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Wastewater Treatment Comes To Detroit: Law, Politics, Technology And Funding

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**WASTEWATER TREATMENT COMES TO DETROIT: LAW, POLITICS,
TECHNOLOGY AND FUNDING.**

by

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DISSERTATION

Submitted to the Graduate School

of Wayne State University,

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Introduction.

Detroit River Circa 1930.¹



The Detroit Water and Sewerage Department began operating its wastewater treatment plant in June of 1940. Prior to 1940, the cities of Detroit, Highland Park, Hamtramck, and the Grosse Pointes simply dumped their industrial waste and sewage from more than 1,500,000 inhabitants into sewers emptying into Connors Creek, Fox Creek, Baby Creek, the Detroit River, the Rouge River, and Lake St Clair.² Experts calculated that the Detroit River's flow of 220,000 cubic feet per second of water was

¹ Detroit River Circa 1930. From Detroit News archives, provided by Reuther Library, Wayne State University, Detroit, Michigan.

² "Dearborn Contracts For Detroit Sewage," *Detroit News*, 23 March 1932, p. 13, Detroit had a small waste water treatment plant on Belle Isle and a cooperative agreement, in 1928, with the City of Dearborn to process sewage from the Southfield Interceptor, serving the North West side of Detroit.

able to accommodate the sewage of 500,000, without severe oxygen depletion, under the popularly held theory of “Dilution is the Solution.”³

Sewage and industrial wastes polluted the Detroit River, and the City of Detroit was fully aware of that. During the period from 1900 to 1940, sewage pollution of the river increased exponentially. The growth of the city’s automobile industry, with its accompanying pollution, meant that the Detroit River was also receiving vast quantities of industrial pollutants. Some people believed that these chemicals killed *Bacillus Coli* organisms, responsible for Typhoid fever, and were therefore beneficial.

The sight and smell of the sewage was apparent to the local citizens and to boat passengers traveling on the river. The loss of the fish stock was another indicator of the severe pollution the river was experiencing. The incidents of contracting Typhoid fever from drinking lake and river water and swimming in the river were increasing. Chlorination of the water supply in 1912 decreased the deaths in communities served by the Detroit Water Board, but downriver communities as well as passengers and crews on lakes shipping vessels not benefiting from chlorination experienced an increase in disease. Downriver pollution increased in tandem with Detroit’s population. Boats drew their drinking water from the lakes and dumped their sewage back into them.⁴ They also took in ballast water—often from sewage-polluted areas—and then discharged it into pristine waters prior to taking on cargo, sometimes near water treatment plant inlets, thus spreading pollution.⁵

³ Paul T. Anastas, John C. Warner, *Green Chemistry* (Oxford: Oxford University Press, 1998), p. 6.

⁴ “Pollution Of Great Lakes Now A Serious Menace,” *Detroit News* 18 December 1914, p. 15. Practically all of these vessels secure the water used aboard by pumping from the lake.

The United States Public Health Service in 1912 and the International Joint Commission (IJC) in 1914 had made the city aware of the severe sewage pollution in the Great Lakes and the Detroit River in their published reports and public hearings. In 1916, a supplementary report commissioned by the City of Detroit substantiated their findings for the Detroit River. The reasons for the delay between the release of these reports and the eventual implementation of wastewater treatment in June 1940 are numerous. A chronological listing, though not emphasizing the importance, does give some order to the events that occurred.⁶

The 1904–1905 and 1905–1906 *Annual Report of the Board of Water Commissioners* expressed concern about protecting the water supply from sewage. In 1906, the report mentioned that the typhoid death rate was above average at forty-four per 100,000 for the months of August to December, compared with thirty-three for the preceding five years.⁷ After putting a new intake tunnel and crib into service, the death rate dropped, and by 1907, the Detroit death rate was down to twelve per 100,000.⁸ By 1912, the Detroit Water Service began adding hypochlorite of lime at the rate of nine

⁵ International Joint Commission, *Hearings of the International Joint Commission in re Remedies For The Pollution of Boundary Waters Between the United States and Canada* (Washington, DC: Government Printing Office, 1917), p. 84.

⁶ The IJC was formed in 1912 to carry out the provisions of the Boundary Waters Treaty of 1909; Leonard B. Dworsky, George R. Francis and Charles F. Swezey, “Management of the International Great Lakes,” *National Resources Journal*, Volume 14 (January 1974), pp. 120-122; Clarence W. Hubbell *Preliminary Report on Sewage Disposal for the City of Detroit, Made to George H. Fenkell, Commissioner of Public Works*, by Clarence W. Hubbell, *Consulting Engineer* (Detroit, 1916), pp. 103-138.

⁷ *Annual Report of the Board of Water Commissioners of the City of Detroit*. Fifty Third Annual Report of the Board of Water Commissioners, Detroit, Michigan, 1905, p. 8; *Annual Report of the Board of Water Commissioners of the City of Detroit*, Fifty Fourth Annual Report of the Board of Water Commissioners, Detroit, Michigan, 1906, p. 35.

⁸ *Annual Report of the Board of Water Commissioners of the City of Detroit*, Fifty Fifth Annual Report of the Board of Water Commissioners, Detroit, Michigan 1907, p. 10, Other cities cited in this report, and Typhoid death rates per 100,000 are New York 16.2, Chicago 16.6, Cleveland 15.1, Buffalo 22.5, and Cincinnati 40.

pounds per million gallons of water and had started work on a 200-million-gallon-per-day filtration plant.⁹ The hypochlorite of lime acted as a disinfectant, killing the *B. Coli* bacteria and thus reducing typhoid infections and deaths. This removed the urgency to treat the sewage.

In the 1910s and 1920s, the City of Detroit expanded at an enormous rate because of the automobile industry. The population grew from around 325,000 in 1903 to 679,000 at the time of the *Preliminary Report on Sewage Disposal for the City of Detroit* in 1916, to over 1 million by 1921 or so, reaching 1.5 million by 1930.¹⁰ The City of Detroit grew, through annexation, from 40.97 square miles in 1915 to 79.2 in 1918, 81.42 in 1922, and 138 square miles in 1926.¹¹ Although the sewer system was crucial to safeguarding the health of the community, it could not be realized without placing an intolerable burden on the present generation or mortgaging the future.¹² In one year, forty square miles were added. It had taken over one hundred years to provide the first forty square miles with amenities, and it was a near-impossible task to provide the same amenities to the newly annexed areas in a short time.

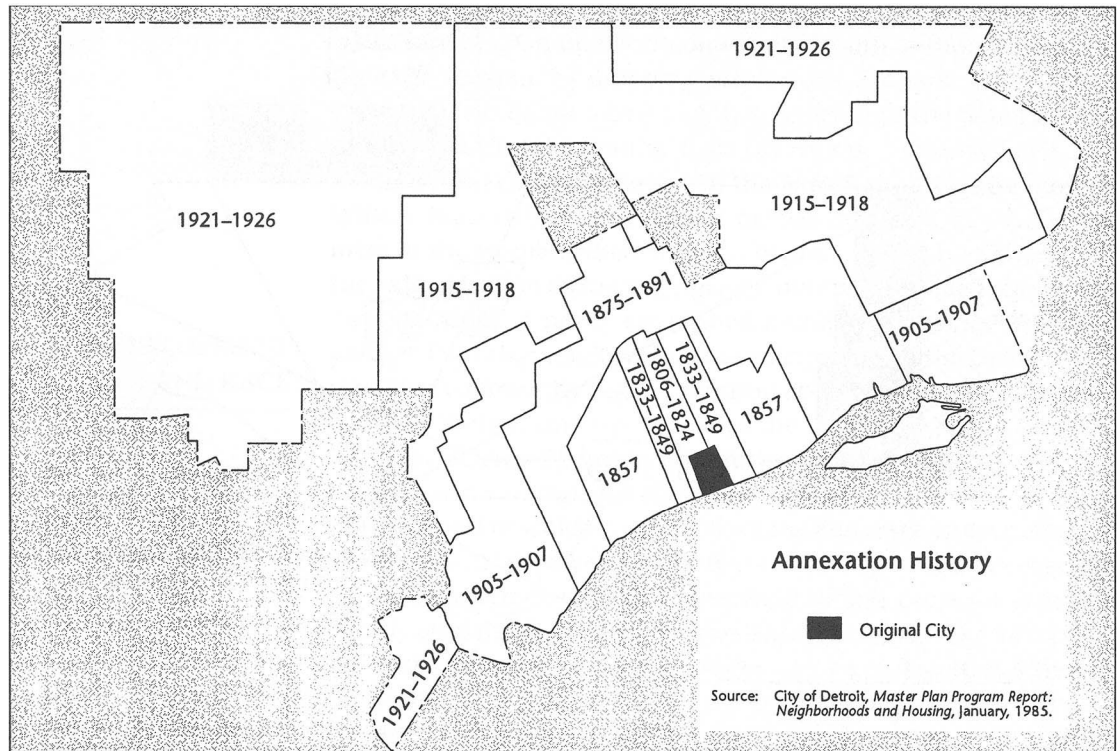
⁹ *Annual Report of the Board of Water Commissioners of the City of Detroit*, Sixty First Annual Report of the Board of Water Commissioners, Detroit Michigan 1913, p. 22.

¹⁰ J. R. Hendry, "Detroit's Intensive Sewer Construction Program," *Engineering News-Record*, 2 November 1922, vol. 89, no. 18, p. 745; Clarence Hubbell, *Preliminary Report on Sewage Disposal for the City of Detroit*, Detroit Michigan 1916, p. 103; "The Detroit Water Works," *The Engineering Record*, vol. 47, no. 25, 20 June 1903, p. 650; "The Detroit Sewage Program-I," *The Excavating Engineer*, December 1923, p. 409. In 1923 the population of Detroit, Highland Park and Hamtramck was 1,088,943. Detroit was the fourth largest city in the USA; it produced 1.1 million cars and employed 310,000 in 3,000 manufacturing establishments.

¹¹ *City of Detroit Master Plan Report*, Neighborhood and Housing, January 1985, Annexation History of Detroit.

¹² Mayor John W. Smith to Common Council, *City of Detroit Annual Report*, 1926, City of Detroit, 1927, pp. 10-11.

Annexation History of the City of Detroit



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Commissioner of Public Works John W. Reid said in 1926 that of these 140 square miles, sixty square miles had no sewer service.¹⁴ Dale Winling, in his paper *Outside the Congested Zone: Annexation in Detroit, 1915-1926*, suggested that in Detroit, real estate speculators fueled annexation during this period.¹⁵

The outbreak of World War I in 1914 had put the country's economy on a wartime footing. Priorities for public works decreased and those for war-related

¹³ *City of Detroit Master Plan Report*, Neighborhood and Housing, January 1985, Annexation History of Detroit.

¹⁴ "\$101,028,000 Needed for Sewerage and Treatment in Detroit," *Engineering News-Record*, vol. 96, no. 3, 21 January 1926, p. 112. This journal says that Detroit was 140 square miles in area. Inconsistencies occur regularly between journals and newspapers, and even between newspapers at different times.

¹⁵ Dale Winling, "Outside the Congested Zone: Annexation in Detroit, 1915-1926," Urban History Association Conference 2006.

industries increased, resulting in manpower and material shortages and an increase in costs for municipalities. The top priority of the city's administration during the postwar years was to provide sewers to the newly annexed areas to avoid severe health problems caused by unsanitary conditions. Developers were building up these areas to the east, west, and north to accommodate the rapidly rising population. Extending sewers and other services to these developments was a function of the city and this rapid expansion overextended the city's financial resources. Wastewater treatment had a very low priority.

Typhoid death rates declined throughout the period after the introduction of chlorine. Between 1922 and 1925 morbidity figures were further reduced from 5 per 100,000 to 2.6.¹⁶ There was a new water filtration plant that was placed into service in December 1925. The ever-increasing quantities of sewage polluting drinking water supplies had caused the city to move the water works inlet first, and then move the sewage outlets away from the inlet.¹⁷ The City of Detroit, realizing that these solutions were only temporary because of the sewage flow into the river, the increasing degradation of the whole riverfront, uncontrollable river currents that occasionally caused polluted water to enter the water intake, and to a lesser extent the threat of either the federal government or the state to take legal action, began planning for a new wastewater treatment plant. Following the 1916 report more were generated in 1920, 1922, and

¹⁶ *City of Detroit Annual Report, 1922*, Detroit, Michigan, 1923, p. 203; *City of Detroit Annual Report 1923*, Detroit, Michigan, 1924, p. 195; *City of Detroit Annual Report, 1924*, Detroit, Michigan, 1925, p. 173; *City of Detroit Annual Report 1925*, Detroit, Michigan, 1926, p. 177.

¹⁷ *City of Detroit Annual Report, 1924*, Detroit, Michigan, 1925, p. 177; *City of Detroit Annual Report 1925*, Detroit, Michigan, 1926, p. 177.

1925.¹⁸ These additional reports were needed as pollution in the Detroit River continued to increase and the earlier reports recommendations were outdated.

The right method of sewage processing had to be decided, and this was a lengthy process. The wastewater plant's location and service area were considerations that had to be decided, another lengthy process that involved not only legislation but also several changes in location and partners. Concurrently with the planning of the new wastewater plant, there were political negotiations between the City of Detroit and other cities and counties. Legislation at the city and state level affected the planning decisions. The final area that affected the construction of the sewage plant was financing. The seven-percent debt limit on assessed value for selling bonds, the Depression, and then the constraints placed on financing by the Roosevelt New Deal programs were among the factors that delayed the completion of the plant.

The Great Depression of 1929 shut off funding for public works, even though at this time, Detroit was well into a massive sewer improvement project, had borrowed the maximum amount of money that it could, and simply could not finance a wastewater treatment plant. The New Deal of 1933 introduced many social welfare programs that were intended to alleviate unemployment and keep the economy going,¹⁹ and these programs eventually became the impetus that solved the financial impasse and provided the money to build the wastewater treatment plant and the connecting sewers.

¹⁸ Special Sewer Commission, *Report of the Special Sewer Commission of the City of Detroit*, Detroit, Michigan, 1920; Harrington Place, *Sewage Disposal for Detroit; A Report Prepared for the Commissioner of Public Works*, Bureau of Governmental Research, Detroit, Michigan, 1925; Special Committee on Sewage Disposal, *Sewage Disposal for the City of Detroit*, Detroit, Michigan, 1925.

¹⁹ The Reconstruction Finance Corporation, the National Industrial Recovery Act, the Federal Emergency Relief Administration, The Civil Works Administration, the Public Works Administration all date from 1933, and the Works Progress Administration from 1935.

There was incredible growth in the Detroit Metropolitan area, which continued within the city until the 1950s and in the areas adjacent until the first decade of the twenty-first century.²⁰ Population growth followed by annexation in a repeating pattern until 1926 forced the city to install sewers and provide other necessary services; wastewater treatment was not a top priority.

Between 1925 and 1940, the State of Michigan passed legislation that included the legal framework for building and financing sewage disposal plants as well as anti-pollution legislation strong enough that violators could be successfully prosecuted. The pressure from the newly instituted Stream Control Commission and the existing State Health Department kept pollution control in the public spotlight. Enabling legislation and innovative financing allowed Detroit to borrow the money to pay for the wastewater treatment plant and then repay the government loans through charging water consumers for wastewater treatment.

Similar to other large cities during this period that experienced pressure from state health departments, or in the case of Chicago from both the War Department and the United States Supreme Court, Detroit was pressured by the Stream Control Commission to resolve the pollution problem on the Detroit River. None of these cities were able to solve their funding problems to attain their goals without federal aid.

Conclusion

Martin Melosi in *Effluent America, Pollution and Reform in American Cities* and *The Sanitary City*, and Jamie Benidickson in *The Culture of Flushing*, and Joel A. Tarr in *The Search for the Ultimate Sink* identify many of the activities that were played out with

²⁰ Campbell Gibson, *Population of the 100 Largest Cities and other Places in the United States: 1790 to 1990*, (Washington: US Census Bureau, 1998). Detroit's population declined 179,424 from 1,849,568 to 1,670,144 between 1950 and 1960.

minor variations throughout the United States in all of the rapidly growing cities.²¹ These trends also occurred in Detroit as it experienced remarkably similar patterns of growth, technological advances, the unforeseen outcomes of this technology and the “fixes” installed. Detroit was also subject to the “path dependency” of decisions made in the 1860s, in the 1910s, 1920s and 1930s to the choice and location of intercepting sewers, and in the 1930s to the type of sewage treatment technology.

All the major cities, once they installed pumped water experienced the problem of dealing with the excess water that was now flowing into cesspits and privy vaults. The economics of the night soil disposal system dissolved, costs of disposal rose. Leaching into ground water and run off into drains and ditches began to cause health problems through the introduction of all the decomposing bacterial material.

The technological fix was to provide underground sewers. This was a very expensive undertaking and the function of providing disposal of household fluid and solid wastes passed from the home occupant to the municipal authorities. The immediate benefit was a reduction in infectious diseases, however this fix or solution resulted in serious pollution of the rivers and lakes where the effluent was redirected. This unforeseen consequence then required first lengthening the water intakes away from the polluted waters, then moving the sewer outlets away from the water intakes, then chlorinating and later also filtering the water and finally having to treat wastewater and remove the sewage. This series of events occurred throughout the United States between the middle of the nineteenth and twentieth centuries.

²¹ Martin Melosi, *Effluent America*. (Pittsburgh, Pennsylvania: University of Pittsburgh Press), 2001. *Pollution and Reform in American Cities*. (Austin: University of Texas Press), 1980. *The Sanitary City*. (Baltimore: The Johns Hopkins University Press), 2000; Joel A. Tarr, *The Search for the Ultimate Sink*. (Akron, Ohio: University of Akron Press), 1996

Cities located in coastal areas were able to dump their effluent into the ocean, in most cases ruining fishing and polluting oyster beds, which caused typhoid epidemics when the oysters were ingested. Some cities did not have copious amounts of fresh water and went to great expense to bring it from great distances through aqueducts. The Great Lakes cities were lucky in that they avoided this expense. Some Great Lakes cities on lake connecting channels also benefited from the large fast flowing rivers that washed their effluent away, while other Great Lakes cities had problems because the very slow lake current retarded the dilution and disposal of their sewage.

This series of events played out against the backdrop of a rapidly changing urban environment. In 1860 twenty percent of the U S population, 6,216,518 lived in cities with more than 2,500 inhabitants. This rose to 14 million by 1880. By 1920, 54,157,973 people or 51 percent of the population was urban.²² Detroit in common with other urban centers experienced this rapid rate of growth.

Consequently a similar political scene appeared. Rural dominated state legislatures reluctantly relinquished their power through home rule legislation. The ward system in cities was also replaced by at large city councils, both of these trends happened in Detroit

Physically cities grew larger, annexing many square miles of undeveloped villages and townships. The nation became one of automobile owners, in 1903, there were 10,000 registered vehicles, and by 1930, there were 26 million. This ownership caused urban sprawl and required cities to build extensive urban networks of water and sewage systems costing many millions of dollars.²³

²² Martin Melosi, *Pollution and Reform in American Cities*, p. 9; *Sanitary City*, p. 72.

The downturn in the economy in 1929 occurred at a time when extensive expansion of these networks was taking place. Private lenders had their own problems, the states were unable to help so municipal lenders had to turn to Washington for help. This new City-Federal relationship provided the impetus for the construction of over 65 percent of the country's wastewater treatment plants between 1933 and 1939, and changed what had been primarily a "local service delivery into systems increasingly influenced by regional and national interests."²⁴

Detroit experienced all of these events at roughly the same time as other major cities. It was unique, however, in that it never became part of a regional system that was provided with water or wastewater treatment through a metropolitan district but instead became a central city service provider of these commodities to a metropolitan region.

²³ Melosi, *Pollution and Reform*, p. 25.

²⁴ Melosi, *Sanitary City*, p. 6, p, 49.

Chapter One – A Brief History of Sewage Disposal in America

This chapter provides a brief history of sewage disposal in America and how Detroit's sewage disposal fits into this broader history. It will discuss pollution in the Detroit River.

The history of early waste disposal systems is well documented, especially by Martin Melosi, Joel Tarr, Jamie Benidickson, and Rose George.¹ There are also books about specific sewer systems in New York, Boston, Los Angeles, and San Francisco Bay,² as well as an excellent Web site located at <http://www.sewerhistory.org> containing numerous articles on all aspects of the history of sewers and sewage, including cesspits and privy vaults.³ No authors have published books on the Detroit water, wastewater treatment, or sewer systems. There is a dissertation by Bert Hudgins on the Detroit water supply problems completed in 1930 and a thesis by Dorothea Engel on the history of the Board of Water Commissioners, finished in 1937.⁴

The water supply for southeast Michigan communities comes from the Detroit River and Lake Huron, although historically, inland streams and wells served the area.

¹ Martin Melosi, *The Sanitary City* (Baltimore: The Johns Hopkins University Press, 2000), *Pollution and Reform in American Cities* (Austin: University of Texas Press, 1980), *Urban Public Policy* (University Park: Pennsylvania University Press, 1993), and *Effluent America* (Pittsburgh: University of Pittsburgh Press, 2001); Joel A. Tarr, *The Search for the Ultimate Sink* (Akron: University of Akron Press, 1996); Joel A. Tarr, James McCurley III, Francis McMichael, and Terry Yosie, "Water and Wastes" *Technology and Culture*, vol. 25, no 2 (April 1984), pp. 226-263; Jamie Benidickson, *The Culture of Flushing* (Vancouver: University of British Columbia Press, 2007); Rose George, *The Big Necessity* (New York: Metropolitan Books, 2008).

² Anna Sklar, *Brown Acres* (Santa Monica: Angel City Press, 2008); Joanne Abel Goldman, *Building New York's Sewers* (West Lafayette, Ind.: Purdue University Press, 1997); Sarah S. Elkind, *Bay Cities and Water Politics* (Lawrence, KS: University Press of Kansas, 1998).

³ <http://www.sewerhistory.org>.

⁴ Bert Hudgins, *A Geographic Study of the Water Supply Problems of Detroit Michigan* (Ph.D. diss, Clark University, Worcester, Massachusetts, 1930); Dorothea Engel, *History of the Board of Water Commissioners* (Master's thesis, Wayne State University, Detroit, Michigan, 1937).

Detroit's first had pumped water in 1824. A reservoir was constructed in 1827. In 1836 the City acquired the water works and in 1853 the Board of Water Commissioners was created through legislative action.⁵

As the population increased, leaching from cesspits infiltrated the water table, rendering most wells unusable. The smaller streams soon became polluted through use as open sewers and became unusable for drinking water. Larger streams and rivers, because of their greater volumes of water, were better able to accommodate the effluent and refuse that was thrown into them. Eventually, only the Detroit River could be used as a reliable source of drinking water. The Detroit River flows at an average velocity of 1.4 feet per second. The volume of water has been calculated at various times at between 144,400 and 220,000 cubic feet per second.⁶ These quantities of water were sufficient to dilute the sewage and other refuse thrown into the river. Under the philosophy of "Dilution is the Solution to Pollution," this quantity of water was believed to be able to handle the Biochemical Oxygen Demand (BOD) of the wastes of a population of 500,000. BOD refers to the amount of oxygen available to microorganisms to decompose waste.⁷

As the population of the Detroit area increased, more waste products were being dumped into the lakes, streams, and rivers that fed the Detroit River. The increased biological load reduced the oxygen available for aquatic life so that fish stocks were dramatically reduced or eliminated. In response to polluted well waters and streams,

⁵ Michael Daisy, ed., "The First 300 Years," Detroit Water and Sewerage Department, pp. 3-11.

⁶ George Trimble, "Greater Detroit American Heritage River Initiative," *The Lake Pilots Handbook*, 1907. This has a figure of 195,000 cubic feet per second. Other references go from a high of 210,000, a median of 184,000 and a low of 170,000 cubic feet per second.

⁷ H. W. Streeter, "Disposal of Sewage in Inland Waterways," *Modern Sewage Disposal*, Langdon Pearse ed. (Lancaster, PA: Federation of Sewage Works Associations, 1938).

water companies formed and began pumping water from the Detroit River to supply fresh water for the population. The river water polluted by human wastes contained *Bacillus Coli* (*Escheria Coli*, *Colon Bacillus*), a microorganism that causes typhoid fever. Typhoid death rates escalated. The inlet pipe for the water treatment plant was moved farther from the shoreline out into cleaner water in the Detroit River by Belle Isle, in 1871. This temporarily solved the problem for Detroit residents, but the downriver communities of Wyandotte, Ecorse, Trenton, and River Rouge, among others, were receiving the sewage from all of the upriver communities and their typhoid casualties increased.

Prior to our modern system of installed in-house flush toilets, privy vaults were used. A privy vault was constructed of stones or bricks and was physically positioned under the privy, or toilet. The construction was such that liquids from the effluent would leach or leak into the earth surrounding it, but would not pollute the water table or other potable water supplies. The remaining solids would become harmless as they broke down under bacterial action. Privies worked very well and were an efficient way of disposing of bodily wastes. Because of the time required for bacterial action, however, they were not well suited for high-density populations. Other drawbacks included odor from the contents and the attraction of flies. When they were cleaned out, the contents were either disposed of as a fertilizer for local farmers or dumped onto unused land or into a convenient river, stream, or lake. Cleaning frequency depended on when the vault was full. In low-density populations, this frequency allowed for the majority of the contents to become harmless compost. Cesspits were similar to privy vaults except that they were

connected to indoor toilets through sewer pipes and were positioned well away from dwellings.

As population densities grew, potable water supplies became scarce. Polluted water in nearby streams caused people to go farther afield for water, to major rivers and lakes. Trades and industries both needed and polluted water supplies. Growing cities with larger populations and higher housing density, which increased fire risks, created a need for plentiful supplies of water for firefighting. These circumstances caused the creation of businesses whose purpose it was to supply water for households and businesses, and for fire prevention. The methods of water delivery ranged from buckets, casks, barrels, and water carts to water pumped through pipes. These pipes, originally made from hollowed-out logs, allowed water to be delivered some distance from its source. Power for the pumps was supplied by water, wind, animals, and steam, and at the end of the nineteenth century by electricity. Initially the logs had plugs in them, which when removed allowed water to flow out. Later, wooden storage containers with faucets were used, and eventually, water was piped into numerous locations, communal faucets, businesses, and private residences. By 1860, sixteen of the largest American cities had water works, and 136 water works were operating in the United States.⁸ With this came an increase in indoor plumbing.

In-home delivery of piped water increased water consumption tremendously, increasing from three to five gallons per person per day when people used streams and wells to over 100 gallons per day by 1880 in large cities such as Chicago, Detroit, and

⁸ Joel A. Tarr and Francis C. McMichael, "Decisions about Wastewater Technology 1850-1932," *Journal of the Water Resources Planning and Management Division*, May 1977, p. 49.

Boston.⁹ In Detroit demand for water prompted the construction of new facilities; with Water Works Park purchased in 1873.¹⁰ Evidence of the increase in water usage per capita can be found in *The Culture of Flushing*, where the author documents this increase through the eighteenth and early nineteenth century in both Europe and the United States.¹¹

The population began a transition from portable bathtubs to fixed baths with plumbing and water closets with piped-in water. Philadelphia had 3,521 bathtubs by 1849, Boston had 6,500 water closets by 1857, and New York had 14,000 baths and 10,000 water closets by 1850.¹² The increase in the volume of water delivered to households and businesses affected drainage in these areas. Cesspits and privy vaults designed for low volumes of liquids soon filled up. The excess polluted liquid leached into ground water supplies, contaminating water tables and wells. The liquids, running along the top of non-permeable surfaces and following natural drainage channels, polluted streams and rivers. Cellars were flooded with leachate that contained large quantities of dangerous bacteria, causing an increase in water-borne communicable diseases such as typhoid and cholera.

The overflowing privy vaults and cesspits required emptying more frequently. Their contents had changed in consistency from a low-moisture, low-volume, relatively odorless product to a high-odor, high-volume product. The handling and transportation

⁹ Joel A. Tarr and Francis C. McMichael, "Historical Turning Points in Water Supply and Wastewater Disposal, 1850-1932," *Journal of Civil Engineering*, October 1977, pp. 82-83.

¹⁰ Michael Daisy, ed., "The First 300 Years," Detroit Water and Sewerage Department, pp. 3-11.

¹¹ Benidickson, *Culture of Flushing*, pp. 72-73.

¹² Benidickson, *Culture of Flushing*, p. 82.

now required a watertight container and pumps to remove the contents of privy vaults and cesspits, where buckets, shovels, and open carts had previously sufficed. The changed technology of pumped water, the unforeseen consequences of liquid effluent, and the technological fix of sealed wagons did not solve the problem. The costs to the households also rose because of the necessity to clean the privy vaults and cesspits more frequently.¹³

The existing surface drainage systems in cities provided a means to evacuate rainwater into the nearest waterway. These drains were not designed to carry sewage, but with a need to get rid of the liquid effluent, households illegally connected their toilets and baths to storm drains. The solids in this effluent were now out in the open, where flies, rats, and the general human population were exposed to them. These conditions were ideal for the propagation of diseases that soon followed. City authorities eventually passed ordinances forbidding the introduction of fecal matter into drains.¹⁴

Water supply systems, the majority of which had started as private enterprises, became public utilities by the twentieth century. Among the reasons for this change were public health requirements, firefighting needs, the availability of water for all classes and all sections of a city, and the demand for consistent delivery pressure and volume.¹⁵

Public health requirements became stricter by the beginning of the twentieth century. Public health acts passed by states increasingly used more precise language about water delivery systems. Michigan's first public health act, passed in 1873, does not

¹³ Edward S. Philbrick, *American Sanitary Engineering* (New York: The Sanitary Engineer, 1881), pp. 73-74; Tarr, "Historical Turning Points," p. 83.

¹⁴ Melosi, *Sanitary City*, p. 91.

¹⁵ Benidickson, *Culture of Flushing*, p. 59.

mention water supply systems.¹⁶ In 1909, the Health Department was given the authority to direct water works operators “To cleanse any portion of such system as it may deem necessary.” This act placed considerable power in the hands of the State Board of Health to control the quality of water delivered by private water systems. In 1913, chlorination of water and sewage disposal systems were added under the Board of Health’s supervision and control.¹⁷ Water filtration was added in 1923.¹⁸

Water works run by municipalities were financially sound, as the product delivered, water, was a salable item. These public utilities used their profits for the maintenance of existing structures and the construction of new facilities, while any major improvements were financed through the sale of bonds. Excess profits were eliminated through a reduction in water rates. Storm sewers and drainage in general were never private ventures, unlike early water systems, and were paid for through assessments and taxes. Starting in 1897, Michigan Public Acts provided for the construction and maintenance of drains.¹⁹ A Public Act of 1911 set a precedent in that it officially endorsed putting sewage into drains.²⁰ In 1931, a provision was added: “Disposal plants, filtration beds and other mechanical devices as will properly purify the flow of any drain

¹⁶ *Michigan Public Acts of 1873*, p. 105.

¹⁷ *Michigan Public Act 98 of 1913*. This Act required the operators of the water supply systems to report annually when water filtration systems were cleaned and supply their maintenance records to the State Board of Health.

¹⁸ Michael Daisy, ed., “The First 300 Years,” Detroit Water and Sewerage Department, pp. 3-11.

¹⁹ *Michigan Public Acts of 1897*, p. 351. This act was concerned with draining land “whenever the same shall be conducive to the public health, convenience and welfare.”

²⁰ *Michigan Public Acts 1911*, p. 362. This act states, “Any county drain may be used for sewage disposal by any city, village or township for which it shall be available...”

may be constructed.”²¹ Finally, in 1941, a Public Act was passed where sewage was to be banned from drains by 1944.²²

In concert with these Michigan Public Acts concerning drains, the legislature passed Public Acts authorizing construction of sewage disposal plants and accommodating legislation to finance them, either through bonds issued against assessed value of property or, when those exceeded the taxable limits allowed by law, revenue bonds.²³ Many Michigan Public Acts were passed throughout the 1920s, 1930s, and 1940s allowing municipalities to complete the transition of what had previously been a private function, the disposal of sewage, into a public function. There was a transition from dumping sewage into convenient waterways, to eliminate unsightly and dangerous wastes, to treating sewage so that the majority of the solids were removed and disposed of through incineration. The remaining effluent was then disposed of through dispersal in convenient watercourses. Legislation to finance this additional public function eventually returned the treatment and disposal costs back to the public through charges placed on their water utility bills.²⁴

²¹ Michigan Public Act 318, p. 544.

²² Michigan Public Act 304 of 1941, p. 527, Chapter 17 section five stated: “From and after 3 years from the effective date hereof, it shall be unlawful for any municipality, industry, public or private corporation, individual, partnership association, or any other entity to discharge into any county drain or inter county drain of the state any sewage or waste matter capable of producing in said drain or drains detrimental deposits, objectionable odor nuisance, injury to drainage conduits or structures, or such pollution of the waters of the state receiving the flow from said drains as to injure livestock, destroy fish life or be injurious to public health.”

²³ Michigan Public Act 184 of 1925, allowed bonds to be issued to fund sewage disposal systems when the State Health Department, or a court, ordered a sewage disposal system to be built. Michigan Public Act 224 of 1925, made provision for a city to borrow money to acquire, own, operate, purchase or construct public utilities, and Michigan Public Act 273 of 1925, allowed bonds for rapid transit and sewage disposal to be issued for over thirty years. Michigan Public Act 2, which was very similar in content, followed this in 1926.

²⁴ Michigan Public Acts, 320 of 1927, 126 of 1929, 160 of 1929, 316 of 1931, 318 of 1931, 13 of 1932, 94 of 1933, 342 of 1939.

Sewage can be viewed either as a nuisance or a commodity. It has to be disposed of, to be removed from sight and smell. The most convenient way was to dump it into flowing water, streams, rivers, lakes, or the ocean. It was immediately diluted and swept away, out of sight and out of mind. Sewage could be collected and transported to be used as landfill or for coast and riverbank restoration, and was also considered a commodity to be used as fertilizer on crops in some areas of the country during certain times. Anna Sklar's *Brown Acres* contains numerous references to sewage and other byproducts of wastewater treatment plants in the Los Angeles area being used as fertilizer from the 1880s until the 1940s.²⁵ The City of Milwaukee has been selling organic fertilizer produced from sewage since 1925 under the name Milorganite, a byproduct of the activated sludge method of sewage treatment.²⁶

The contents of privy vaults were hauled into the countryside and spread on fields, but once pumped water became available, the quantity and consistency of the contents changed. This required modifications to the carts to transport liquids, not solids, and reduced the profitability as the product was so diluted. Sewers linking the cities to nearby watercourses became the preferred method of disposing of sewage.

There was an existing infrastructure of storm drains in most cities, and when sewage, because of the volume of pumped water added, became liquefied, connecting house drains to these storm drains was a logical solution to dispose of wastes. When there was a low population density, this did not cause problems. However, high population densities coupled with rainstorms was a different scenario. Storm drain

²⁵ Sklar, *Brown Acres*, p. 29, pp. 42-43, p. 100.

²⁶ Sklar, *Brown Acres*, p. 63; <http://www.milorganite.com/about/history.cfm>, (Accessed 1 September 2008).

overflow when only storm water was entering the drain did not cause an environmental impact. When sewage was introduced and overflows occurred, the results were quite different because of the bacterial contamination coupled with the cleanup required. The solution could have been to build extra capacity into the storm sewers, a system applied today in Chicago with multi-billion-gallon holding tanks for storm sewage overflow.²⁷

Another solution would have been to build separate systems for storm water and sewage. The combined-versus-separate sewers decision was one confronted by many municipalities during the latter part of the nineteenth century. With a combined sewer system, both sewage and storm water use the same sewer. The benefits for this are the cost, as only one sewer is required. There is convenience in installation, repair, and maintenance, especially in densely built-up neighborhoods. A study done by Rudolph Hering in 1881 gave the criteria for deciding which system to use. The combined system was best when “Rainwater must be carried off underground, treatment of sewage prior to discharge is not required, a sufficient amount of water from sewage and/or rainfall is available to keep the sewers clean.” A separate system is best when

Underground removal of storm water is not required, existing sewer pipes can be used for storm drainage but are not suitable for sewage, sewage treatment is required prior to discharge, pumping costs are so high that the cost of pumping a combined sewage flow (sewage plus storm water) would be unacceptable.²⁸

Neither system was more effective from a public health standpoint. A combined system was best for large cities concerned with storm water and wastewater. In smaller cities

²⁷ “The Metropolitan Water Reclamation District of Greater Chicago’s Deep Tunnel,” 109 miles of tunnel carved out of bedrock limestone up to 300 feet underground can hold 2.5 billion gallons of storm water overflow at one time. http://www.huffingtonpost.com/debra-shore/storm-of-the-century_b_126341.html, (Accessed 6 July 2009).

