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THE HISTORY OF SEWERAGE IN SZCZECIN IN THE 19TH AND 20TH CENTURIES

Abstract: The utilization of sewage was a serious problem in medieval and early modern Szczecin in Western Pomerania. The basis of this system was latrines, cesspools and drainage channels. In the mid-19th century there were plans to build a sewage disposal system in Szczecin. Its originator was James Friedrich Ludolf Hobrecht. In the 1870s the city gained a functional network for municipal sewage. Along with the development of the city the sewer infrastructure was constantly expanded. In 1897 the sewer system consisted of 73.7 km of canals and collectors, and in 1941 – 300 km. In the years 1914-1928 three sewage treatment plants were built. This municipal infrastructure was severely damaged during World War II.

Keywords: sewage system, wastewater treatment, Szczecin, Western Pomerania, James Friedrich Ludolf Hobrecht

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The issue of water supply and the utilization of waste, both solid (garbage) and liquid (sewage), in towns has been a significant problem for their residents since earliest times. Sewage systems were already known in ancient times, the symbol of which was the Roman *Cloaca maxima*.[1] In the Middle Ages, the achievements of municipal engineering were almost forgotten, and in order to utilize (store) sewage, townspeople built cesspools or manure pits, or they poured out wastewater onto the streets or to the city's drainage system.[2]

In the Middle Ages and modern times in Szczecin, sewage was collected in cesspools or manure pits, or they poured out wastewater onto the streets. In the mid-14th century probably the first fruits of the city's drainage system operated. In the 16th century, the castle in Szczecin certainly had a system of draining and removing sewage outside the city walls to the River Oder.[3] This system was probably ruined during the sieges of Szczecin in 1659, and 1676-1677.[4]

In the 18th century, in connection with works raising the sanitary safety of Szczecin, which was one of the most important fortresses of the Prussian state, drainage conduits were run under the city streets, which drained rainwater collected by gutters, along with sewage from the laundry and public baths. This system had been developed by the 1860s, including the New Town. However, that network of conduits did not constitute a sanitary sewage system or a fully functional rainwater sewage system. In turn, sanitary sewage was still collected in settling tanks and manure pits and exported from the city in barrels[5] (Fig. 1).

The middle of the 19th century meant for Szczecin the beginning of accelerated urban development, just like for many other European towns. In 1848, a gas works was opened in Szczecin, and in 1865 waterworks.[6] The architect of the latter was James Friedrich Ludolf Hobrecht, who in 1861-1869 was a municipal

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[1] MEKA, 157; Cembrzyński 2011, 14.

[2] Sowina 1996, 219-227; Cembrzyński 2011, 60-81; Sowina 2011, 269-274.

[3] Meyer 1886, 8.

[4] Gut 2015, 31.

[5] APS, AMS II/3922, 27-28; Gut 2015, 32-33.

[6] 80JSW; Frankiewicz and Gaziński 1996; Gut 2015, 38.

Fig. 1. Drainage channels (Rainwater) Szczecin from before 1850. After Hobrecht 1868, Plan no. 1.

Fig. 2. Drainage project of Szczecin developed by J. Hobrecht. After Hobrecht 1868, Plan no. 2.

building councillor (*Stadtbaurat*) in Szczecin, responsible for urban infrastructure, spatial development and construction.[7]

J. F. L. Hobrecht was also the designer of the construction of sanitary and storm water drainage in Szczecin. That is why he undertook a detailed study of the physiographic location of Szczecin and the amount of sewage produced by its inhabitants as well as he carried out the analysis of the local industry. The results of his research were published in the book *Kanalisation der Stadt Stettin*,[8] and they became the basis for designing a sewage system under his direction for the city.[9] The preparation of the sewage system was preceded in 1866 by his monthly tour of sewage systems already operating in the towns of France and Great Britain[10] (Fig. 2). In the course of his studies, Hobrecht assumed that a municipal sewage system should meet certain conditions. First of all, it had to remove all household waste as soon as possible (up to half an hour), before they were decomposed, which could not be done with open gutters used to drain rainwater. The latter should be connected to underground pipes which would drain excess rainwater. Then, the sewage system was to ensure the liquidation of all cesspools and settling tanks in the city, and the liquidation of deep gutters was to improve street transport. The planned sewage system was also supposed to be inexpensive to operate, i.e. cleaning pipelines, collectors, etc., was not to generate such large costs as the previous drainage channels existing in the middle of the 19th century. In addition, J. F. L. Hobrecht postulated that Szczecin's sewage system should have only one discharge point for discharging municipal sewage into the Oder river, so that it would not become silted in many places.[11]

According Hobrecht's design, the combined sewage system (storm water and sanitary) was to consist of a system of pipes connected to properties and collecting rainwater from the streets, which were to be connected to the main collectors discharging sewage, municipal and rainwater outside the town. Due to the fact that Szczecin was divided by the river into two parts, Hobrecht planned the construction of two sewage systems, one for the town located on the left side of the River Oder and the other for Łasztownia (Lastadie) and Kępa Parnicka (Silberwiese). Each of them was to have its own sewage pumping station for a common collector removing waste water outside the city.[12]

Sewerage system projects implemented in many European cities between the 1860s and 1880s assumed that sewage would be purified in a natural way by spilling it on special irrigation fields, from where after "natural" filtration it would flow down to the constructed channels, and then it would be discharged to designated watercourses. That was how Hobrecht designed it also for Szczecin. He wanted to locate irrigation fields and discharging sewers in meadows on the Oder islands, where sewage was to be sent via two pumping stations. The latter investment had never been carried out and sewage from both parts of the sewerage system was discharged to the River Oder, and the solid fractions selected from the settling tanks of the final collectors were transferred to agricultural needs. Living in Berlin, Hobrecht remained a consultant of the Szczecin authorities in the field of municipal investments and proposed to the city the creation of irrigation fields in Niecka Niebuszewska near Lübsche Mill (Lübsche Mühle), in the vicinity of the present Juliusz Słowacki and Paweł VI Streets. However, this project has not been implemented.[13]

The construction of a modern sewage system according to Hobrecht's design began in 1870, after his departure to Berlin, and continued incessantly with the development of the town. The first sewage collectors were built in 1872. In 1880, the length of the main sewer lines beneath the city was 30.4 km, and they covered the Old Town and the New Town, and also they went beyond the fortress that had been liquidated in 1873, covering properties in what today is Wyzwolenie Avenue (Pölitzerstrasse). At that time 726 households were connected to the sewage system, including 14 public buildings. 218 drip wells (*Einsteigebrunnen*), 723 rainwater catch pits (*Regeneinlässen*), as well as 170 sludge settling tanks (*Schlammkasten*) were located in this network. In 1882, the sewerage system was 37 km long, and after another ten years, in 1892 it was over 60 km long[14] (Fig. 3).

