward)	420
Heikyugawa, right bank (Koto ward)	450
Ooyokogawa south tributary, left bank (Koto ward)	420
Ooyokogawa south tributary, right bank (Koto ward)	430
Edogawa, right bank (Edogawa ward)	3,980

Source: Tokyo Chiho Toshikeikaku Iinkai, 1947, pp. 87–8.