²⁸ Tarr, “Historical Turning Points,” p. 84.

where traffic was not a problem, the separate system without storm drainage could be constructed.²⁹ Joel Tarr in *Historical Turning Points* said that originally, urban sewers were for storm water only and became combined when households, by necessity, connected to them after the installation of running water. The improper working of these systems through poor design led to the idea of a separate sewer pipe for human wastes. This led in turn to the possibility, suggested by sanitarians, that these waste could be retrieved and used for fertilizer.³⁰ The majority of the systems installed were combined systems.

The first large separate system installed was in Memphis, Tennessee in 1880. It was designed and installed by George Waring, a sanitarian. In his 1867 book, *Draining for Profit and Draining for Health*, Waring states:

In towns all offensive smells from the decomposition of animal and vegetable matter, indicated the generation and presence of the causes of insalubrity [not promoting good health] and of preventable disease, at the same time they proved defective local administration.³¹

Waring believed “that ‘sewer gas’ produced by putrefying fecal wastes was the cause of ‘zymotic’ or infectious diseases believed to be caused by a zyme or microzyme.”³² They were thought to be caused by some virus or organism in the system,

²⁹ Tarr, “Historical Turning Points,” pp. 83-84, Hering was a pioneering sanitary engineer in America.

³⁰ Joel A. Tarr, “Decisions About Wastewater Technology 1850-1932,” *Journal of the Water Resources Planning and Management Division*, p. 52; Joel A. Tarr and Francis Clay McMichael, “The Separate vs. Combined Sewer Problem,” *Journal of Urban History*, May 1974, p. 313.

³¹ George E. Waring, *Draining for Profit and Draining for Health* (New York: Orange Judd and Company 245 Broadway, 1867), p. 222, p. 239. This statement was from a report published “by the General Board of Health to the British Parliament, concerning the administration of the Public Health Acts and the Nuisances Removal and Diseases Prevention Acts from 1848 to 1854.”

like a ferment. This fermentation theory, which is now obsolete, proposed that many diseases owed their origin to a “morbific” principle in the system, acting in a manner analogous to the process of fermentation.³³ Martin Melosi in *Sanitary City* wrote, “Zymosis equated disease with fermentation, focusing on the idea of self reproducing particles of organic Matter.”³⁴

Another theory that was prevalent in this time, also espoused by Waring, was Miasmas. A miasma was defined as a poisonous vapor or mist, identified by its foul smell, believed to be made up of particles from decomposing material that could cause disease.³⁵ Waring believed that fecal matter should be removed very quickly from households before it started to decompose and give off putrid smells because the gases emanating from the feces contained germs that could infect people. This theory was a precursor to the modern germ theory in which bacteria in fecal matter entering the food chain through bad sanitary practices or into potable water supplies are the causes of communicable diseases.

Waring’s separate sewer system in Memphis was partially successful; 22 other towns and cities constructed similar systems. His system however, as installed in Memphis, required extensive maintenance. No manhole covers were installed, and blocked pipes required streets to be dug up. The flushing of the feces by homeowners

³² Tarr, “Sewer Problem,” p. 315. The diseases were mainly fevers and contagious diseases, such as Typhus, Typhoid Fever, Small Pox, Scarlet Fever, Measles, Erysipelas, Cholera, Whooping Cough, Diphtheria, etc.

³³ Morbific being defined as “causing disease.”

³⁴ *Webster’s Third New International Dictionary*, 1971, p. 1469; All Experts Encyclopedia Beta, http://en.allexperts.com/e/f/fe/fermentation_theory.htm, (Accessed 30 September 2008); http://en.allexperts.com/e/z/zy/zymotic_disease.htm, (Accessed 30 September 2008); Melosi, *Sanitary City*, p. 110.

³⁵ Benidickson, *Culture of Flushing*; p. 115; medicinenet.com, http://www.medterms.com/script/main/art.asp?article_key=19304, (Accessed 30 September 2008).

required connections to the Memphis water system, which was inadequate in supplying water for this purpose.³⁶

Both separate systems and combined systems moved sewage away from households to a final disposal point. Large cities such as New York, Detroit, and Chicago adopted combined systems in which storm drainage also entered sewers. These cities had many roadways, equating many square miles of impervious surface area. Storm drains carried not just storm water, but all of the other effluent of a modern society as well, including millions of tons of horse droppings; the residues from slaughterhouses, waste from industrial processes; wastewater from laundries, households, and breweries; and the leachate from rubbish dumps. The decision to use combined sewers was predicated on the existing drainage systems and the amount of hard surfaces installed in most of the major cities in the United States. Smaller rural cities with fewer hard surfaces tended to build separate systems when their population was less than 30,000.³⁷ By 1909, 90 percent of cities over 300,000 had combined systems, 72 percent between 100,000 and 300,000, 54 percent between 50,000 and 100,000, and 49 percent between 30,000 to 50,000. Combined statistics show that 23 percent of all cities had separate systems and 73 percent had combined systems, with the remainder having a combination of both.³⁸

There was an evolution in thinking about the causes of diseases in the 1880s. Prior to this, zymotic and miasmatic theories abounded. Louis Pasteur and Robert Koch revealed disease causation by bacteria and viruses. In his experiments, Pasteur proved

³⁶ Melosi, *Sanitary City*, p. 156.

³⁷ Tarr, "Wastewater Technology Decisions," p. 33.

³⁸ Melosi, *Sanitary City*, p. 159.

that microorganisms in the air caused mold to grow, supporting the germ theory of infectious diseases. Koch, a German bacteriologist, was responsible for identifying the anthrax bacteria *Bacillus Anthracis*. These scientists and their students identified cholera, diphtheria, typhoid, anthrax, and many other disease-causing organisms.³⁹

One popular theory that held sway throughout the late nineteenth and early twentieth century was that “Dilution is the Solution to Pollution.” This term, heavily used in the literature of the time - it appears, for example, in *Principals of Sanitary Science and the Public Health*, 1905 by William Sedgwick - does not appear to have a documented origin.⁴⁰ The Environmental Protection Agency used it in 1970 as an example of incorrect procedures.⁴¹ Dr. Christensen of the Research Triangle Park, North Carolina, quoted it when speaking to lab employees about changes in environmental awareness since the first Earth Day was celebrated in 1970.⁴² There is a chapter in *Brown Acres* entitled “Dilution is the Solution to Pollution,” but the author does not reveal the source of the phrase. Inquiries to many authoritative sources, including Jamie Benidickson, did not lead to any conclusions about the origin of the phrase. An early example of the concept appears in Greek and Roman Mythology: Hercules’ sixth challenge was to clean the stables of King Augeus and he did so by diverting a river.⁴³

³⁹ *Encyclopedia Britannica*, Robert Koch, <http://www.britannica.com/ebchecked/topic/320839/Robert-Koch>, (Accessed 1 October 2008); *Encyclopedia Britannica*, Louis Pasteur, <http://www.britannica.com/ebchecked/topic/445964/Louis-Pasteur>, (Accessed 1 October 2008).

⁴⁰ William Sedgwick, *Principals of Sanitary Science and the Public Health* (New York: Macmillan Company, 1905), p. 128.

⁴¹ 3 July 1980 <http://www.epa.gov/athens/staff/members/frickwaltbre/index.html>, (Accessed 1 October 2008).

⁴² <http://www.epa.gov/wed/webpages/news/dec00/lead.html>, (Accessed 1 October 2008).

Observations made in the last century showed that running water purifies itself. Sedgwick stated that “...engineers, chemists and sanitary engineers alike, held as true a theory of the purification of watercourses which is now known to be false, or, at best, only a half truth.”⁴⁴ Observations showed that when a large amount of sewage was dumped into a river, the sewage appeared to have dissipated at a short distance downstream. Chemical analysis using the techniques of the period revealed a lower concentration of organic material in the water at the downstream point than at the upstream point. In actuality, the dilution of the sewage by river water accounted for the observed reduction of organic matter from the sewage. As Sedgwick states, “In all these cases the fundamental principle of purification, and the basis of successful disposal is simple dilution by a relatively large volume of purer water.”⁴⁵ Sedgwick modifies the theory by adding that in fact stagnant or standing water purifies itself better because it allows most of the organic matter to precipitate out. He also notes that “...some of the pathogenic elements disappear en-route from cold, or inanition, or by entanglement, or by falling to the bottom or by the germicidal influence of light.”⁴⁶ He does mention the

⁴³ Professor Paul Taiganades, Department of Agriculture University of Illinois Chicago, <http://www.livestocktrail.uluc.edu/gowm/paperdisplay.dfm?contentid=6527>, (Accessed 1 October 2008), King Augeus had thousands of cattle in barns; the resulting piles of manure were never cleaned up causing a pollution problem. When Augeus was made aware of the problem he ordered his men to either get rid of the smell, or get rid of the animals. The king’s men contacted Hercules who diverted the rivers Tigris and Euphrates upstream from the barns so that the resulting water would flush the manure out of the barns and with it the smell.

⁴⁴ William Sedgwick, *Principals of Sanitary Science and the Public Health* (New York: Macmillan Company, 1905), p. 128.

⁴⁵ Sedgwick, *Principals*, p. 131.

⁴⁶ Sedgwick, *Principals*, p. 232.

exposure to free oxygen as a causative effect in the running water or rivers but holds that “Quiescence did far more.”⁴⁷

By 1911, the U.S. Public Health Service began examining stream pollution by sewage and the Biochemical Oxygen Demand (BOD) the sewage made on the water.⁴⁸ Oxygen, dissolved in water, is used in water by aquatic animals, decomposition of organic materials, and chemical reactions. Water gains oxygen from the atmosphere and from plants growing in it through photosynthesis. The amount of oxygen varies depending on the water temperature, ranging from 14.6 milligrams per liter (mg/l) at 32° F (0° C) down to 5.95 mg/l at 113° F (45° C).⁴⁹ Indications of reduced levels of dissolved oxygen in watercourses show up in the disappearance of certain species of fish. Whitefish had disappeared from the Detroit River by 1874.⁵⁰ The U.S. Public Health Service released standards for water quality and acceptable levels of dissolved oxygen in water in 1912.⁵¹

Conclusion

Supplying water needs and basic sanitation through the proper disposal of human wastes became a major concern for metropolitan areas in the United States in the

⁴⁷ Sedgwick, *Principals*, p. 235.

⁴⁸ “Monitoring and Assessing Stream Pollution,” Environmental Protection Agency, <http://www.epa.gov/volunteer/stream/ums52.html>, (Accessed 1 October 2008). This source explains BOD in detail; also see Harrison P. Eddy, “Some Viewpoints on Stream Pollution,” *The Canadian Engineer*, 16 February 1926, vol. 50, no. 7, p. 225.

⁴⁹ <http://www.epa.gov/volunteer/stream/ums52.html>, (Accessed 15 September 2008).

⁵⁰ Margaret Beattie Bogue, *Fishing the Great Lakes* (Madison: University of Wisconsin Press, 2000), pp. 142-147.

⁵¹ Allan McLaughlin, *Sewage Pollution of Interstate and International Waters*, US Public Health Service Hygienic Laboratory Bulletin 77, July 1911 (Washington, D.C. : Government Printing Office, 1911), pp. 131-135; Ellis L Armstrong, Ed., *History of Public Works in the United States 1776–1976* (Chicago: American Public Works Association, 1976), p. 405.

nineteenth and early twentieth centuries. Detroit mirrored many other major American cities in building combined sewer systems. From early on in its history it followed the pattern of cesspits and privy vaults. Once piped water became prevalent and the consistency of effluent changed to 99 percent liquid the necessity to channel the liquid away from dwellings was accomplished by building sewer systems that removed the effluent to the nearest watercourse.

The installation of underground sewers in the 1860s with good airtight seals connecting toilets to sewers was consistent with the scientific theory of the day regarding Miasmatic gases as the causes of illness. The sewers contained these dangerous gases. This so the theory presumed would insulate the population from inhaling the gas and expose them to the multitude of diseases these gases were supposed to transmit. In actuality with the installation of sewers the infection rate dropped dramatically.⁵² The push to sewer American cities beginning in the 1860s contributed to this decline because the sewers removed sewage from the immediate vicinity of the populace. The science was wrong but the end result was beneficial.

With the installation of sewers, effluent now flowed into rivers and lakes; this practice was considered safe and became the normal practice as it had been observed that running water cleansed itself. The existing methodology used in the chemical analysis of water quality in the 1870s supported this theory.⁵³

The unregulated dumping of sewage into waterways had mixed results. If the waterway was seen as able to accommodate the bacterial load and there was no

⁵² Melosi, *Sanitary City*, p. 47. Death rates in all but a few cities between 1860 and 1880 dropped from approximately 25 - 40 per 1,000 to 16 - 26 per 1,000.

⁵³ Benidickson, *Culture of Flushing*, p. 116

observable damage, dumping continued. In down river communities increases in diseases revealed that the dilution theory had limitations. There were no published standards that could be used to ascertain when a waterway was being overloaded with bacteria. Rudolph Hering was the first to propose standards for dilution in association with the Chicago Drainage Canal when he proposed 3.3 cubic feet per second for 1,000 people.⁵⁴ These standards were founded around the Biochemical Oxygen Demand. Another suggested standard was proposed by the International Joint Commission in its report on the pollution of boundary waters at the conclusion of its study. This report founded its standard on the amount of Bacillus Coli in raw water that a water treatment facility could safely treat. This standard also defined the maximum above which no water treatment could clean raw water.

Initially Detroit had the water volume, and flow of the Detroit River to easily dilute its sewage to a point where the sewage was rendered harmless through bacterial action. Downriver communities who used raw water were not harmed, however as the population grew so did the bacterial load. Continuous expansion of the city brought further sewers into service so that eventually there were over forty public outfalls into the Detroit and Rouge Rivers and Connors Creek. These sewers and the numerous privately owned ones carrying both industrial pollutants and human waste from the manufacturing establishments adjacent to the Detroit River severely impacted the water quality of the river by the early 1920's.

For rapidly growing areas like Detroit, providing the basic amenities of water treatment and sewage disposal went hand-in-hand with facilitating other municipal services to the burgeoning population. Detroit was also the fastest growing city in the

⁵⁴ Melosi, Sanitary City, p. 105.

country in the decade 1910 – 1920. Between 1915 and 1925 its area increased from 48 to 138 square miles, putting an enormous demand for the city to build the infrastructure in the newly annexed areas. This unprecedented development placed an extraordinary load on all the functional divisions of the city. Borrowing the money to pay for the infrastructure meant that the city was increasingly at the maximum debt it was legally allowed to owe. Decisions about what projects to finance many times left all but the fundamental needs covered. Wastewater treatment was one project that was not a necessity whereas removal of sewage from the neighborhoods had to be accomplished. Consequently while sewers were a major expense in the city's budget in these decades, wastewater treatment was neglected and only becomes an issue when sewage pollution contaminated the water supply.

Chapter Two – Boundary Waters Treaty, Law, Regional Politics and Negotiations on the Necessity to Build a Regional Sewage Treatment Plant.

This chapter presents the Boundary Waters Treaty of 1909 and its influence upon the region through the International Joint Commission's (IJC) investigation of boundary waters pollution. The Public Health and Marine Hospital Service reports of 1911 through 1913 initially investigated sewage pollution of interstate and international waters and the IJC's inquiries were made following these reports. There is an examination of the laws surrounding water pollution and the possible legal remedies in the United States and Canada, and how Michigan approached it. The State Department of Health and the State Department of Conservation began to pursue polluters in Michigan aggressively in 1927 and then the newly created Stream Control Commission took over their pollution duties and increased the investigation and subsequent law suites against polluters. The metropolitan district approach to providing wastewater treatment and water treatment is reviewed. Why this approach did not evolve in the Detroit metropolitan area is examined.

The Boundary Waters Treaty of 1909 provided Canada and the United States with methods to resolve disputes over water, and it specifically mentioned water pollution when it stated "It is further agreed that the waters herein defined as boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health or property on the other."¹ The treaty made provision for the creation of the International Joint Commission (IJC) to investigate any violation of the treaty. "Its purpose is to help prevent and resolve disputes relating to the use and quality of boundary

¹ "Treaty Between the United States and Great Britain Respecting Boundary Waters Between the United States and Canada." *The American Journal of International Law*, vol. 4, no. 3, Supplement: Official Documents, (July, 1910), pp. 239-249.

waters and to advise Canada and the United States on related questions.”² With the increased population growth on both sides of the border, water pollution was taking place and both governments asked the IJC on August 1, 1912 to:

Investigate and report on: To what extent and by what causes and in what localities have the boundary waters between the United States and Canada been polluted so as to be injurious to the public health and be unfit for domestic or other uses? In what way or manner...is it possible and advisable to remedy or prevent the pollution of these waters?³

There had been other joint commissions set up between the United States and Canada to resolve points of friction. The Joint Commission Relative to the Preservation of the Fisheries in Waters Contiguous to Canada and the United States was created in 1892, and the International Waterways Commission (IWC) was formed in 1905.

The Boundary Waters Treaty was signed on January 11, 1909. The principal negotiators were Elihu Root (Secretary of War, 1899–1904, and Secretary of State, 1905–1909) and Sir Wilfred Laurier (Prime Minister of Canada, 1896–1911). The treaty was designed to prevent disputes between the United States and Great Britain over the use of the boundary waters between the United States and Canada and to settle all pending questions over “the rights, obligations or interests of either in relation to the other.” It defined the boundary waters, which included tributary waters and rivers flowing across the boundaries. Article I establishes the principle of free navigation by ships of both countries in the Great Lakes, including Lake Michigan, which lies entirely within United States borders. Article IV addresses pollution. Article V mentions diversion of water for

² www.ijc.org/background/biogr_commiss.htm, (Accessed 1 June 2008).

³ International Joint Commission, *Progress Report of the International Joint Commission on the References by the United States and Canada in re the Pollution of Boundary Waters* (Washington: Government Printing Office, 16 January 1914), p. 2.

electric power at Niagara Falls. Article VI mentions irrigation diversions on the St. Mary's and Milk Rivers in Montana, Saskatchewan, and Alberta. Article VII and VIII state that the United States and Canada will create an International Joint Commission with three commissioners from each country. The commission was to have cases referred to it at the request of either government, and both the United States Senate and the Governor General of Canada had to agree to the reference. These cases were to be about the use, obstruction, or diversion of the boundary waters. The commission was to investigate and report back with its recommendations. If the commission was evenly divided on any reference,⁴ the final decision was to be made by a referee appointed under the rules of the Hague Convention.⁵

Starting in 1912, the IJC began an examination of the Great Lakes, Lake St. Clair, the St. Clair River, the Detroit River, the Niagara River, and the St. Lawrence River. A preliminary report published in 1914 detailed the bacterial investigation that had tested 1,447 water samples on the Great Lakes between Rainy River, Ontario (on the Rainy River in the northwest) and Cornwall, Ontario on the St Lawrence in the east. This was one of the most intensive sanitary investigations ever attempted. It identified severe pollution, caused by sewage, in the Detroit and Buffalo areas of the border. The report revealed that *Bacillus coli* (now commonly known as *E. coli*) bacteria, which caused typhoid fever when ingested, was present in these water sources. These conclusions complemented the results of the investigations by Allan J. McLaughlin of the Public

⁴ Any investigation or dispute referred to the IJC.

⁵ N. F. Dreisziger "Dreams and Disappointments," *The International Joint Commission Seventy Years On*, ed. Robert Spencer, Johns Kirton, and Kim Richard Nosall, Centre For International Studies (Toronto: University of Toronto, 1981), p. 15; *The American Journal of International Law*, vol. 4, no. 3, Supplement: Official Document (Jul 1910), p. 242.

Health and Marine Hospital Service of the United States, published between 1911 and 1913. In one instance, the results of the IJC investigation, done in the summer of 1913, had a high bacterial count of 11,592 *Bacillus coli* per 100 cubic centimeters of water at Amherstburg, Ontario, downstream and across the Detroit River from the City of Detroit.⁶ Detroit at the time had a population of 850,000 and all of its sewage went into the river. Typhoid deaths per 100,000 people in Amherstburg, Ontario in 1912 were 118, and in Niagara Falls, Ontario were 194. In Trenton, Michigan in 1913 the typhoid death rate was 244 per 100,000.⁷

Intercession by the U. S. Government because of the violation of the Boundary Waters Treaty never materialized. News reports cite various state officials referencing the treaty but no federal official doing so. If the Federal Government had really wanted to pursue Detroit for polluting the Detroit River and being in contravention of the treaty, there was abundant evidence to support their case. Alternatively, if the priority had been to live up to the treaty and stop the pollution, the government could have paid for a wastewater treatment plant. The government became aware of this problem in 1914, but the pollution became much more serious and lasted until 1940.

⁶ International Joint Commission, *Progress Report of the International Joint Commission on the Reference of the United States and Canada in re the Pollution of Boundary Waters* (Washington, D.C.: Government Printing Office, January 16 1914), p. 37. This was an extremely high count in comparison with the other readings.

⁷ Jennifer Read, "A Sort of Destiny," *Scientia Canadensis*, vol. 22-23, 1988/1989, p. 116; Robert A. MacKay, "The International Joint Commission Between the United States and Canada," *The American Journal of International Law*, vol. 22, no. 2 (April 1928), p. 309 –310; International Joint Commission, *Progress Report of the International Joint Commission on the reference by United States and Canada in re the pollution of boundary waters whether or not such pollution extends across the boundary in contravention of the treaty of January 11, 1909, and if so, in what manner or by what means it is possible to prevent the same, including report of the sanitary experts* (Washington, D.C.: Government Printing Office, 1914); Allan J. McLaughlin, *Sewage Pollution of Interstate and International Waters*, Hygienic Laboratory-Bulletin No. 79 1911, No. 83 1912, No. 89 1913 (Washington, D.C.: Government Printing Office); Read, "Destiny," p 118.; *Final Report of the International Joint Commission on the Pollution of Boundary Waters Reference*, Washington, D.C., Ottawa, Ontario (Washington, D.C.: Government Printing Office, 1918), pp. 20, 24.

Robert A. MacKay, in his article “The International Joint Commission Between the United States and Canada,” analyzed the treaty and the IJC from its inception until 1928, stating, “It was discovered that neither party was guilty of polluting the waters involved to the detriment of the other.”⁸ However, this statement is in direct contradiction with the *Final Report of the International Joint Commission 1918*, which clearly states:

The most intense and the most clearly demonstrable cases of pollution crossing the border exist in the Detroit and Niagara Rivers... Beyond question the pollution from Detroit and towns lower down the river crosses the boundary line... In the case of the Detroit and Niagara River pollution exists on one side of the boundary line which unquestionable is an “Injury” within the meaning of the treaty to health and property on the other.⁹

So why was there never any litigation? Dr. Heinmiller, from Brock University, noted in his article “Do Intergovernmental Institutions Matter?”:

Intergovernmental institutions with politically enforced veto players are usually the product of intergovernmental cooperation and the continued existence of these institutions relies primarily upon the value that the partner governments attribute to this institutionalized cooperation... generally, governments are unwilling to risk this sort of institutional demise for a short-term policy objective because they place significant value on retaining their veto for the future, when they may need it to block damaging policy proposals from other governments. The Canadian government values the effective continuance of the Boundary Waters Treaty as an institution far more than it values a policy victory on any individual file. The mere presence of veto players can have a deterrent effect on particularly contentious policy issues, so that they are not even brought forward for consideration.¹⁰

⁸ Robert A. MacKay, “The International Joint Commission Between the United States and Canada,” *The American Journal of International Law*, vol. 22, no. 2 (April 1928), p. 310.

⁹ IJC, “Final Report 1918,” p. 25, p. 34.

The British North American Act gave the Canadian Federal Government specific power related to water resources. Section 132 gave Canada the power to meet treaty obligations negotiated while it was part of the British Empire. Dr. Jennifer Read, in her dissertation “Addressing a Quiet Horror: The Evolution of Ontario Pollution Control in the International Great Lakes, 1910–1972,” said the Canadian federal government has not had the political will to meet its treaty obligations in relation to Great Lakes pollution. Between 1912 and 1915, the Canadian Senate and House of Commons were proposing legislation that would have made national standards for pollution control, the “Navigable Waters Bill.” There was much opposition at the local level, so the federal government of Canada in 1915 decided to wait on the IJC’s Final Report (published in 1918) rather than implement legislation that might cause it to be voted out of office. Dr. Read also stated that with the typhoid fever problem disposed of through chlorine treatment of drinking water, “There was little need to pursue further changes in Canadian American relations along the border.”¹¹

The first Canadian draft of the Boundary Waters treaty in 1907 did not contain a pollution clause, and the American draft mentioned it in relation to population growth in the northwest. If pollution had been a main factor, the United States Senate would not have ratified it. Many senators objected to the pollution clause because they thought it might be used to force Detroit and Buffalo to build sewage treatment plants. A Department of State aide approached the Canadian negotiator about removing the clause.

¹⁰ Timothy Heinmiller, “Do Intergovernmental Institutions Matter? The Case of Water Diversion Regulations in the Great Lakes Basin,” *Governance: An International Journal of Policy, Administration and Institutions*, vol. 20, no. 4 (October 2007), pp. 670-672.

¹¹ Read, “Destiny,” pp. 116-117; Jennifer Read, *Addressing a Quiet Horror; The Evolution of Ontario Pollution Control Policy in the International Great Lakes, 1907–1972* (Ph.D. diss., University of Western Ontario, 1999), pp. 9-10, 34, 57, 58, 66.

The Canadian negotiator replied that the pollution clause was important and would only be enforced in extreme cases. It was intended to limit industrial pollutants, which endangered fish life.¹²

The IJC was not structured to be an enforcement body, and the emphasis has always been on agreement and negotiation rather than national interests.

The highest level of government in each country appoints the Commissioners, but once appointed they do not represent their national governments; they operate at arms length. The Commissioners traditionally work in consensus to find solutions that are in the best interests of both countries. When it approves a project, the IJC considers interests in both countries in accordance with the treaty and may require, in its order of approval, that certain conditions in project design or operations be met to protect interests on either side of the border.¹³

Even when consensus is reached within the various working groups of the IJC the emphasis remains on acceptance of the findings.

Usually when the IJC receives a reference, it appoints a board consisting of equal numbers of experts from each country. Board members jointly establish the facts in their personal and professional capacities, not as representatives of a particular organization or region. Reports by the IJC in response to references are advisory only. However, they are made to the governments and the public following an impartial investigation by the IJC boards consulting with the public and building consensus among the Commissioners from both countries.¹⁴

Not every decision or recommendation by the IJC is accepted by the respective governments.

¹² Read, "A Quiet Horror," pp. 68-69.

¹³ *International Joint Commission Annual Report for 2008: Boundary Waters Treaty Centennial Edition*, p. 3.

¹⁴ *International Joint Commission Annual Report for 2008: Boundary Waters Treaty Centennial Edition*, p. 4.

Legal Remedies

The City of Detroit was polluting the Detroit River with its sewage at the time of the treaty's signing. After the publication of reports by the United States Public Health Service and the International Joint Commission between 1911 and 1916, the general public was made more aware of this situation. Detroit was violating not only the Boundary Waters Treaty but also some more basic legal constructs. The sewage was causing health problems both for downriver communities and across the river in Canadian communities. This was pollution of intrastate, interstate, and international waters. Yet there were never any lawsuits filed against the city to stop this pollution.¹⁵

While no one ever sued, there appear to have been multiple legal opportunities to initiate a lawsuit. These could have included nuisance, violation of the public trust, violation of riparian rights, violation of the 1899 Rivers and Harbors Acts, and trespass.¹⁶ Statutory law and common law govern the Great Lakes, and the United States and Canada got their common law rules from English common law. Riparian landowners had the right to use the water flowing past their lands as long as they used it reasonably. Reasonable use meant that the quality and quantity of the water was not changed significantly. Any polluting activity that changed the quality of the water was a cause for legal action. The United States adopted the reasonable use policy while Canada used the

¹⁵ Stephen McCaffrey, "Jurisdictional Considerations in Private Litigation Between Canada and the United States," *California Western International Law Journal*, vol. 3, 1973, pp. 204, 219; Shi-Ling Hsui and Austen L. Parrish, "Litigating Canada- US Trans Boundary Harm: International Environmental Lawmaking and the Threat of Extraterritorial Reciprocity," available at SSRN:<http://abstract=967519> (Accessed 26 February 2007), p. 31.

¹⁶ Stephen McCaffrey, "Private Remedies for Trans Frontier Pollution Damage in Canada and the United States," *University of Western Ontario Law Review*, vol. 19, no. 1, (1981), pp. 50-51; P. S. Elder, "Environmental Protection Through the Common Law," *Western Ontario Law Review*, vol. 12 (1973), p. 134; Dianne D. Eames, "The Refuse Act of 1899: Its Scope and Role in Control of Water Pollution," *Ecology Law Quarterly*, vol. 1 (1971), p. 174; McCaffrey, "Private Remedies," p. 57.

common law of England. The Federal Government under the Constitution has the rights to the flow of water through the Commerce Clause and as such this allows the government to enforce navigation laws. The common law upholds the rights of riparian owners and can be used to sue when those rights are violated. There are many settled cases where polluters had judgments against them.¹⁷

Catherine Stafford, in her dissertation “The Political Economy of the Great Lakes,” stated that dumping sewage into the Great Lakes was thought to be reasonable use. When the population was small, the environmental impact was insignificant because of the self-cleaning capability of the lakes. When the population increased the problem, instead of a conflict between riparian owners, became “A community custom that was slowly creating a local nuisance.”¹⁸ Further, this created legal issues that required legislation, which took time to enact, since the pollution was now “Affecting state-owned property rather than private property which would reduce the incentives to raise private suit to protect the lakes.”¹⁹ In a footnote, Stafford writes that in conversations with the IJC legal officer James Chandler, former board member of the Great Lakes Water Quality board Grant Merritt, and Villanova Law School professor Dr. Joseph Dellapenna, “Discussions lead me to the conclusion that even though the court system was expensive at the time, the issue was related to what was reasonable use at the time rather than an impediment to using the court system.”²⁰

¹⁷ Catherine Stafford, *The Political Economy of the Great Lakes* (Ph.D. diss., George Mason University, Fairfax, Virginia, 2000), pp. 28-31.

¹⁸ Stafford, *Political Economy*, p. 32.

¹⁹ Stafford, *Political Economy*, p. 32.

²⁰ Stafford, *Political Economy*, p. 42.

The Executive Secretary of the Stream Control Commission said that every city and village in Michigan using state waters was violating the rights of lower riparian rights owners or open drains. He said that owners must act separately from the state in bringing about a correction of these conditions.²¹

Even though all of these legal remedies existed, who was to bring a lawsuit against the City of Detroit? Downriver communities, Canadian municipalities, other states, the Canadian and American federal governments, individuals, or the State of Michigan could have sued.

The state and federal governments were not aggressive in enforcing any pollution laws. There was one case in Michigan—*Attorney General ex rel. Township of Wyoming v. Grand Rapids* in 1913—where a city was ruled against. The usual hands-off treatment may have been caused by political pressure by corporations, or because authorities did not want to lose manufacturers to other locales, or because the service being performed could not be interrupted without significant cost. Authorities also tried to use persuasion to curtail pollution. It was not until June 1927, when the State Department of Health and the State Department of Conservation cited 22 cities for contempt of stream pollution orders, that there was a concerted effort to curb stream pollution in Michigan.²²

The *Detroit News* and the *Detroit Free Press* reported that the City of Detroit was violating the Boundary Waters Treaty in articles and editorials throughout the 1920s and 1930s and the Annual Reports of the City of Detroit make references to the Treaty

²¹ “Sewage Disposal Plant Construction Aids Idle,” *Detroit News*, 21 January 1932, p. 30.

²² *Michigan Reports: Cases Decided in the Supreme Court of Michigan*, Phelps and Stevens (Lansing, 1914), p. 543; Eames, “Refuse Act,” p. 199; Jeffery, “Transboundary Pollution and Cross Border Remedies,” *Canada – United States Law Journal*, vol. 18, 1992, p. 182; McCaffrey “Jurisdictional Considerations,” p. 202; Eames, “Refuse Act,” p. 197; “State Cites 22 Cities On Pollution Charges,” *Detroit News*, 25 June 1927, p. 15 col. 6; “Kiefer And Young Agree On Pollution Campaign,” *Detroit News*, 28 January 1927, p. 21 col. 5.

throughout the years 1922 to 1925.²³ The Treaty in Article II gave “Injured parties the same legal remedies as if such injury took place in the country where such... interference occurs.”²⁴ In the negotiations leading up to the treaty’s eventual wording, Secretary of State Elihu Root made the statement regarding these rights to the effect that injured parties would have recourse to American courts rather than it becoming an international problem.²⁵ This provision was included into the treaty on the insistence of the Canadian negotiators as there was a very strong nationalist feeling in United States. Attorney General Judson Harmon stated in 1895 that the “United States was under no international legal obligation to protect the environment of its downstream neighbor.” This response was concerning a dispute with Mexico over the waters of the Rio Grande. This position became known as the Harmon Doctrine.²⁶

Even though the Boundary Waters Treaty had provisions for containing trans-boundary pollution, it had no mechanisms to enforce them.²⁷ Awareness of pollution during this time period was minimal. The rapid growth of the economy, along with the exploitation of natural resources to maintain that growth, was aided by the government’s

²³ “The One Best Method,” *Detroit Free Press*, 22 December 1925; “Detroit Fights the Darin Bill,” *Detroit News*, 30 March 1927, p. 20; “City Projects in Works Plan,” *Detroit News*, 11 May 1933, p. 1; “City May Get Sewage Plant,” *Detroit News*, 2 July 1933, p. 3; “Sewage Parley Is Called Here,” *Detroit News*, 22 October 1933, p. 1.

²⁴ McCaffrey, “Jurisdictional Considerations,” p. 203.

²⁵ McCaffrey, “Jurisdictional Considerations,” p. 202.

²⁶ McCaffrey, “Jurisdictional Considerations,” p. 204; Noah. A. Hall, “Trans Boundary Pollution: Harmonizing International and Domestic Law,” *University of Michigan Journal of Law Reform*, vol. 40, no. 4, Summer 2007, p. 685, pp. 692-694. The Harmon Doctrine was an extreme position of absolute territorial sovereignty where a state does whatever it wants, disregarding its neighboring states. Absolute territorial integrity, the other extreme, is where an upstream state does not allow any pollution to cross state boundaries and enter a downstream state; McCaffrey, “Jurisdictional Considerations,” p. 207.

²⁷ McCaffrey, “Jurisdictional Considerations,” p. 236; Hall, “Trans Boundary Pollution,” p. 723; Noah A. Hall, “Bilateral Breakdown: U.S. - Canada Pollution Disputes,” *Natural Resources and the Environment*, 21 18, (Summer 2006), p. 472; Hall, “Trans Boundary Pollution” pp. 741, 740.

policy favoring this economic expansion.²⁸ The prevailing attitude can be seen in this statement by Judge Musmanno in the 1935 legal opinion *Versailles Borough v. McKeesport Coal and Coke Co.*:

While smoke per se is objectionable and adds nothing to the outer aesthetics of any community, it is not without its connotational beauty as it rises in clouds from smoke stacks of furnaces and ovens (and even gob fires) telling the world that the fires of prosperity are burning--- the fires that assure economic security to the working man, as well as establish profitable returns on capital legitimately invested.²⁹

This attitude did not even consider the cost to society for the benefits the polluters received from using the air and water as a free garbage dump.³⁰ This eventually led to the near collapse of the Detroit River and the Great Lakes

There were many avenues for injured parties to seek relief from the sewage problem. The Wyoming-Grand Rapids suit is one that resulted in a trial and judgment against the City of Grand Rapids. There is no recorded evidence that Detroit was ever sued. The State Department of Health was given jurisdiction over sewage disposal systems in 1913 with Public Act 98.³¹ At a meeting of the IJC in Detroit on September 30, 1914, State Board of Health Secretary Dr. John L. Burkhart said,

The State Board of Health, which had complete control of the regulation of the disposal of sewage and garbage had found no opposition, except in rare instances, to its instructions, but a healthy sentiment among all municipalities in the state to cooperating with the state

²⁸ McCaffrey, "Jurisdictional Considerations," p. 201.

²⁹ McCaffrey, "Jurisdictional Considerations," p. 201.

³⁰ McCaffrey, "Jurisdictional Considerations," p. 190.