However, the municipal sewer system in Szczecin did not have a sewage treatment plant. Sanitary and industrial sewage as well as rainwater was discharged

[7] In 1869, J. F. L. Hobrecht was appointed a city construction councilor in Berlin, where he became the main urban planner of the capital of Prussia and Germany. During his work in Berlin, he became famous as an international expert in urban planning and municipal infrastructure. Kozińska 1995, 156-162.

[8] Hobrecht 1868.

[9] Matzerath 1985, 207-208.

[10] J. F. L. Hobrecht's report of his voyages to France and Great Britain, dated September 26, 1866. APS, RS I/3525.

[11] Hobrecht 1868, 18-19; Gut 2015, 63.

[12] Kozińska 2002, 50.

[13] APS, AMS III/66, 20 (Snippet from the "General Anzeiger", October 21, 1925), II/6342 (Study dealing with the sewage system prepared on the occasion of the opening sewage treatment plant of the Grabowo, in 1928); Kozińska 1995, 157; Kozińska 2002, 50; Gut 2015, 64.

[14] APS, AMS II/3922, 1036; VB 1880/1881, 50; VB 1892/1893, 22-23; Zaremba and Orlińska 1965, 73, 153-154; Włodarczyk 1982, 12-13; Włodarczyk 1994, 303.

Fig. 3. Szczecin city sewerage system from 1880. District: Old Town and Castle. Source: APS, ZA 23.

directly to the River Oder. It was not until 1890 that this problem was addressed. At that time, a plan for the development of a sewage system along with the construction of a sewage treatment plant was developed under the supervision of Szczecin's building consultant F. Krause, although in 1905 it was proposed to return to the irrigation fields project again.[15] The town was divided into five sections – reception basins. Section 1 (Sektion) – Turzyn (Torney) and Pomorzany (Pommerensdorfer Anlage) covered an area of around 500 ha. Section 2 was Niemierzyn, Grabowo, Drzetowo, Bolinko and the western and northern districts with a collector in the Grabowo meadows (Grabower Freistaden). This part of the town covered 450 ha. Section 3 – the centre, including the Old Town – totalled 380 ha. Section 4 – Lower Old Town, Upper Wik, Northern housing estate (Northe Ansiedlung) – had an area of 55 ha. Section 5 included the right bank of the Oder, i.e. Łasztownia and Kępa Parnicka – a total of 98 ha.[16] Each of the sections was intended to have its own separate collection system and a sewage system leading sewage to the treatment plant.[17]

During the design work in 1890, and also for the next two decades, the method and construction of the wastewater treatment system was discussed. Initially, the plans provided for the construction of a central sewage treatment plant on the islands between the Oder and Dąbie Lake in the Rottse system (Rottse-Degener System) or according to the model from Cologne (Absitzverfahren). Sewage from all sections – Szczecin's sewerage reception basins – was to be brought together to this plant by a collector. However, the opinion of Professor Fraenkel from Halle prevailed, who proposed a separate plant for each reception basin to neutralize sanitary sewage and rainwater.[18]

Along with the preparation of the sewage development plan, construction of new sections was started, as well as the reconstruction of the existing infrastructure in the Old and New Town and also in the newly created

[15] APS, AMS II/6342, III/6335.
[16] APS, AMS III/66.
[17] Gut 2015, 65.

[18] [anonym], *Das unterirdische Stettin*. "General Anzeiger" 21.10.1925, 2. At that time, there were plans to build mechanical treatment plants at three points in the city, in Pomorzany, in Grabowo and on the Grodzka Island (Schlächterwiese). The latter was to be the main place of urban waste disposal. Each of these plants was to consist of a system of settlers and mixers, in which all solid fractions were deposited, as well as component fields where waste was to be collected and formed into briquettes. APS, AMS III/548.

Fig. 4. Szczecin city sewerage system from 1900. District: City centre, Old Town, Łasztownia APS. Source: APS, ZA 17.

districts. It involved, among other things, the construction of new consolidating collectors, which were to be the core of the sewerage network for each section. In 1897 work was carried out on the consolidating collector of the reception basin – section 3 (the Old Town), which ran beneath Lazurowa Street (Junkerstrasse) and Sołtysia Street (Schulzenstrasse), which involved reconstruction of water supply and gas networks in this area of the city. Work was also carried out on the collectors of Jan z Kolna Street (Unterwiek), as well as of the present Jan Paweł II Avenue (Kaiser Wilhelmstrasse) from Grunwaldzki Square (Kaiser Wilhelmplatz) to Mazurska Street (Preussischestrasse). However, investment was suspended because the Government District of Stettin (Regierung Stettin) ordered the removal of defects in the sewage plant project. Moreover, some of the work was abandoned, as the delineation of new streets was not complete, and they were to be immediately provided with a sewage system. At that time, however, part of the sewer system for the free port (Freibezirk) was built. Despite these obstacles, the town managed to build nearly 2 km of sewers in this one year.[19] In turn, in 1898, 3082 m of new sewers and sewage pipelines were built beneath what is now Jan Paweł II Avenue, Józef Piłsudski Avenue (Friedrich Karlstrasse), Franciszkańska Street (Klosterstrasse), the Wielecki Quay (Bollwerkstrasse), Gdański Boulevard (Wallstrasse), and Krzysztof Kolumb Street (Oberwiek), Władysław IV Street (Parnitzplatz). In addition, 2200 m of sewage system was reconstructed beneath the following streets: Małopolska (Augustastrasse), Nad Wodą (Königsstrasse), Mała and Wielka Odrzańska (Kleine und Grosse Oderstrasse), Krzysztof Kolumb, Florian (Kirchenstrasse), Mazurska (Preussischestrasse), Jan Dąbrowski (Galgwiesenstrasse), as well as beneath the squares: Bateria Laskowskiego (Zimmerplatz), Grunwaldzki (Kaiser Wilhelmplatz) and others. 351,000 marks were spent on this purpose[20] (Fig. 4).

In 1902, 1788 m of the sewage system was reconstructed beneath the streets of Kaszubska (Elisabethstarsse), Wojciech (Karkutschstrasse), Jabłonkowska (Weidendammstrasse), Wincenty Niegodlewski (Gneisenaustrasse), Szpitalna (Verbindungsstrasse), and 5120 pipelines were built beneath the modern streets of Niemierzyńska, Zygmunt Krasiński, Jan

[19] VB 1897/1898, 39-40, 43.