³¹ PA 98 1914, "An Act providing for the supervision and control by the State Board of health over water works systems and sewage disposal systems".

board in passing sanitary measures. The exception being Highland Park where the state had taken them to court.³²

In December 1926, Michigan Governor Fred Green appointed Dr. Guy Kiefer as State Health Commissioner. Dr. Kiefer and Leigh Young, the Director of Conservation, held a conference in Lansing on January 27, 1927, where they announced they would “Continue an aggressive fight against manufacturing and municipalities to force them to stop polluting the rivers.”³³ By June 1927, twenty-two cities were cited by the State Department of Health and the State Department of Conservation for contempt of stream pollution orders. Detroit was not one of them; Monroe was the only city cited in southeast Michigan.³⁴ A suit was filed against the City of Lansing in July 1927. The State Department of Health decided to use the 1921 Public Act 398, which gave them the power to issue direct orders to cities to force them to install sewage disposal plants. The cities of Howell and Sandusky were ordered to build disposal plants in October 1927.³⁵

Thirty cities were told that they would be required to make arrangements for immediate disposition of their sewage wastes by the Michigan Pollution Control Commission. This commission consisted of representatives from the State Department of Health, the State Department of Conservation, and the State Attorney General. Several cities from southeast Michigan were among them, including Ann Arbor, Wayne, Fenton,

³² “River Pollution State Question, Not Bi-National,” *Detroit News*, 30 September 1914, p. 1 col. 7.

³³ “Kiefer And Young Agree On Pollution Campaign,” *Detroit News*, 28 January 1927, p. 21 col. 5.

³⁴ “State Cites 22 Cities For River Pollution,” *Detroit News*, 25 June 1927, p. 15 col. 6. The cities were Three Rivers, Grand Ledge, Greenville, Midland, Manchester, Standish, South Haven, St. Ignace, Munising, St. Joseph, Newberry, Bessemer, Negaunee, Allegan, Charlotte, Plainwell, Monroe, Pentwater, Marquette and Menominee.

³⁵ “Sewage Suits To Be Delayed,” *Detroit News*, 13 July 1927, p. 6 col. 2; “State Invokes 1921 Law In Anti-Pollution Fight,” *Detroit News*, 31 October 1927, p. 2 col. 1; Public Act 398 “An Act providing for the supervision and control by the State Department of Public Health over waterworks systems and sewage disposal systems.”

and Holly, but again not Detroit, the major polluter.³⁶ The state reported that of the seventy-eight cities asked to clean up, fifty-four had submitted plans.³⁷ In May 1929, the Michigan legislature passed the Stream Control Commission Act, which created a strong agency responsible for controlling water pollution in Michigan. Five towns were cited for polluting streams with sewage and industrial wastes in September, including Birmingham, Wayne, and Howell—once again, not Detroit—in southeast Michigan.³⁸ Port Huron was cited in December for polluting the St. Clair River.³⁹

The Mayor of Traverse City questioned the Stream Control Commission Act as being unconstitutional when his city was cited for polluting the Boardman River and Grand Traverse Bay. The state filed a suit against Traverse City in October of 1930 and also ordered Port Huron to file plans for a sewage disposal plant by 1932.⁴⁰

Detroit had contracted with the City of Dearborn in 1928 for the treatment of the sewage from the Southfield Sewer, which covered an area of twenty-three square miles. This contract may have taken some pressure off the City of Detroit to stop polluting the

³⁶ “30 Cities To Be Told To Dispose Of Sewage,” *Detroit News*, 27 June 1928, p. 2 col. 4. These cities were Tecumseh, Pentwater, Hart, Muskegon, Lowell, Greenville, Belding, Ypsilanti, Wayne, Crosswell, Charlotte, Portland, Grand Ledge, Eaton Rapids, Owosso, Ithaca, Alma, Alpena, Sturgis, Plainwell, Otsego, Allegan, Standish, Pinconning, Gladwin, Lapeer, Bay City, Holly, Fenton and Ann Arbor.

³⁷ “Stream Pollution War Is Waged Successfully,” *Detroit News*, 11 July 1928, p. 18 col. 7.

³⁸ “Five Towns Are Cited For Stream Pollution,” *Detroit News*, 27 September 1929, p. 26 col. 6; Public Act 245 of 1929, “An Act to create a Stream Control Commission to have control over the pollution of any waters of the State and the Great Lakes, . . .,” 22 May 1929.

³⁹ “State To Act On Pollution,” *Detroit News*, 12 December 1929, p. 52 col. 1.

⁴⁰ “Pollution Act Is Challenged,” *Detroit News*, 25 April 1930, p. 53 col. 4; “Suit Will Test Powers Of Stream Commission,” *Detroit News*, 9 October 1930, p. 46 col. 3; “Port Huron Is Ordered To File Sewage Plans,” *Detroit News*, 10 January 1931, p. 2 col. 5.

Detroit River, as the Stream Control Commission never cited Detroit for its polluting activities.⁴¹

Mount Clemens was ordered to stop polluting the Clinton River in August 1932, Port Huron and the City of St. Clair were warned in July 1935 to stop polluting the St. Clair River and given ninety days to submit plans. Pontiac was ordered to present plans in December 1937, and Rochester was cited for pollution of the Clinton River at the same time.⁴²

There was an enormous amount of activity from 1927 onward, as the State Department of Health and the State Department of Conservation, and later the Stream Control Commission, pursued polluting municipalities. The Stream Control Commission was structured so that it could investigate and pursue polluters because it was funded and had staff. While all of these smaller cities were pressured into compliance, with some cities being charged with polluting activities, Detroit appeared to be attempting to comply. The contract with Dearborn to process the Southfield sewer's effluent, the building of the Detroit River Interceptor (which was eventually to bring the majority of Detroit's sewage to a common point), and the extensive planning and efforts to finance a sewage disposal plant would appear to have satisfied the Stream Control Commission of the good-faith efforts of Detroit city officials.

Regarding the Boundary Waters Treaty, Stafford said that it was unique in that it did not restrict litigation to governments, as is usually the case, but established rights

⁴¹ "City To Enter Sewer Pact," *Detroit News*, 3 September 1931, p. 39 col. 1.

⁴² "Order To End Pollution Faced By Mt. Clemens," *Detroit News*, 5 August 1932, p. 4 col. 7; "Cities Warned On Pollution," *Detroit News*, 23 July 1935, p. 15 col. 5.

similar to those in domestic law.⁴³ Yet even with this provision there was never any litigation as far as I have been able to discover after examining numerous sources.

Law and regional politics.

Southeast Michigan is unique in that the Detroit Water and Sewerage Department provides its services to many municipalities in this large metropolitan area. It is the only central city in the United States providing these services to numerous municipalities. Metropolitan Water and Sewage Districts that were brought about by enabling legislation serve most communities.

Prior to 1909, the Michigan State legislature wrote special Acts to create or amend city charters. In 1907, over 400 of these acts were issued.⁴⁴ The 1908 State Constitution, article VIII, section 21 gave cities and villages the right to create charters and “pass all laws and ordinances relating to municipal concerns, subject to the constitution and general laws of this state.”⁴⁵

In 1909, the legislature passed Public Act 279, the Home Rule City Act, and Public Act 278, the Home Rule Village Act. The powers granted under these acts were “In broad general terms, in sharp contrast with the [then] prevailing system of minutely specified powers, which had hitherto existed in Michigan.”⁴⁶ There were fiscal limitations in place, including an 8-percent limit of the assessed property evaluation for

⁴³ Stafford, *Political Economy*, p. 33.

⁴⁴ “Home Rule in Michigan---Then and Now,” www.mml.org/advocacy/homerule-paper/pdf (Accessed 24 November 2009).

⁴⁵ “Home Rule in Michigan---Then and Now,” www.mml.org/advocacy/homerule-paper/pdf (Accessed 24 November 2009).

⁴⁶ John A. Fairlie, “Home Rule in Michigan,” *The American Political Review*, vol. 4, no. 1, (Feb 1910), p.123.

loans.⁴⁷ Bonds could be issued above this limitation for public utilities when secured by the property and revenues of the utility. The Home Rule Act authorized cities to supply water, light, heat, power, and transportation, with some constitutional restrictions.⁴⁸ Home rule, especially for Detroit, allowed it to grow and prosper at an extraordinary accelerated rate during the early decades of the last century. This growth, untrammelled by legislative action, led to Detroit building its own infrastructure. Because of constitutional limitations Detroit could not annex existing cities, or expand beyond county lines. Surrounding municipalities were affected by Detroit's growth. Some municipalities within Wayne County incorporated to stop themselves from being absorbed, Dearborn as an example. Downriver communities were inundated with Detroit's sewage and threatened, in the case of River Rouge, both with condemnation of land, and a sewage treatment plant being built in their city.

Detroit was a central city surrounding two cities, Hamtramck and Highland Park, and was itself physically surrounded by other cities, both in its own county, Wayne, and surrounding counties, Macomb, Oakland, Monroe, and Washtenaw. Because Detroit had built its own utilities, water, power, and transportation, these other municipalities to varying degrees found it expedient to use these rather than building their own. As exceptions, Highland Park and Grosse Pointe Farms did have their own water treatment plants.

The water services supplied by the Water Board illustrate this. The Board of Water Commissioners was established in 1853 to run the Detroit water works serving

⁴⁷ John A. Fairlie, "Home Rule in Michigan," *The American Political Review*, vol. 4, no. 1, (Feb 1910), p.123.

⁴⁸ Albert W. Bromage, "Municipal and County Home Rule for Michigan," *Citizens Research Council of Michigan*, p. 8.

Detroit. The City of River Rouge became a customer in 1900, followed by Hamtramck in 1902 and Ecorse in 1904. No cities contracted for service in the 1910s, but the decade of the 1920s had seventeen cities joining. All of these cities were inner-ring cities adjacent to Detroit, including cities in both Oakland and Macomb Counties. Nine cities joined in the 1930s and another ten in the 1940s. By this time, the trend was no longer one of adjacent cities, as second-ring cities were joining in as new customers.⁴⁹

This was to be expected. Population growth, which had been concentrated in Detroit in the earlier decades, now began to increase in the adjacent urban areas and to a lesser extent in the outer urban area. This growth dropped from a high of 90 percent in 1900–1910 to 70 percent in the 1920s and 25 percent in the 1930s. By 1944, 80 percent of the population growth was in the adjacent urban area.⁵⁰ With this transition to accelerated adjacent urban growth—a trend mirrored in other metropolitan areas—Detroit was unique in that it did not become part of a Metropolitan District sharing water or sewage utilities with other municipalities. In other areas of the world, and in America, Metropolitan Districts were common. For a metropolitan district to exist, community cooperation must happen. To have unity there has to be legislation to allow annexation, extension of municipal jurisdiction, contracts between municipalities, and county administration of metropolitan districts.

Sewerage especially lends itself to this concept because it is more dependent on drainage and consequently geography. Early examples of this tendency were the Metropolitan Sewerage Board of Massachusetts of 1919, serving Boston and surrounding

⁴⁹ Detroit Water and Sewerage Department, “The First 300 Years,” appendix B, Water System Roster, http://www.dwsd.org/history/complete_history.pdf (Accessed 16 February 2010).

⁵⁰ Betty Tableman, *Governmental Organization in Metropolitan Areas* (Ann Arbor: University of Michigan Press, 1951), pp. 86-87.

cities. In Illinois, the Sanitary District of Chicago was formed in 1899. In New Jersey, the Passaic Valley Sewerage Commission and the Plainfield, North Plainfield, and Dunnellon Sewerage District were formed in 1910. In Ontario, the Essex Border Utilities Commission was formed in 1917 as a metropolitan water and sewerage district.⁵¹

By 1921, a listing of these districts included Greater Vancouver, New Orleans, Washington Suburban, Syracuse, Fitchburg, and Indianapolis. Washington Suburban was a sanitary commission for the counties of Montgomery and Prince George. Indiana had sanitary districts including one for Indianapolis. Legislation was passed as early as 1913 for Indiana, with the Indianapolis Sanitary Districts organized by 1917.⁵²

In Wisconsin, the Milwaukee Sewerage Commission was formed under provisions of “The Sewerage Disposal Works in Cities of the First Class, 1917.”⁵³ The Metropolitan District Commission of Massachusetts created the Sewerage District in 1899.⁵⁴ These instances reflect the many areas where sewerage commissions crossed political lines to provide services for metropolitan areas. The Detroit Board of Commerce first proposed establishing a metropolitan special district to solve area-wide problems in 1916.⁵⁵ A 1917 Metropolitan District Committee report said that the existing 1908 Michigan Constitution:

⁵¹ *Proceedings of the American Society for Municipal Improvements* (Menasha, Wisconsin: George Banta Publishing, 1921), p. 122.

⁵² *Proceedings of the American Society for Municipal Improvements* (Menasha, Wisconsin: George Banta Publishing, 1921), pp. 113-116.

⁵³ *Proceedings of the American Society for Municipal Improvements* (Menasha, Wisconsin: George Banta Publishing, 1921), p. 124.

⁵⁴ *Public Business*, “Government of Metropolitan Areas,” Detroit Bureau of Governmental Affairs, vol. 3, no. 11, 20 December 1924, p. 171.

⁵⁵ Betty Tableman, *Governmental Organization in Metropolitan Areas* (Ann Arbor: University of Michigan Press, 1951), p. 87.

Practically prohibits the creation by the legislature of any Metropolitan District in the state with power and authority to exercise the requisite function and control of the public works and utilities for which the district should be organized.⁵⁶

The functions and control were vested by the constitution in the cities, villages, and townships of the state and could not be delegated by them to a Metropolitan District. The “Home Rule” provision barred any co-operative mergers unless by annexation.⁵⁷ This 1917 committee recommended that Article VIII of the Michigan Constitution needed a new section (Section 30) to allow metropolitan districts, and that Article X Section 9 should be modified to allow taxation to be transferred to another municipal corporation.

The Detroit Bureau of Governmental Research was also a proponent of metropolitan districts. In 1923, it proposed a metropolitan district for Detroit and surrounding cities sufficiently large enough to permit the development of rapid transit, water treatment, sewer, and port facilities, and to provide sewage purification, health, police, and education.⁵⁸

The Bureau thought that the purpose of a metropolitan district was primarily “To secure a single government area large enough to undertake certain projects that cannot be undertaken by the cities and village individually.” Secondary was “The idea of eliminating the unnecessary duplication of government that exists within the borders of the county.” Three methods were proposed to accomplish these goals: a metropolitan district to undertake activities affecting the whole district; city-county consolidation of

⁵⁶ *Public Business*, “Government of Metropolitan Areas,” Detroit Bureau of Governmental Affairs, vol. 3, no. 11, 20 December 1924, p. 182.

⁵⁷ *Public Business*, “Government of Metropolitan Areas,” Detroit Bureau of Governmental Affairs, vol. 3, no. 11, 20 December 1924, p. 182.

⁵⁸ *Public Business*, “The Metropolitan Area,” Detroit Bureau of Governmental Affairs, vol. 3, no. 2, 10 September 1923, p. 3.

the governments of all the cities, villages, and townships of Wayne County and the county government into a single government; and the annexation of all the territory in the eastern part of the county. The consolidation option would accomplish both objectives.⁵⁹

The Detroit Bureau of Governmental Research was also very concerned about the duplication of officials. With 160 different governments electing 725 people, the Bureau had to consider both the costs of duplicate officials and the work involved in holding all of the elections.⁶⁰

Creating a metropolitan district required giving power to a board with authority to run a special function, such as a water or sewer system. Each municipality was required to surrender certain powers to a central board.⁶¹ This required the municipalities to relinquish some sovereign powers and a certain loss of autonomy.

The Detroit Bureau of Governmental Research published an additional document in December 1924 when it discussed “Government of Metropolitan Areas.” The Bureau thought that one district with numerous responsibilities would be more acceptable to the taxpayers of Southeastern Michigan than numerous districts with individual taxing powers.⁶²

This 1924 Detroit Bureau of Governmental Research report proposed an extensive State constitutional amendment covering only public works. It was voted on in 1926

⁵⁹ *Public Business*, “The Metropolitan Area,” Detroit Bureau of Governmental Affairs, vol. 3, no. 2, 10 September 1923, p. 3.

⁶⁰ *Public Business*, “The Metropolitan Area,” Detroit Bureau of Governmental Affairs, vol. 3, no. 2, 10 September 1923, p. 6.

⁶¹ *Public Business*, “The Metropolitan Area,” Detroit Bureau of Governmental Affairs, vol. 3, no. 2, 10 September 1923, p. 6.

⁶² *Public Business*, “Government of Metropolitan Areas,” Detroit Bureau of Governmental Affairs, vol. 3, no. 11, 20 December 1924, p. 179.

when it lost by 21,321 votes “Due primarily to opposition by smaller cities”. After an extensive public campaign, it was reintroduced in April 1927 when it passed 210,880 to 200,490.⁶³ The margin of 10,390 was obtained by majorities in Wayne, Oakland, and Macomb Counties.⁶⁴

The passage of the constitutional amendment in April 1927 to allow the formation of Metropolitan Districts coincided with the passage of the Darin Bill, which disallowed construction of sewage treatment in cities without majority approval. Therefore, even though the constituents of the area realized that regional cooperation was a necessity, when faced with reality, as in River Rouge, there was no regional consciousness. Similarly, the Detroit Common Council pursued their goal of a Detroit-only wastewater treatment plant.

For insight into Detroit’s attitude towards Metropolitan Districts, a March 1, 1927 meeting of the Detroit Common Council, where Board of Water Commissioners Book, Dow, and Skrzycki were present, is helpful. Referring to a fall 1926 meeting where Commissioner Dow was asked if “The Board could prepare a bill to be introduced to the legislature to be an enabling act for the organization of Metropolitan Water Districts,” the reply by the board was:

We do not believe that any bill can be drawn under which the City of Detroit would be justified in organizing a water district in conjunction with any neighboring community, except possibly Highland Park. Our city has a complete water pumping and filtration plant and is now doubling the pumping capacity in a second plant. Highland Park has a pumping plant sufficient for its own needs... None of the other municipalities has a complete plant. If the city should

⁶³ Betty Tableman, *Governmental Organization in Metropolitan Areas* (Ann Arbor: University of Michigan Press, 1951), p. 88.

⁶⁴ “Now Is The Time,” *Detroit News*, 18 October 1927, p. 4-1.

join with Highland Park in dealing (1) with water supply it might be practicable later to invite Hamtramck, the Grosse Pointe Villages and Dearborn to join in the operation. However, the advantages to Detroit of adding these would be less than the disadvantages. We therefore do not suggest that this bill be sent to the legislature as something for the direct use of the city.⁶⁵

The commissioners continued by stating that if the “adjacent communities” would organize into a Metropolitan Water District, or Districts, the Water Board’s dealings with them would be substantially easier. Dealing with these communities because of differences of opinion or active disputes was causing the Water Board to be unable to develop a water supply in an “orderly” fashion. Smaller communities could not maintain efficient water departments. The Water Board in many instances was forced to deal with individual customers in many communities instead of with water departments, complicating installation, repairs, and ongoing billing and rate hikes.⁶⁶ The Board felt that if this bill became law, their dealings with a metropolitan water district would be simplified, requiring interaction with only one entity rather than multiple municipalities and numerous individuals. For these reasons, they endorsed the concept of a metropolitan water district.

In May 1929, the Michigan Legislature passed Public Act 312, the Metropolitan District Act, which in many respects was similar to the proposed Detroit Bureau of Governmental Research legislation of 1924, which duplicated the 1917 Metropolitan District Committee report. The 1924 Bureau publication suggested that the Michigan Constitution Article VIII be amended to allow the legislature to create a law allowing two

⁶⁵ *Board of Water Commissioners Annual Report 1927*, Board of Water Commissioners, City of Detroit, 1927, p. 2.

⁶⁶ *Board of Water Commissioners Annual Report 1927*, Board of Water Commissioners, City of Detroit, 1927, p. 2.

or more municipalities to incorporate to provide utilities to their inhabitants. It further suggested that Article X Section 9 be amended to allow a municipality to transfer its power of taxation to another municipality or municipal corporation.⁶⁷

The 1929 Metropolitan District Act 312 states in Section 1:

Any two or more cities, villages or townships or any combination or parts thereof, may incorporate into a metropolitan district or districts comprising territory within their respective limits for the purpose of acquiring, owning and operating and maintaining either within or without their limits, as may be established hereunder, parks or public utilities for supplying sewage disposal, drainage, water transportation or any combination thereof.⁶⁸

Section 2 states:

Provided that no city, village or township shall surrender any such rights or obligations or property without the approval thereof by a majority vote of the electorate of any such village or township.⁶⁹

Section 6 states:

To become part of a metropolitan district a city, village or township has to have a resolution passed by its legislative body indicating its desire to become part of a district.⁷⁰

When the wastewater treatment plant became operational in 1940, it immediately began serving nine municipalities in Wayne County. In 1942, eleven additional communities from Oakland County were added. Two more from Macomb County were

⁶⁷ *Public Business*, "Government of Metropolitan Areas," Detroit Bureau of Governmental Affairs, vol. 3, no. 11, 20 December 1924, pp. 183-184.

⁶⁸ *Public Acts of The Legislature of the State of Michigan Passed at the Regular Session of 1929*, Compiled by John S. Haggerty Secretary of State (Lansing, Michigan: Franklin DeKleine, 1929), pp. 850-851.

⁶⁹ *Public Acts of The Legislature of the State of Michigan Passed at the Regular Session of 1929*, Compiled by John S. Haggerty Secretary of State (Lansing, Michigan: Franklin DeKleine, 1929), p. 851

⁷⁰ *Public Acts of The Legislature of the State of Michigan Passed at the Regular Session of 1929*, Compiled by John S. Haggerty Secretary of State (Lansing, Michigan: Franklin DeKleine, 1929), p. 854.

added in 1944. In the majority of these agreements, the contracting agency was the Wayne County Board of Road Commissioners, the Oakland County Board of Public Works and Drain Commission, or the Oakland County Drain Commission. The exceptions to this were directly negotiated contracts with the cities of Grosse Pointe, Grosse Pointe Farms, Grosse Pointe Park, Hamtramck, and Highland Park.⁷¹

These sewage contracts with county authorities are in contrast with the water contracts. The only water contracts negotiated with a county authority, starting in 1928, were with the cities of Lathrup Village, Pleasant Ridge in 1929, Royal Oak in 1931, Southfield, and Huntington Woods in 1941. These were negotiated between the City of Detroit and the Southeastern Oakland Water Authority.

It appears that the services provided by the wastewater treatment plant were more suited to management by organized agencies than individualized municipalities. The services provided by the Water Board were much older, and the municipalities had created water boards or other agencies to negotiate with Detroit's water board.

The population difference between Detroit and the surrounding municipalities was significant. Detroit had 81 percent of the population in 1900, while the inner-ring cities had about 11 percent and the outer-ring cities 8 percent. By 1910, Detroit had 85 percent of the total metropolitan population, growing to 87 percent by 1920. These percentages then began to drop. By 1930, Detroit's population had fallen to 80 percent, and by 1940 it was 76 percent.⁷²

⁷¹ Detroit Water and Sewage Department, "The First 300 Years," Appendix C, http://www.dwsd.org/history/complete_history.pdf (Accessed 11 February 2010).

⁷² Betty Tableman, *Governmental Organization in Metropolitan Areas* (Ann Arbor: University of Michigan Press, 1951), p. 87.

Until 1940, the population of the adjacent and outer urban area was very small compared to Detroit's population. The idea that Detroit should give up any autonomy to share its resources, water, sewage treatment, or transportation would have been very hard to sell to residents. There would have been no benefits and in fact would appear to be a giveaway of Detroit's assets if it had entered into a Metropolitan District agreement for any of these public utilities.

Conclusion

Even though the Boundary Waters Treaty of 1909 appeared to have legal enforceable provisions, and the IJC findings in its 1914 through 1918 reports proved a violation of the treaty, in reality the treaty never became anything more than a gentleman's agreement. Relations between the two countries were not to be disrupted because of pollution problems. Once the Typhoid problem became a non-issue because of chlorination the impetus for solving the problem dissipated. The Boundary Waters Treaty and its pollution provisions created a lot of discussion and was reported on quite extensively during this period. Other than the perceived government intervention over its violation there was no activity that resulted from this treaty.

Likewise legal action by aggrieved persons whose riparian rights were violated never materialized. Probably because of the complexity of proving who the violators were, the obstacles presented in pursuing the cases in the courts and the lack of public environmental awareness.

In the case of sewage discharge, the question of public versus private rights complicated the determination of reasonable use. Cities were treated as agents of the state, acting under legislative authority through a charter or special act. Discharging sewage into streams was regarded

as a legal function of cities and thus the city was without liability in damages to a lower riparian owner.⁷³

Neither Federal, State, Provincial nor municipal governments pursued legal action on Great Lakes pollution against Detroit. The Commerce Clause in the United States Constitution was not violated, as sewage did not impede commercial traffic. The Stream Control Commission aggressively pursued other cities in Michigan once it was created in 1929. Adams the head of the commission accurately assessed the situation with Detroit, the city was making an effort to abate pollution by focusing on planning, building an intercepting sewer system, and pursuing partners and financing at a time when revenue from taxes had fallen precipitously. By 1930 city revenues were lower at a time of increased public welfare, many cities had defaulted on bonds, and the price of municipal bonds had fallen.⁷⁴ Under these circumstances it was impossible to have bond sales, notwithstanding as in Detroit's case it was already at its debt limit.

The metropolitan district option though provided by legislation was never pursued unlike in other metropolitan areas. Detroit was a rapidly expanding city annexing sparsely populated villages and townships adjacent to it. City leaders did not see any value joining with adjacent municipalities in a collaborative effort to abate pollution. Detroit through its water department already had extensive experience in being a utility service provider. In these decades its population was many times greater than the surrounding area, there was no political or financial reason to lose autonomy, the benefits just were not there. When Detroit did consider building the wastewater treatment plant as a regional facility, after the political opposition to its Rouge River site in 1928, and the

⁷³ Melosi, *Sanitary City*, p 106.

⁷⁴ Melosi, *Sanitary City*, p. 131.

desire by the Down River League of Municipalities to build a plant on Lake Erie it passed the project off to Wayne County. The resulting inertia of the Wayne County Board of Supervisors brought that plan to a halt.

Sarah S. Elkind in *Bay Cities and Water Politics* said “From the 1880s on, many cities saw metropolitan or regional administration as an ideal means to improve the efficiency of public services and to reduce resource competition among urban neighbors.” Regional water or sewer authorities were not constrained by “state imposed spending caps.” “Cities could only issue bonds secured by the value of local property, but public works districts could issue revenue bonds, borrowing against future earnings, and thus freeing enormous sums of money for public works construction.”⁷⁵

Detroit was late in using revenue bonds, it was only after Harold Ickes the Public Works Administrator forced them in conjunction with the loan and grant for the wastewater treatment plant in 1935, and the revenue did not start to be paid in 1940 after charges for wastewater treatment appeared on their water bills.

Joel A. Tarr in *Search for the Ultimate Sink* said:

Special district governments were an alternative to central city annexation, and suburban authorities for this reason preferred them. Sanitary engineers and public health professionals, as well as public health reformers pushed for the creation of the special authorities because of the need for a functional structure independent of political boundaries and because of the wish to escape tax or debt limits and be free of municipal political control.⁷⁶

⁷⁵ Sarah S. Elkind. *Bay Cities and Water Politics*. (Lawrence: University of Kansas Press, 1998.), pp. 2, 119.

⁷⁶ Joel A. Tarr. *The Search for the Ultimate Sink*. (Akron, Ohio: University of Akron Press, 1996), p. 200.

This was an attractive option for the suburban communities, the Downriver League of Municipalities were opposed to Detroit locating the plant anywhere except close to Lake Erie. Governor Comstock tried to get a regional system built when he was heavily involved in the organizing and planning for the wastewater plant after Detroit decided to drop the River Rouge site plan. A Metropolitan District Act was passed in 1929. The Detroit Bureau of Governmental Research published reports on Metropolitan Districts in 1924.

With all of this effort to publicize and create a Metropolitan District, by the time the wastewater plant was being actively planned for the city had spent millions of dollars on main and interceptor sewers leading to a general area on West Jefferson south of the central city. Only a few of the Common Council members were for a plant on the shore of Lake Erie, or at other sites south of Detroit. The attempt to get Wayne County as the lead agency, and to back the financing of the project had not succeeded. Detroit was still the largest city in the state, and I do not think that the administration, especially the Common Council, thought that they had to share their political power. This had become greater in the years since Home Rule was granted. Detroit's growing population was also giving them increasing representation in Washington, Lansing and Wayne County.

Chapter Three – Published Reports on Waste Disposal by the City of Detroit, the Special Sewer Commission, and the Detroit Bureau of Governmental Research, 1861–1926

Over the years, many reports were issued discussing Detroit's sewers, the pollution of the water supply, and possible remedies. In later reports, references were made to earlier reports and the solutions provided. These reports, the first one issued in 1861 and the last in 1926, not only provide an historical record of Detroit's growth during this fifty-year period, but they also are an important source into the way changing conditions forced these planners to rethink earlier decisions. Because the earlier authors could not have known of the tremendous growth that the area would undergo, their estimates were conservative. The later authors, having experienced this growth firsthand, made provisions for continued growth on the same scale with fifty-year projections. Examination of these reports provides evidence of fiscal responsibility on the part of the planners. There is an understanding of the physics and mechanics of sewer construction. Weather statistics figure prominently, as do considerations of the volume of water in the Detroit River and the area's soil porosity. The earliest report acknowledges the consequences of piped-in water supplies, saturated privy vaults, and waterlogged ground. The early decision to use combined sewers because of lower costs, continued in later decisions, still exists today because of the impracticability of conversion that would now cost billions of dollars. The later reports—building on both the earlier analysis and solutions to sewerage problems and a growing knowledge base about disease causation and wastewater treatment methods—reflect a more scientific approach to the waste disposal problem.

The first report on Detroit's sewers was the 1861 *Report of the Board of Sewer Commissioners to the Common Council of the City of Detroit Showing the Sewers Built Under the Direction of the Present Board With Their Size and Cost Together With a Report of the Engineer For a General System of Sewerage For the City*. E. Willard Smith, an engineer, prepared it, with the assistance of William Campau.¹ The City of Detroit in 1861 was eleven square miles in size. The proposed drainage area was 3,700 acres, bounded by the Detroit River on the south, on the west by a line 600 feet west of La Fontaine Avenue, on the east by a line 600 feet east of Chene Street, and on the north by a line parallel to Jefferson Avenue and two miles distant from the river.² The city's population was 47,000, and the report's authors envisioned that the area to be drained was capable of supporting 285,000 inhabitants. The sewers as designed were to handle both sewage and storm water. The anticipated maximum rainfall was two to three inches per hour. The sewers were designed to accommodate one inch per hour. The authors acknowledged that accommodating the maximum anticipated would be enormously expensive.³ The table tracking rainfall in Detroit from January 1840 through December 1860 showed that in some months rainfall exceeded fifteen inches; July 1854 was taken as an example; the highest rainfalls shown were in May, June and July.⁴ The drainage area had a height difference of forty-five feet from the west to the river, providing enough

¹ E Willard Smith, *Report of the Board of Sewer Commissioners to the Common Council of the City of Detroit Showing the Sewers Built Under the Direction of the Present Board With Their Size and Cost Together With a Report of the Engineer For a General System of Sewerage For the City*, Detroit, Michigan, 1861, p. 23.

² Smith, *Report of the Board*, p. 1. The area being drained was one-half of the entire area.

³ Smith, *Report of the Board*, p. 2.

⁴ Smith, *Report of the Board*, p. 14.

slope in the sewers of between five and ten feet per mile. This slope gave the sewage and storm water enough velocity to make the sewers self-cleaning.

The authors of this report had no problem with discharging the contents of the sewer into the Detroit River. “The Detroit River, from its velocity and great volume, and the uniformity of its current, is more than sufficient to receive any amount of sewage which can be brought into it, without rendering the water of the river or its banks at all offensive.”⁵ The authors bring up the concept of separate sewer systems, one for the conveyance of sewage, and another for the discharge of storm water. They conclude with the statement, “The expense of such a system prevents its adoption.” The introduction of water closets in preference to privies “is much to be desired.” The authors note that privies saturate the soil in their vicinity and that this is “offensive to the whole neighborhood.”⁶

The plan as implemented called for twelve sewers ranging in size from three feet in diameter at their start to five feet at their termination. Their lengths ranged from 5,800 feet to 9,500 feet long. They were to be placed in every third street or about 1,200 feet apart, running north and south, instead of every second street.⁷ They were to be connected to a lower intercepting sewer that had a length of 18,000 feet. Sewers were to be put into these locations from east to west: Chene Street, St. Aubin, Riopelle, Hastings, Beaubien, Cass, Third, Sixth, Trumbull, Thompson, and La Fontaine. They were to be connected to the lower intercepting sewer. This sewer was to discharge into the river at

⁵ Smith, *Report of the Board*, pp. 15-16.

⁶ Smith, *Report of the Board*, p. 16.

⁷ Smith, *Report of the Board*, p. 18.

Woodward, Chene, and LaFontaine with a dimension of six feet at the upper end and twelve feet at the lower end. The authors noted that because the soil of the city was of stiff clay it was impervious and therefore needed a “more perfect system of drainage than if it was a porous service.” The cost for the twelve sewers and the interceptor was proposed at \$445,000, and the average cost per sewer was \$28,920 with a high of \$33,491 and a low of \$17,690.

The authors of this report were conversant with sewer construction, understood the soil conditions in Detroit, and were aware of European practices. The discussion of sewer shapes and how much slope per mile showed that the concept of velocity of the wastewater and sewage as a means of cleaning and scouring was understood. The transition from privy vaults to water closets as acceptable and desirable because of the pollution and saturation of the areas around the vaults showed an early grasp of the problems that piped water was causing.

The new practice of water carriage of sewage from the commode inside the house to a privy vault, or cesspit, involved an additional use of piped water. Introduced initially for drinking and cooking, new uses for piped water included bathing and laundry. The removal of all of this extra water into drainage systems originally designed for storm water was not a significant problem. Water carriage of sewage into sewage systems, privy vaults, and cesspits, however, caused a major problem as these systems were not designed and built to handle large quantities of liquid. They were dry wells designed to allow small quantities of liquids to leach out into the surrounding soil. The buildup of waste matter in the vault was gradual, requiring annual removal, and could be sold to farmers for fertilizer. The introduction of extra water into these systems changed the

dynamics of the system, creating a product composed mainly of liquid. The extra liquid saturated the ground, causing pollution and flooding problems. This also required rethinking the disposal strategy, as the product was now liquid rather than solid and not saleable.

The decision to put main sewers every 1,200 feet and connect them to a main intercepting sewer, reducing the outlets into the river, showed a grasp of fiscal responsibility. There was no means of recovering the costs of this major installation other than property taxes, so this prudent decision reduced these costs by 62 percent over past practice, which was to place a sewer in every street.⁸ Other examples of fiscal integrity are the decision of not trying to accommodate the maximum rainfall because of excessive costs, and the decision to use combined sewers.

There was some discussion in this report about land disposal of the sewage. A mention is made of Edinburgh where the “liquid discharge” is used to “irrigate neighboring lands... but with doubtful success, and has proved to be a great annoyance to the city.”⁹ Later in the report, the authors said experiments showed that it was economically impracticable to apply sewage to agricultural lands because the effluent is so diluted that separating the solids from the liquid was too expensive.¹⁰

Clarence W. Hubbell wrote a short history of the Detroit Water Works in 1903. He explained about the soil conditions and the problems they caused. The soil was impervious blue clay with occasional pockets of sand. Limestone was found at a depth of

⁸ Smith, *Report of the Board*, p.19.

⁹ Smith, *Report of the Board*, p. 16.

¹⁰ Smith, *Report of the Board*, p. 20.