[20] VB 1898/1899, 42-43, 75.

Długosz (Adolfstrasse), Wincenty Kadłubek (Zabelsdorferstrasse), Cyryl i Metody (Feldstrasse), Julian Niemcewicz (Elysiumstrasse), Pocztowa (Gabelsbergerstrasse), Piotr Ściegienny (Pionierstrasse), Jagiellońska (Turnerstrasse) and Władysław Jagiełło (Saunierstrasse).[21] In 1900, as many as 140,000 of the 210,000 inhabitants of Szczecin used sanitary facilities connected to the sewage system. In the years 1900-1914, 6% of citizens got connected to the sewage system every year. In 1900, each of the inhabitants of Szczecin discharged 95 litres of sewage per day to the sewage system and in 1906 it was 144 litres[22] (Fig. 5).

During the construction of the sewage system, some efforts were also made to channelize some of the watercourses. In 1912, the Osówka and Warszewiec streams were placed in the underground collector in the area from the Niemierzyńska Valley (Nemitzer Tal) to Lake Rusałka in what is now Kasprowicz Park. This investment was continued after World War I by building a collector (1,800-2,500 mm in diameter) for

Fig. 5. Szczecin city sewerage system divided into sections and mark the location of planned wastewater treatment plants, 1914. Source: APS, ZK 1818.

[21] VB 1902/1903, 72-73.

[22] APS, AMSII/39, 77-89; APS, AMS III/1036.

the Osówka stream from Lake Rusałka, beneath the streets: Wyzwolenie (Pölitzerstrasse), Hugo Kołłątaj (Friedebornstrasse), Stanisław Staszic (Grenzstrasse), and Ofiar Oświęcimia (Heinrichstrasse) and then 1 Maj (Hindenburgstrasse), to the Oder. Finally, the channelization of this stream was completed in the mid-1930s[23] (Figs. 6 and 7).

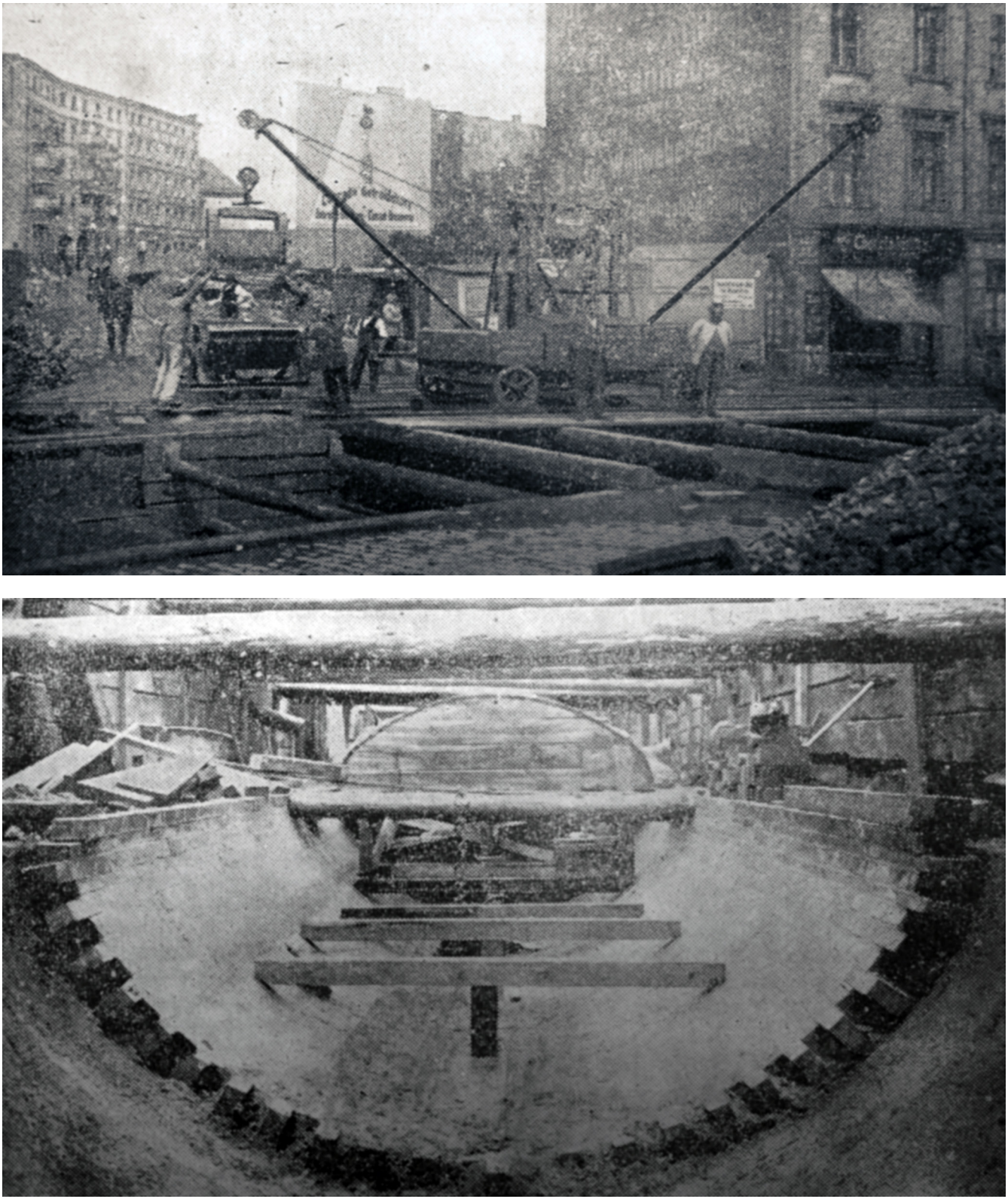


Fig. 6-7. Construction of a collector for the Osówka stream under the streets of Kołłątaj and Wyzwolenie. Source: APS, AMS III/66.

[23] VB 1912, 198; APS, AMS II/4419.

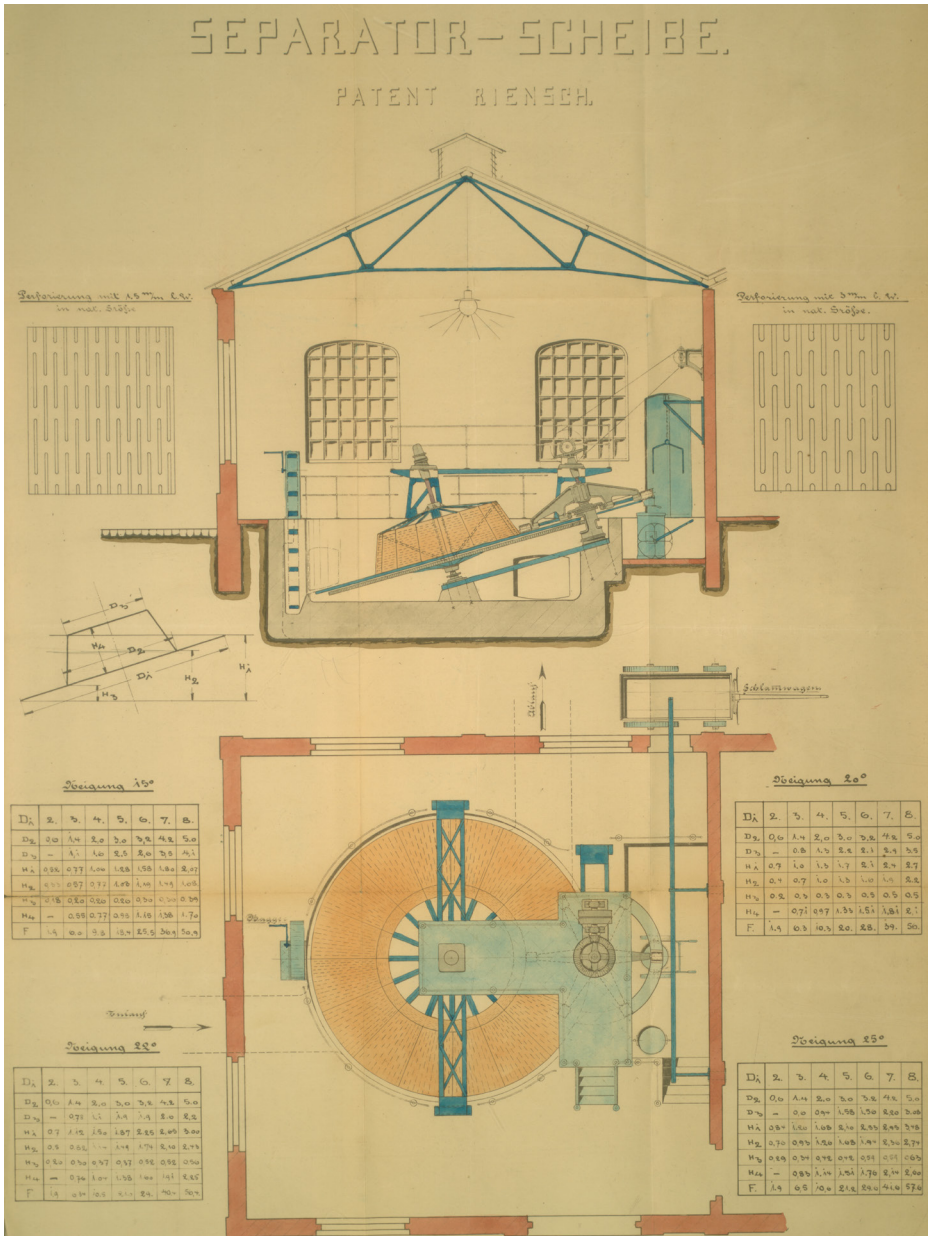


Fig. 8. Design of the Riensch Wurl sewage treatment plant Lower Wik/Dolny Wik (Unterwiek), 1914. Source: APS, AMS III/1302.

The Szczecin sewerage system at the end of the 19th century had a diversified diameter and most often a concrete-ceramic structure. The largest were consolidating sewage collectors, which were made of brick, and their dimensions (diameter) ranged from 600 × 900 mm to 800 × 3,400 mm, and one of the collectors, 1,099 m long and 1,000 mm in diameter, was a wooden structure. In 1919, the wooden collectors were 233 m long.[24] However, most of the sewerage network was of concrete or ceramic construction. The latter had a diameter of 250 mm to 820 mm, and the concrete channels had dimensions from 350 mm up to 1,000 × 1,500 mm.[25] At the beginning of the 20th century, part of the new masonry collectors had a diameter of 1,500 × 2,000 to 2,000 × 1,900 mm, and even 2,200 × 1,550 mm and 3,000 × 2,000 mm or 2,000 × 4,000 mm.[26] In turn, during the Interwar Period concrete pipes with a diameter of 250 mm to 500 mm were used to build a street sewage system.[27] Ceramic and concrete pipes used to connect households to the sewerage network had a diameter of 200 mm.[28]

[24] The length of wooden channels was decreasing each year. In 1897, their length was still 1.400 meters. VB 1897/1898, 41; VB 1918, 59; Włodarczyk 1994, 303-304.

[25] VB 1897/1898, 41.

[26] VB 1902/1903, 74; VB 1905/1906, 89.

[27] APS, AMS III/161. In the years 1942-1944, beneath Wormsstrasse, a sewage system was built of concrete pipes with a diameter of 250-450 mm. APS, AMS III/162.

[28] VB 1902/1903, 75.

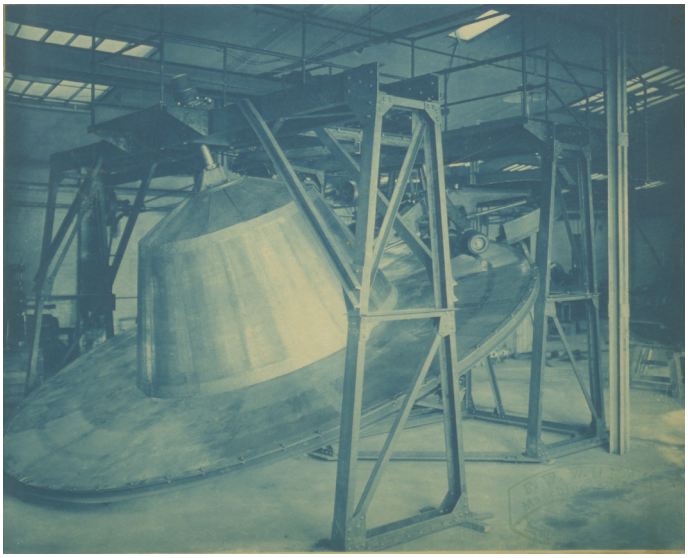


Fig. 9. Riensch Wurl system separator for sewage treatment plant Lower Wik/Dolny Wik (Unterwiek), 1914.
Source: APS, AMS III/1302.