70–120 feet below the river surface. There were no springs and the wells that were sunk were for the most part brackish.¹¹

An article on the Detroit sewer system appeared in the Journal of the Association of Engineering Societies in 1903. The author W. C. King gave credit to the original sewer construction done in accordance with the 1861 plan. Newer main sewers were now laid out on every other street in a north-south direction. He faulted the planners for not envisioning “A city like the Detroit of today,” and even if they had dreamed it, “They would not have cared to assume the great expense of construction deep enough and large enough to drain the great stretches now included in the city.” The author was concerned that the newer areas being annexed were without a natural slope and the present gravity system would be inadequate. He was critical of the placement of the sewer outlets as they were submerged, and the river went a long way up into the sewers, retarding the flow of sewage and causing it to deposit and block the sewer. He said that newer sewers were kept above the river water until near the end and then given a steeper fall with only the end submerged. “It has been necessary, however, to utilize this old construction, money for sewer purposes being always grudgingly given, and now this down-town district looks like a patch on a new garment.”¹²

The work done in the 1860s was so comprehensive and the estimated capacity to serve a population of 285,000 was sufficient to serve the city until the early twentieth century, when Detroit’s population did reach 285,000. By 1900, main sewer mileage had reached 167 miles and lateral sewer mileage reached 328 miles. Between 1900 and 1916,

¹¹ Clarence W. Hubbell, “The Detroit Water Works,” *The Engineering Record*, vol. 47 no. 25, 20 June 1903, p. 650.

¹² W. C. King, “Detroit Sewer System,” *Journal of the Association of Engineering Societies*, January 1903, pp. 37-40.

an additional 70.5 miles of mains and 240.3 miles of laterals were added.¹³ The population of 45,619 in 1860 had increased to 285,704. The square mileage had increased from 12.75 to 28.35. By the time of the 1916 Preliminary Report on Sewage Disposal for the City of Detroit the population had increased to 678,746 and the square mileage to 41.76.¹⁴ The mileage of sewers had increased to 237.5 for mains and 568.3 for laterals. By 1920, the population had further increased to 993,078, the mileage of sewers to 249.6 for mains and 630 for laterals.

The first report regarding sewage disposal was published in 1916. Clarence W. Hubbell, Consulting Engineer prepared the *Preliminary Report on Sewage Disposal for the City of Detroit* for George E. Fenkell, Commissioner of Public Works. Fenkell was the Commissioner of the Detroit Department of Public Works (DPW) from 1913 to 1917.¹⁵ He originally joined the Detroit Water Services, later renamed the Detroit Water Department, in 1893 as a draftsman, left in 1902, and returned in 1908. From 1918 to 1938, he was the Superintendent and General Manager of the DPW.¹⁶

Clarence W. Hubbell was a civil engineer who graduated from the University of Michigan in 1893. He worked for the Detroit Water Services from 1893 to 1907. From 1910 to 1914, he was the Chief Engineer in charge of public works in the Philippine Islands. Fenkell hired him in 1914 to report on what was needed to comply with issues raised in the International Joint Commission's preliminary report of 1914. From 1917 to

¹³ United States Government Census Bureau.
<http://www.census.gov/population/www/documentation/twps0027.html> (Accessed 29 October 2007).

¹⁴ Clarence Hubbell, *Preliminary Report on Sewage Disposal for the City of Detroit* (Detroit Michigan 1916), p. 103.

¹⁵ "Engineer of Water Board to D.P.W. Head," *Detroit News*, 11 July 1913, p. 1.

¹⁶ Detroit Water and Sewerage Department, "In The Flow," vol. 3 no. 2 Spring 2003 p. 2; Detroit Water and Sewerage Department, "In The Flow," vol. 6 no. 2, Spring 2006, p. 6.

1922, Hubbell served as the City Engineer. He started his own Civil Engineering consulting firm, Hubbell, Hartgering and Roth, in 1914. He was well acquainted with George H. Fenkell; their paths may have crossed at the University of Michigan as Hubbell attended from 1889 to 1893 and Fenkell from 1892 to 1893. They then were both at the Detroit Department of Water Services, Hubbell from 1893 to 1907, Fenkell from 1897 to 1902 as a draftsman. Fenkell returned in 1908 as a civil engineer. Fenkell replaced Hubbell when Hubbell became an engineer and took Gardner S. Williams' position at the Detroit Water Board. They co-authored with Williams a paper *Experiments at Detroit, Michigan on the Effects of Curvature Upon the Flow of Water in Pipes* in 1902, for which they won the Norman Medal from the American Society of Civil Engineers.¹⁷ They were reacquainted in 1914 when Fenkell commissioned Hubbell to prepare the *Preliminary Report on Sewage Disposal for the City of Detroit*. In 1916, Fenkell appointed Hubbell as the City Engineer.¹⁸

Hubbell prepared this report after he reviewed the International Joint Commission's 1914 preliminary report, and it was in effect a response to the concerns raised in that publication. It was the first plan for sewage treatment for the City of Detroit; all previous planning had been concerned with removing sewage from the neighborhoods into the river by the most efficient means available.¹⁹ Fenkell requested that Hubbell: 1. "Review the data and conclusions of the International Joint

¹⁷ *Who's Who in America*, vol. 23, 1944-1945, p. 662, p. 1020; later the firm became Hubbell, Roth and Clark; *History of Wayne County and the City of Detroit*, Michigan vol. IV (S. J. Clarke Publishing, 1930), pp. 234-235; "Draughtsman Hubbell Succeeds Engineer Williams," *Detroit News*, 27 September 1898, p.1; E. G. Pipp, "Men Who Made Michigan," *Pipps Magazine*, Detroit, Michigan, 1927.

¹⁸ "Mr. Hubbell Says He Is Surprised," *Detroit News*, 29 December 1916.

¹⁹ Clarence Hubbell, *Preliminary Report on Sewage Disposal for the City of Detroit*, (Detroit, Michigan, 1916), p. 8.

Commission... in order to determine what preventative or remedial measures are required with reference to remedial measures.” He then asked Hubbell to determine: 2. “To what extent does the City of Detroit’s sewage pollute American waters so as to render them unfit as a source of raw water for filtration purposes?” and 3. “By what means, if any, should the City of Detroit undertake to purify the sewage, and what expense would be justifiable for that purpose?”²⁰

Hubbell’s specific reply to the first problem, after studying the International Joint Commission report and upon collecting additional data, was:

It is evident that pollution may, and at times undoubtedly does, cross the boundary line from either side in such a degree as to render the waters on the other unsafe for drinking or domestic use without some form of treatment or purification. The pollution crossing the boundary line from either side has not yet reached such a degree as to render the waters on the other unfit as a source of raw water supply for a water purification plant.²¹

Hubbell based this conclusion on data using the IJC’s 500 *B. Coli* per 100 cc of water standard, and water taken from the middle of the Detroit River. Hubbell stated that even if all the storm water and drainage, including sewage, was treated, it would still be necessary to treat water in a water purification plant before drinking it. Hubbell said that sewage treatment should be limited to the extent that was needed so as not to put “An undue burden... on any water purification plant with its water intake located in the purest raw water available.”²² To ensure that future conditions did not pollute the raw water further, Hubbell thought that sewage from vessels should be sterilized and that urban

²⁰ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 15.

²¹ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 14.

²² Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 14.

sewage be treated “By means of fine screens or settling tanks, followed by sterilization.”²³

In response to the second problem “To what extent does the City of Detroit’s sewage pollute American waters so as to render them unfit as a source of raw water for filtration purposes?”, Hubbell replied: “It is difficult to separate the pollution in American waters caused by Detroit’s sewage from that which comes from surface wash and from the sewage of other cities and villages both above and below the City of Detroit.” He then described the extent of the pollution. He noted it hugs the shorelines of the river and that on the American side, the *B. Coli* counts range from 500 to 10,000 per 100 cc, between Lake St. Clair and Lake Erie. Between Belle Isle and Fighting Island, it occupies one third of the river’s width, between 900 and 1400 feet.²⁴ He noted the pollution extended into Lake Erie for twenty to thirty miles before it eventually dissipated.

The report continues with the information that the quantities of *B. Coli* affecting the public water supplies of the downriver communities of Ford, Wyandotte, Trenton, and Monroe, which was reaching 1,000 per 100 cc, was low enough that suitable water could be supplied after filtration. Ford and Wyandotte could obtain water suitable for filtration if they put their water supply intake 3,000 feet from shore. Trenton could not obtain water sufficiently clean enough for filtration unless Detroit’s sewage was treated.

Hubbell noted that treatment of sewage would protect private water supplies but more importantly “would greatly improve the conditions surrounding the summer home, pleasure resorts and bathing beaches patronized by thousands of Detroit’s citizens during

²³ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 14.

²⁴ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 15.

the summer months.” Removing the solids and floating material would improve the appearance of the river.²⁵

Reversal of the water flow in the river was another cause for concern. Under conditions in which there was a strong easterly wind, the water level at the west end of Lake Erie rose several feet, causing the Detroit River to flow backwards. This happened in February 1909, January 1914, February 1915, and on many other occasions.²⁶ The result of this reversal was that sewage that entered the river downstream of the freshwater intakes was flowing upriver and entering the water system. When this phenomenon went undetected, there was a vast rise in intestinal problems, including cases of diarrhea and typhoid. Hubbell suggested that the Detroit Water Department construct a new water intake farther out from the shore and this would prevent pollution entering the intake.²⁷

In his reply to the third problem, Hubbell rephrased it into two parts: By what means, if any, should the City of Detroit undertake to purify its sewage? What expense would be justified for that purpose? Hubbell did not think that anything other than primary treatment should be required for Detroit’s sewage. This would require removal of oil, grease, and other floating matter “obnoxious to sight” and the removal of most of the settleable solids. He said the most important thing is the removal of pathogenic, or disease producing, organisms. Ninety to ninety-five percent of the bacteria in the sewage

²⁵ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 16.

²⁶ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 16; Bert Hudgins, “Weather conditions as factors in the filtration of the water supply at Detroit Michigan,” *Monthly Weather Review*, September 1930, p. 337.

²⁷ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 17.

needed to be removed to reduce the *B. Coli* to 500 per 100 cc of water. He proposed to do this by disinfecting the remaining effluent with hypochlorite of lime.²⁸

There were five different methods proposed for sewage treatment. 1. Shallow tanks on the riverfront. There, the sewage would be disinfected, pumped to a site where it could be treated further, and the residue used to fill low land. 2. A treatment plant south of the city. All sewage would be processed through Imhoff tanks and the residue used to fill low lands, or processed further and sold as fertilizer. 3. Two treatment plants using Imhoff tanks, one at Fort Wayne and one at Connors Creek by Mack Avenue, where the effluent would be disinfected. 4. Three treatment plants at Fort Wayne, Fairview Avenue and the River, and at Connors Creek north of Mack Avenue. Once again, this would involve Imhoff tanks and sludge disposal either as fertilizer or to fill low land. 5. Removal of solids by fine screens at five treatment works at Fairview, Orleans, Twenty-fourth and Fort Wayne on the riverfront, and one at Rollins Street and Junction Avenue. He also proposed two additional future plants, one at Livernois Avenue and one at Connors Creek, when needed. The effluent would be disinfected and the screenings were to be incinerated.²⁹

Of these five proposed solutions, Hubbell considered numbers four and five to be the best. The three sedimentation plants in proposal four, while having higher initial construction costs, had lower annual maintenance costs than the five fine screening plants and appeared to Hubbell to be more desirable, so this was the one proposal

²⁸ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 18.

²⁹ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 18.

recommended. He estimated the costs at \$6,091,000 to serve a population of 950,000, with an annual operating cost of \$517,450 or 54.5 cents per capita.³⁰

In response to the question of what expenses sewage treatment would justify, Hubbell again reiterated the benefits of a clean water front, clean bathing beaches and summer playgrounds, a reduction of infectious diseases, cleaner raw water sources in cities below Detroit and in Detroit when the river flowed backwards. Thus, he concluded, that the \$6 million was a justified expense.

This report adopted the 500 *B. Coli* per 100 cc water standard for a treatable water supply. *B. Coli* exceeding this limit indicated a severely polluted water source that would overwhelm the capability of a water treatment plant. Consulting sanitary engineers to the International Joint Commission, George W. Fuller, Earle B. Phelps, George C. Whipple, W. S. Lea, and T. J. LaFreniere, all agreed that “The average maximum pollution in raw water which can be safely treated in a purification plant without placing an undue burden upon the plant is fixed as 500 *B. Coli* per 100 cc.”³¹ A dissenting voice came from F. A. Dallyn, a consulting sanitary engineer, who argued that the 500 *B. Coli* per 100 cc standard should be calculated on a monthly basis, since in many cities the annual calculated average was below that figure whereas in some months it exceeded that amount greatly.³² For example, Grand Rapids’ annual average was 373 *B. Coli* per 100 cc and yet in January and July of 1915, the average was 677 and 548, respectively.³³ The author’s conclusion was that the standard “Appears to be a justifiable and at the same

³⁰ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 19.

³¹ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 23, Agreed in a conference with the International Joint Commission, May 26-27 1914.

³² Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 24.

³³ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 29.

time a conservative limitation of the pollution which should be permitted in waters to be purified for domestic use.”³⁴

There were three sources of water pollution noted in the Detroit River: surface wash, pollution from vessels, and urban sewage. Surface wash pollution was intermittent; it followed rains and thaws and was “Practically unpreventable and inevitable.”³⁵ Vessel pollution during the shipping season was from sewage and refuse. Vessels did not treat their sewage, and 26,000 vessels traversed the Detroit River in 1916. Because sewage was discharged anywhere and anytime, vessel pollution was capable of entering water intakes as well as pristine unpolluted waters. Another noted problem with vessel pollution was its “Fresh conditions and concentrated form in which it may reach a waterworks intake.”³⁶ Hubbell was referring to a discussion that took place at the IJC hearings in Buffalo, New York on 21 June 1916 when Leslie C. Frank of the United States Public Health Service presented evidence regarding vessel pollution on the Great Lakes and a possible solution with vessel holding tanks.³⁷

The third source, urban sewage, was the greatest source of water pollution in the Detroit River. Out of a combined area population of 810,000, the majority, 775,000, were on the American side. The report discusses what steps had been taken to reduce diseases from polluted water, and what steps should be taken. Treatment with hypochlorite of lime started in March 1913. This had had a dramatic effect on typhoid

³⁴ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 33.

³⁵ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 34.

³⁶ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 35.

³⁷ International Joint Commission, *Hearings of the International Joint Commission in re Remedies for the Pollution of Boundary Waters Between the United States and Canada*, (Washington: Government Printing Office, 1917), p. 73.

deaths, reducing them from 29.4 per 100,000 in 1913 to 14 per 100,000 in 1914 and 13 per 100,000 in 1915. Hubbell proposed that the most economical solution to providing cleaner raw water was to move the water inlet to “A location somewhat further removed from the influence of surface wash and storm water pollution.” He suggested the location be on the “Further side of the Belle Isle shoal.” This suggested location was away from the polluted shoreline and in a place where pure water from the center of the Detroit River encountered Belle Isle.³⁸

In summarizing, Hubbell stated: “The treatment of sewage and the regulation of the dumping of sewage, garbage and refuse into the river from boats and from docks is desirable.”³⁹ Because all water taken from the Detroit River was polluted and therefore unsafe as a source for a raw water supply, Hubbell proposed that Detroit extend the water intakes a reasonable distance from the shore, install water purification plants and that “Sewage treatment, to better present conditions and maintain standards of raw water purity in the future, is necessary and, as a general policy, should be required in all communities.”⁴⁰

This report delivered an up-to-date view, circa 1915, of the condition of the Detroit River and the Detroit sewer system. The Detroit sewage system was logically broken down by drainage district into three main areas: the Detroit district, which included Detroit, Highland Park, Hamtramck, St. Clair Heights, Grosse Pointe Park and an unincorporated district to the north to the Wayne County line; a second district that included the villages of Grosse Pointe, Grosse Pointe Farms, Grosse Pointe Shores, and

³⁸ Hubbell, *Preliminary Report on Sewage Disposal 1916*, pp. 89-90.

³⁹ Hubbell, *Preliminary Report on Sewage Disposal 1916*, pp. 93-94.

⁴⁰ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 94.

unincorporated areas that drained into Lake Ste Clair; and a third district that included communities to the south, the Villages of Oakwood, River Rouge, Ecorse, Ford, Wyandotte, and Trenton.

In 1915, the main Detroit drainage district calculated by Hubbell was 11.76 square miles. The sewers serving Detroit, Hamtramck, and Highland Park were perpendicular to the river. Hamtramck and Highland Park were connected to the Detroit sewer system.⁴¹ Because of the growth of the greater Detroit area, Hubbell envisioned that there would be a need to coordinate sewer building and sewage disposal and he proposed two plans. Plan one encompassed the three drainage areas into one sanitary district authorized by the state legislature. The second plan proposed that the State Board of Health exercise its authority under Public Act 98 of 1913 and allow Detroit to expand its city limits to annex land that could be incorporated because of population growth, and that a sewerage commission be created under the direction of the city engineer to coordinate “Collection and disposal of sewage.” Hubbell noted, “Each of the two plans outlined has certain advantages. The first would probably be more difficult to initiate, but may prove the more adequate to meet all future conditions.”⁴² His prediction proved to be accurate under the auspices of the Public Act 302 — the Metropolitan District legislation — passed in 1929, the Detroit Water and Sewage Department still remains as a central city utility servicing the metropolitan area.

The sewer system existing at the time was a combined one. There were fifty sewers discharging at thirty-two outlets: twenty-nine on the Detroit River and three on the River Rouge. In 1914, these sewers were 214 miles long and cost \$5.9 million.

⁴¹ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 97.

⁴² Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 99.

Lateral sewers that connected households to the main sewers extended for 530 miles and cost \$3 million. The report notes that the system was developed without sewage treatment being considered, but further expansion “Should be designed with reference... for collection works.”⁴³

Hubbell examined the growth of Detroit in 1915 with a population of 678,746 and a physical size of 47.76 square miles. He projected that population growth would reach 1.5 million by 1940. He said because of this growth, the design of the sewer system should have the capacity to accommodate the estimated increase in population for thirty-five to fifty years.⁴⁴ The graph showing the projected population growth only projects growth to 1940, however, whereas a projected thirty-five to fifty year range should logically show projections to 1951 and 1966.⁴⁵

Hubbell said that the ratio between water supply and sewage flow in many cases is equal and that future per capita daily usage in Detroit would be 190 gallons.⁴⁶ Total daily usage in 1915 was averaging 122,162,805 gallons.⁴⁷ From this he calculated that gallons of sewage per capita per day could be assumed to be 114. To this he added daily averages of 12,000 gallons per acre for industrial sites and 50,000 gallons per acre for commercial areas. Daily ground water infiltration into the sewers he calculated at 500 gallons per acre for clay soils and 1,000 gallons per acre for sandy soils. A final analysis of the data revealed, “Less than 2% of the total yearly flow of sewage may be expected to

⁴³ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 100.

⁴⁴ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 106.

⁴⁵ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 105.

⁴⁶ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 110.

⁴⁷ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 114.

overflow into the Detroit River in times of storm so no additional capacity for storm water was allowed in the design of the interceptors.”⁴⁸ His analysis of the sewage revealed that it was 99.9 percent water and it did not contain many solids. Hubbell did not mention pollution from any industry and said “Industrial wastes did not present any serious difficulties except that grease and gasoline from the large automobile factories constitute a special problem, and means must be taken to prevent explosions in the sewers and pumping stations.”⁴⁹

Hubbell’s criteria for sewage treatment fell into four areas: removal of the floating matter, which might be offensive to sight, removal of solid particles held in suspension, oxidation of the remaining organic matter, and removal of the bacteria.⁵⁰ Hubbell stated that the results to be attained by the treatment of sewage were “Removal of material in sewage offensive to sight, to retain cleanliness of river, water front and pleasure grounds.” Another goal was the “Removal of pathogens or organisms in sewage by sterilization or otherwise, in order to protect bathing beaches, to relieve burden on future purification plants below city, and to protect future of Canadian waters in contravention of treaty.”⁵¹

Methods of sewage treatment were discussed. Adequate dilution of the sewage by standards established by the Sanitary District of Chicago in 1899 required 3.3 cubic feet per second of water per 1,000 people. With an average flow of 210,000 cubic feet per second (cfps) Hubbell stated, “The Detroit River will care for the ultimate population

⁴⁸ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 119.

⁴⁹ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 120.

⁵⁰ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 120.

⁵¹ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 123.

of this district with a large margin of safety.” The calculation 3.3 cfps for 1,000 people where 210,000 cfps was available gives a figure of 63,636,363. This figure seems erroneous and very high unless he meant and never mentioned that this was after the sewage was treated. Hubbell did say, “It should be noted that this standard is considered from the standpoint of nuisance created by depletion of dissolved oxygen in waters with resultant fouling of liquid and the giving off of obnoxious liquid.”⁵² The table supporting these calculations showed that the average reduction of dissolved oxygen along the American side of the river was 25 percent.⁵³ However, Hubbell noted that during the summer when water temperatures are over 70° F, there was a 69 percent reduction in dissolved oxygen. His conclusion on dilution was that the sewage would not require oxidization of the organic matter except for discharges into Connors or Fox’s Creek, and that discharges of treated effluent into the Detroit River should be done from submerged outlets to take advantage of dissolved oxygen.⁵⁴

Screening of solids out of the raw sewage as a method of treatment was considered, and the most satisfactory method identified was the Reinsch-Wurl screening process from Germany. These were fine screens with a ¼- to 3/8-inch mesh. However, these screens were not very efficient, only removing “From 30 to 50% of suspended solids.” Hubbell said, and continues, “Although fine screening removes all of the offensive looking matter, yet the liquid remains quite turbid, and that much better results can be obtained by a few hours sedimentation in large tanks.”⁵⁵ From this data Hubbell

⁵² Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 124.

⁵³ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 124.

⁵⁴ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 125.

⁵⁵ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 126.

arrived at several conclusions. Fine screenings are capable of removing material that is offensive to sight. If screening plants are chosen it would require several. Coarse screens and grit chambers would also be needed to protect pumping machinery. To dispose of the screenings incinerators would be needed. Screening plants can be located in built up areas without being a nuisance. The remaining effluent should be sterilized. The effluent should be discharged through submerged outlets to take advantage of dilution and biochemical oxygen demand. Hubbell's final conclusion was that the decision to choose between screens and sedimentation was dependent on initial costs, operating costs, and the efficiency achieved in cleaning up the sewage.⁵⁶

Sedimentation appeared to Hubbell to be a much better solution for sewage treatment. A sedimentation tank allowed the suspended solids to settle at the bottom of the tank by slowing the flow of the sewage. Settled solids, or sludge, could be removed mechanically. Hubbell stated, "Where conditions are favorable, the fresh sludge can be disposed of at sea... or can be dumped on remote waste land and allowed to decompose."⁵⁷ Sludge was 90 to 95-percent water and dewatering was costly. When dried the sludge could be used for fertilizer, as was done in Milwaukee, or incinerated, which was the solution finally arrived at in Detroit when the plant was started in 1940.

Hubbell concluded, "After a preliminary study of the possible interceptor schemes it was shown that it would be neither economical nor desirable to collect the sewage of Detroit for treatment at a single sewage disposal site located beyond the Rouge River or to the east of the city."⁵⁸ Studies did indicate it would be better to collect and treat at two

⁵⁶ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 127.

⁵⁷ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 128.

or more sites within the city and that Imhoff tanks were the best treatment solution.⁵⁹ The most economical method of disposing of the sludge, Hubbell calculated, was by drying and incinerating. Consideration was given to using it to fill wetlands below the city or selling it to farmers, but these were ruled out because of the quantities anticipated and the logistics involved in transporting it.

Hubbell believed that the remaining treated effluent could be safely disposed of in the Detroit River because the large volume of water and its oxygen-carrying capability could easily accommodate the effluent and provide enough oxygen to allow bacterial action to reduce it to harmless components. Treatment of this effluent with hypochlorite of lime was considered a necessity. Because a reduction in bacteria of 90 to 95 percent was needed in Detroit's sewage to reduce the *B. Coli* content to 500 per 100 cc of water, Hubbell recommended five parts per million of chlorine for settled, Imhoff tank sewage and seven parts per million for screened sewage.⁶⁰

Hubbell proposed that the city acquire three sites for the sedimentation plan. The Fort Wayne site would require twenty acres, and this plant would service the land west of Dequindre Road and north to Palmer Park, including Highland Park. For the Fairview Plant seventeen acres was needed, and this would service the far east side of the city and the Grosse Pointes. He also proposed a third future site at Connors Creek north of Mack Avenue, requiring twenty-four acres. Hubbell stressed that land values were high and in some circumstances federal land or city parks could provide the required acreage. To feed these proposed plants, interceptor sewers would be required for the Fort Wayne

⁵⁸ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 130.

⁵⁹ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 130.

⁶⁰ Hubbell, *Preliminary Report on Sewage Disposal 1916*, pp. 132-133.

Plant and the Fairview Plant, and two for the future Connors Creek Plant.⁶¹ Hubbell believed these plants would initially serve a population of 950,000 (1916), 1.5 million by 1940, and eventually, looking fifty years into the future, 2,664,000 (1966), with the sewage volume increasing from 287 to 493 million gallons per day.⁶²

If Reinsch-Wurl screening was used, instead of Imhoff settling tanks, Hubbell proposed building six smaller interceptors to service four screening plants at Fairview, Orleans Street, Twenty Fourth Street, and Fort Wayne. For the future fifty-year plan, screening plants were proposed at Rollin and Junction, Livernois, and Connors Creek, with an estimated population of 2.6 million.

Estimated costs for interceptor sewers were \$2.36 million for the Fort Wayne Plant and \$357,000 for the Fairview Plant. Plant construction costs for Imhoff Tanks were projected at \$1.74 million for Fort Wayne and \$1.63 million for Fairview. Annual estimated operating costs were \$140,000 for Fort Wayne and \$75,000 for Fairview. Future costs for Fort Wayne's additional interceptors were \$940,000, and Fairview's \$780,000. The addition of Connors Creek would require \$1.4 million for interceptors and \$2 million for the structures for the fifty-year plan, and additions at Fort Wayne would increase its costs to \$3 million. Annual operating costs would increase to \$255,000 for Fort Wayne, \$77,000 for Fairview, and \$135,000 for Connors Creek. Initial projected costs were estimated at \$6 million, and \$13 million for the fifty-year plan.⁶³

Costs for screening were projected as follows: \$2.33 million for intercepting sewers and \$1.6 million for plants for a total cost of \$5.2 million. For the fifty-year plan

⁶¹ Hubbell, *Preliminary Report on Sewage Disposal 1916*, pp. 136-138.

⁶² Hubbell, *Preliminary Report on Sewage Disposal 1916*, pp. 142-143.

⁶³ Hubbell, *Preliminary Report on Sewage Disposal 1916*, pp. 140-157.

with eight screening plants, it was to be \$10 million. Annual projected operating costs were \$632,000 with fifty-year costs of \$1.38 million.

Final estimates for a population of 950,000 were that screening would cost \$5.1 million with annual costs of 66.5 cents per capita. The fifty-year cost was \$10 million and 51.8 cents per capita. This would remove 95 percent of the bacteria and 20–35 percent of the solids. For sedimentation, initial costs were projected at \$6.1 million or 54.5 cents per capita and ultimately \$13.3 million and 45.9 cents per capita with 95 percent removal of bacteria and 50–65 percent removal of solids. Hubbell’s final statement was that “From the foregoing analysis it is evident that the sedimentation project is the more desirable and economical plan for the collection of sewage.”⁶⁴

No action was taken on this report by the city administration given that World War I was in progress. As America was supplying the allies with war material, construction materials were diverted to building docks and dry docks for shipbuilding, while manpower was redirected into the war effort.⁶⁵ Consequently, the resulting inflation caused major public works projects to be shelved temporarily.

In September 1916, the Detroit Bureau of Governmental Research published *Report on Sewer Construction, Department of Public Works, City of Detroit*. The Detroit Bureau of Governmental Research was “A non partisan organization” whose purpose was “To get things done for Detroit through cooperating with persons who are in office by increasing efficiency and eliminating waste, and to serve as an independent, non partisan

⁶⁴ Hubbell, *Preliminary Report on Sewage Disposal 1916*, p. 162.

⁶⁵ Special Sewer Commission, *Report of the Special Sewer Commission of the City of Detroit*, Detroit, Michigan, 1920, p. 37.

agency for keeping citizens informed about the city's business."⁶⁶ Now the Citizens Research Council of Michigan, the group was created in 1916

This report is for the most part a list of recommendations made to the DPW about materials, practices, and sewer types. However, the report proposed "that a comprehensive system of sewerage be planned, looking both to extensions to keep pace with the rapid growth of the city, and to the collection and ultimate treatment and disposal of sewage."⁶⁷ The Detroit Bureau of Governmental Research, now the Citizens Research Council of Michigan, was created in 1916 to examine public policy and to offer rational solutions based on sound policy rather than on political considerations.⁶⁸

In August 1920, after the war's conclusion, the city published a *Report of the Special Sewer Commission of the City of Detroit Michigan*.⁶⁹ In 1919, the Commissioner of Public Works had appointed a Special Sewer Commission "To act in an advisory capacity to with reference to the plans for new sewers, forms of contracts and methods which will hasten construction."⁷⁰ This was because sewer construction was falling behind. The City of Detroit's Annual Report of 1919 noted that contracts were awarded

⁶⁶ *Public Business*, Detroit Bureau of Governmental Research, no. 51, 15 July 15 1920, p. 2. The Detroit Bureau of Governmental Research became the Citizens Research Council of Michigan.

⁶⁷ Detroit Bureau of Governmental Research, *Report on Sewer Construction, Department of Public Works, City of Detroit, Michigan* (Detroit Michigan, 1916), pp. 22-23.

⁶⁸ T. Scott, "Research Leading to Sound Public Policy," *Dome Magazine*, 16 November 2009, <http://domemagazine.com/features/121109> (Accessed 30 April 2010).

⁶⁹ Special Sewer Commission, *Report of Special Sewer Commission*, p. 9, Personnel were Wilson Kinnear, Consulting Engineer, New York City and Detroit; William Hoad, Professor of Sanitary Engineering, University of Michigan; Edward D. Rich, State Sanitary Engineer, Lansing, Michigan; John A. Mercier, Contractor Detroit; George C. Cooke, Contracting Engineer, Detroit. The Special Sewer Commission was created on 20 December 1919; Detroit Bureau of Governmental Research, *Public Business* No 51, July 1920. This publication has a map showing where sewers were needed and their cost. It also contained a proposal for a bond issuance of \$25 million for 31 August 1920.

⁷⁰ *City of Detroit, Annual Report 1919*, City of Detroit Michigan, 1920, p. 101.

on thirty jobs. Twenty-four were started and six completed; however, labor and material conditions were impeding the work.⁷¹ This report also speaks of the dissatisfaction with the contract wording by the companies that were required to bid. Other issues included the state of existing sewers. DPW Commissioner George Engel had spoken to Clarence Hubbell, at that time City Engineer, about the state of sewerage in the downtown area, specifically the Woodward Avenue sewer. Hubbell had told him this sewer was overloaded and there was a need for a new additional sewer to relieve the Woodward sewer.⁷² The majority of this report discussed the proposed new Bates Street sewer.

Part 3 of the report discussed the city's general approach to the sewerage system for the city. Three needs were identified: sewers for the newly annexed parts of the city where no sewers existed; additional storm water relief in the older parts of the city where the existing sewers had become inadequate; and the proper treatment of the city's sewage prior to its discharge into the Detroit River.⁷³ The newly acquired territory lay in a broad zone one to three miles in width surrounding the sewered areas of the old city, extending from Grosse Pointe Park on the east to River Rouge on the west. A small part of this zone was partially furnished with lateral sewers, with inadequate outlets to the river.⁷⁴ The plan consisted of two new main trunk sewers, Connors Creek on the east side and Baby Creek on the west side. These sewers were to be laid in public streets requiring little acquisition of private land. The design of the system, "once realized, will be permanently useful and satisfactory and which can readily be strengthened by local

⁷¹ *City of Detroit, Annual Report 1919*, City of Detroit Michigan, 1920, p. 101.

⁷² *Proceeding of the Common Council of the City of Detroit*, 22 July 1919, Detroit Michigan 1920, p. 1108.

⁷³ *Special Sewer Commission, Report of Special Sewer Commission*, 1920, p. 37.

⁷⁴ *Special Sewer Commission, Report of Special Sewer Commission*, 1920, p. 37.

supplementary sewers in case the future development in any particular location should prove to be denser than what has been allowed for in the present design.”⁷⁵

The increase in population, along with industrial development, had caused dense development in the older portions of the city; with the result that storm water runoff had increased beyond the capacity of the existing sewer system. It was not possible to extend these sewers into the newly annexed areas because they had small capacities and were already over capacity. The Lonyo Road west side and Connors Creek east side sewer proposals had been accepted and were to serve the newly annexed parts of the city as well as the City of Highland Park and the Village of Hamtramck.

This report makes mention of the obligations of the city under Article 10 of the Boundary Waters Treaty by stating that “Detroit has also been confronted with the problem of treating its sewage in order to reduce the pollution of the waters with the recommendation of the International Joint Commission.”⁷⁶ This indicates that the committee recognized the problem, but in this publication they did not present any solutions. The authors state that the sewer program would require many years to complete - fifteen to twenty - and a large amount of money - forty to fifty million dollars.⁷⁷ Sewers that were mentioned at the time in August 1920 are the Lonyo Road sewer, and then under construction, and the Dexter Boulevard and Linwood Avenue sewers, which were nearly completed. No progress had been made with the Connors Creek sewer. The Lynch Road sewer was 50 percent complete; its sewage was being pumped into Connors Creek. Another area of the Connors Creek drainage area was east

⁷⁵ Special Sewer Commission, *Report of Special Sewer Commission*, 1920, p. 37.

⁷⁶ Special Sewer Commission, *Report of Special Sewer Commission*, 1920, p. 37.

⁷⁷ Special Sewer Commission, *Report of Special Sewer Commission*, 1920, pp. 37-38.

of Woodward Avenue between Six and Eight Mile Roads. Until completion of the Six and Seven Mile sewers, sewage from this area was discharged into open ditches from where it flowed into Connors Creek and eventually into the Detroit River.⁷⁸ This report notes that sewer construction was behind schedule because of disturbed conditions in the labor and materials markets; inflation was causing a slowdown in construction. The report noted that sewer construction accomplishments for 1919 were only 20 percent of what was projected.⁷⁹ Realizing that market conditions were affecting this construction, the city had modified its bidding procedures to “meet present day conditions, encourage contractors to bid on sewer construction, and place the city in a position to secure economical competitive propositions for the prompt and efficient prosecution of work.”⁸⁰ The authors state that since starting this investigation, the Commissioner of the DPW had requested them “To curtail the scope of the work of the Commission from that originally contemplated” and that “The general scheme of sewage disposal is not reported upon, owing to lack of time for consideration of the important problem.”⁸¹

This report shows that the recommendations for sewer construction made in the *1916 Preliminary Report* were followed to some extent. Hubbell had said that three processing plants would be required, located at Fort Wayne, Connors Creek and Fairview Avenue. He had also proposed that future sewer development take into consideration the location of treatment plants and that it would be more economical to collect and treat sewage at one or more sites. The 1920 report is concerned with providing sewers for the

⁷⁸ Special Sewer Commission, *Report of Special Sewer Commission*, 1920, p. 38.

⁷⁹ Special Sewer Commission, *Report of Special Sewer Commission*, 1920, pp. 9-10.

⁸⁰ Special Sewer Commission, *Report of Special Sewer Commission*, 1920, p. 10.

⁸¹ Special Sewer Commission, *Report of Special Sewer Commission*, 1920, p. 10.

newly annexed areas, and upgrading the inadequate sewers more than it is with providing channels for sewage to the areas where Hubbell had proposed plants. Connors Creek and Baby Creek are identified as places where main sewers were to be constructed.

In April 1922, the Detroit Bureau of Governmental Research published *Sewage Disposal for Detroit*, “A Report Prepared for the Commissioner of Public Works.” This report was revised in August 1922 and again in January 1925. The first two versions are unavailable. The 1925 report is in eleven parts, the first being “What is the Problem?” The primary problem cited by this report was that Detroit was compelled by international treaty to find a more satisfactory method of sewage disposal, and was morally obligated to keep the Detroit River free of sewage pollution.⁸² After citing relevant articles of the Boundary Waters Treaty, the authors then discussed the need to keep the river “in the best possible condition” as a waterway, a source of clean water and a summer playground.⁸³

Part two discussed the published studies of the problem. Covered are the 1914 and 1918 International Joint Commission reports and the 1916 Hubbell report. The authors took exception to the 1918 International Joint Commission report as being “Unsatisfactory as the findings and recommendations are general and the recommendations are not sufficiently specific in their applications.”⁸⁴

Part three discussed the specific recommendations of the reports that bacterial loads of *B. Coli* must be below 500 *B. Coli* per 100 cc of water for a water treatment

⁸² Harrington Place, *Sewage Disposal for Detroit; A Report Prepared for the Commissioner of Public Works*, Bureau of Governmental Research, Detroit Michigan, 1925, p. 1.

⁸³ Place, *Sewage Disposal*, 1925, pp. 1-2.

⁸⁴ Place, *Sewage Disposal*, 1925, p. 3.

plant to safely process the water. This would require the removal of 95 percent of the solid matter from the sewage before it entered the river and 95 percent of the bacteria. The presence of *B. Coli*, as the author states, does not mean that typhoid fever must follow but does mean that if there are sources of infection the *B. Coli* will act as a carrier of the bacteria of typhoid.⁸⁵ That is why the *B. Coli* standard is used as an index of bacterial pollution for a population of one million people and the bacterial load on the Detroit River. Ninety five percent of these bacteria must be removed to bring the bacterial load down to the standard, as well as 95 percent of the solids. It was noted that there was not enough water in the Detroit River to dilute Detroit's sewage below this prescribed standard.⁸⁶

The following calculations were offered to support these conclusions: The Detroit River ran at 210,000 cubic feet per second; the river could accommodate 105,000 *B. Coli* per second; each inhabitant contributes 2,000 per second. 105 million divided by 2,000 equals 52,500. This was the maximum population whose sewage the river could accommodate.⁸⁷

Part four was a discussion of the 1916 International Joint Commission's report and the query "in what way is it possible and advisable to remedy or prevent the pollution of these waters, on either side, to the injury of health or property on the other." Part of this discussion considered the International Joint Commission report's figures of 8,030 *B. Coli* per 100 cc as the average pollution from May 1 to Sept 30, 1913. The report stated

⁸⁵ Place, *Sewage Disposal*, 1925, p. 5.

⁸⁶ Place, *Sewage Disposal*, 1925, p. 5.

⁸⁷ Place, *Sewage Disposal*, 1925, p. 6. To calculate what percentage of reduction was needed $2000 \times \text{population} - 105 \text{ million} = 3 \text{ billion} - 105 \text{ million} = 22.85 \text{ billion}$ or 95 percent.

that there was a direct relationship between *B. Coli* values in the water and the incidence of typhoid by users of the water. Formerly, 50 *B. Coli* per 100 cc of water was an allowable standard for drinking water, but newer standards of 10 or less *B. Coli* per 100 cc of water were called for. The authors proposed a 95 percent reduction in solid sewage and bacterial load to bring the *B. Coli* under the 500 per 100 cc level so that a water treatment plant would not be overloaded.⁸⁸

The methods for removal of solids and suspended solids that were available at the time were fine screening and sedimentation. The authors' decision to base their estimates on sedimentation was made on the superior merits of sedimentation in removing solids. They acknowledged the deficiencies of screening as a weakness of machinery and higher operating costs.⁸⁹ Another factor was that screening effluent required a higher concentration of disinfectant, chlorine, creating still-higher costs. Imhoff tanks were the latest and best sedimentation devices and gave "innocuous sludge" and an "absence of undesirable odor."⁹⁰ These findings and recommendations were similar to the 1916 Hubbell report.

The authors inserted an excerpt from the 1916 International Joint Commission's report to stress that a policy should be adopted in which no untreated sewage should go into the boundary waters, that local communities should take advantage of local conditions to keep the cost of sewage treatment as low as possible, and that the simplest allowable method was by screening, with a ¼- inch mesh, followed by disinfectant.⁹¹

⁸⁸ Place, *Sewage Disposal*, 1925, p. 9.

⁸⁹ Place, *Sewage Disposal*, 1925, p. 11.

⁹⁰ Place, *Sewage Disposal*, 1925, p. 12.

⁹¹ Place, *Sewage Disposal*, 1925, p. 14.

Disinfectant should be required whenever the discharge of effluent would cause the load on a water treatment plant to exceed the 500 *B. Coli* per 100 cc standard. The authors of this report reiterated the conclusions of the International Joint Commission by including the statement that “protection of public water supplies is more economically secured by water purification at the intake than by sewage purification at the sewer outlet, but that under some conditions both water purification and sewage treatment may be necessary.”⁹²

Part six of this report discussed the 1916 Hubbell report. Hubbell had suggested either two sedimentation plants on the east and west side of the city or several screening plants on the riverfront. He had also stated that sedimentation plants were more economical. Hubbell’s report was predicated on responding to three questions. “To what extent does the City of Detroit’s sewage pollute American waters, so as to render them unfit as a source of raw water for filtration purposes?” In addition, “By what means, if any, should the City of Detroit undertake to purify its sewage? Thirdly what expense would be justified for that purpose?”⁹³

Part seven of this report addressed the final 1918 report of the International Joint Commission. The Detroit Bureau of Governmental Research concluded that the report of the International Joint Commission gave no recommendation except that 500 *B. Coli* per 100 cc of water be adopted as the maximum pollution allowed. There were no statements on how to achieve this result, or on purification methods. There were no time limits specified or assignment of who was responsible for enforcement. There was no emphasis

⁹² Place, *Sewage Disposal*, 1925, p. 15.

⁹³ Place, *Sewage Disposal*, 1925, p. 20.

on the removal of solids.⁹⁴ The Detroit Bureau of Governmental Research did emphasize, however, that the International Joint Commission recommended the creation of an authority with “full power to establish rules and see that they are properly observed” and to modify standards as conditions change on the Detroit River.⁹⁵

Part eight discussed remedial treatment and contains extensive inserts from the 1918 International Joint Commission Report. The Detroit Bureau of Governmental Research’s conclusion was that the remedy must provide:

A clean, attractive waterfront, sanitary bathing beaches, playgrounds and summer colonies, a source of water supply that will be safe at all times and the discharge of all legal and moral obligations toward neighbors, whether living on the American or Canadian side of the river, not only now, but indefinitely in the future.⁹⁶

The Bureau’s authors felt that the City must satisfy the treaty whatever the cost, and that any treatment systems considered must meet the needed requirements.⁹⁷

Part nine discussed different available systems of sewage treatment. In January 1921, a public hearing held in the Common Council Chamber in Detroit asked several vendors to explain their methods. The Pacific Flush Tank Company, representing Imhoff Tanks declined to participate, saying it was an engineering problem and public hearings would serve no purpose. The Sanitation Company representing Reinsch-Wurl screens gave a presentation including a slide show, lecture, and technical discussion. The Dorr Company gave a description of the Dorr Thickener; a mechanical device that they

⁹⁴ Place, *Sewage Disposal*, 1925, pp. 21-24.

⁹⁵ Place, *Sewage Disposal*, 1925, p. 25.

⁹⁶ Place, *Sewage Disposal*, 1925, p. 28.

⁹⁷ Place, *Sewage Disposal*, 1925, p. 29.

claimed was more efficient than the screening process. At the conclusion of this process, the Detroit Bureau of Governmental Research claimed that this meeting left the Common Council confused about the cost – benefit analysis of the various options available.⁹⁸

The Detroit Common Council then visited sewage-processing plants in New York City; Bridgeport, Connecticut; and the Irondequoit Plant in Rochester, New York, all of which were Reinsch-Wurl Screening Plants. The council also visited plants using Imhoff tanks in West Haven, Connecticut; Schenectady, New York; Rochester, New York; Batavia, New York; Cleveland, Ohio; Fitchburg, Massachusetts; and Pontiac, Michigan. One plant in Plainfield, New Jersey combined Reinsch-Wurl screens and Imhoff tanks. In Syracuse, New York, the plant used the Dorr-Thickener Process and the resulting sludge was disposed of by combining it with industrial waste and using it for landfill.

The Fitchburg, Massachusetts plant was extremely efficient at cleaning up sewage. At the time of inspection in December 1921, the city had 40,000 inhabitants. The plant handled 4 million gallons a day, using grit chambers, Imhoff Tanks, trickling filters, and sludge drying beds. The Plant removed from 96 percent to 99.99 percent of settleable solids. The plant in Pontiac, Michigan, with its effluent flow into the Clinton River, also used Imhoff Tanks, grit chambers, and sludge beds. Similar to the Fitchburg plant, it served a population 35,000 and handled 4 million gallons per day since it began operation in July 1921. It removed 97 percent of settleable solids. Although not considered for Detroit, activated sludge treatment was also reviewed in the Detroit Bureau of Governmental Research's report, described as:

A biochemical process for purifying sewage by passing it through tanks in which sewage sludge is agitated and mixed with sewage and is supplied the necessary oxygen

⁹⁸ Place, *Sewage Disposal*, 1925, p. 30.

for the most favorable developments of the nitrifying organisms incorporated in sludge and adhering to it the final settlement of which causes a clarification of the oxidized sewage.⁹⁹

Milwaukee was using this method since the sludge had value as a fertilizer. Indianapolis was also using this method.

Part ten outlined the conclusions reached by the Bureau's engineer. Harrington Place is referred to as the Engineer of the Bureau.¹⁰⁰ He concluded that under certain conditions, and within limits, fine screens had an important function. When a greater degree of purification was required, a combination of fine screens and tanks produced better results. The only stand-alone Reinsch-Wurl screening plant had been discharging into tidal water and the raw water supply was not an issue. In conjunction with Imhoff Tanks, the additional expense was not justified. Cleveland, with a similar situation to Detroit, had built plants without them. Activated sludge in 1921 was still in an experimental stage and with the additional cost of aeration, these factors made it unacceptable at the time.

The final conclusions from this report were that Imhoff Tanks, because of the degree of purification and operating costs, were preferable to Reinsch-Wurl screens. The treaty obligations necessitated that the majority of the "objectionable matter" be removed from effluent. This was also a "moral obligation" and "for self protection".¹⁰¹

The Bureau posed five questions to the Common Council in making their decision on what sewage treatment to consider. What purification of sewage is necessary to

⁹⁹ Place, *Sewage Disposal*, 1925, p. 65.

¹⁰⁰ "Council Hears Two Sewer Plans," *Detroit News*, 26 October 1926.

¹⁰¹ Place, *Sewage Disposal*, 1925, p. 69.

comply with the treaty? Will such requirements meet the needs of the city now and in the future? Will any screening system accomplish this? Are prohibitive areas for tanks and sludge beds nuisances? What are the differences in initial and operating costs between screens and tanks?¹⁰²

The authors recommended that the Common Council acquaint themselves with installation in inland cities that are operating under similar conditions. These were the cities of Chicago, Cleveland, Buffalo, Milwaukee, and Indianapolis. According to the report, the council should also investigate Imhoff Tank installations in Fitchburg, Batavia, Rochester, Cleveland, Pontiac, and Springwells, Michigan. The Council should authorize expenditures to build experimental plants in Detroit to process Detroit's sewage. They should appoint a commission of sanitary engineers to study the reports already done, conduct tests at the experimental plants, and arrive at a good technical and scientific solution.¹⁰³

Even though these recommendations were made, it is apparent that politics got in the way of good sense. In the ensuing year between December 1925 and December 1926, William D'Olier, a persuasive salesman and President of the New York Sanitation Company, who had the licensing rights to Reinsch-Wurl screens, was able to impede this process through his aggressive techniques and his influence on some Common Council members.

Another published report was *Sewage Disposal for the City of Detroit*, "A Report of the Investigation and Recommendation of the Special Committee on Sewage Disposal Appointed by the Mayor with the Approval of the Common Council." Councilman

¹⁰² Place, *Sewage Disposal*, 1925, p. 70.

¹⁰³ Place, *Sewage Disposal*, 1925, p. 71.

Bradley had placed a resolution before the Common Council on July 1 1924 requesting that the Department of Public Works study the question of sewage disposal with particular reference to a large collecting sewer along the riverfront.¹⁰⁴ Mayor John Smith had requested on January 5, 1925 that the Common Council appoint a commission of eminent engineers to study and report on the problem of sewage disposal.¹⁰⁵ He stated that he believed the question of sewage disposal had gone beyond the experimental stage. The Council voted 9–0 to authorize this commission. The commission retained Harrison P. Eddy of Boston, John H. Gregory of Maryland, and Clarence W. Hubbell of Detroit as consulting engineers. Harrison P. Eddy and Leonard Metcalf were authors of *American Sewerage Practice*, a three-volume work published in 1916, and later *Sewerage and Sewage Disposal*, published in 1930. John H. Gregory was the professor of civil engineering at Johns Hopkins University in Baltimore, Maryland, and Clarence Hubbell was a civil engineer in private practice in Detroit. Eddy was the Dean of Sanitary Engineers who had designed some of the largest disposal works in operation.¹⁰⁶ Gregory was ranked second to Eddy and had designed and built plants in Columbus, Ohio.¹⁰⁷

¹⁰⁴ *Minutes of the Common Council of the City of Detroit*, Detroit, Michigan 1925, p. 1575.

¹⁰⁵ *Minutes of the Common Council of the City of Detroit*, Detroit, Michigan, 1925, p. 3401. The five commission members were A. C. Marshall Chairman, Perry A. Fellows, Francis C. McMath, Louis C. Rogers and George R. Cooke. Perry Fellows was the City Engineer and later went on to be an executive with the WPA in the New Deal Administration.

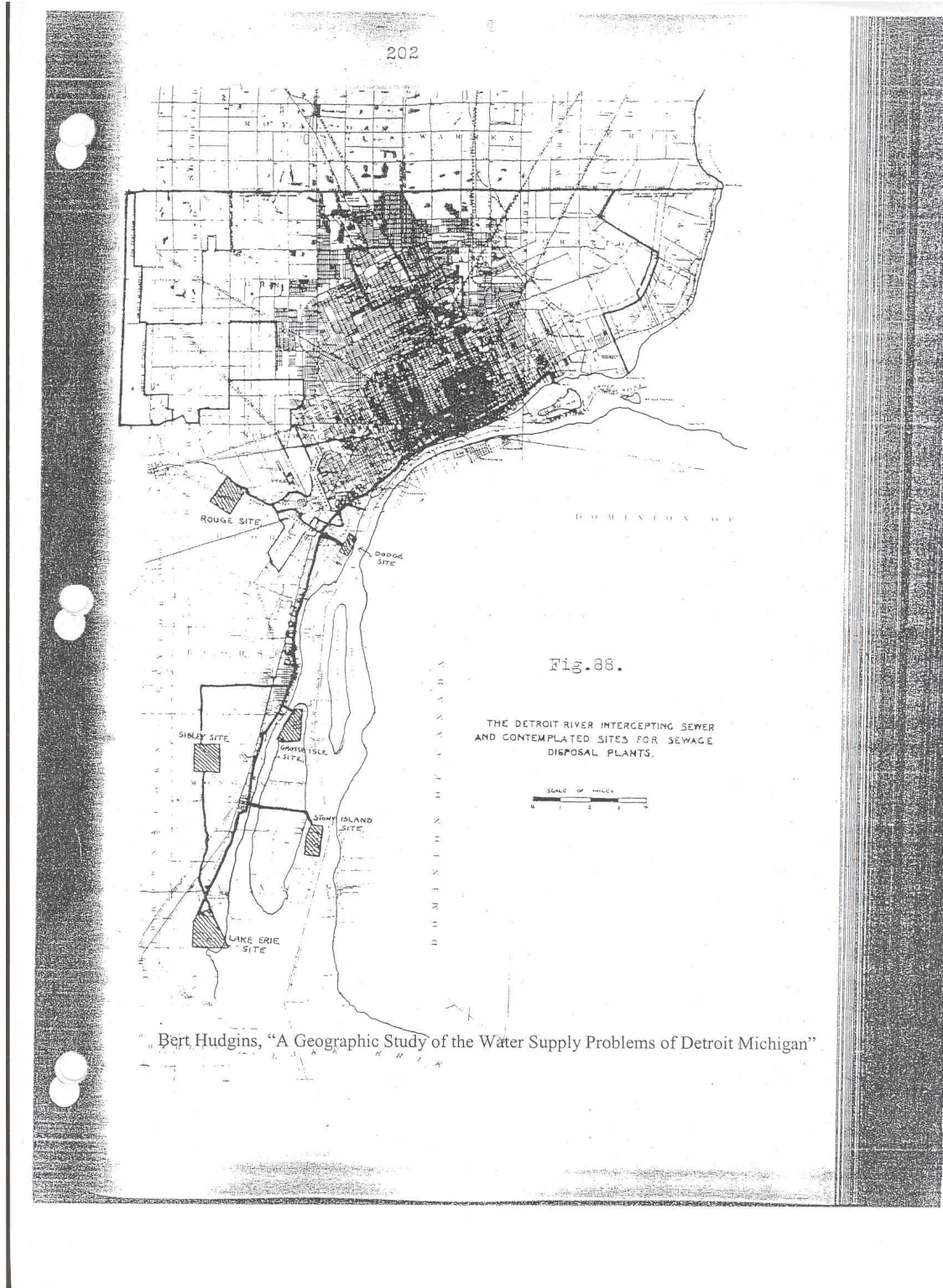
¹⁰⁶ Special Committee on Sewage Disposal, *Sewage Disposal for the City of Detroit*, Detroit, Michigan, 1925, p. 11. In a 1926 report, Eddy refers to this as the Fenkell Report.

¹⁰⁷ Special Commission Sewage Disposal, *Sewage Disposal Detroit*, 1925, p. 11.

By 1925, a new study was needed because the population had reached 1.5 million and the pollution in the Detroit River had increased 70 to 90 percent from 1915 levels, corresponding to the increase in population over the same period.¹⁰⁸ The growth of the

¹⁰⁸ Clarence W. Hubbell, "Background and Development of Detroit's Sewage Disposal Project," *Civil Engineering*, vol. 8 no. 7, July 1938, p. 467.

Map of Detroit showing suggested site locations.¹⁰⁹



¹⁰⁹ Bert Hudgins, *A Geographic Study of the Water Supply Problems of Detroit Michigan*, (Ph.D. diss, Clark University, Worcester Mass, 1930), p. 202.

city to the north and northwest had caused major pollution to occur in the tributary streams of Connors Creek, Baby Creek, and the Rouge River. The need for clean drinking water on both sides of the river was an issue, as well as the desire for bathing beaches without the sight and smell of sewage. The high costs involved in the construction of a sewage treatment plant necessitated that decisions could not be made based on ten-year-old surveys. “The unusual increases in cost, the advance of the science of sewage disposal and the phenomenal growth of our city have combined to make this information insufficient.”¹¹⁰ This study also came at the end of the \$25,000,000 sewer project started in 1920.

Upon the urging of the mayor to the Commissioner of the DPW, the newly published report was immediately forwarded to the Common Council so that a hearing date could be set. This was so that a “prompt decision may be had with respect to the recommendations of the committee and its engineers to the end that such moneys as may be needed for this project during 1926 may be placed in the 1926-27 budget.”¹¹¹

The report presented a statement of the problems, the methods used in the study, and the proposed solutions.¹¹² The chairman of the commission further explained that the commission was turning the supporting data and details over to the Commissioner of Public Works as further work could be better done by that department. He stated that the study only determined general requirements and that a great deal of work by draftsmen and sanitary engineers needed to be accomplished. He urged the DPW to seek additional staff and retention of professionals. The observations and recommendations regarding

¹¹⁰ “Sewage Board Appoints Aids,” *Detroit News*, 5 April 1925.

¹¹¹ Special Commission Sewage Disposal, *Sewage Disposal Detroit*, 1925, p. 5.

¹¹² Special Commission Sewage Disposal, *Sewage Disposal Detroit*, 1925, p. 6.

Fox Creek and Connors Creek were incorporated into the June 1926 *East Side Sewerage and Storm Water Relief* report.¹¹³

The committee's summary was brief but cogent. It covered surface pollution, suspended material, and other pollution. It addressed improvement needed in the areas of oxygen content, bacteria, and floating materials. It spoke about the obligation of Detroit to the international treaty, and presented the progress that had been made, the appointment of the committee, the study, and the retention of consulting engineers. The final part of the summary presented the suggested plan: a single plant with an interceptor sewer paralleling the Detroit River, complete with branch interceptors to collect sewage. The proposed treatment called for removal of all floating material and settleable solids, disinfection of the effluent, and digestion of sludge. The estimated cost for the plan was \$39.6 million, to be spent over a seven-year period. The authors pointed out that storm water relief was not a part of this problem.¹¹⁴

According to the authors, the mayor had called for an investigation in January 1925, and their report was the result. They stated that public officials had been reluctant to recommend expenditure for sewage treatment. The courts had been slow to insist on any other treatment than dilution. The explanation for this was that the science of sewage disposal was seen to be in its infancy. Rapid progress had been made in this area and experts such as the investigators of this report were aware of this progress.¹¹⁵

The study offered a single definite plan. The engineers Eddy, Gregory, and Hubbell had collaborated on this plan and were in complete agreement, as were the

¹¹³ Special Commission Sewage Disposal, *Sewage Disposal Detroit*, 1925, p. 6.

¹¹⁴ Special Commission Sewage Disposal, *Sewage Disposal Detroit*, 1925, p. 7.

¹¹⁵ Special Commission Sewage Disposal, *Sewage Disposal Detroit*, 1925, p. 11.

members of the committee. The plan was supported by the vast amount of technical data that had been gathered during the study. It called for the collection and treatment of the sewage, the sterilization of the effluent, and the disposal of the sewage sludge collection.

The committee recommended that all collection of sewage should be done at one single treatment plant. This was different from the 1916 Hubbell report and the 1922–25 Detroit Bureau of Governmental Research studies, where several treatment plants were considered. They proposed a single intercepting sewer, the Detroit River Interceptor (DRI), running parallel to the river. Other existing sewers not dumping directly into the Detroit River would be connected to new interceptors connected to the DRI.¹¹⁶

Only primary treatment was proposed. This consisted of the removal of floating material, paper, leaves, wood, oil, and grease. Heavier material such as sand and grit would sink and be removed. The remaining effluent would enter long sedimentation tanks where it would flow very slowly, allowing the suspended solids to precipitate as sludge. This sludge would be removed and dried either for incineration or for sale as fertilizer. The effluent flowing out of the sedimentation plants would be sterilized with liquid chlorine and pumped through an underground tunnel into the middle of the river where it would be released. The study stresses that such a treatment plant should not be objectionable and that many treatment plants were located in high-class residential areas. The plant could also be located in a remote area and landscaped to have a park setting. Once again, they stressed that the plans did not include any storm water relief. The plant and its intercepting sewers, which could handle a population of 2,400,000 people, were estimated to cost \$39,600,000.¹¹⁷

¹¹⁶ Special Commission Sewage Disposal, *Sewage Disposal Detroit*, 1925, p. 12.

The study included the report of the consulting engineers to the committee. In early 1925, Detroit had an area of 120 square miles, with twenty more added later in the year. Population was growing at 100,000 annually. Detroit had 1,647 miles of sewers and discharged 225 million gallons per day of sewage into the river during dry weather. Most of this sewage discharge into the Detroit River was between Connors Creek and the Rouge River, a distance of ten miles. There were forty-four sewer outlets into the Detroit River, one into Baby Creek and five into the River Rouge.¹¹⁸

The condition of the river water was clean when it entered from Lake St. Clair. Sewage from Fox Creek, a large amount from Connors Creek and the sewers along the riverfront and from the River Rouge as well as industrial wastes made it increasingly more polluted. This resulted in vast amounts of floating solids, recognizable as sewage being in plain sight. Gases emitted from decomposing sewage lifted suspended solids to the surface, and riverboat traffic disturbed the sewage deposits, bringing them to the surface as well. Combined with this unsightly water surface was an odor of sewage, stronger in the summer months.¹¹⁹ Oil film on the surface of the water was visible from Connors Creek and continued over the international boundary line. The oil was also being blown by the wind onto the bathing beaches of Belle Isle. Bathing in the river below Fox Creek was dangerous to one's health.¹²⁰ All of the aforementioned conditions were a menace to the health of the public and damaged the city's image, and the engineers felt that the expenditure for sewage treatment was thus justified.

¹¹⁷ Special Commission Sewage Disposal, *Sewage Disposal Detroit*, 1925, pp. 13-14.

¹¹⁸ Special Commission Sewage Disposal, *Sewage Disposal Detroit*, 1925, p. 15, pp. 115-116.

¹¹⁹ Special Commission Sewage Disposal, *Sewage Disposal Detroit*, 1925, p. 19.

¹²⁰ Special Commission Sewage Disposal, *Sewage Disposal Detroit*, 1925, p. 17.

The engineers thought that it was absolutely essential to remove the oil, grease, and other floating material entering the river from manufacturing establishments. Settleable solids, calculated at 35,000 tons annually, were another priority. Bacteria, especially pathogenic organisms, needed to be killed through disinfection with chlorine.¹²¹

The engineers acknowledged that since the reports of the previous decade, (International Joint Commission 1914, Hubbell 1916), the population had doubled from 750,000 to 1.5 million, as had the amount of sewage. The acreage of land previously available for multiple sewage treatment plants no longer existed. The engineers identified many sites outside the Detroit City limits between the River Rouge and Lake Erie, all adjacent to the Detroit River.

The engineers stated that intercepting sewers must be built for the Detroit River, the Rouge River, and Baby Creek. The DRI would be eleven miles long from the proposed plant below the River Rouge upriver to the existing Fairview Pumping Station, where it would connect with the existing Jefferson sewer. It would be seventeen feet underground at the northern end and forty feet at the south. The Baby Creek intercepting sewer would be twenty-eight miles long and would collect the sewage going into Baby Creek and connect to the DRI. The River Rouge intercepting sewer would be fifteen miles long and would run close to the Rouge River from Seven Mile and Grand River to the DRI. The proposed design of these sewers was for a capacity to accommodate 3.5 million people, once again reiterating, “Except during and immediately following storms.”¹²² During storms, the overflow of storm water and sewage would go into the

¹²¹ Special Commission Sewage Disposal, *Sewage Disposal Detroit*, 1925, p. 17.

river. As the engineers explained it, storm water could be fifty times the normal flow and it was impracticable to convey the storm flow to the treatment plant and treat it.¹²³ The Connors Creek sewage would be connected to the Jefferson Sewer, which would flow into the DRI.

Where the DRI was to enter the treatment plant, it was to be thirty-six feet below the sedimentation tanks level; a pumping station was to be constructed to lift the sewage to the required level.¹²⁴ After being lifted by the pumping station, the sewage was to enter a skimming detritus tank where solids and oil would float to the surface and mechanical devices would skim them off. At the same time, through a predetermined retention time, grit and sand would settle and be removed. The sewage was then to go into Imhoff sedimentation tanks where the suspended solids would be deposited. The solids were to be retained in the Imhoff tanks for two to six months where biological degradation would reduce them to an odorless composition. The deposited sludge would then be mechanically removed from the tanks and dewatered, as its constituency would be 90 percent liquid. To dewater the sludge, it was to be sprayed onto sand beds and left for up to ten days. The dried sludge would then be disposed of.¹²⁵ The engineers anticipated that sufficient quantities of dried sludge could be used to fertilize 2,000 acres annually, and proposed that agriculture in Rochester, Michigan and Baltimore, Michigan would use it. If any excess did exist, it would be used as fill at a distribution center where the sludge had been transported.

¹²² Special Commission Sewage Disposal, *Sewage Disposal Detroit*, 1925, pp. 18-19.

¹²³ Special Commission Sewage Disposal, *Sewage Disposal Detroit*, 1925, p. 19.

¹²⁴ Special Commission Sewage Disposal, *Sewage Disposal Detroit*, 1925, p. 19.

¹²⁵ Special Commission Sewage Disposal, *Sewage Disposal Detroit*, 1925, pp. 19-20.

The remaining effluent would have its bacterial content lowered considerably and chlorine would be added to it after it left the sedimentation plant prior to its discharge into the Detroit River through a submerged outlet on the American side of the river. The engineers believed that these procedures would clean up the Detroit River but knew that storms would still cause the release of sewage into the river an estimated 2 percent of the time. They believed that because of the high volume of water and the high speed at which it flowed, the polluted water would quickly pass down river.¹²⁶

Costs for the intercepting sewer were calculated for a population of 3.5 million. The Baby Creek intercepting sewer was estimated at \$1.47 million, the River Rouge at \$1.38 million, and the DRI at \$12.75 million, for a total \$15.6 million. The River Rouge pumping station was estimated at \$2.25 million and the treatment plant at \$18.15 million, for a total of \$36 million with a 10 percent buffer, altogether \$39.6 million. They estimated annual operating costs of \$312,000 for pumping and \$618,000 for treatment, for a total of \$930,000. Interest of 6 percent and payments on a \$39,000,000 bond issuance would cost \$2.37 million, and annual operating costs would total \$3.3 million. Emphasizing the need to protect the water intake and acknowledging the multi-year construction project, the engineers stressed the need to construct part of the DRI from the Fairview pumping station to Helen Avenue right away, with an estimated cost of \$1.1 million.

The time requirements for completion were dependent on acceptance of the plan, acquisition of the plant site, and the design of interceptors, pumping station, and plant. They believed that the system could be completed in seven years.¹²⁷ The authors were

¹²⁶ Special Commission Sewage Disposal, *Sewage Disposal Detroit*, 1925, p. 20.

concerned with sewage entering the inlet of the water treatment plant and stressed that this should be a priority. They stated that even though several years would be required to design and construct the wastewater treatment plant and the DRI, it would be possible to divert the sewage from the river above the Belle Isle Bridge at an earlier date by constructing a portion of the interceptor sewer. The cost estimate for this temporary diversion was \$1.1 million; however, they stressed that this should not be undertaken until the city had accepted the proposed treatment plan and the final location of the DRI was determined.

This diversion project became the subject of the next report, *East Side Sewerage and Storm Water Relief for the City of Detroit*, published in June 1926, prepared by the consulting engineers of Metcalf and Eddy, with Harrison P. Eddy as the author. Metcalf and Eddy were the co-authors with Hubbell and Gregory of the 1925 *Special Committee on Sewage Disposal* report. The report is in three sections: part A covered the relief of the East Jefferson Sewer system, part B examined the sewerage of the Fox Creek district, and part C looked at the Connors Creek outlet. This report was issued after Detroit had nearly completed its annexation of surrounding territory; its city limits were then fixed and survive to the present day. This annexation strained the budget, pushing the city's debt limit to the maximum allowed under law. The city could not ignore the requirements of providing roads, lighting, water, and sewers to these newly annexed areas.

Part A of this report was the relief of the East Jefferson sewer system. The area studied was 36,000-plus acres, or six square miles. The intent was to add a sewer to supplement an existing sewer that would not be able to handle the expected load when

¹²⁷ Special Commission Sewage Disposal, *Sewage Disposal Detroit*, 1925, p. 22.

the other two projects, the sewerage of the Fox Creek district and the increase in size of the Connors Creek outlet, were to be completed simultaneously. The plan recommended by the Special Committee on Sewage Disposal provided for the discharge of the sewage from the Connors Creek district and the Fox Creek district into the existing Jefferson Avenue main sewer. The existing sewer ran from Cadieux in Grosse Pointe Park to the Fairview Pumping Station on Jefferson Avenue. The plan was to provide for the eventual built community, buildings, and population, and to accommodate the anticipated runoff from a ten-year storm.¹²⁸ The relief sewer was designed to take the sewage flow from Fox Creek and Connors Creek with an estimated cost of \$4.9 million. The sewer was to be located below the existing sewer arms, which were connected to the Jefferson Avenue sewer; these sewer arms would then be connected to the new sewer.¹²⁹

The Fox Creek Sewer District occupied twenty-five square miles. The suggested plan was to build a sewer in the creek bed from Vernier Road to the intersection of Ashland Avenue and Jefferson and then an open sewer to Lake St. Clair. The Fox Creek District's boundaries were located on the north by the Wayne County-Macomb County line, on the east by Lake St. Clair, on the West by a line from Lake St. Clair parallel to Alter, Newport, Dickerson, Aspen, Chalmers, and (Unknown) Line Road to the Wayne County Line.¹³⁰ The anticipated future population of this district was 344,000. Fox Creek had three city sewers discharging into it. The conditions were considered unhealthy, as it was a mosquito breeding ground. During storm conditions, the flow of

¹²⁸ Harrison P. Eddy, *East Side Sewerage and Storm Water Relief for the City of Detroit*, Detroit, Michigan 1926, p. 10.

¹²⁹ Eddy, *East Side Sewerage*, p. 10.

¹³⁰ Eddy, *East Side Sewerage*, p. 15.

the storm and sewage water sometimes reached the water intake of the water treatment plant.¹³¹ The plan was to divert the Fox Creek storm water and sewage through the proposed East Jefferson Relief sewer to the proposed Connors Creek outlet. Under normal dry weather conditions, the low-volume sewage would flow into Lake St. Clair, while under storm conditions, through a series of gates and pumps, the high-volume storm water and sewage would be diverted into the Jefferson Avenue relief drain. Under extraordinary conditions, occurring six to eight times a year, this system would be unable to contain the volume of water and would overflow into Lake St. Clair, threatening the water supply. This was better, however, than the estimated 100 times a year that was presently occurring.

The proposed work at Connors Creek outlet was designed to stop sewage flow into the river above the water works intake. Eleven gates, ten feet by ten feet, would stop the river water from entering the Connors Creek sewer. Only when the sewer water level was higher than the river level, during storms, would the gates be opened to allow the storm flow to enter the river.¹³² This backwater gate structure was to be constructed at one end of the proposed fifty-feet-wide by thirty-feet-deep open channel that would run from the end of the Connors Creek sewer, at Clairpointe Avenue, to Freud Avenue, then to Fairview and finally to the river. The cost was estimated at \$3.1 million.¹³³

The authors of this report were very concerned about sewage-polluted water entering the Belle Isle water intake. Another consideration expressed throughout was for wastewater treatment. They provided many reasons for the need for a joint sewerage

¹³¹ Eddy, *East Side Sewerage*, p. 16.

¹³² Eddy, *East Side Sewerage*, p. 6.

¹³³ Eddy, *East Side Sewerage*, p. 6.

project for the Fox Creek area. Their final point was that it was “Clearly indicated that the entire district should be treated in a single comprehensive manner as a single sewage and drainage unit.”¹³⁴ Another consideration - that of separate versus combined sewers - was discussed. Once again, cost was the largest deterrent, as “The expense involved in such duplicate connection must be borne directly by the building owner.” Homeowners would also be burdened with indirect costs transferred to them by the municipalities. The authors also noted the difficulties of administering the separate system. Mentioned are sewers hooked up to storm drains and storm runoff going into separate sewers. The water intake on Belle Isle was located two miles downstream and one thousand feet offshore from Fox Creek and four-fifths of a mile and two thousand feet from the Connors Creek outlet.¹³⁵

The city was committed to taking its water from the American Channel of the Detroit River at the north end of Belle Isle. Wherever this water was taken from, the Detroit River, the St. Clair River, or Lake St. Clair, it had to be filtered and purified. The Belle Isle location at times would be subject to high pollution levels because of weather conditions, storms, reverse currents, and high winds. Other contamination came from upstream cities and river traffic.¹³⁶ The population of this area was 202,000 in 1926 and estimated to increase to 931,500 by 1965.¹³⁷ The author mentions storm runoff occurring one hundred times a year and severe storms adding up to 5,000 cubic feet per second of water to the Connors Creek outlet. Under these conditions, polluted water entering the

¹³⁴ Eddy, *East Side Sewerage*, p .17.

¹³⁵ Eddy, *East Side Sewerage*, p. 20.

¹³⁶ Eddy, *East Side Sewerage*, p. 25.

¹³⁷ Eddy, *East Side Sewerage*, p. 26.

Detroit River reached the waterworks intake. In this report, the author made extensive use of the 1913 IJC Report, the 1915 Hubbell Report, and the 1925 Fenkell Report to support the recommendations presented. The purpose of this study was to eliminate any sewage from entering the river around Belle Isle. To achieve this, sewage in Fox Creek was to be diverted through the East Jefferson Relief tunnel to the Connors Creek outlet. At Connors Creek, the sewage was to be diverted into the Jefferson Avenue sewer, “whence it will be conveyed to the sewage treatment plant.” At Connors Creek, it was anticipated that 4.7 million cubic feet of sewage could be retained, and then flow through the diversion sewer into the Jefferson Avenue sewer to the planned treatment plant. With this plan, no sewage in dry weather would go into the river. In storm conditions, sewage from Fox Creek at Windmill Pointe, which were considered discharges of limited occurrence and small duration, would still occur. At Connors Creek, anticipated storm discharges would occur thirty times per annum.

The authors’ conclusions were that there would be “six or eight large and unavoidable storm discharges from the Fox Creek outlet yearly.” The discharges were likely to cause contamination at the waterworks intake.