The great reconstruction and extension of the sewage system lasted until World War I. The last accent just before the outbreak of conflict was the opening of a mechanical treatment plant and pumping station at Lower Wik (Kläranlage Unterwiek), today called Dolny Brzeg (Jan z Kolna Street), on April 1, 1914. The sewage treatment plant was built according to the designs from Dresden and Grudziądz (Graudenz) in the Riensch-Wurl system. It was supposed to clean up sewage from the reception basin – section 3 of the sewage system, i.e. from the centre and the Old Town. The plant was built by the Szczecin construction company Gollnow & Sohn, and the technical equipment was provided by Wilhelm Wurl Maschinen Fabrik from Berlin[29] (Figs. 8 and 9).

A collector with a diameter of 1,500 × 1,200 mm which ended with a sand settling funnel (Sandfang mit Grobrechen) ran into the new sewage treatment plant. Next, the sewage was drained into the proper treatment plant of the Riensch-Wurl system, in which two brass disks, separation sieves (*Siebscheibe*) were used, each of which was 7 m in diameter and placed in a silo at a 20 degree angle. It had meshes of 1.5 mm in diameter, through which the sewage flowing from the city collector was "strained". The contaminants from the sieves were swept by brushes straight into the mechanical bucket feeder, which dropped them onto the transport trailer. Similarly, the sand from the settling tank was successively removed using a similar electric motor-powered bucket sand separator and stored for further use. The treatment plant had high efficiency and effectively separated solid pollution, and treated sewage was pumped into the Oder even during the so-called backwater. In the years 1920-1921, the second separator was activated, which was not built in 1914 due to the war. The separators worked alternately, with up to 1100 dm^3/s processing capacity, while normally the sewage flew from the collector at 250 dm^3/s. Excess power was used during the increase of wastewater inflow caused by rainfall. From each disc separator, after about one day of work, approximately 7.5 m^3 of sludge and solid debris called "screenings" were removed.[30]

In addition, in 1912, a biological treatment plant was built for residential districts of Szczecin: Łękno (Westend), Nowe Łękno (Ackermannshöhe, Neuwestend) and Pogodno (Braunsfelde).[31]

A dozen or so years after the launch of the sewage system in Szczecin, the authorities of neighbouring municipalities also started similar projects. Investments made in the towns nearby Szczecin usually included rainwater and industrial sewerage. Faeces were still collected in cesspools and settling tanks. Such systems were built, among others in Żelechowa (Züllchow) in the years 1889-1899, Drzetowo (Bredow) in 1897, Golęcino (Frauendorf) in the years 1901-1914, or in Pomorzany (Pommerensdorf) in the years 1907-1912. Some of these towns lost their municipal independence in the first decades of the 20th century and were incorporated into Szczecin.[32]

In addition to the authorities of Szczecin and the surrounding municipalities, also some industrial plants built their own sewerage networks. In 1911, the Paper Factory in Skolwin (Feldmühle Papier und Zellstoffwerke AG Odermünde) built a sewage system for factory buildings as well as a colony of residential houses for the employees along with a treatment plant (Emscher-Brunnen--Anlage), which was to process 1800-2000 m^3 of sewage per hour. The construction works lasted until 1913, although technical and administrative problems with the operation of the sewage treatment plant were still present after the start of the sewage system.[33]

The development of the sewerage network in Szczecin after World War I (until the year 1945) ran at a different pace. In the first half of the 1920s, due to the economic crisis (including hyperinflation), the construction of the sewage system was rather slow. Nevertheless, in 1926, 13 km of sewers were built in

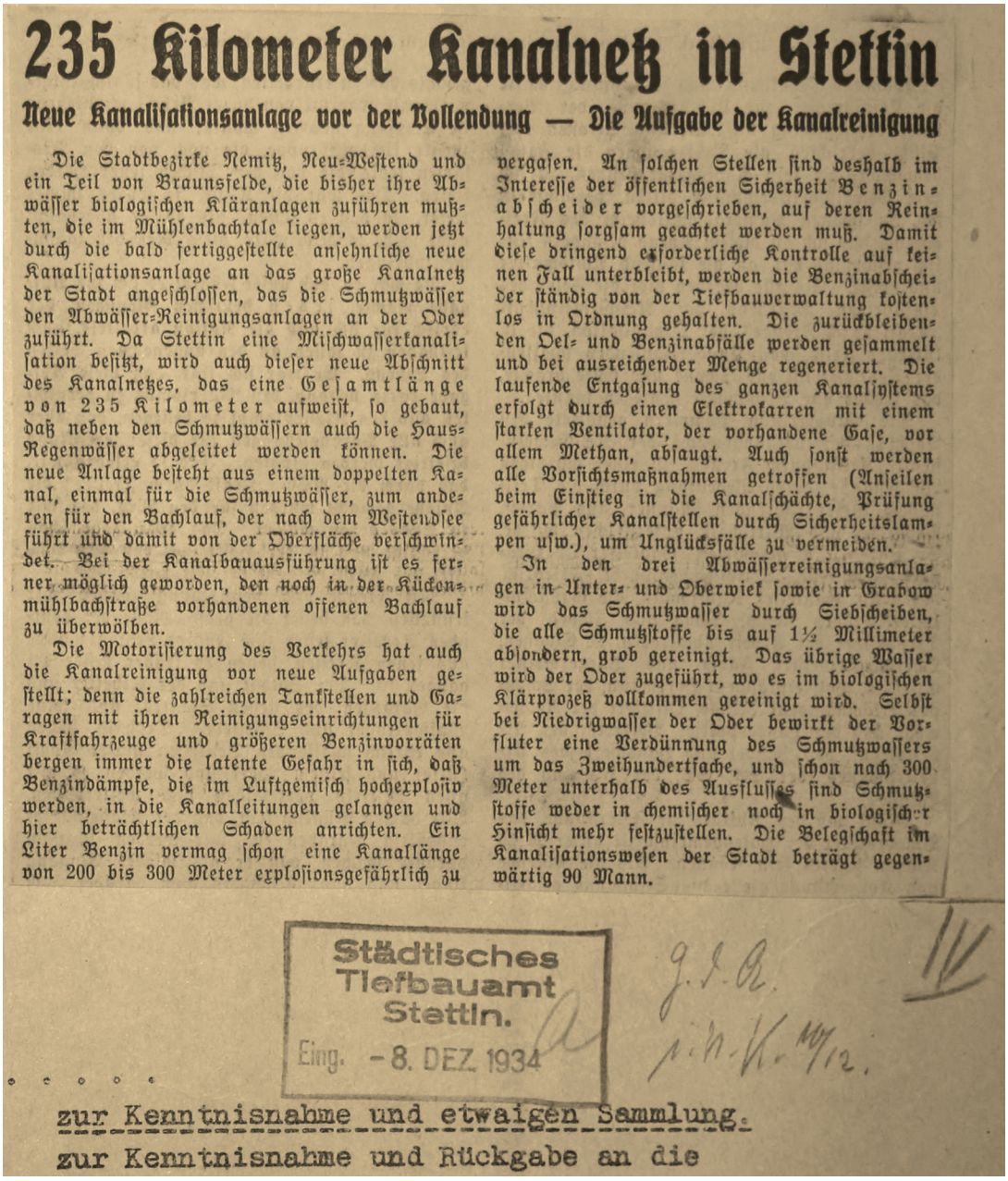
[29] APS, AMS II/6335, II/6344. The Riensch-Wurl system was used in sewage treatment plants, among others in Magdeburg, Mainz, Racibórz, Tczew before 1939. More about Riensch's system, see: Lidzbarski 2011, 72-76; Gut 2015, 68-69.