There may be sixty discharges of all intensities and probably ten or twelve heavy discharges from Connors Creek. Under normal conditions these discharges would not reach the water intake. Under low river velocity or river reversal the polluted water would reach the water intake.¹³⁸

Because the river water diluted the sewage, the polluted water entering the treatment plant would still be treatable, as it would not exceed the pollution level the plant could handle. The operators needed to be vigilant at these times to purify the waters and be

¹³⁸ Eddy, *East Side Sewerage*, p. 31.

aware of the additional contamination.¹³⁹ A final warning was issued: “In view of the large population exposed to possible infection it is advisable in so far as is practicable, to prevent all danger of contaminating the water supply.”¹⁴⁰

The “Final Report” of *Sewage Disposal for the City of Detroit*, December 1925, makes mention of the fact that in June 1925, recommendations made by Harrison P. Eddy for the temporary relief of conditions in Baby Creek and Fox Creek were submitted to City Council, approved, and eventually carried out.¹⁴¹ Similar to Fox Creek, Baby Creek on the west side of Detroit received sewage, and dry weather conditions were problematic as there was not enough water volume to flush the sewage, leaving it to decompose in stagnant pools. The engineers proposed that diversion of the sewage take place by constructing an overflow weir at the outlet at the Lonyo Sewer and pumping the sewage through a pipe to the Central Avenue sewer. Eddy proposed another diversion at the Morrell Street Sewer. The estimated cost for the diversion of sewage from Baby Creek was \$1,470,000.¹⁴²

Summary

The 1861 Board of Sewer Commissioners report was the first plan of sewers for the city. The consequences of the decisions made then are still in existence today, and the combined sewer decision has shaped sewer policy ever since. Fiscal responsibility shows itself in this report through the judicious use of evenly spaced sewers, the limited

¹³⁹ Eddy, *East Side Sewerage*, p. 32.

¹⁴⁰ Eddy, *East Side Sewerage*, p. 32.

¹⁴¹ Special Committee, *Sewage Disposal*, p. 12.

¹⁴² Special Committee, *Sewage Disposal*, p. 21.

number of outlets to the river, and the decision not to provide for accommodating the maximum storm rainfall.

The 1916 Hubbell report was a response to the 1914 IJC report and the 1911–1913 Public Health Service Reports. Hubbell recommended that the city move the water intake to the head of Belle Isle. He proposed building either three Imhoff sedimentation plants or five Reinsch-Wurl screening plants along with interceptor sewers. Hubbell's plans also included projections for a fifty-year horizon. His plans were for combined sewers without a great extra capacity for storms. He realized that under storm conditions, sewage overflow into the river would occur, but the extra cost was not justified.

His examination of the sewage problem had a scientific methodology and an analytical approach. Biochemical Oxygen Demand calculations determined the carrying capacity of the river. Costs were projected under different scenarios and for different time periods. Hubbell realized that sewage in the river was only one type of pollutant; surface runoff and river traffic were other contributors. He proposed that the river traffic's sewage be contained in holding tanks and processed before disposal.

Both the 1920 Special Sewer Commission report and the 1925 Fenkell Report of Hubbell, Eddy and Gregory recommended a single downriver sedimentation plant. Primary treatment of sewage was proposed but provisions for activated sludge were mentioned. Immediate construction of intercepting and diverting sewers was recommended. Activated sludge was also considered and provisions for expansion were proposed.

The 1922–1925 Detroit Bureau of Governmental Research authors felt that the primary problem was the obligations of the Boundary Waters Treaty to find a better way

to deal with sewage. Sedimentation was chosen as the best method, concurring with the 1916 Hubbell report, the 1920 Special Sewer Commission Report and the 1925 Fenkell Report.

The 1926 Report on East-Side Sewerage and Storm Water Relief made specific recommendations in preparation for a wastewater treatment plant, including diverting sewage from Fox Creek and building sewers so that the sewage would go into the river below the Belle Isle Water Intake. This report depended heavily on surveys done for the 1925 Fenkell Report.

Conclusion

After the 1861 report that laid out the initial city plan for a sewer system conditions to relieve the city of sewage constantly changed. Increasing population, and in certain sections population density was a constant. Accommodating larger tracts of land meant additional sewers and adding miles to existing sewers. The planned capacity for this first system was 285,000; this population was reached in 1900. By this time there were 167 miles of main sewers and 328 miles of connecting sewers.

By 1910 the population was 465,766 expanding to over 679,000 by 1916, with over 237 miles of main sewer and 644 miles of connecting sewers. Sewage treatment was covered extensively in the 1916 report with two existing methods of treatment proposed as solutions. These alternatives with suggested site locations were proposed. No formal activity followed this report. At this time the war effort was interfering with civic works, bonds for civic construction were not being allowed to be floated, so financing would have been difficult. Construction costs were rising as the main thrust of the nations efforts were towards supplying the Allies with war material. Extensive sewer

construction continued, the bonds financing this had been floated before restrictions were imposed. By 1921 an additional 46 miles of main and 196 miles of connecting sewer were built. Building additional sewers since 1900 had cost over \$14,700,000.

The later reports from 1920, 1922, 1925 and 1926, while still considering the two proposed methods also look at improvements to the technology of wastewater treatment. These clearly identify Imhoff Tanks as superior in removing impurities. A new method of cleaning wastewater, activated sludge, was now being used. This method combined with the existing technologies was cleaning up to 99 percent of pollution out of effluent. Another thing that had to be considered was that the sites and their availability identified in earlier reports no longer existed. The drainage area of the city had increased by nearly 100 square miles going from 48 to 138 by 1925. The population had increased from 678,00 in 1916, to 993,00 in 1920 and 1.5 million by 1925. The additional square mileage added between 1921 and 1925 in the far northeast, the northwest and west of the city made all of the previous reports unusable.

Presented with all of these changed conditions it was necessary for the administration to get revised and updated reports. The increased volume of sewage and both the data and information received from site visits to operating wastewater treatment plants in other locales lead to the more definite recommendations contained in these later reports. The increase in buildings, roads, sidewalks and other paved surfaces affected the water carrying capacity of the natural terrain resulting in the necessity for additional sewers, and further increasing the volume of storm water which had to be accommodated. The preliminary report of the Special Committee on Sewage Disposal issued in April 1925 said:

The growth of the city to the northeast and northwest has precipitated the question of the tributary streams into the discussion. Connor's Creek, Baby Creek and River Rouge all call for prompt action. In view of the expenditures involved in any construction program, it is said, no plans should be adopted based on studies more adequate than the 10-year old surveys, which are now the only ones available. The unusual increases in cost, the advance of the science of sewage disposal and the phenomenal growth of our city, have combined to make this information insufficient.¹⁴³

¹⁴³ "Sewage Board Appoints Aids," *Detroit News*, 5 April 1925.

Chapter Four-The Choice of Technology.

The story of building the wastewater treatment plant in the 1920's and 1930's falls into several areas. The main concern of Detroit officials was to protect the water supply from sewage. Protecting the Detroit River from pollution was of secondary concern. To protect the water supply, all sewer outfalls on the east side of the city had to be located below the Belle Isle Bridge. This meant that interceptor sewers had to divert sewage from Connors Creek and Fox Creek before they reached their natural outlets into the Detroit River. Interceptor sewer construction preceded the wastewater treatment plant activities but was a necessary part of the overall long-term plan. Interceptor sewer construction slowed in 1931 and ceased in 1932 when the funding obtained from bonds was exhausted. It was restarted in 1936 and completed in 1937 with federal funds.¹ Detroit officials knew that the diversion of sewage downstream was only a temporary measure and that the long-term solution was wastewater treatment. Eventually, Mayor Smith was able to get wastewater treatment back onto the agenda through his 1925 *Sewage Disposal for the City of Detroit* report and the Common Council approval vote.²

It took from December 1925 to June 1940 to fully implement the recommendations from the 1925 report. The Common Council meetings and investigations to settle on the technology of sewage processing that the wastewater plant would use lasted until November 1926. Once the technology question was resolved, the plant's location became an issue. Inter city politics intervened and this stopped Detroit from pursuing their preferred location. Next, through pressure from adjoining

¹ *City of Detroit, Annual Report 1942*, Detroit, Michigan, 1943. Miles of interceptor sewer completed in 1931–1932, was 4.26, in 1937–1938, 8.62 miles.

² Special Committee on Sewage Disposal, *Sewage Disposal for the City of Detroit*, Detroit, Michigan 1925.

municipalities, it became an issue of a local versus an area-wide wastewater plant. Investigating this approach with discussions of plant locations, associated costs, and funding issues produced no practical solution. Further delays occurred when Detroit transferred the project to Wayne County where it languished in a county commission and eventually became “Pigeonholed”. Resurrected as a city project, the poor economy, resulting in a drop off in tax collections, and the inevitable lack of funds halted it once again. A further effort as a joint City-County project met with no success because of funding legalities. Finally, agreement between the City and the Federal Government provided for the plant’s funding as a city-only project.

Once the parties settled the funding problem, issues of site selection and condemnation commenced. The final phases of design, bid letting, and construction proceeded without any major problems. The city had to acquire additional construction financing because of the complexity of the project and inflation. The city could not meet the original completion deadlines because of the complex final phases of construction, which necessitated requesting numerous time extensions. These time extension requests to the Federal government were because the documents required to qualify for the financing of the project disqualified bid letting or payments to contractors after these deadlines passed.

The Wastewater Treatment Plant

The Common Council received the 1925 *Sewage Disposal for the City of Detroit* report on December 17, 1925. It took almost a year to accept the report and approve a plan to build a wastewater treatment plant. The report proposed various methods of

sewage treatment, along with the authors' recommendations.³ One constant in all of the reports and proposals was the necessity to build intercepting sewers to funnel the sewage to disposal plants. Part of the ongoing sewer construction in the 1920s had been the Connors Creek, Fox Creek, and Ashland Avenue sewers. By the time this report was produced, there was already a consensus that no matter which method of sewage treatment was decided upon, the treatment plant(s) would be located adjacent to the interceptor sewer outlet to the river. As the years progressed, these could have been located at the Connors Creek, Baby Creek, and Fox Creek outlets. As the Detroit River Interceptor was being built, a plant could be constructed at its terminus. Similarly, as the Oakwood Interceptor and Southfield Sewer were constructed, logical placement of plants would occur at their outlets.

Councilman Bradley had previously introduced a resolution on July 1, 1924 requesting the DPW "To cause a study to be made as the matter of sewage disposal, having particular reference to the construction of one large collecting sewer along the City's riverfront and terminating at a treatment plant at or below the City." The resolution also said "Whereas there is urgent necessity of finding some route of east and west traffic parallel to Jefferson Avenue, and whereas, it may be ascertained that by building an intercepting sewer along the waterfront, a driveway may be provided..."⁴

Continuing in this same line of thought, a *Detroit News* editorial on December 22, 1925 asked whether the United States Government would extend the harbor line sufficiently so that the city could build a large intercepting sewer in the riverbed and

³ "Sewage Plan Given Council," *Detroit News*, 18 December 1925, p. 1.

⁴ *Journal of the Common Council of the City of Detroit*, 1 July 1924, Detroit, Michigan 1925, p. 1575.

create a waterfront boulevard by filling in this portion of the river. This appeared to be a good idea, as it solved the question of the reconstruction of the Detroit waterfront and would put Detroit on a par with Paris and Budapest. Both Paris on the Seine and Budapest on the Danube had an open wide commercial thoroughfare, and which allowed a view of the river but hid the view of the docks unless one looked over the balustrade.⁵

On March 21, 1926, William H. Adams, former chair of the Board of Commerce Committee on Port Development, proposed in the Sunday *Detroit News* a “plan to solve port and sewage problems.”⁶ The article said “a plan which the News offers to the consideration of the citizens of Detroit as an alternative for the proposed laying of a huge intercepting sewer under Jefferson and West Jefferson to carry the sewage of the city to a great disposal plant on the west side.” The article summarized the activity pursuant to sewage treatment on the Detroit River since 1915 and stated, “Since that time, proposals for sewage disposal have been before the Common Council continuously. “ The 1925 *City of Detroit Annual Report* noted, “No actual construction work has been accomplished on the city’s sewage disposal program with the exception of some purely temporary remedial measures in Fox Creek, Connor Creek, and Baby Creek.”⁷

The proposal in the 1925 report to build an intercepting sewer along Jefferson, to build diverting chambers in the north-south sewers while the Detroit River Interceptor was being built, and to build “stub ends” between the north-south sewers and the Detroit River Interceptor was deemed too costly by Adams. Instead, Adams said the city could

⁵ Editorial, “The One Best Method,” *Detroit News*, 22 December 1925.

⁶ Adams was a civil engineer who had been chairman of the Inland Waterways Commission of the Detroit Board of Commerce.

⁷ *Annual Report City of Detroit*, Detroit, Michigan 1925, p. 145.

build a motor highway along the river in connection with a new location for the Jefferson Avenue Sewer. Adams proposed placing a sewer in front of the harbor line from the Belle Isle Bridge at the intersection of East Grand Boulevard and Jefferson to West Grand Boulevard and Jefferson. He said that the city should secure the authority to extend the harbor line to construct a highway. Adams said that below West Grand Boulevard, the river was 1,800 feet wide; while above East Grand it was 2,600 feet wide. He proposed that the sewer could connect to the Jefferson Avenue sewer above the Belle Isle Bridge and at West Grand Boulevard the sewer could be routed back to West Jefferson and connect to the proposed city sewer leading to the wastewater treatment plant. His rationale was that there was heavy traffic on Jefferson, and massive disruption would occur during construction of the sewer. The proposed sewer built on land newly constructed from fill would not have these traffic problems, and the building materials could be delivered from the river.

Adams wanted a 110-foot extension of the harbor line, thirty feet for Lake and Ocean shipping dock use, and a 200-foot extension where the river was very wide. Adams's rationale was that the five miles of the Detroit River Interceptor running through the heart of the city was the most expensive. Constructing it on filled land and adding a limited-access highway above it was not any more expensive and would provide the city with a first-class riverfront drive similar to Chicago's.⁸ In the following days, the *Detroit News* reported that many people endorsed the plan, but it appears that it did not advance beyond this proposal.⁹

⁸ "Plan To Solve Port And Sewage Problems," *Detroit News*, 21 March 1926, Realty Section, pp. 1, 2, 13.

Technologies To Be Used

The Common Council had received the report proposed by Mayor Smith and prepared by the civil engineers Clarence W. Hubbell, John H. Gregory, and Harrison P. Eddy in December 1925, but it was not until October 1926 that hearings began on the relative merits of the two competing methods of sewage treatment, Reinsch-Wurl screening and Imhoff tank sedimentation.

Screening used a large fifteen- to twenty-five-foot perforated disk with one-half- to three-quarter-inch openings. The disk rotated in a conduit with influent flowing by. The larger particles of solid matter were deposited onto the disk and then swept off onto conveyor belts and disposed of. The remaining effluent was then deposited into a body of water. Sedimentation tanks had fixed screens with three-quarter-inch openings. The influent flowing through them deposited matter, which was removed onto conveyors by mechanical rakes. The effluent then was slowed down in tanks where the solids, grit, and sand separated out, and then were mechanically collected and disposed of. The remaining effluent entered large-capacity tanks with a slow rate of flow. Here the suspended particles descended to the bottom of the tanks and were mechanically removed and disposed of. The remaining liquid was disinfected with chlorine and deposited into a body of water.

On October 25, 1926, the Common Council said that a decision would occur within ten days. The need for the ten-day decision was so that John W. Reid,

⁹ "Harbor Plan Draws Praise," *Detroit News*, 22 March 1926; "River Drive Plan Drafted," *Detroit News*, 28 February 1941. After the completion of the wastewater plant in 1941, a similar proposal to build a riverfront drive arose when the City Planning Commission was given a plan for a forty-mile route from Grosse Pointe to the mouth of the Huron River. This plan, however, was more concerned with the military importance of connecting the Wayne County Airport, the Naval Reserve Air Base on Grosse Ile, Fort Wayne in Detroit, and Selfridge Field in Macomb County.

Commissioner of Public Works, could estimate the cost of sewer construction for the next year's budget. This decision - one sedimentation plant or two or three screening plants - would affect where sewers were laid.¹⁰ This announcement came after a Common Council meeting at which William L. D'Olier, President of the Sanitation Company of New York—a company that possessed the licensing rights for Reinsch-Wurl screens in the USA—had requested that the Common Council allow him to attend their meeting and make a presentation.¹¹

D'Olier read a very long report about the merits of his screens. He said that since the report of the International Joint Commission in 1916, screening technology had improved significantly and now met international standards, whereas sedimentation tanks had only improved slightly. Furthermore, if tanks were not operated properly, they became breeding grounds for bacteria.¹² Present at the council meeting was Harrison Eddy, one of the authors of the 1925 report that had recommended sedimentation tanks. Councilman Bradley asked him if the D'Olier report had changed his opinion of the screening system. Eddy replied, "Absolutely not, my recommendation is exactly the same as it was." Asked about activated sludge by Councilman Callahan, Eddy said it was not required and that simple, primary sedimentation was sufficient. The Common Council was split on accepting the 1925 report: William P. Bradley, John C. Lodge, Fred W. Castator and Arthur G. Dingeman were for it, while John C. Nagel, Sherman

¹⁰ "Council Hears Two Sewer Plans," *Detroit News*, 26 October 1926.

¹¹ Johns Hetmanski, "Dedication of Detroit's New Sewage Plant Will Bring to Conclusion 30 Years of Delay," *Detroit Free Press*, 10 March 1940, D'Olier was shot to death two years later on the eve of the day when he was to give grand jury testimony on the Queens Borough sewer graft investigation.

¹² There were no IJC reports published in 1916. There was rather the *Hearings of the International Joint Commission in Re Remedies for the Pollution of Boundary Waters Between the United States and Canada*, Washington, D.C., 1917, that D'Olier was referring to, with a reference to screening on page 36.

Littlefield, and Philip A. Callahan were opposed. John Stevenson and Robert G. Ewald were undecided. Dr. Henry Vaughan, Commissioner of Health, was in favor of the sedimentation tanks but said that he spoke only for himself and would not commit the Detroit Board of Health.¹³

D'Olier recommended to the Common Council that the city immediately build one screening plant near the Belle Isle Bridge at Helen Avenue, at the end of the partially completed Detroit River Interceptor, for a cost of \$4.6 million. He said that it could be completed within one year and “later you could build your other plants but would not have to wait until the entire system was built before cleaning up the river.” In addition, “if the screen system proved inadequate, and he contended it would not, the screened effluent could be carried down the river, through an interceptor to a tank plant and be treated.” Council Callahan then asked Eddy if seven years was the shortest time the tank system could be built. Eddy replied, “The seven year period was taken as convenient for the work and also for the city to finance.”¹⁴

D'Olier spoke again on November 12, 1926, for one and a half hours before the Common Council about Reinsch-Wurl screens because council members Nagel and Stevenson had allowed him to reply specifically to the 1925 report. This stopped Councilman Bradley and Dingeman from moving forward with a motion to vote on this report. Nagel had allowed D'Olier to speak for two hours and fifteen minutes at the previous Common Council meeting on October 25 and then succeeded in getting a two-week adjournment to provide another report. Civil engineers John H. Gregory and Harrison P. Eddy were questioned at the November 12 meeting and refuted the claims

¹³ “Vaughan Urges Sewer Tanks,” *Detroit News*, 26 October 1926.

¹⁴ “Vaughan Urges Sewer Tanks,” *Detroit News*, 26 October 1926.

made by D'Olier about the efficiency of screens. They cited statistics where the highest degree of removal of solids by screens was 27.5 percent and the lowest 2.8, while for sedimentation tanks it was 89 percent with the lowest at 42.1 percent. This clearly indicated that sedimentation was superior to screening. D'Olier then said that the sedimentation tanks at Philadelphia were not working, but Eddy claimed that in fact they were and removing from 76 to 82 percent of the solids.¹⁵

In a November 12, 1926 letter to his wife, Clarence W. Hubbell wrote, "Last night Eddy, Gregory, Hartgering and Roth came out to the house to go over our reply to the screen propaganda which they presented to the Common Council this afternoon. I will not go down. Providentially for our case we found that the back flow of the River on Feb. 26 [1926] caused 200,000 cases of sickness in spite of the filter plant."¹⁶ Gregory stated this fact at the council meeting and Dr. Henry Vaughan substantiated it. The cause of contamination of the water supply was attributed to the river's reversal because of strong winds, resulting in sewage going into the water inlet. Hudgins showed that these reversals, as reported by the Great Lakes Survey Office, occurred on seven occasions between 1909 and 1926.¹⁷ The *City of Detroit Annual Report 1926* noted this as "on February 25th a 'Flash' of polluted water from Connors Creek entered the intake."¹⁸ At

¹⁵ "Sewage Vote Again Held Up," *Detroit Free Press*, 13 November 1926, p. 1.

¹⁶ Bentley Library, Hubbell Family, Clarence Hubbell (Husband of Winifred) correspondence to Winifred and family 1902-1926; University of Michigan, Ann Arbor, Michigan. The water works by this time were filtering and chlorinating water.

¹⁷ *Detroit Free Press*, 13 November 1926; Bert Hudgins, *A Geographic Study of the Water Supply Problems of Detroit Michigan*, (Ph.D. diss., Clark University, Worcester Mass, 1930), p. 161. These reversals occurred on 5 February 1909, 6 February 1911, 21 March 1913, 31 January 1914, 1 February 1915, 10 April 1918, and 5 December 1926.

¹⁸ *City of Detroit Annual Report*, 1926, City of Detroit 1927, p. 198.

this meeting, Eddy pointed out that the screen system D'Olier had proposed had never been built or put into operation.

Councilman Bradley was very upset with D'Olier and with Councilmen Nagel, Stevenson, and Littlefield, stating:

There is no doubt in my mind that the city council is being made to look ridiculous before the great mass of people who understand the sewage disposal question. Most of the time is being monopolized by a salesman [D'Olier] who seeks to have the council adopt a plan which is diametrically opposed to the one recommended to us.¹⁹

Bradley asked the council why, if they wanted to listen to sales talks, they would listen to only one, since there were dozens of screen manufacturers who got better results than the ones made by D'Olier.²⁰ Bradley also questioned why they were paying \$200 a day for the expert services of Gregory and Eddy if a sales clerk was allowed to refute their recommendations.

A *Detroit Free Press* editorial the same day warned that if there were an epidemic from water pollution, it would be the Common Council's fault:

A public danger has arisen because of the obstinate attitude of certain members of the common council, who, under the influence of a representative of an interested private corporation, are desperately championing the screen system of sewage disposal and are apparently determined to block fair consideration of any other system.²¹

Councilman Dingeman said that Councilman Nagel had invited D'Olier to meet the council members while they had visited sewage plants in the east in June 1926.²² A *Free*

¹⁹ "Bradley Hits Sewer Dispute," *Detroit Free Press*, 15 November 1926, p. 2.

²⁰ "Bradley Hits Sewer Dispute," *Detroit Free Press*, 15 November 1926, p. 2.

²¹ Editorial, "It Will Be Their Fault," *Detroit Free Press*, 15 November 1926.

²² "Point To Nagel As Source Of Mix Up," *Detroit Free Press*, 16 November 1926.

Press editorial suggested, “A recall would be good,” continuing “and while those councilmen persist in their present conduct, they are not fit to be public servants entrusted with large responsibilities.”²³

While some public officials, including Commissioner of Public Works John W. Reid and City Engineer Perry A. Fellows, had been advocating the sedimentation plan, others were not as committed to it. Because the question of sewage disposal was primarily a health question, acting Mayor John C. Lodge had requested that the President of the Board of Health, William H. Maybury, and the Commissioner of Health, Dr. Henry F. Vaughan, give him “their ideas and best judgment.” They both issued communications to the press saying the city should quickly build the interceptor sewer for the plant.

Vaughan said that the city should examine new methods of sewage treatment and that there was time to do this while the city was building the intercepting sewer. He thought that all sewage:

Should be carried by means of an intercepting sewer to a point approximately opposite the western most limits of the city or beyond. I feel that the construction of this interceptor should not await any final conclusion as to what form of sewage treatment plant shall ultimately be accepted. As there have occurred in recent years new developments in the methods of sewage treatment, and as it will take some time to complete the intercepting sewer, I feel that it would be quite proper for the City of Detroit to study the application of sewage treatment methods to local conditions, and within a few years it should be possible to say with reasonable certainty whether the tank system or the activated-sludge system or screens, will best cope with Detroit's problems.²⁴

²³ Editorial, “A Recall Would Be Good,” *Detroit Free Press*, 16 November 1926.

²⁴ *Journal of the Common Council of the City of Detroit*, 16 November 1926, Detroit, Michigan 1927, pp. 3434-3435.

The resulting *Detroit News* editorial said that the suggestion to postpone a decision regarding the type of sewage disposal plant was weak. This editorial came out positively for the tank system and stated, “Every qualified expert says that screens will not do for Detroit.”²⁵

Maybury proposed a similar approach, advising that the city should wait on deciding what treatment method should be used while the intercepting sewer was built. He thought that the sewer should end at a point farther south, below Trenton, as there was no data on how far sewage would travel upriver when the Detroit River reversed course. He also proposed that Wayne County join with the City to provide service for the entire county, especially for the communities “South on the river front where the harmful results are most prominent.” He said, “I believe it unwise at this time to definitely decide upon a form or make of disposal plant... If now constructed there is no means of making it operative as no provision has been made for sewer lines to reach it.” He stated that if a plant was built at the Rouge site, as suggested in the report, another one would be required later to the south or west. Here the “solid accumulations could be used for filling purposes and the overflow would immediately enter Lake Erie where its volume of water, its currents and open space, would eliminate for all time any hazard to public health.”²⁶

Councilman Nagel issued a statement explaining his position as one of fiscal responsibility. He calculated that the Imhoff tank installation, including activated sludge and engineer’s fees of \$3.6 million for tanks and \$1.5 million extra for activated sludge, would cost \$61.5 million and the Reinsch-Wurl screen system would cost \$27.5 million.

²⁵ Editorial “No Excuse For Delay,” *Detroit Free Press*, 17 November 1926.

²⁶ “Officials Ask Sewer Action,” *Detroit Free Press*, 17 November 1926, p. 1.

He said that screens were \$34 million cheaper and with the city's strained financial system this was not to be scoffed at. He suggested that an experimental screen plant could be constructed in under a year at the soon-to-be-completed Helen Road sewer outlet, echoing D'Olier's suggestion.²⁷

The November 20, 1926 edition of the *Detroit Saturday Night Magazine*, reprinted in the *Detroit Free Press* on November 17, 1926 summarized the events from the past year with a report entitled "Councilmen Jeopardizing the Public Health."²⁸ The report said that the 1925 report warned that a reversal in the Detroit River "might easily lay a blanket of death over the city that would be appalling." In February 1926 a reversal had happened and 200,000 people got sick, yet the "Council ignored this alarming occurrence with the same somnolent complacency that it ignored the recommendation of the committee." The article continued by saying the report was pigeonholed until June 1926, when "some interest in it was manifested by a junket to the east by six councilmen for the ostensible purpose of thoroughly investigating various methods of sewage disposal." The article said that once the committee met D'Olier, "undoubtedly America's leading sewer lobbyist," the investigation mostly visited screening plants, inferring that D'Olier manipulated the visits. A few tank systems were inspected but they were not representative of efficient tank performance. The article noted that D'Olier had taken up the majority of the time at two public hearings, while the experts were given less than one

²⁷ "Officials Ask Sewer Action," *Detroit Free Press*, 17 November 1926, p. 1.

²⁸ "Bickerings of Council Over Sewage Plant Hit," *Detroit Free Press*, 20 November 1926. The Free Press reproduced this article in full.

quarter of the time. At the last meeting when a vote was scheduled to be taken, D'Olier was instead given an extra two weeks to file additional arguments.²⁹

The article then discussed Councilman Nagel and a letter that he had sent to the editor of *Detroit Saturday Night Magazine* in July, after the editor had criticized the Common Council for delay in adopting the 1925 report's recommendations. Nagel had said that tanks were unnecessary, cost more than the 1925 report's estimate, and that a tank sedimentation plant would generate lawsuits for damages from adjoining property owners. He said that the danger from water pollution had been eliminated by the construction of the interceptor sewer below the Belle Isle water intake. This remark was in conflict with the testimony of expert engineers, who said that water from as far downstream as Joseph Campau had reached the intake.³⁰

The *Detroit Saturday Night Magazine* article mentioned the Vaughan and Maybury communications and their urging to build an interceptor sewer. The author warned about voting for the screen system. He cautioned that if the vote was taken for the screen system, there should not be any specifications written that appeared to favor any one screen manufacturer. This was in reference to the Reinsch-Wurl system with D'Olier as the one to profit. This article finished by saying that the council members favoring screens should cease a course of action that made them and their city ridiculous and endangered the public health.³¹

²⁹ "Officials Ask Sewer Action," *Detroit Free Press*, 17 November 1926, p. 1.

³⁰ "Bickerings of Council Over Sewage Plant Hit," *Detroit Free Press*, 20 November 1926, Reprint of *Detroit Saturday Night Magazine* "Council Jeopardizing the Public Health" edited by H. M. Nimmo, 20 November 1926.

³¹ "Bickerings of Council Over Sewage Plant Hit," *Detroit Free Press*, 20 November 1926, Reprint of *Detroit Saturday Night Magazine* "Council Jeopardizing the Public Health" edited by H. M. Nimmo, 20 November 1926.

The Down River League of Municipalities endorsed the Imhoff sedimentation tank plan before the Common Council. This was a surprise, as they had also informed the council they would resort to court action if the city built a plant in River Rouge.³² The plant's location was specified in the report and acceptance of the report signified acceptance of its location. John C. Lodge, President of the Common Council, received a letter from the league on November 26, 1926, saying that the league would oppose any plan that did not provide protection for the downriver communities. The group argued that sewage disposal was not a question that the City of Detroit alone should decide; it was a problem for Detroit and the downriver communities and should be treated as such. The communities were opposed to the site location in the City of River Rouge and to any solution that did not include the league. The letter concluded with the statement: "Typhoid and other disease germs do not respect municipal boundary lines."³³

The league requested that a joint commission be formed to consider the question of sewage disposal, as it affected both Detroit and the downriver district to Lake Erie. The letter said that the territory south of the River Rouge and extending to the Huron River would have a population of 1.5 million people in ten to fifteen years. The City of Detroit should not make any decisions on the basis of its sewage alone, as the sewage must necessarily pass along the shores of the downriver municipalities and affect their health.

³² "Sewage Vote Held Up Again," *Detroit Free Press*, 13 November 1926, p. 3.

³³ *Journal of the Common Council of the City of Detroit*, 23 November 1926, Detroit, Michigan 1927, p. 3498. The league was comprised of the cities of Wyandotte, River Rouge, Lincoln Park and Fordson; the villages of Trenton, Sibley, River View, Ecorse and Melvindale; and the townships of Monguagon, Ecorse, Grosse Ile and Brownstown.

Maybury, President of the Detroit Board of Health, had suggested a site at a point south of Trenton, near Gibraltar, at the mouth of the Detroit River at Lake Erie. Perry A. Fellows, City Engineer, had suggested using the River Rouge site and building an interceptor sewer to carry the downriver towns' sewage north to the plant. The estimated cost of the Lake Erie site was \$63 million, compared to \$39 million for the River Rouge site. A suggestion by James Vernon of the Wayne County Board of Supervisors was for the county to build the Lake Erie site and finance it through a county bond issue. Maybury said that Detroit should pay the costs for a River Rouge plant and let the downriver towns and the county pay the rest.³⁴

A minority report presented to the Common Council by councilmen Nagel, Stevenson, and Callahan stated it was useless to adopt a plan calling for the expenditure of many millions of dollars when the 7-percent limit for bonds was already exceeded.³⁵ The reference was to a New York State law, the "So called New York 7% law which governs the sale of securities in New York which constitutes one of the principal markets for larger municipalities." The law forbade the legal investment of certain savings banks and insurance companies in New York in a city's bonds when the city's net debt exceeded 7 percent of its assessed valuation.³⁶

The minority report stated that because the city had exceeded the 7-percent limit for saleable city bonds, the proposed expenditure would compel the city to abandon every

³⁴ *Journal of the Common Council of the City of Detroit*, 23 November 1926, Detroit, Michigan 1927, p. 3498.

³⁵ "Joint Sewage Disposal Asked," *Detroit News*, 21 November 1926.

³⁶ "The Government of Metropolitan Areas," *Public Business*, Detroit Bureau of Governmental Affairs, vol. III, no. 11, 20 December 1924, p. 180; *City of Detroit Annual Report*, 1927, Detroit Michigan 1928, p. 12, Mayor John Smith in discussing the New York Bond law noted that the New York legislature may increase the bond limit from 7 to 10 percent.

other needed municipal improvement. Because the plant would take seven years to complete, Nagel said this “does not meet our notion of cleaning up the river at a reasonably early date.” He felt that the Detroit River, with “reasonable treatment of sewage” (i.e. D’Olier’s screens), provided a dilution factor of over 200,000 feet per second, which was more than ample to take care of Detroit’s sewage at much less cost. He said that it was not wise to bind Detroit’s hands seven years in advance of the slightest relief, when it was possible that better and cheaper methods of sewage disposal will be devised. He said the rights of neighboring municipalities should be considered. He finished by saying it was the collective opinion of Callahan, Nagel, and Stevenson that the plan adopted in the majority report was wasteful, extravagant, and not required by any existing necessity.³⁷

Nagel was in the news once again when he said that the United States Government had the final say on the sewage disposal plant, not the State of Michigan. Nagel said that William F. Connally, former judge and national Democratic committeeman, now the attorney representing the Sanitation Company of New York, had told him this. This response followed a statement by Dr. Richard Olin, State Commissioner of Health, that the state would oppose the installation of screens under a 1911 state law that gave it the power to condemn any disposal plant that did not meet with state health and sanitation standards. This dialogue continued in the next day’s press with information that Stevenson and Nagel had met previously with State Sanitary

³⁷ *Journal of the Common Council of the City of Detroit*, 30 November 1926, Detroit, Michigan 1927, p. 3683.

Engineer E. D. Rich on November 21, 1926, and that Rich had cited the 1911 law to them, which they apparently did not want to hear.³⁸

Finally, at the Common Council meeting of November 22, 1926, Councilmen Sherman Littlefield and John Stevenson announced they would not vote for a screen system. When interviewed, Littlefield said he would vote for the interceptor, as it was equivalent to a vote for the tanks. Stevenson said the City of Baltimore initially had an Imhoff System but had abandoned it for a sedimentation and filtration plant, and that the City of Cleveland had an Imhoff System but dumped its sludge back into the lake, furthering the pollution. He went on to say that even if an Imhoff system was approved, it would take seven years to complete, and the City of River Rouge would not permit the plant within its city limits. He then reverted to his pro-screen stance when he said, "If we put in the screens at Helen Avenue, there would be no danger of sewage backing into the city's water supply. The infection that has been cited comes from Connors Creek and that is being taken care of with the new sewer down Helen Avenue."³⁹

On November 26, Councilman William P. Bradley made a motion to have the Common Council accept the 1925 report advocating the Imhoff tank system, and four council members approved the motion. The official vote was set for the following Tuesday. During the Friday council session, D'Olier once again spoke for one and a half hours, as Councilmen Nagel was in the chair and could not be overridden. D'Olier was able to monopolize the last few council meetings because Mayor Smith was absent. Councilman Lodge, the chair, became the acting Mayor and could not vote, and Nagel

³⁸ "Sewage Screen Plan Doomed," *Detroit Free Press*, 22 November 1926, p. 1.

³⁹ "Two in Council Switch Sewer Screen Stand," *Detroit Free Press*, 23 November 1926, p.1, Stevenson was correct, Cleveland was dumping sludge into Lake Erie. It was thoroughly digested, having spent six months in sedimentation tanks.

became the acting chair. Mayor Smith was expected to be back in town for the Tuesday vote, and Councilman Dingeman, who had been injured in an automobile accident in Chicago, would return.⁴⁰ Each of D'Olier's appearances necessitated that the council bring Harrison P. Eddy from Boston and pay him \$200 a day.⁴¹

Finally, on November 30, 1926, the council voted 5–4 to accept the 1925 report advocating the Imhoff tank system. Council members Bradley, Castator, Dingeman, Ewald, and Lodge voted for it, while Nagel, Stevenson, Littlefield, and Callahan opposed.⁴² Once again, Nagel attempted to stop this vote by offering up a minority report, but this was not adopted. Had it been this would have halted the vote on the Imhoff tank plan.⁴³ The minority report that was rejected by a 6–3 vote included the statement,

It is our opinion that the plan adopted in the majority report is extravagant, wasteful, and is a plan not required by any existing necessity; and is admitted to involve ultimately a further expenditure of millions of dollars for further purification of [by?] activated sludge or other process.⁴⁴

Conclusion

The Progressive Era, 1890-1920, influenced to some extent the building of the Detroit plant. Progressivism reformed city administrations. In Detroit through the new city charter of 1918, brought about by bribery scandals of 1912, the ward system was

⁴⁰ "Council Hears Two Sewer Plans," *Detroit News*, 26 October 1926; "City to Build Sewage Tanks Vote Indicates," *Detroit Free Press*, 27 November 1926, p. 1.

⁴¹ "Screen Advocate Talks Expert Waits," *Detroit Free Press*, 27 November 1927. Eddy was an expert witness who was brought from Boston to listen to D'Olier's testimony and advise the Common Council on the validity of his statements.

⁴² "Council Votes 5 to 4 in Favor of Imhoff Tank," *Detroit Free Press*, 1 December 1926, p. 1.

⁴³ "Council Votes Tank System," *Detroit News*, 1 December 1926.

⁴⁴ "Tank Sewage Plan Adopted By Detroit City Council," *Engineering News-Record*, vol. 97, no. 24, 9 December 1926, p. 971.

eliminated. This partisan system elected 42 aldermen representing 21 wards. Many of these aldermen were corrupt. The 1918 charter replaced the partisan ward system with a non-partisan at-large system with nine council members.⁴⁵ Among its members was John C. Nagel, council member 1919-1927, 1930-1931. Nagel had also been an assessor 1907-1912 and had many contacts with businesses both large and small. He was an alternative representative to the Democratic National Convention in 1912⁴⁶. He placed second to John C. Lodge in the Common Council elections of 1922, 1924 and 1926. Because of this, he assumed the role of Council President whenever Lodge was absent, or when Lodge became acting mayor when the mayor was absent. These temporary assignments gave him a lot of power to run council meetings.

William D'Olier, President of the New York Sanitation Corporation attempted to sell the Common Council on a patented process, the Reinsch-Wurl Screening Process. Conditional on how many screening plants were constructed, a substantial amount of royalties would be earned by his company. It is likely that some type of financial incentive may have been placed before Nagel. Nagel spoke about fiscal responsibility and that the Reinsch-Wurl process would cost \$34 million less than Imhoff sedimentation tanks. There was never any discussion or stated costs on royalty payments for the Reinsch-Wurl process.⁴⁷ The very fact that D'Olier was assassinated in 1928, before he was to give testimony to a grand jury in New York, raises questions about his ethics and

⁴⁵ "Battle for 'Good Government' Spurred Early Charter Reform," *Detroit News*, 28 October 2001, p. 15.

⁴⁶ Sidney Fine, *Frank Murphy, The Detroit Years*, (Ann Arbor: University of Michigan Press 1975), p. 433; Clarence Burton, Editor in chief, Gordon Miller, Associate editor, William Stocking, Associate editor, *The City of Detroit Michigan 1701-1922*, (Detroit: S. J. Clarke Publishing Company)

⁴⁷ "Officials Ask Sewer Action," *Detroit News*, 19 October 1926, p. 1

criminal connections.⁴⁸ Nagel gave D'Olier an excessive amount of time to speak at these council meetings. These talks were essentially sales presentations, and qualified sanitation engineers present were limited in their presentation time. It is conceivable that D'Olier and Nagel had a financial agreement between them conditional on the Common Council choosing Reinsch-Wurl screens as the treatment method to be adopted. The city would have had to pay royalties to the New York Sanitation Company (D'Olier's company), which had the copyrights to the technology in the United States. D'Olier had also recently been awarded a patent for a screen cleaning system which would also be used and produce further revenue for him. The delay in adopting the method to be used conceptually could have been an attempt by Nagel to enrich D'Olier and himself.

Another explanation could be that Nagel seriously considered Reinsch-Wurl screening to be the solution. His zeal as an assessor is mentioned in newspaper articles all throughout his career, and even after he left this profession he was called back by Wayne County on special assessment projects.⁴⁹ In 1921 he examined operating wastewater treatment plants on the east coast and came back with a glowing report of the Reinsch-Wurl method.⁵⁰ He was consistent in his statements about the least inexpensive method of treatment, and said after his east coast visit that this method would save \$50 million over the Imhoff Tank method. He continued by saying that many sanitary engineers who had advocated the tank method now approved the screening method as being superior. This conviction of Nagel that Reinsch-Wurl Screening was both superior

⁴⁸ John Hetmanski, "Dedication Of Detroit's New Sewage Plant Will Bring To Conclusion 30 years Of Delay," *Detroit Free Press*, 10 March 1940

⁴⁹ "Nagel Is Nearing End Of Six Years in City's Service," *Detroit Free Press*, 10 June 1914, p. 16; "John ;C. Nagel To Collect Tax Data," *Detroit Free Press*, 19 March 1916, p.6;

⁵⁰ "Sewage Plans May Be Revised – Nagel," *Detroit Free Press*, June 1920, p. 5.

and cheaper is another possibility in his stubbornness in the Common Council meetings prior to the deciding vote for tanks. D'Olier who realized this used it to his advantage in his pursuit of a lucrative sale.

The positions of the Common Council members on the technology to be used were unchanging for the majority of members. Following the *Detroit News* and *Free Press* stories throughout late October and November 1926 up until the vote on 1 December there was no change for seven of the nine members. In favor of Imhoff tanks from the beginning were Bradley, Lodge, Castator and Dingeman. For Reinsch-Wurl screens were Nagel, Littlefield and Callahan. On 28 October Stevenson and Ewald were undecided. On 13 November it was reported that Callahan wanted activated sludge. On 15 November Stevenson had switched to screens and Callahan and Ewald were undecided. On 20 November Lodge, Bradley, Dingeman and Castator were still for tanks, Nagel, Ewald, Littlefield and Stevenson were for screens and Callahan was undecided, as he still wanted activated sludge. On 23 November it was reported that Stevenson and Littlefield had switched their opinions and would not vote for screens. Finally on 27 November Ewald indicated he would vote with the majority for Tanks.

There was no newspaper report on why Ewald changed his mind and voted that way, and at one time it was reported that he was not sure that tanks were superior... Callahan had been advocating the tanks for months, and then had voted against the tanks, because he wanted the activated sludge process. Littlefield said he would vote to build the intercepting sewer but was against both tanks and screens.⁵¹

⁵¹ "Council Hears Two Sewer Plans," *Detroit News*, 26 October 1926; "Sewage Vote Again Held Up," *Detroit Free Press*, 13 November 1926, p. 1; "Bradley Hits Sewer Dispute," *Detroit Free Press*, 15 November 1926, p. 1; "Action Urged On Sewer Issue," *Detroit Free Press*, 17 November 1926, p. 1; "Bickerings of Council Over Sewage Plant Hit," *Detroit Free Press*, 20 November 1926; "Two In Council

It was Councilman Bradley who was the most active in pushing the process through, bringing up resolutions in the Common Council and scheduling meetings to get this matter resolved. He was also very active in putting resolutions before the Common Council when the dispute started over the Dodge Site in River Rouge as the chosen site for the plant. Once the Dodge Site was eliminated he was very active in getting other communities involved in a Metropolitan District plan.

Switch Sewer Screen Stand,” *Detroit Free Press*, 23 November 1926, p. 1; “City To Build Sewage Tanks, Vote Indicates,” *Detroit Free Press*, 27 November 1926, p. 1; “Council Votes 5 To 4 in Favor Of Imhoff System,” *Detroit Free Press*, 1 December 1926, p. 1; “Council Votes Tank system,” *Detroit News*, 1 December 1926.

Chapter Five-Choosing a Location and Financing Construction

The Debate Over Location

The initial decision to locate the plant in River Rouge turned into a major political problem resulting in pitting Detroit against River Rouge and the Downriver League of Municipalities. This dispute eventually resulted in the adoption of restrictive legislation at the state level and the decision by Detroit officials to try to build the treatment plant as a regional facility. Giving the planning to the Wayne County Board of Supervisors resulted in the project being “pigeonholed.” With the election of a new mayor Detroit attempted to restart the project as a means of reducing unemployment in the early stages of the Depression.

The Depression halted any hope of Detroit financing the plant until New Deal legislation provided funds for civic improvements. The combination of the application process, the ever changing requirements of New Deal agencies and the inability of Detroit to assure that the loans would be repaid resulted in a long delay before funds became available. Even with the financing assured other unpreventable events occurred that could have derailed the process and caused the funds to be withdrawn. These delays caused costs to rise, in turn requiring further applications for loans.

A dispute arose over the plant’s location—River Rouge or Lake Erie—with Councilmen Callahan, Stevenson, and Littlefield all against the River Rouge site. Councilman Bradley stated he “could see no reason for the members of the Detroit council fostering a plan to carry the sewage to Lake Erie at an estimated additional cost of \$25 million.” He said “Acceptance of the engineers report would pave the way for these communities to negotiate with Detroit to have the sewage carried down to the

lake.”¹ Detroit had chosen a 200-acre site near the mouth of the River Rouge Canal in the City of River Rouge as the best location for the wastewater treatment plant.² John W. Reid, Commissioner of Public Works, sent a request to the Common Council on April 30, 1926, asking their approval to acquire the site identified in the 1925 Report recommended by the Mayor’s Special Commission on Sewage Disposal. The site was identified as lying “in private claim 45, Springwells, and is bounded by Dearborn Road, River Rouge (New Channel), Detroit, Toledo and Ironton Railroad Company’s right of way and the Detroit River, and contains an area of approximately two hundred acres.”³ Reid said he would confer with representatives of the downriver communities to arrive at details of a system that was satisfactory. The Down River League of Municipalities wanted to be consulted about the plant’s location and they disapproved of the River Rouge site. They had been raising this issue ever since the report was first published.⁴

In November 1926, the City of River Rouge passed an ordinance prohibiting the City of Detroit from building a sewage treatment plant in their city. A second ordinance prohibited the building of an underground sewer or intercepting sewer without a five-sevenths vote of the City of River Rouge’s council. Mayor Thomas J. Bresnahan of River Rouge stated that the value of the site was \$3 million, and this would be lost from their tax roll. A third proposed ordinance was to zone the site as a commercial district.

¹ “City To Build Sewage Tanks, Vote Indicates,” *Detroit Free Press*, 27 November 1926, p. 1.

² “Sewer Plans Stir Suburb,” *Detroit News*, 15 December 1926; “Rouge Fights Waste Plant,” *Detroit News*, 22 December 1926. Detroit at its southern end is surrounded by Dearborn, Melvindale, Lincoln Park, Ecorse and River Rouge. Digging the River Rouge Canal created Zug Island and shortened the distance shipping traveled.

³ *Journal of the Common Council of the City of Detroit*, 4 May 1926, Detroit, Michigan 1927, p. 1223.

⁴ “Council Votes Tank System” *Detroit News*, 1 December 1926; *Journal of the Common Council of the City of Detroit, 1926*, Detroit, Michigan 1927, p. 3498.

Cleveland had been prevented from building a plant in Euclid Heights, Ohio by a similar ordinance, whose legality was upheld by the United States Supreme Court. Detroit's Corporation Counsel Charles P. O'Neal thought that two of these ordinances would not stand up in the State Supreme Court, whereas the interceptor sewer ordinance would. John W. Reid disagreed on this and pointed out that the State Supreme Court had allowed the City of Highland Park to build a sewer across Detroit territory.⁵

In January 1927, the Detroit Common Council invited the Down River League of Municipalities to attend a meeting to discuss the location of the plant, whether they would join in the planning and financing, and whether they would share the facility. John W. Reid had identified six plant sites with costs ranging from \$39.6 million for the River Rouge site to \$74.9 million for the Lake Erie site. Reid estimated annual operating costs at \$3.3 million for River Rouge and \$5.5 million for Lake Erie. Reid stated that there would be a rise in maintenance costs because of the need for additional pumping the farther south the plant was located, as the interceptor would be lower in the ground and the sewage would have to be pumped up to the river. These figures did not include the additional expense that would be required to expand the plant's capacity to accommodate the downriver communities' sewage. Reid had proposed a \$10 million collector sewer running northward to the Dodge site as a solution. He also noted that several Ontario communities had combined and were planning an Imhoff tank plant to take care of the border cities' sewage with an outlet opposite the foot of 24th Street.⁶

⁵ "Rouge Fights Waste Plan," *Detroit News*, 22 December 1926.

⁶ "Sewer Plans Parley Called," *Detroit News*, 11 January 1927, p.10, The six sites identified and their associated costs were: The Dodge Site \$39.6 million, annual maintenance \$3.3 million; Rouge site one mile inland on the River Rouge \$46.1 and \$3.81; Grosse Ile \$47.2 and \$3.84; Sibley Quarry \$60.87 and \$4.82; Stoney Island \$67.45 and \$5.17; and Lake Erie \$74.87 and \$5.54.

This meeting did not result in any decision by the Common Council, but Mayor Bresnahan of River Rouge stated afterwards that any decision to locate the plant at the mouth of the River Rouge Canal in River Rouge would result in injunctive action.⁷ Reid in a January 21 interview said that the additional expenditure for the Lake Erie plant was not warranted: the River Rouge plant could be up and running by 1934 versus 1940 for the Lake Erie plant. He added that if the downriver communities really wanted the Detroit River cleaned up, they could attain it with the River Rouge site at a cost of \$56.8 million. This included the expansion of the plant to accommodate the downriver communities and the necessary additional interceptor sewer.⁸ A split in the Common Council had Councilmen Ewald, Nagel, and Callahan opposing the Rouge River site. The council voted six to two to build the plant at this chosen site in the City of River Rouge on January 25 1927, with Nagel and Ewald voting against it. Councilman Callahan did not explain his shift in position.⁹

State Representative Frank P. Darin of River Rouge introduced a bill in the state legislature on February 2, 1927 (Public Act 261) that would prevent any construction of garbage disposal or sewage disposal plants in any incorporated city or village with over 2,500 inhabitants without a two-thirds vote of the legislative body and a majority vote of the people in the next general election.¹⁰ The portion of the bill containing the involvement for the legislative body vote was later dropped.¹¹ Darin also asked to have

⁷ "Suburbs Stand Pat on Sewage," *Detroit News*, 18 January 1927, p. 13.

⁸ "Reid Defends Site on River," *Detroit News*, 21 January 1927.

⁹ "Suburb Sewage Plea Is Ignored," *Detroit News*, 26 January 1927, p. 25.

¹⁰ "Bill Attacks Sewage Plan," *Detroit News*, 3 February 1927, p. 17.

¹¹ "Sewage Bills Trade Flayed," *Detroit News*, 10 February 1927, p. 24.

an amendment inserted into the newly introduced Dykstra Bill; this bill's intent was to allow municipalities to fund sewer service on a utility basis. Darin's amendment, as noted in the press, "Would make it necessary for cities desiring to locate their plants under the provisions of the bill in neighboring communities first to obtain the consent of the community in which the plant is to be located".¹² This would let municipalities charge users of wastewater treatment in the same manner that water rates were charged. Darin dropped his request when it was pointed out that Detroit could choose not to use the Dykstra Bill's provisions. The Dykstra Bill freed up municipalities from the limitation of their tax base for selling bonds, the 7-percent limit.

The *Detroit News* article, reporting this activity, explored the possibilities that the Darin bill would succeed because of the small-town bias against big cities, and how the reapportionment fights of 1923 and 1925 were proof, as small town and county representation far outnumbered big town representatives in the state legislature. It also raised the concern that Darin could raise enough support to kill the Dykstra Bill if the Detroit delegation in Lansing voted against his bill.¹³ It noted that his position was one of strength. In fact, none of the Detroit delegation voted on the Darin Bill because Detroit's representatives, who had fought in Lansing for many years for home rule, could not oppose the Darin bill, which was a home rule proposal. The Detroit delegation wanted the Dykstra bill to pass, so they abstained from voting on the Darin bill. Representative Charles H. Coburn said, "He had been assured that the Detroit council did not oppose the [Darin] bill as it originally read, several amendments had been made to it

¹² "Whip Hand Held by River Rouge," *Detroit News*, 12 February 1927, p. 5.

¹³ "Whip Hand Held by River Rouge," *Detroit News*, 12 February 1927, p. 5.

in the meanwhile and he did not know how the council would stand on the amended bill.” Both the Dykstra Bill and the Darin Bill eventually became law.¹⁴

The Mayor of River Rouge sent a letter to the Detroit Common Council asking them to rescind their action selecting the Dodge Site at the mouth of the River Rouge canal.¹⁵ He asked that they “reopen the matter with a view to deciding on a disposal system for the entire metropolitan area”; he also said the disposal site would create a “nuisance” and would handicap the riverfront of Detroit and the downriver communities. Detroit Corporation Counsel Charles P. O’Neil suggested that the city should appeal to the State Department of Health, as the blocking of the plant construction by River Rouge endangered the health of the entire area. He also said that Detroit should terminate the water contract between the two cities, forcing River Rouge to build its own water treatment facilities.¹⁶

Representative Darin visited Cleveland to inspect its Imhoff tanks and said, “After viewing the Cleveland plant he was more than ever opposed to a similar one being built in River Rouge.”¹⁷ Darin also said he intended to introduce a joint resolution in the legislature for a joint committee to investigate the sewage disposal problem along the Detroit and Huron Rivers and Lake Erie. The committee’s purpose would be to study the feasibility of building one large sewage disposal plant to serve the entire district.¹⁸

¹⁴ “Sewage Plant Ban Approved,” *Detroit News*, 23 February 1927, p. 35.

¹⁵ “Sewage Site Repeal Asked,” *Detroit News*, 24 February 1927, p. 20.

¹⁶ “Health Enters Tank Site Fight,” *Detroit News*, 1 March 1927, p. 25.

¹⁷ “Darin Visits Cleveland to Study Sewage Plant,” *Detroit News*, 14 March 1927, p. 2.

¹⁸ “Urges Sewage Plant For Entire District,” *Detroit News*, 29 March 1927, p. 2.

At a Senate Public Health Committee meeting, Darin, Mayor Bresnahan, and Judge John R. Valois, a contender for the River Rouge Mayor's position, opposed Dr. Guy I. Kiefer, the State Commissioner of Public Health; Charles P. O'Neill, the Corporation Counsel; Dr. Henry F. Vaughan, Detroit's Public Health Commissioner; Clarence W. Hubbell, Civil Engineer; and Edward D. Rich of the State Department of Health. Both sides stated their opinions about the location of the disposal plant. The hearing ended with no decision reached.¹⁹ A *Detroit News* editorial argued that the plant should be built at the mouth of the Detroit River on Lake Erie, as the opening of the St. Lawrence Waterway would cause the metropolitan area to grow to the south and southwest. Putting a disposal plant above such a large population, with the probability it would pollute the river, was not sensible.²⁰

When Governor Fred W. Green signed the Darin Bill into law on May 24, 1927, it would seem that Detroit should have reconsidered its position on the divisive issue of the plant's location in River Rouge; however Detroit continued on this course. Commissioner of Public Works John W. Reid asked Charles P. O'Neill, Corporation Counsel, to proceed with the condemnation of the River Rouge site. Reid made reference to the June 25, 1927 Detroit Department of Public Health request that the Detroit Police Department enforce the ban on people swimming in the Detroit River because of the health concerns brought on by sewage pollution of the water and how it re-emphasized the need to free the Detroit River of pollution.²¹ Reid made numerous requests for the

¹⁹ "Detroit Fights Darin Bill," *Detroit News*, 30 March 1927, p. 20.

²⁰ Editorial, "The Broader View Is the Better," *Detroit News*, 31 March 1927, p. 4.

²¹ "Police To Stop River Bathing," *Detroit News*, 1 July 1927 p. 1; "Ready To Take Up Sewer Plan," *Detroit News*, 8 July 1927, p. 19.

Common Council to condemn the site, and eventually in September, the council instructed the Corporation Counsel to prepare the condemnation resolution, which they then unanimously passed on October 12 1927.²² The city had the power under the State Constitution to condemn land for public purposes within ten miles of the city limits, and the River Rouge site owned by Dodge Brothers Incorporated was less than one mile from Detroit's border.²³ The City of River Rouge immediately passed "A resolution authorizing Frank P. Darin, City Attorney for River Rouge, to obtain additional counsel and take every means necessary, with no regard to expenditure of money, legally to enjoin the City of Detroit from locating its proposed disposal plant on the so called Dodge Site."²⁴

Once again the *Detroit News* editorialized, asking the question "Which is it to be?" and then discussing the idea of a Metropolitan District for sewage disposal. The editorial ended with the statement: "Which is it to be – Detroit the Little or Detroit the Great?"²⁵ This editorial was followed three days later with another one discussing the Metropolitan District and the history behind it. With the election of the Common Council three weeks away, it suggested that the people could express themselves by voting out representatives who were considering a plant for "The Detroit of today rather than for the vast municipal community of which Detroit is the circumscribed center."²⁶

²² "Council Promises Action On Site Of Sewage Plant," *Detroit News*, 27 July 1927 p. 33; "Orders Resolution To Condemn Land," *Detroit News*, 28 September 1927, p. 36.

²³ "Orders Dodge Site Acquired," *Detroit News*, 12 October 1927, p. 18.

²⁴ "Rouge Makes War On Detroit," *Detroit News*, 14 October 1927, p. 25.

²⁵ "Which Is It To Be?," *Detroit News*, 15 October 1927, p. 4.

²⁶ "Now Is The Time" *Detroit News*, 18 October 1927, p. 2.

The idea for a Metropolitan District had been proposed in 1923. The Detroit Bureau for Governmental Research had published two reports in their biweekly publication *Public Business* concerning this subject, “The Metropolitan Area” in 1923 and “Government of Metropolitan Areas” in 1924, as well as a separate report, “The Detroit Metropolitan Area,” also published in 1924.²⁷ The problem that Detroit ran into in 1927 with River Rouge clearly illustrated that the metropolitan area of southeast Michigan needed to consider area plans when area concerns such as water, sewers, and rapid transit came up. These utilities crossed political boundaries and there were no mechanisms in place to handle them. A *Detroit News* editorial of October 1927 said that metropolitan planning for metropolitan problems needed to be initiated.²⁸

Judge Clyde I. Webster of the Circuit Court issued a temporary restraining order against Detroit on December 6, 1927 with a show cause hearing scheduled for December 10 as to why a permanent injunction against the condemnation should not be issued. Frank P. Darin filed the petition citing PA 261 of 1927.²⁹ The hearing was adjourned until December 23.³⁰ The River Rouge council voted to take a trip to several eastern cities to inspect sewage disposal plants similar to the one proposed by Detroit, in order to familiarize themselves with disposal systems.³¹

²⁷ Detroit Bureau of Governmental Research, *Public Business*, “The Metropolitan Area,” 10 September 1923, vol. III, no 2, 82; “Government of Metropolitan Areas” 20 December 1924, vol. III, no. 11, 90; “The Detroit Metropolitan Area” 24 January 1924, Report no. 71.

²⁸ Editorial, “Which Is It To Be,” *Detroit News*, 15 October 1927, p. 4.

²⁹ “Enjoins Rouge Sewage Plant,” *Detroit News*, 7 December 1927, p. 45.

³⁰ “Disposal Plant Suit Goes Over To Dec 23,” *Detroit News*, 12 December 1927, p. 16.

³¹ “River Rouge Council To See Sewage Plants,” *Detroit News*, 22 December 1927, p. 44.

The new Mayor of River Rouge, John R. Valois, sent a letter to the Mayor and Common Council of Detroit asking them to withdraw the condemnation suit pending in the Circuit Court, and to hold it in abeyance until an alternative plan for a plant could be proposed.³² In his inaugural address, the new Mayor of Detroit, John C. Lodge, spoke out against spending any more money on the Dodge site and urged consideration of a metropolitan plan. Mayor Lodge, writing in the *City of Detroit Annual Report, 1927*, said that no further expenditure of large sums of money should be made for sewage disposal upon the theory that a disposal plant should be located at the mouth of the River Rouge. “My belief is that when a sewage disposal plant is built it should be designed to take care of all sewage collected by an intercepting sewer running from Grosse Pointe to Lake Erie.” He said that the cost must be shared and the municipalities pay their share. Detroit and the surrounding municipalities should form a Metropolitan Sewage District.³³

At their January 12, 1928 meeting, the Common Council set a January 25 meeting date to discuss the formation of a metropolitan sewage district. To form this district, a Metropolitan District Act had to be passed by the state legislature and each municipality would have to approve of the plan formulated. Common Council members also indicated that they would drop the plan to build at the Dodge site.³⁴ A *Detroit News* editorial commended the new mayor and Common Council for their change in position.³⁵

³² “Rouge Asks Dropping Of Plant,” *Detroit News*, 11 January 1928, p. 12.

³³ Mayor Lodge to Common Council, *City of Detroit Annual Report, 1927*, City of Detroit 1928, p. 13.

³⁴ “Council Turns On Dodge Site,” *Detroit News*, 13 January 1928, p. 11; “Detroit Proposes Metropolitan Sewerage District,” *Engineering News-Record*, vol. 100, no. 7, 16 February 1928, p. 296.

³⁵ “Fine Work By The Council,” *Detroit News*, 26 January 1928, p. 4.

On January 24, 1928, the Common Council dropped its plan to use the Dodge site and said it was willing to go ahead with a metropolitan plan.³⁶ Communities represented at the January 25 meeting were Wyandotte, Melvindale, Flat Rock, Hamtramck, Highland Park, River Rouge, Wayne, Ecorse, Melvindale, Lochmoor, Detroit, and the Grosse Pointe villages. William P. Lovett, Secretary of the Detroit Citizens League, said that it would take three to four years to get all the needed legislation passed in the various communities before they could start building. John W. Reid, the Department of Public Works Commissioner, said that Wayne, Oakland, and Macomb Counties should be involved.³⁷ Corporation Counsel Clarence E. Wilcox asked all the mayors, city clerks, village presidents, and township supervisors to attend a February 13 meeting to study the enabling legislation to form a Metropolitan Sewage District.³⁸ As a result of these delays, the final decision on a plant site was not resolved until late 1936 when a site on West Jefferson inside the Detroit city limits was identified.

Financing Plant Construction

The problem for the sewage disposal plant became one of finance, and the administration turned their efforts in that direction. John C. Lodge asked Clarence E. Wilcox, Corporation Counsel, to draw up a bill to present to the Michigan Legislature that would permit Wayne County's financing of a sewage disposal plant.³⁹ In March 1929, the Common Council passed a resolution asking the legislature for a favorable action on the plan to finance a \$100 million sewage disposal plant as a Wayne County

³⁶ "Detroit Proposes Metropolitan Sewerage District," *Engineering News-Record*, vol. 100, no. 7, 16 February 1928, p. 296.

³⁷ "Great Area Sewer Planned," *Detroit News*, 26 January 1928.

³⁸ "Calls Sewer Conference," *Detroit News*, 3 February 1928, pp. 2-4.

³⁹ "Bill May Break Sewage Tie-Up," *Detroit News*, 18 December 1928, p. 20.

proposition. John C. Lodge had proposed in January 1928 that the county's credit be used to finance the plant. Clarence E. Wilcox said that there was no reason "Why the city's already over taxed bonding capacity should be loaded down with another large obligation to pay for improvements that will benefit the entire county."⁴⁰ In 1929, Public Act 160 allowed counties to unite to provide for sewage disposal. Public Act 312, which was the Metropolitan District Act, cleared the way for cities and counties to come together for these joint purposes. Public Act 99 allowed counties to build sewage disposal systems.

In June 1929, John C. Lodge sent a resolution to the Ways and Means Committee of the Board of Supervisors of Wayne County asking them to conduct a study for a metropolitan sewage disposal plant. The purpose of the study was to generate a comprehensive plan for a metropolitan sewage disposal system, to be financed and owned by Wayne County, and to serve not only Wayne but also Oakland and Macomb County municipalities where advisable. He called for the appointment of a committee of five to conduct the investigation. Lodge wanted the study finished for the September 1929 meeting of the Wayne County Board of Supervisors. The committee was to be charged to investigate all details of the steps necessary for Wayne County to acquire plants for the treatment purification and disposal of sewage; employ engineers and staff to make surveys and such investigation as might be found necessary; and report to the supervisors with recommendations on at least two tentative plans and locations for disposal plants. "The plan should permit sewerage systems of all cities, towns, and

⁴⁰ "Sewage Plant Bill Is Drawn," *Detroit News*, 12 March 1929, p. 46.

villages in Wayne County, and in adjoining counties to be connected with the sewage disposal plant and the intercepting sewer on the Detroit River.”⁴¹

Lodge said that the basis for the system would be the existing report from the Special Committee for Sewage Disposal, *Sewage Disposal for the City of Detroit 1925* that was headed by Harrison P. Eddy. Although this report advocated a city system, it could be converted into a county system. Lodge believed that two of the members for this new committee would be John W. Reid, Department of Public Works Commissioner, and Clarence W. Wilcox, Corporation Counsel. These two men were Wayne County supervisors, and the Chairman of the Board of Supervisors was Common Councilman Phillip A. Callahan. Callahan did appoint Reid, Wilcox, James E. Cheriot, Prosecuting Attorney, Mayor John C. Shields of Highland Park, and John M. Bischoff, Commissioner of Buildings and Safety, to the Special Committee on Sewage Disposal.⁴²

In August 1929, a *Detroit News* editorial questioned the logic and timing behind a Detroit Bureau of Governmental Research bulletin arguing that the Lake Erie plant would cost \$35 million more than one at the Dodge Site in River Rouge. The bureau also noted that Dearborn had independent plans for providing for sewage disposal. The bureau wanted reconsideration of the whole sewage plan. The editorial stated, “This matter is too large and involves too many interests to make satisfactory a decision for Detroit alone.”⁴³

The Special Committee on Sewage Disposal presented their investigation to the Wayne County Board of Supervisors in September 1929. They recommended the Dodge

⁴¹ “Sewage Plant Survey Asked,” *Detroit News*, 13 June 1929, p. 1.

⁴² “County Sewer On City Basis,” *Detroit News*, 16 June 1929, sec. 1, p. 21.

⁴³ “The Sewage Disposal Question,” *Detroit News*, 25 August 1929, sec. 10, p. 1.

Brothers Inc. site at the mouth of the River Rouge Canal as their first choice, with an estimated cost of \$42 million. Their second choice was the Rouge site, one mile up the river from the Detroit River, for a cost of \$50 million. Another alternative was the Taylor Township site, near the Ecorse River, costing \$56 million. They thought that the Lake Erie site, with a cost of more than \$80 million, was not warranted even though construction of the plant was feasible. The committee recommended that funding for construction and operations should be done through faith and credit bonds of the county, and maintenance by general county taxes. Any municipality outside the county would be charged a fixed rate for sewage processing. The report said that opposition to the Dodge site by River Rouge voters might be overturned, as the plant would be modern and not a nuisance. The report noted that dumping the effluent into Lake Erie from the Lake Erie plant would be a problem as there was little current in the lake, whereas in a river with a flowing current there was more oxygen available for bacterial action.⁴⁴ The River Rouge City Council once again opposed the chosen site location and sent a resolution to the Wayne County Board of Supervisors voicing their opposition.⁴⁵

The State legislature passed the Stream Control Act (Public Act 245) on May 22, 1929, creating the Stream Control Commission. The Commission was to “have control over the pollution of any waters of the State and the Great Lakes.”⁴⁶ Water pollution, which had been previously divided between the Departments of Conservation and Health, now had its own agency, which also had enforcement powers. Once this agency was up

⁴⁴ “Dodge Sewage Site Sought,” *Detroit News*, 30 September 1929, p. 1.

⁴⁵ “River Rouge Council Opposes Sewer Site,” *Detroit News*, 2 October 1929, p. 2.

⁴⁶ *Public Acts of the Legislature of the State of Michigan passed at the regular session of 1929*, Compiled by John S. Haggerty, Secretary of State, Lansing, Michigan, 1929, pp. 597-599.

and running, there was a lot of activity with towns throughout the state getting citations for polluting waterways.⁴⁷

The First Biennial Report of the Stream Control Commission, published in January 1932, stated “Certain municipalities, particularly in the southeast part of the state have been forced through tax delinquencies and over-expansion in the past to curtail substantially all ordinary public improvement work at this time.” The report also noted that many cities delayed undertaking this work, believing it unnecessary, and presently were awaiting legal action by the commission to compel them to build sewage works. It further stated, “Under present economic conditions, the commission is not pressing for the correction of existing unlawful pollution, involving major capital expenditures beyond a limit that is reasonable for municipalities or industries to bear.” The only reference to Detroit in this report is under a heading of “Sewage Collection and Treatment Required,” where Detroit is listed with a 1930 census population of 1,568,622.⁴⁸ The commission stated that nearly 75 percent of the uncorrected pollution in State waters originated within the metropolitan area of Detroit. They thought that the solution to the problem called for a district rather than an individual action.⁴⁹

Because of the Stream Control Commission requirements, the plans for an Oakland-Macomb County Drainage Project had to be revised to include a sewage disposal plant to serve southern Oakland County.⁵⁰ The City of Wayne, after it was cited

⁴⁷ “Five Towns Are Cited For Pollution,” *Detroit News*, 27 September 1929, p. 26.

⁴⁸ *Biennial Report of the Michigan Stream Control Commission 1931 – 1932*, The Stream Control Commission, Lansing, Michigan 1933, p. 4, p. 5, p. 8, p. 13.

⁴⁹ *Second Biennial Report 1933 – 1934* The Stream Control Commission, State of Michigan, Franklin DeKleine Printers, Lansing, Michigan 1935, pp. 27-28.

for pollution, stated that it fell within the Detroit area, hence their plans for a municipal facility. Further, a disposal plant would cost \$75,000 and the City of Wayne already had \$700,000 in bonds outstanding. Its representatives said that within two to three years, a metropolitan sewer system might make the local plant the Stream Control Commission wanted them to build useless. Given this explanation, the Stream Control Commission deferred action on their case.⁵¹

On January 24, 1930, the Ways and Means Committee of the Board of Supervisors held their third meeting on the disposal plant, without making any progress. At this meeting, discussions included proposing that the Detroit Board of Water Commissioners build and operate the plant, taking it off the county's hands. Another discussion centered on building a plant in two parts, the first at a site on Jefferson Avenue, inside the city limits, to house a grit chamber, grease removal and sedimentation tanks, and then pump the undigested sludge to an outlying area with digestion tanks and sludge drying beds. A third discussion centered on the use of existing and proposed wastewater plants as part of the metropolitan plan.⁵²

On June 17, 1930, Councilman Bradley requested that the corporation counsel and the prosecuting attorney be available to answer questions at a Ways and Means Committee of the Wayne County Board of Supervisors meeting later in the month. He had a resolution passed asking the Corporation Counsel to study whether Wayne County could build a plant and intercepting sewers and finance them by issuing bonds on the

⁵⁰ "State Will Assist On Sewage Plant," *Detroit News*, 5 October 1929, p. 14; "Demand Disposal Plant As Part Of Drain System," *Detroit News*, 14 November 1929, p. 2.

⁵¹ "5 Towns Seek Sewage Delay," *Detroit News*, 30 October 1929, p. 17.

⁵² "Sewage Plant Action Lagging," *Detroit News*, 24 January 1930, p. 6.

faith and credit of the county. Bradley also asked whether several plants could be located in various parts of the county and be financed by one bond issue on the faith and credit of the county. Another question raised was whether the Wayne County Drain Commission could create a drainage district to build a sewage disposal plant to take care of the needs of Detroit, Highland Park, Hamtramck, and portions of Wayne County and finance the same through the issuance of drainage district bonds.⁵³ Finally, he asked, if the Drain Commissioners could issue bonds, would these municipalities collect their share of the cost through taxation?⁵⁴

The county plan went nowhere, and it languished in the Ways and Means Committee for the rest of 1930. The committee did vote to distribute copies of the Special Sewage Committee's September 1929 report to all members of the Ways and Means Committee. The committee also voted to "Take up with the Detroit Board of water Commissioners a proposal that they build and operate the whole project, taking the matter of the County's hands."⁵⁵

In October 1930 the new Mayor of Detroit, Frank Murphy, revived the Special Committee on Sewage Disposal. He wanted to "Have construction started in time to provide work for the unemployed this winter."⁵⁶ Murphy had to contend with the same problems that had existed for his predecessors, namely site location and financing. When Murphy became the Mayor, Detroit's bonded indebtedness was \$350 million.⁵⁷ Detroit's

⁵³ *Journal of the Common Council of the City of Detroit*, 17 June 1930, Detroit, Michigan, 1931, p. 1596.