[30] APS, AMS III/66, II/6335, II/6344; VB 1919, 66; Gut 2015, 69.

[31] VB 1912, 198.

[32] Gut 2015, 70-72.

[33] APS, RS I/7249, passim.



235 Kilometer Kanalnetz in Stettin

Neue Kanalisationsanlage vor der Vollendung — Die Aufgabe der Kanalreinigung

Die Stadtbezirke Nemitz, Neu-Westend und ein Teil von Braunsfelde, die bisher ihre Abwässer biologischen Kläranlagen zuführen mußten, die im Mühlenbachtale liegen, werden jetzt durch die bald fertiggestellte ansehnliche neue Kanalisationsanlage an das große Kanalnetz der Stadt angeschlossen, das die Schmutzwässer den Abwässer-Reinigungsanlagen an der Oder zuführt. Da Stettin eine Mischwasserkanalisation besitzt, wird auch dieser neue Abschnitt des Kanalnetzes, das eine Gesamtlänge von 235 Kilometer aufweist, so gebaut, daß neben den Schmutzwässern auch die Haus-Regenwässer abgeleitet werden können. Die neue Anlage besteht aus einem doppelten Kanal, einmal für die Schmutzwässer, zum anderen für den Bachlauf, der nach dem Westendsee führt und damit von der Oberfläche verschwindet. Bei der Kanalbauausführung ist es ferner möglich geworden, den noch in der Kückenmühlbachstraße vorhandenen offenen Bachlauf zu überwölben.

Die Motorisierung des Verkehrs hat auch die Kanalreinigung vor neue Aufgaben gestellt; denn die zahlreichen Tankstellen und Garagen mit ihren Reinigungseinrichtungen für Kraftfahrzeuge und größeren Benzinvorräten bergen immer die latente Gefahr in sich, daß Benzindämpfe, die im Luftgemisch hochexplosiv werden, in die Kanalleitungen gelangen und hier beträchtlichen Schaden anrichten. Ein Liter Benzin vermag schon eine Kanallänge von 200 bis 300 Meter explosionsgefährlich zu vergasen. An solchen Stellen sind deshalb im Interesse der öffentlichen Sicherheit Benzinabscheider vorgeschrieben, auf deren Reinhaltung sorgsam geachtet werden muß. Damit diese dringend erforderliche Kontrolle auf keinen Fall unterbleibt, werden die Benzinabscheider ständig von der Tiefbauverwaltung kostenlos in Ordnung gehalten. Die zurückbleibenden Oel- und Benzinabfälle werden gesammelt und bei ausreichender Menge regeneriert. Die laufende Entgasung des ganzen Kanalsystems erfolgt durch einen Elektrokarren mit einem starken Ventilator, der vorhandene Gase, vor allem Methan, absaugt. Auch sonst werden alle Vorsichtsmaßnahmen getroffen (Anseilen beim Einstieg in die Kanalschächte, Prüfung gefährlicher Kanalstellen durch Sicherheitslampen usw.), um Unglücksfälle zu vermeiden.

In den drei Abwässerreinigungsanlagen in Unter- und Oberwiek sowie in Grabow wird das Schmutzwasser durch Siebscheiben, die alle Schmutzstoffe bis auf 1½ Millimeter absondern, grob gereinigt. Das übrige Wasser wird der Oder zugeführt, wo es im biologischen Klärprozeß vollkommen gereinigt wird. Selbst bei Niedrigwasser der Oder bewirkt der Vorfluter eine Verdünnung des Schmutzwassers um das Zweihundertfache, und schon nach 300 Meter unterhalb des Ausflusses sind Schmutzstoffe weder in chemischer noch in biologischer Hinsicht mehr festzustellen. Die Belegschaft im Kanalisationswesen der Stadt beträgt gegenwärtig 90 Mann.

Städtisches Tiefbauamt Stettin. Eing. - 8. DEZ. 1934

zur Kenntnisnahme und etwaigen Sammlung.

zur Kenntnisnahme und Rückgabe an die

Fig. 10. Press article about the sewage system in Szczecin and the construction of 235 km of sewer and canal network, 1934. Source: APS, AMS III/66.

74 streets.[34] In 1927, 7 km of sewage system were constructed in 36 streets.[35] In 1928, 13,102 m of sewer pipes were laid in 50 streets of the city, and in 1929, 34 km of storm and sanitary sewerage systems were built, primarily in the Pogodno housing estate (over 30 km).[36]

The last extension of the sewerage network in the Pogodno district was connected with the expansion of the consolidating collector of Section no. 2, covering the northern districts of the city: Grabowo, Niermierzyn, Pogodno, Nowe Łękno (Neuwestend). In the years 1925-1930, 450 m of a collector with a section of 1,900 × 1,800 mm were built of clinker brick beneath today's Juliusz Słowacki Street (Mühlenstrasse) to the Lübsche Mill (Lübsche Mühle), followed by a further 1148 m concrete pipeline with a diameter of 1,000 × 1,500 to 700 × 1,050 mm beneath present streets of Bohdan Zalewski (Friedrichshoferweg), Ludwik Waryński (Dürerweg), Romuald Traugutt (Delbrückallee) up to Jakub Bojko Square (Johannis Platz). The cost of this sewage system under Słowacki Street amounted to 355,000 marks, and of the concrete

[34] VB 1926, 124-125.
[35] VB 1927, 123.
[36] VB 1929, 160-161.

Year	The length of the sewerage network in meters	Number of properties connected to the sewage system	Year	The length of the sewerage network in meters	Number of properties connected to the sewage system
1897	73,760	2,877	1920	143,738	4,866
1898	75,031	2,999	1921	144,734	4,958
1899	78,061	3,141	1922	145,453	5,137
1900	n/d	n/d	1923	146,158	5,223
1901	n/d	n/d	1924	146,256	5,290
1902	99,801	3,556	1925	146,778	5,443
1903	105,629	3,669	1926	149,204	5,529
1904	n/d	n/d	1927	162,200	5,658
1905	114,968	3,744	1928	168,878	6,058
1906	119,843	3,847	1929	181,682	6,419
1907	122,691	3,947	1930	215,920	6,825
1908	124,141	4,056	1931	224,648	7,361
1910	128,987	4,212	1932	228,008	7,742
1911	130,512	4,310	1933	228,179	7,826
1912	131,386	4,403	1934	239,280	8,147
1913	136,532	4,564	1935	253,092	8,762
1914	139,170	4,735	1936	265,127	9,155
1915	140,735	4,796	1937	279,135	9,520
1916	140,806	4,820	1938	292,921	9,994
1917	n/d	4,829	1939	295,335	10,141
1918	140,660	4,837	1940	296,541	10,350
1919	140,935	4,848	1941	299,290	10,368

Table 1. The length of the sewerage network and the number of properties connected to it in Szczecin in the years 1897-1941. After Gut 2015, 73.

collector – 297,000 marks.[37] Moreover, in the years 1928-1929, the collector of Section 2 was connected to the sewerage network including, among others, today's streets: Warcisław (Wolgasterstrasse), Józef Lompa (Hermannstrasse), Bożena (Eduardstrasse), Bronisława (Elsenstrasse), as well as the sewage system of the present provincial hospital in Arkońska Street. The latter then had its own sewage system and treatment plant.[38]

The next period of sewerage extension took place in the 1930s. In 1934, 13,358 m of sewers and sewage collectors were built.[39] In 1936, sewage system was built in the current streets: Unia Lubelska, Adam Mickiewicz (Kreckowerstrasse), Ku Słońcu (Pasewalker Chaussee) by the barracks. In total, it was 14,000 meters of sewerage network with a diameter of 250 mm to 900 mm of concrete pipes and masonry channels with a cross-section of 1,250/1,500 mm.[40] In 1937, 400 meters of sewerage were built of ceramic pipes and 13,600 meters of concrete pipes, among others beneath the current Wojska Polskiego Avenue from Unia Lubelska to Zawadzkiego, in A. Kordecki Street (Schwarzower Strasse), beneath housing estates in Gumieńce and Krzekowo (Łukasiński St.), as well as the Arkoński housing estate between Arkońska and Chopin streets[41] (Fig. 10).

The length of the sewerage network in the interwar period (1919-1939) increased by over 100%, from 141 km to 295 km in 1939 (Table 1). Additionally, during the first two years of World War II (until 1941),

[37] APS, RS I/10371.
[38] APS, RS I/10370.
[39] VB 1934, 79-80.
[40] VB 1936, 95-97.
[41] VB 1937, 92-95.

4 km of pipelines were built. On October 15, 1939, owing to the exclusion of several dozen towns, including Dąbie and Police, from the districts of Randow, Nowogard and Gryfino[42] and their subsequent inclusion into Wielki Szczecin (Great Szczecin), the municipal sewage system increased by several kilometres, most of which were not integrated within the municipal sewage system (Table 2).

District / type of sewage system	Number of built-up properties	Number of properties connected to the sewerage network
Dąbie / rainwater-sanitary without treatment plant	1,827	468
Wielgowo / rainwater	726	0
Zdroje / rainwater	421	0
Golęcino / rainwater-sanitary without treatment plant	410	421
Gocław / rainwater-sanitary without treatment plant	50	32
Mścięcino / rainwater	156	23
Skolwin / rainwater-sanitary without treatment plant	314	54
Podjuchy / rainwater, sanitary with a biological treatment plant	970	402
Żydowce / incorporated into the network in Podjuchy	529	18
Pomorzany / rainwater, sanitary with a biological treatment plant	261	142
Police / rainwater-sanitary without treatment plant	735	310
Gumieńce / rainwater, sanitary included in the municipal network	813	195
Krzekowo/ rainwater, sanitary included in the municipal network	261	80
Stołczyn / rainwater-sanitary without treatment plant	425	254
Żelechowo / rainwater--sanitary without treatment plant	315	69

Table 2. List of Szczecin districts included in it on October 15, 1939, having a sewage system together with the number of properties connected to it. After Gut 2015, 74.

[42] Stelmach 1994, 542-553.

The sewerage network included connections (connecting pipes) to properties, which were divided into sanitary and rainwater connections/terminals. In 1898, the former were 25,873 metres long, and the storm sewers were 12,032 metres long.[43] In 1902, they were 33,934 and 15,598 metres long respectively.[44] Forty years later, in 1941 the sanitary sewer connections had a length of 89,886 m, and the rainwater sewage connections of 56,857 m and increased respectively in one year by 1,065 and 258 m.[45] The sewerage network system is complemented by various elements of technical equipment: sumps/catch pits, settling tanks, ventilators, culverts, etc. In 1898, there were 2,087 rainwater catch pits, 1212 sanitary sewage manholes (sumps), as well as 143 ventilators (*Luftschächte*), 9 flood gates (*Hochwasserschieber*), and 7 overflow valves (*Überlaufwehre*) in the sewage system.[46] In 1928, that is 30 years later, in the system there were 6,177 storm catch pits with sludge settling tanks, 9 sand and sludge separators (*Sand- und Schlammfänger*), 2,465 sanitary sewer manholes made of cement gutters and 594 made of brick.[47] According to the last detailed report of the German municipal authorities of Szczecin on March 31, 1941, the sewage system had 10,720 sludge and rain catch pits (*Regeneinlässe*, *Schlammkästen*), 48 sludge and sand separators (*Sand und Schlammfänge*), 5,064 sanitary manholes (*Einsteigeschächte*), 16 snow catch pits (*Schneeschächte*) and 155 ventilators (*Luftschächte*).[48]

In the interwar period, the plan of building treatment plants for the first and third sections – sewage reception basins was continued. First of all, just after World War I, the second disc separator was completed in the Dolny Brzeg sewage treatment plant. In 1927, for the reception basin – section 1 of the sewage system, the Upper Wik (Oberwiek) sewage treatment plant was built in the present Zapadła Street (now the Górny Brzeg pumping station). This object was also built in the Riensch-Wurl system. The official opening took place on 17 May. In addition, on 15 April, a biological sewage treatment plant was opened in Niemierzyn of a similar structure to the existing plant in Nowe Łękno.[49]

In the following year, the construction of another (third) Riensch-Wurl type mechanical treatment plant was continued, which was to receive sewage from the

[43] VB 1897/1898, 42.
[44] VB 1902/1903, 75.
[45] VB 1940, 109.
[46] VB 1897/1898, 42.
[47] VB 1927, 124.
[48] VB 1940, 109.
[49] VB 1927, 125. In 1927, a biological treatment plant for the Niemierzyn district was built. It was located in present Słowiańska Street (Nemitzer Talweg), and it was built by the Krem Klärgesellschaft m.b.H. from Berlin-Schöneberg: APS, AMS I/1914; II/5628.

reception basin – section 2 of the municipal sewage system. On November 15, 1928, the aforementioned treatment plant, located on Grabowo at today's 1 Maj Street (Hindenburgstrasse 26), was commissioned. Currently, the Grabowo pumping station operates in this object. Three mechanical treatment plants, Dolny and Górny Wik, as well as Grabowo cost 1.8 million marks, according to prices from 1928.[50] Their significance for improving the quality of water in the Oder can be proved by the amount of sludge extracted from sewage. In one year, out of three Riensch-Wurl plants, about 6,000 m³ of sewage sludge (Klärschlamm) were taken to landfills.[51]

In the years 1929-1932, a sewage pumping station was built for the reception basin – section 1 of the sewerage system in Pomorzany in the current Białowieska Street (Marienfelderstrasse), which supported the work of the sewerage network and sent sewage to the Górny Brzeg treatment plant. This station pumped 750-810,000 m³ of sewage per year. The next sewage pumping stations were located in Międzyparkowa Street (Weg nach der Lindenhofer Weg) in Arkoński Forest, Bronisława (Elsenstrasse) in Niebuszewo and Bulwar Gdański (Wallstrasse) in Łasztownia.[52]

In 1939, the sewage plant took over two sewage treatment plants in districts incorporated into Szczecin, one in Podjuchy, operating from 1933 in the Imhoff system (Imhoff settler) and the second in the Absitzbecken mit Tropfkörper system in Pomorzany.[53]

Work on the development of the sewerage network of Szczecin continued in the first years of World War II.

In the years 1939-1941, 2,500 metres of sewerage pipelines with a cross-section of 250/1,000 mm were built.[54] In 1941, the channelizing of the Warszewiec stream (Kuckenmühlenbach) was completed in its lower reaches. Plans were also made to expand the sewage system in the districts of Police, Dąbie, Stołczyn, Gocław, Żelechowa, Stołczyn, Kraśnik, and Golęcino, which had been incorporated into Wielki Szczecin (Great Szczecin).[55] Particularly large investments in the construction of a modern sewage system were made in Police. These works were related to the construction of chemical factory (synthetic petrol) and housing estates for employees of this factory. Work on the sewerage continued here until 1944.[56]

During the 70 years (1870-1939), from the beginning of the construction of the sewage system in Szczecin until World War II, the city gained a functional network (300 km of channels and pipelines) for municipal sewage, utility and sanitary sewage along with sewage treatment in three Riensch-Wurl treatment plants. This system, which was developed constantly, fully fulfilled the municipal needs in the field of wastewater management. Its performance can be proved by the fact that in Szczecin in 1939 over 90% of properties had water and sewerage connections, and 38% of households had fully functional bathrooms.[57] This municipal infrastructure was severely damaged in the Allied air bombing raids (1941-1944) during World War II, and during the Battles of Szczecin in March and April 1945.

Archival sources

APS, AMS I/1914, II/39, II/2021, II/3922, II/4205, II/4419, II/5628, II/5796, II/5888, II/5912, II/5915, II/6335, II/6339, II/6342, II/6344, II/6432, III/66, III/161, III/162, III/548, III/1036, III/1302. Archiwum Państwowe w Szczecinie. Archival fund: Akta miasta Szczecina.

APS, RS I/3525, I/7249, I/10370, I/10371. Archiwum Państwowe w Szczecinie. Archival fund: Rejencja Szczecińska.

APS, ZA 17, 18. Archiwum Państwowe w Szczecinie. Archival fund: Zbiór atlasów.

APS, ZK 1818. Archiwum Państwowe w Szczecinie. Archival fund: Zbiór kartograficzny.

[50] VB 1928, 1; APS, AMS III/66, II/6342.

[51] VB 1940, 110.

[52] APS, AMS II/4205, II/6341. Pomorzany pumping had constant service, while the remaining pumping stations were supervised by the Grabowo plant: VB 1939, 99.

[53] APS, AMS II/5915; II/6432; VB 1940, 110. The sewage after treatment was discharged into the Eastern Oder, or the Regalica river near today's Szlamowa Street.

[54] In 1942, the construction of a storm and sanitary sewage system was started beneath the present S. Moniuszki Street (Wormsstrasse) in Police. The works were completed after 1000 working days in March 1944: APS, AMS III/162.

[55] APS, AMS II/5912 (sewage development plan in the suburbs of Szczecin from 1938); VB 1940, 108.

[56] APS, AMS II/2021, II/5796, II/5888, II/6339.

[57] Gut 2015, 37.

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Streszczenie

Dzieje kanalizacji w Szczecinie w XIX i XX wieku

Usuwanie ścieków stanowiło w średniowiecznym i nowożytnym Szczecinie, podobnie jak w innych miastach, poważny problem. Podstawą systemu sanitarnego były latryny i doły kloaczne oraz kanały odpływowe dla wód opadowych. Znaczna część ścieków trafiała jednak bezpośrednio na ulice. W XVIII wieku zaczęto budowę kanałów odprowadzających z miasta wody opadowe, które zbierały również część ścieków komunalnych. Dopiero w połowie XIX wieku wzorem innych miast europejskich w Szczecinie zaczęto planować kanalizację. Jej głównym projektantem był James Friedrich Ludolf Hobrecht. W latach 70-tych XIX wieku całe miasto zostało skanalizowane. Wraz z rozwojem przestrzennym Szczecina rozbudowywano również kanalizację i stale ją unowocześniano. W 1897 roku system ten obejmował 73,7 km kanałów i kolektorów, do których przyłączono 2877 nieruchomości. U progu I wojny światowej (1914) sieć kanalizacyjna liczyła już 140 km, a na początku II wojny światowej (1941) długość kolektorów i kanałów obejmowała 300 km o średnicy od 200 mm do 2000 mm. Do tego systemu kanalizacji przyłączonych było 10368 nieruchomości. W latach 1914, 1927 i 1928 wybudowano trzy oczyszczalnie ścieków. Sieć kanalizacyjna została poważnie uszkodzona podczas II wojny światowej w następstwie alianckich nalotów bombowych z lat 1941-1944, a następnie w trakcie walk o Szczecin w marcu i kwietniu 1945 roku.