⁵⁴ *Journal of the Common Council of the City of Detroit*, 17 June 1930. Detroit, Michigan, 1931, p. 1596.

⁵⁵ "Sewage Plant Action Lagging," *Detroit News*, 24 January 1930, p. 6.

⁵⁶ "Ask Sewage Plant Action," *Detroit News*, 30 October 1930, p. 43.

tax delinquency rate in 1930 was 10.8 percent, rising to 17.2 percent in 1931, 25 percent in 1932, and 34.6 percent in 1933.⁵⁸ In Michigan in 1933, against an assessed value of \$5.5 billion and a tax levy of \$216.6 million, 40.72 percent or \$88.2 million was uncollected and delinquent. Delinquency rates ran from 10 percent to 92 percent by county.⁵⁹ Detroit simply did not have any tax revenues to fund a treatment plant once the Depression was underway.

Mayor Lodge had transferred the project to the county, but no progress had taken place, and the county eventually pigeonholed it.⁶⁰ Mayor Murphy wanted to put unemployed people to work and this project would accomplish that.

In the State Legislature, Public Act 316 of 1931 became law. This act authorized cities and villages to build and operate sewage disposal plants, paying for construction and operations from revenue bonds and removing the limitations of the 7-percent assessed valuation debt.⁶¹

The depression that started in October 1929 resulted in reduced spending on civic improvements by municipalities. President Franklin D. Roosevelt replaced President Hoover in 1933, and Roosevelt, a Democrat, instituted a number of programs under the

⁵⁷ Jean Rusig, *The Works Progress Administration in Detroit*, Masters Thesis, Wayne State University, Detroit, 1974, p. 4.

⁵⁸ Arthur D. Gayer, *Public Work in Prosperity and Depression*, (New York: National Bureau of Economic Research, 1935), p. 316.

⁵⁹ Arthur D. Gayer, *Public Work in Prosperity and Depression*, (New York: National Bureau of Economic Research, 1935), p. 318.

⁶⁰ "Ask Sewage Plant Action," *Detroit News*, 30 October 1930, p. 43. Special Committee members were A.C. Marshall, Francis C. McGrath, Lewis C. Rogers, George R. Cooke and Perry A. Fellows.

⁶¹ "Activities In Michigan Legislature," *Detroit News*, 16 June 1931, p. 39.

Federal Emergency Relief Administration (FERA) to jump-start the economy.⁶² These programs were the Civil Works Administration (CWA), the Public Works Administration (PWA), and the Works Progress Administration (WPA).⁶³ The PWA's administrator was Harold Ickes, the Secretary of the Interior, and this organization made repayable loans available for high-material, low-labor-cost projects. The WPA's administrator was Harry Hopkins and this organization made non-repayable grants available for high-labor, low-material-cost projects in order to get the unemployed off the welfare rolls.

Detroit began applying for the Public Works money that Congress had made available. In May 1933, Detroit applied for funds totaling \$109 million, with a projected employment figure of 43,000. A sewage disposal plant was included in this proposal at a cost of \$12.5 million to be financed through revenue bonds paying 5 percent. The proposal indicated that the Water Board would run the plant instead of the Department of Public Works, and this would result in a 10-percent savings in operating costs. It estimated direct employment of 1,300 men for three years and 3,000 more in fabrication, supply, and transportation of materials.⁶⁴ Fifteen million dollars had already been spent on intercepting sewers by 1933, and the \$12.5 million would complete the sewage disposal project.

Clarence E. Page, Assistant Corporation Counsel reported to the Common Council that construction of a sewage disposal plant would probably be the first public works project authorized by the federal government. He said, "We can apply for Federal

⁶² Public Works Administration, *America Builds*, (Washington, D.C.: United States Government Printing Office, 1939), pp. 37-55, p. 67.

⁶³ The CWA was created 8 November 1933 and ended 31 March 1934, the PWA was created by FERA 16 June 1933 and ended 30 June 1943, and the WPA was created 8 April 1935 and ended 30 June 1943.

⁶⁴ "City Projects In Work Plan," *Detroit News*, 11 May 1933, p. 1.

financial aid immediately.” He added that if this project were for the whole Detroit area, rather than Detroit alone, they would have a good chance of 100-percent financing. The costs were now restated at \$15.5 million and would employ 2,000 to 2,200 men over a two-year period.⁶⁵

Preparatory discussions prior to a trip to Washington by acting Mayor Couzens centered on constructing either a \$15.5 million plant on the parade ground at Fort Wayne to serve only Detroit, Hamtramck, Highland Park, and the Grosse Pointes, or a \$75 million plant on Lake Erie. The Commissioner of Public Works, Laurence G. Lenhardt, outlined the alternatives. He recommended a plant at Fort Wayne and one at Lake Erie, one to serve the immediate Detroit Area, the other to serve the rest of Wayne County. In July 1933, the Common Council and representatives from the outlying areas met to discuss the sewage treatment plant. They decided that a joint application from Detroit and interested surrounding municipalities and counties should be prepared. The Common Council and the representatives of twenty-one other communities backed the plan.

Alternatives presented by Lenhardt included nine smaller plants, each servicing a drainage area. Under this plan, a plant for Detroit, Highland Park, and Hamtramck, comprising the Detroit drainage area, would cost \$12 million. While the majority of the communities were in favor of the plans, the Mayor of Lincoln Park said that his city had already spent \$4,000 on plans, had selected a site, and were preparing to ask the Federal Government for a grant and loan, as they were under a court order to construct a plant. He said their plant would cost \$165,000.⁶⁶ A *Detroit News* editorial criticized the

⁶⁵ “U.S. May Build Sewage Plant,” *Detroit News*, 4 July 1933, p. 9.

⁶⁶ “Detroit Works Plans Drafted,” *Detroit News*, 11 July 1933, p. 1, p. 20.

Lenhardt proposal because it was a piecemeal plan, and said sewage disposal should be done for the whole district.⁶⁷

The Stream Control Commission announced that in order to expedite projects under the National Industrial Recovery Act (NIRA), it would institute a policy of having an executive committee act upon construction applications and orders, rather than the full commission, and that it would dispense with the hearings that usually followed.⁶⁸ Milton P. Adams, Secretary of the Stream Control Commission, said that the Federal government was advancing funds for entire projects with the requirement that only 70 percent had to be repaid with 4 percent interest over thirty years. Adams had a list of one hundred cities that were violating the state's pollution law. Detroit was on this list with a \$15 million price tag for its proposed project. The total project cost for these one hundred cities was \$32.43 million.⁶⁹ In 1933, Public Act 94 expanded revenue bonds to cover counties and metropolitan areas, and to encompass a far wider range of civic improvement than just sewage disposal plants.⁷⁰

The proposal submitted to Harold Ickes of the Public Works Administration on July 27 was rejected. When the Detroit Public Works Committee, headed by acting Mayor James Couzens, met in Washington with Harold Ickes, they were told that they had to submit their proposal to the newly appointed Michigan State Advisory Board of Public Works. Ickes had said publicly that applications for grants and loans must be made to the

⁶⁷ "Have Faith In Detroit's Future," *Detroit News*, 13 July 1933, p. 18.

⁶⁸ Title II of NIRA created the Federal Emergency Administration of Public Works.

⁶⁹ "Sewage Plant Rules Relaxed," *Detroit News*, 14 July 1933, p. 19.

⁷⁰ *Public Acts of the Legislature State of Michigan 1933* Franklin DeKleine, Lansing Michigan, p. 117.

state advisory boards.⁷¹ The advisory board's role was to forward proposals that they approved to Washington. With this change, the original regional advisors' role changed to that of inspectors who would report on the progress of projects. Ickes's instructions to the State Advisory Boards were that they were initially to include only "Projects which are ready for prompt inspection and early execution" and to select "for early submission to the administration a balanced program of useful public works which will move men from relief rolls to payrolls." Ickes cautioned the Advisory Boards to "keep the financial status of the communities in mind at all times. Local government budgets must be carefully scrutinized" and "it will be far better to reject firmly unqualified projects than to run a city or other public body inextricably into debt."⁷²

The yardstick by which an application was measured for a PWA proposal contained these provisions:

1. The social desirability of the project.
2. The economic desirability; that is its relationship to unemployment and the revival of industry.
3. The soundness of the project from engineering and technical aspects.
4. The financial ability of the applicant to complete the work and "reasonably secure" any loans by the United States.
5. The legal collectibility of the securities to be purchased or the enforceability of any lease entered into.⁷³

⁷¹ The Michigan State Advisory Board members were Leo J. Nowicki, Wayne County Drain Commissioner, Murray D. Van Wagoner, State Highway Commissioner and Frank H. Alfred, Railroad Executive.

⁷² "Detroit Works Plans Delayed," *Detroit News*, 27 July 1933, p. 1, p. 12.

Detroit still planned to submit their proposal directly to Washington under the terms of the National Industrial Recovery Act Title II. Henry T. Hunt, Solicitor of the Public Works Administration, thought it was “legally possible.” Colonel Henry M. Waite, the Assistant PWA Administrator, also advised them to resubmit the plan. He said that they should get approval by the State Board of Health to reinforce their application.⁷⁴ At the same time, Common Councilman John S. Hall said that Frank H. Alfred, Chairman of the Public Works Advisory Board of Michigan, was “intensely interested” in Detroit’s proposal and wanted details of the proposal to be submitted immediately.⁷⁵

The Detroit Corporation Counsel Kelly talked to Waite, who explained that certain data must be included and certain problems explained before the PWA could consider the proposal. Detroit officials held meetings with the State Board of Health and the Public Works Administration State Advisory Board. During these meetings, it became clear that Detroit needed to do more work on the proposal. Governor Comstock had further meetings with the Common Council and the Drain Commissioners of Wayne, Oakland, Macomb, and St. Clair Counties. These four commissioners and the DPW Commissioner Laurence Lenhardt formed a committee to submit proposals to the Federal Government.

Another proposal, submitted by Assistant Corporation Counsel Clarence E. Page to the Public Work Administration in July 1933, was based on a provision of NIRA. The Common Council passed a resolution supporting this application to the Federal

⁷³ Public Works Administration, *America Builds*, (Washington: United States Government Printing Office, 1939), p. 36.

⁷⁴ “Sewer Project Still Alive,” *Detroit News*, 28 July 1933, p. 1.

⁷⁵ “Sewage Plant Issued Revived,” *Detroit News*, 17 August 1933, p. 1.

Government for 100-percent funding under the provisions of NIRA Title II Section 202 Subsection (B) as an obligation of the government to satisfy a foreign treaty. Construction of a treatment plant would be a “River or drainage requirement required to satisfy treaty obligations of the United States.” The Boundary Waters Treaty of 1909 with Canada had addressed pollution. This provision of the Act had been included because of the urgings of a Texas congressional representative, as the Mexican government was protesting the pollution of the Rio Grande River.⁷⁶ A newspaper article early in June noted a similar situation: “Repeated protests have been made by the Canadian government against the pollution of the Detroit River by Detroit’s sewage.”⁷⁷

Governor Comstock held a meeting in the Detroit Common Council Chambers on October 26, 1933 with representatives of forty-eight communities in southeastern Michigan, from Port Huron to Gibraltar. He proposed a sewage plan that would take care of the entire St. Clair-Detroit River area. This plan entailed five plants and was also to be submitted under provisions of NIRA, with the premise that the Federal Government would pay the whole cost. The violation of the Boundary Waters Treaty was the basis for this plan, and because the plan involved the whole St. Clair-Detroit River area, the provisions of the NIRA applied.⁷⁸ The Oakland County Board of Supervisors supported Detroit’s proposal for a metropolitan sewage disposal system funded by the federal government, as it would benefit the southeastern portion of their county.⁷⁹

⁷⁶ *Annual Report of the Common Council of the City of Detroit*, 23 July 1933, Detroit, Michigan, 1934, p. 1166.

⁷⁷ “City May Get Sewage Plant,” *Detroit News*, 2 July 1933, sec 1, p. 3.

⁷⁸ “Officials Back Sewage Plans” *Detroit News*, 19 October 1933, p. 10; “Sewage Parley Is Called Here,” *Detroit News*, 22 October 1933, p. 1; “Sewage Plans Given Impetus,” *Detroit News*, 26 October 1933.

It was revealed at this meeting that the Federal Administration's policies had once again been altered and now provided for applicants submitting plans directly to Washington. Laurence G. Lenhardt, Commissioner of Public Works, requested that Oakland, Macomb, Wayne, and St. Clair counties provide him with information to present to the Federal Government as part of this proposal, but only Wayne complied; the missing data held up further applications. The information that he asked for was the population from the last three census reports, welfare figures including unemployment, relief money spent, sewer locations, sewage treatment plants operating and under construction, and the sewage treatment situation in the county.⁸⁰ In November 1933, the federal government created the Civil Works Administration, and the pressure of processing applications to employ 42,000 men stopped all activity by the Detroit administration on the sewage plant proposals.⁸¹

Oakland County was also contacting Washington for funds independently of Detroit. The Oakland County Drain Commissioner, Lewis C. Jarrendt, sent a proposal to the government for a \$4-million Hazel Park treatment plant. He also cited the treaty obligation under NIRA, as well as the Health Department's concerns about the area and the lack of county funds to finance this project. He proposed a plant at Eight Mile and Dequindre to serve a seven-square-mile area, which would cut pollution in the Red Run Drain.⁸²

⁷⁹ "Oakland Supports Sewage Proposal," *Detroit News*, 26 July 1933, p. 1.

⁸⁰ "Oakland Acts On Wayne's Plea," *Detroit News*, 2 November 1933, p. 1.

⁸¹ *Annual Report of the Department of Public Works*, Detroit, Michigan, 1933, p. 1.

⁸² "Sewage Plant Plea Prepared," *Detroit News*, 11 November 1933, sec. 1, p. 2.

In 1934, Congress made another \$2 billion in funds available. Once again, Detroit submitted its \$25-million application for sewage disposal for the four-county area, with either four or five plants. Lenhardt said that the Federal Government had “Done work in Tennessee, Mississippi and other valleys out of purely government funds. No treaty obligations were involved there and the work was purely for the benefit of valley residents.”⁸³

Laurence G. Lenhardt was one of the prime movers in the wastewater treatment plant, and the Detroit newspaper articles of this period do not reflect any personal side to his character. The WPA, under Harry Hopkins, had people going out into the various states to observe and report on how well the state organizations were being run. The field observer for Michigan in 1934 was Howard O. Hunter. He is quite blunt in his assessment of many people, including Governor Comstock, whom he describes as a “very weak leader of the party and has done many untactful things....” When he spoke of Detroit, he said,

The Detroit set up is infested with prima donnas such as Ballenger [Relief Administrator for Wayne County], Laurence Lenhardt, Commission of Public Welfare, and Gorman, the City Purchasing Agent and others. They are generally encouraged by our friend in Washington, Blair Moody, correspondent of the *Detroit News*, who writes the damndest articles from Washington which of course, when published in Detroit, give the local boys the impression that the State Commission is just a lot of nose old women and that Detroit can get anything it wants by going direct to Washington.⁸⁴

⁸³ Blair Moody, “PWA’s Decision Hits Major City Projects,” *Detroit News*, 7 March 1934, p. 4.

⁸⁴ Howard C. Hunter to Hopkins, June 1 1934, Michigan Field Report, 1933-1934, Hopkins Papers, box 50. Roosevelt Library, Hyde Park, New York.

Lenhardt noted that Detroit had only received \$321,000 from the first \$3 billion allocated, but based on population should have received \$60 million. He explained that Detroit's budget could not accommodate any additional expenditure, and that Washington's financial requirements meant that the city had to put up \$700,000 in budget money to get a \$300,000 grant for street repairs and \$700,000 for a \$21,000 grant for sewers. He said to build a \$15 million sewage disposal plant Detroit would have to put up \$12 million to get a \$3 million grant. The only way out of this situation was if the provision of Section 203(d) of the National Industrial Recovery Act was used, whereby the President could approve the project regardless of a city's debt limitations.⁸⁵

Columnist Blair Moody of the *Detroit News's* Washington Bureau wrote that Ickes was only going to finance projects backed by bonds of petitioning cities. This stopped Detroit's chances of getting the disposal plant built with PWA money. Ickes revealed that only \$300 million would be available for new projects and \$200 million was for projects already started. Moody wrote that from now on, Detroit must concentrate on the Relief Work Project of the Civil Works Administration. Because the city could not assume any more debt, recent votes on bond issues had rejected this avenue; the only possibility for financing the sewage plant would be to make it a state or county project backed by state or county bonds.⁸⁶

The sewage disposal plant proposal had now become dual proposals. The first, an application to the Federal Government under Article 202 of the National Industrial Recovery Act as a treaty violation, was for the whole St. Clair-Detroit River area. Governor Comstock, Wayne County Drain Commissioner Leo J. Nowicki, and DPW

⁸⁵ "Application Being Drawn," *Detroit News*, 4 March 1934, sec. 1, p. 10.

⁸⁶ Blair Moody, "PWA's Decision Hits Major City Projects," *Detroit News*, 7 March 1934, p. 4.

Commissioner Laurence G. Lenhardt were to submit the St. Clair-Detroit River proposal as a \$25 million, five-disposal-plant project.⁸⁷ The second proposal was to the PWA for a single plant to serve Detroit; this was later changed to several plants that would also serve Wayne County. The Detroit proposal became a Wayne County proposal after the publication of Moody's article. The Ways and Means Committee of the Wayne County Board of Supervisors met in early June and agreed to submit this proposal as a county project backed by good faith bonds of the county.⁸⁸

At a meeting with PWA Officials, Wayne County Auditor Ray D. Schneider said that a self-liquidating project paying off the cost through a "Disposal Charge" on sewage added to water rates was a feasible way to finance a disposal plant.⁸⁹ Meetings in Washington between PWA officials and Detroit officials in late June brought forth a new plan to finance the plant. Under this new plan, using the newly passed Michigan Revenue Bond Act, the county would issue revenue bonds to pay for 70 percent of the cost, and the PWA would pay 30 percent of the cost as a direct grant. This plan would get around both the city's debt limit and the need for a public vote to issue the county's faith and credit bonds. The city would make payments to the county before the county had to pay anything on the bonds.⁹⁰

⁸⁷ "\$25,000,000 PWA Project Framed," *Detroit News*, 22 March 1934, p. 1; "PWA Plant May End Pollution," *Detroit News*, 25 March 1934, sec. 5, p. 14.

⁸⁸ "County Scans PWA Sewer Aid of \$15,000,000," *Detroit News*, 29 May 1934, p. 1; "County Sewer Project To Seek PWA Financing" *Detroit News*, 1 June 1934, p. 18; "County Sewer Action Urged," *Detroit News*, 3 June 1934, sec. 1, p. 12; "Detroit to apply for PWA Loan to Build Sewage Plant," *Engineering News-Record*, vol. 107, no. 12 July 1934, p. 60.

⁸⁹ "PWA Approves Wayne Works," *Detroit News*, 15 June 1934, p. 14; "Sewer Scheme To Be Studied," *Detroit News*, 15 June 1934, p. 15.

⁹⁰ "Plan May Save PWA Projects," *Detroit News*, 27 June 1934, p. 7.

Quick action in resubmitting these revised proposals was required by the Detroit officials because Ickes said, “he intended to pay out very rapidly the next \$300,000,000 appropriated by the PWA in the new emergency act.”⁹¹ In fact, on June 27, 1934, this rapid approval of projects was illustrated when 255 projects worth \$33 million were announced. Moody's article stated, “Ickes new watch word is ‘speed’. The old ultra-caution is gone... The previously ponderous PWA has taken on the snap that characterized the CWA last winter.”⁹² The CWA between November 21, 1933 and March 31, 1934 had provided funds to clean up 1,850 feet of the Connors Creek sewer where the DPW removed 7,600 cubic yards of sludge. The DPW also spent \$226,000 for 413,000 man-hours of labor to clean, widen, and deepen the slope of the banks of four miles of the River Rouge.⁹³ The follow-up agency to the CWA, the Federal Emergency Relief Administration (FERA) and the City of Detroit paid \$55,000 to provide 69,813 man-hours to remove 21,800 cubic yards of sludge from 6,100 feet of Connors Creek sewer.⁹⁴

One problem was the very size and nature of the projects the PWA was undertaking. “By their nature, projects such as these, requiring elaborate and time consuming preparations, ... took a long time to reach the construction phase.” Ickes himself was a problem. He was “Mindful of his stewardship of the \$3.3 billion with which he had been entrusted. He was determined that the money be spent on substantial

⁹¹ “Plan May Save PWA Projects,” *Detroit News*, 27 June 1934, p. 7.

⁹² “Speed To Mark PWA Spending of Half Billion,” *Detroit News*, 28 June 1934, p 1; “PWA’s \$36,484,832 Allotted By Ickes,” *New York Times*, 1 July 1934.

⁹³ *Annual Report Department of Public Works*, 1934, City of Detroit, Detroit, Michigan, 1935, p. 6.

⁹⁴ *Annual Report Department of Public Works*, 1934, City of Detroit, Detroit, Michigan, 1935, p.15.

projects... and that corruption and graft would not intrude.” Early on, he let it be known that he would examine each project for planning and engineering, and legal and financial soundness. This caused applications to back up while he went over the fine print.⁹⁵

Moody’s article also noted that Michigan had only received \$142,000 from the PWA, and even though it was among the five leading states in tax payments, it got less than one-half a percent of the funds allotted. He also cautioned against any delays by officials in getting the proposals to Washington, as there would not be any money left. The Ways and Means Committee of the Wayne County Board of Supervisors instructed Laurence G. Lenhardt and County Corporation Counsel Oscar A. Kaufman to have the application ready the next week, on July 2. Unfortunately, on Tuesday, July 3 in Washington, Ickes said that there was “little if any” money left in his treasury and that the sewage disposal project could not be financed. Lenhardt said, “We will continue right on with the effort to set the project up on a county revenue bond basis” and “We can only hope more money for projects will be voted in the next session of Congress.”⁹⁶

In a *Detroit News* article, analysis of the reasons that Detroit failed in its efforts to gain approval of its proposals pointed to the fact that Detroit did not have a PWA lobby in Washington, and powerful lobbies had got fat appropriations for other cities and states. Detroit would have to pay \$100 million in federal taxes as its contribution to the \$3.5 billion Public Works Fund and had not received anything from it yet. Michigan had only received 27 percent of the amount that the PWA had set as a fair allocation, yet one state had received 1,200 percent of its original allotment. Upon receiving this information, Mayor Couzens declared that Detroit had been “grossly and deliberately discriminated

⁹⁵ Nick Taylor, *American Made*, (New York; Bantam Books, 2008), pp. 114-115.

⁹⁶ “City To Press PWA Projects,” *Detroit News*, 4 July 1934, p. 1.

against.” Lenhardt complained that the PWA claimed, “Detroit could not ‘qualify’ for PWA funds because of its inability to sell faith and credit bonds, the city having exceeded its legal bonding limitation.” He said the PWA Act had a provision, Sec. 203 (D), which allowed the President “to extend ‘any of the benefits of this Act’ to any city, county, or state, regardless of any constitutional or legal restriction on the right of the community concerned to borrow money or incur indebtedness.” Lenhardt believed the lack of a strong Detroit lobby in Washington was the reason. He cited the friendship between Senator Hiram Johnson of California with Ickes, and that the Vice President, Garner, came from Texas as the reason these states had received enormous amounts of PWA funds. He further cited instances where Detroit had submitted proposals within days of Ickes's appointment, and within two days of the opening of the Michigan PWA offices as examples of Detroit's quick response to the alleged delays that Ickes accused Detroit of committing.⁹⁷

PWA officials said on August 9, 1934 that they would not even accept an application for the \$23 million sewage disposal plant. The Deputy PWA Administrator, Colonel Henry B. Waite, said that the refusal was because the PWA had instructed the State boards, several months earlier, to stop accepting new projects. He said the original application on this project was verbal and never “formally” submitted.⁹⁸ On August 10, 1934, Dean Mortimer E. Cooley, State PWA Engineer, was asked to re-examine the project following a meeting between Congressional Representative Carl M. Weideman of Detroit and Henry B. Waite.⁹⁹ The principal PWA objection to the plan, that it was

⁹⁷ “No PWA Lobby So City Failed to Get US Cash,” *Detroit News*, 13 July 1934, p. 4.

⁹⁸ “PWA Rejects Sewage Plan,” *Detroit News*, 9 August 1934, p. 11.

purely a city of Detroit plan, had been removed on August 1 when the Board of Supervisors of Wayne County approved Wayne County's inclusion in the plan.¹⁰⁰ Cooley said that he received a wire from Washington informing him that the application he was sending to the PWA would get "serious consideration." The PWA's policy of not accepting any new applications had not changed, he said, but this was not a new application, as it had been submitted last September as a 100-percent Federal Grant. Now as a 70-percent loan and a 30-percent grant, it was considered an old project in a new form. In addition, through the efforts of Jesse H. Jones, the Reconstruction Finance Corporation Chairman, \$6 million of municipal bonds taken over from the PWA had been sold. This, along with cancellations of PWA projects that were stalled, gave the PWA additional funds.¹⁰¹

Governor Comstock was also pushing a \$23-million Detroit metropolitan area sewage disposal plan. He wanted to get consensus on the site of the proposed plant, as this was an obstacle to approval by the PWA. To this end, he set up the Public Works Commission, a special fact-finding commission that held its first meeting on Monday September 9, 1934.¹⁰² It was charged with developing a metropolitan Detroit water supply and sewage disposal plan for the State.¹⁰³ Cooley, PWA Engineer, said that "The sewage disposal project is, I feel, one of the most deserving projects offered in the whole year here... If it had been originally offered in the form that it now takes, it would have

⁹⁹ "Sewer Plan Hope Revived," *Detroit News*, 11 August 1934, p. 4.

¹⁰⁰ "PWA Sewage Plan Given New Chance," *Detroit News*, 12 August 1934, sec. 1, p. 10.

¹⁰¹ "Chances Good, Cooley Thinks," *Detroit News*, 25 August 1934, p. 4.

¹⁰² "Commission to Seek Sewage Plans Facts," *Detroit News*, 5 September 1934, p. 20.

¹⁰³ "State Studies Sewage Needs," *Detroit News*, 11 September 1934, p. 14.

been approved by the PWA long ago.” However, he said the PWA doubted if the full \$23 million would be available if the project was approved.¹⁰⁴

PWA officials had asked if the project could be divided into sections. If it was to be divided, Cooley had suggested: 1. Extension of a main intercepting sewer from Brush Street to a plant site at \$8 to \$10 million. 2. Construction of a sewage disposal plant at \$8 million. 3. Construction of the \$3 million downriver plant. 4. Construction of outlets from the plants to the Detroit River at \$2 million.¹⁰⁵

Ickes said that the sewage disposal had no hope of approval for even a partial allotment until Congress made another PWA appropriation. He said “Why didn’t they bring that project down here in proper form sooner? Why did they fool around with other projects that had no chance of approval until all the money was gone and then blame us?” He noted, “Detroit has mishandled her PWA situation worse than anyplace in the country. If they had brought the sewage disposal project down here in the form it’s in now in the first place, it probably would be underway now.” He continued, “Partial allotments could not be done because the PWA did not have \$8 million and how could the PWA approve revenue bonds on a partially completed project that would have no revenue?” He indicated that he would be inclined to approve the project as it now stood because of the favorable consideration it had received from the PWA Departments that had reviewed it.¹⁰⁶ Ickes appears to be speaking about the provision in the proposal now where Wayne County would issue revenue bonds as security for the loan from the

¹⁰⁴ “PWA Again Considers 2 Projects for State,” *Detroit News*, 15 September 1934, p. 1.

¹⁰⁵ “PWA Again Considers 2 Projects for State,” *Detroit News*, 15 September 1934, pp. 1-2.

¹⁰⁶ “City PWA Hopes Up To Congress,” *Detroit News*, 21 September 1934, p. 12.

PWA.¹⁰⁷ His main concern throughout this period was that municipalities repay the loans to the federal government so that the government could continue to loan funds.

By October 1934, Ickes no longer opposed this plan, since other PWA officials, notably Major Philip B. Fleming, Deputy PWA Administrator, looked favorably on it. Cooley, PWA Engineer, pressed Fleming to approve the project and allocate funds to it. Cooley advised that the first step should be a completion of the intercepting sewer from Brush Street to a proposed site on Jefferson Avenue, west of the River Rouge.¹⁰⁸ A *Detroit News* editorial praised this section plan.¹⁰⁹

The series of events for the wastewater treatment plant were summarized in the 1934 Annual Report of the Department of Public Works. It shows that Detroit aggressively applied for funds and worked with state and federal agencies starting on July 27, 1933. Then there was a lapse from October 1933 until June 1934, when city officials once again met in Washington with PWA officials. During this period Governor Comstock of Michigan began a series of meetings to create a proposal for a regional system for southeast Michigan.¹¹⁰ ¹¹¹With the announcement of a further \$300 million for PWA projects Detroit once again submitted an application in March 1934. Activity again ceased in August 1934 and resumed in December 1934.¹¹² During this time there was a lot of correspondence between Detroit and Washington with both the Governor and

¹⁰⁷ "PWA Again Considers 2 Projects for State," *Detroit News*, 15 September 1934, p. 1.

¹⁰⁸ "Sewer Plans Gain Favor," *Detroit News*, 4 October 1934, p. 12.

¹⁰⁹ "A Smart Suggestion," *Detroit News*, 5 October 1934, p. 24.

¹¹⁰ "Officials Back Sewage Plans," *Detroit News*, 19 October 1933, p. 10; "Oakland Acts on Wayne Plea," *Detroit News*, 2 November 1933, p. 6.

¹¹¹ "Application Being Drawn," *Detroit News*, 4 March 1934, p. 1.

¹¹² *Annual Report Department of Public Works*, 1934, City of Detroit, Detroit, Michigan, 1935, p. 22.

the State PWA office pressuring all sides to expedite submissions and reviews of proposals.

In February 1935, the State Metropolitan Sewerage and Water Commission submitted a plan for a water purification project and sewage collection and treatment system for the Detroit Metropolitan District to the State Planning Commission. This plan proposed a treatment plant in Wayne County with collection or intercepting sewers in Oakland and Macomb Counties. The estimated cost of this plan, prepared by the civil engineering firm of Hubbell, Hartgering, and Roth, was \$14.6 million. Wayne County's share was \$13.04 million, Oakland's \$720,000, and Macomb's \$850,000.¹¹³ The civil engineers proposed a plant at West Jefferson, one in Wyandotte, and one in Trenton. Southeastern Oakland County would be connected to the Detroit sewer system at Seven Mile and Dequindre; this new sewer would intercept the sewage that was going into the Red Run Drain. Macomb County would be served from Mt. Clemens to the Detroit sewer connection at Kerby Road in Grosse Pointe. Hubbell's estimates included a main plant for \$12 million, the Wyandotte plant for \$280,000, and the Trenton plant for \$150,000. Oakland County sewers would cost \$720,000 and Macomb County sewers \$1.04 million. Annual operating costs of \$1.05 million and \$600,000 for loan repayment were part of these estimates.¹¹⁴

A March 24, 1935 article in *The Detroit News* noted that there was a new \$4.88 billion Federal Relief Fund, and that the city had submitted PWA proposals for \$345.2

¹¹³ "Giant Water Plan Offered," *Detroit News*, 16 February 1935, p. 13.

¹¹⁴ "Project Laid Before Board," *Detroit News*, 17 February 1935, sec. 4, p. 11.

million to the State Planning Commission for multiple projects. Included in this amount was \$20 million for sewage disposal and \$13.2 million for sewers.¹¹⁵

Mayor Couzens said, after a trip to Washington in May 1935, that Detroit's \$23 million plan had an excellent chance of approval as a self-liquidating project.¹¹⁶ However, concerns arose over whether it could be completed in one year, as required under the Rules of the Works Allotment Board. Frank C. Walker, Executive Director of the National Emergency Council, said that any project taking longer than twelve to sixteen months could not get a pledge for Federal funds; however, parts of the Detroit project could be split off and completed in less than this time.¹¹⁷

In Washington on May 22, officials from Detroit heard that the \$23-million sewage disposal project had little change of approval, if any. The reasoning was that Michigan's share of the \$4.88 billion allocated was to be \$150 to \$180 million. Seventy-five percent of that was to go to providing jobs for the unemployed, about 28,000 in Detroit. This was because \$1 billion in projects with high material costs had already been approved and President Roosevelt and Harry Hopkins, head of the WPA, wanted to get 3.5 million people back to work.

While in Washington, the Detroit officials found out that Ickes had not sent the Detroit sewage proposal to Hopkins for the "jobs per dollar" check, and that it was not even on a list of projects being seriously considered. The "jobs per dollar" check amounted to one job for every \$1,100 spent, whereas the average jobs per dollar on the

¹¹⁵ "Detroit PWA Projects Valued at \$345,183,148," *Detroit News*, 24 March 1935, sec. 1, p. 4.

¹¹⁶ "Mayor Clears Path For Plan," *Detroit News*, 9 May 1935, p. 2.

¹¹⁷ "Perils Sewage Disposal Plans," *Detroit News*, 16 May 1935, p. 19.

project that Detroit submitted was no lower than \$2,000.¹¹⁸ Laurence G. Lenhardt, DPW Commissioner, and Perry A. Fellows, former City of Detroit Engineer and now Administrative Assistant to WPA Administrator Harry Hopkins, negotiated a compromise whereby the average "jobs per dollar" was raised to \$1,500. This was coupled with a 45-percent PWA grant and financing from an entity outside the \$4.88 billion fund, possibly from the Reconstruction Finance Corporation. This Fellows-Lenhardt proposal, borrowing more than half the money from private sources, would allow the city to show that the money taken from the \$4.88 billion fund would provide sufficient jobs to justify the loan.¹¹⁹ What the Fellows-Lenhardt plan entailed was to create about 20,000 high-labor, low-material-cost jobs averaging \$1,000 per year in Wayne County, which would cost \$20 million. This would leave \$22 million to create another 8,000 jobs, allowing a substantial amount to be spent on materials. The county would have to finance the other 55 percent privately.¹²⁰ A *Detroit News* editorial embraced this plan and said that fitting the sewage disposal project into the Federal Work Relief program should be pushed, as should private financing through the sale of Wayne County bonds.¹²¹

President Roosevelt announced in July 1935 that he wanted cities and states to pay larger contributions to augment the \$4.88 billion fund. He also said that the WPA, under Harry Hopkins, would only handle construction projects costing less than \$25,000. Anything costing over \$25,000 was to go through the PWA Loan-Grant process. If the

¹¹⁸ "Hopkins Clarifies," *Detroit News*, 23 May 1935, p. 4.

¹¹⁹ "Sewage Plan Chances Revived by Revamping," *Detroit News*, 27 May 1935, sec. 4, p. 20.

¹²⁰ "Sewage Plan Chances Revived by Revamping," *Detroit News*, 27 May 1935, sec. 4, p. 20.

¹²¹ Editorial, "The Sewage Disposal Project," *Detroit News*, 28 June 1935, p. 20.

PWA rejected the project, it would then go to the WPA, who could finance it. In addition, many high labor, low material projects were omitted from the \$25,000 order. From a practical perspective, proposals would be filed with Dean Mortimer E. Cooley, PWA Engineer; if the PWA did not approve them, they would then be forwarded to Harry L. Pierson, the state WPA Administrator, who could approve them. WPA projects were to be submitted to the state's WPA administrator's office who would forward them to Washington, where they were to be reviewed by the WPA Division of Projects and Planning. They were then to be sent to the Bureau of the Budget and then to the President for final approval.¹²²

This new policy forced cities that wanted major developments to borrow 55 percent of the cost. Harry Hopkins believed that Wayne County's \$23 million sewage disposal plant "Would be carried out by the PWA or not at all" because of the financial arrangements that were made for the 55 percent of the cost. Hopkins said, "There is no reason the project should not go forward."¹²³

In late July 1935 Milton P. Adams, Secretary of the Stream Control Commission, wrote to Colonel Horatio B. Hackett, Assistant PWA Administrator, asking for favorable and prompt action on Wayne County's \$23 million sewage disposal project. The Stream Control Commission was proactive in its aid to Detroit and Wayne County in their attempts to get federal money. In the Stream Control Commission's biennial report,

¹²² Jean Rusig, *The Works Progress Administration in Detroit*, Masters Thesis, Wayne State University, Detroit, Michigan 1974, p. 24; "More Relief Cash Sought," *Detroit News*, 4 July 1935, p. 1.

¹²³ "More Relief Cash Sought," *Detroit News*, 4 July 1935, p. 1.

1935-1936, it shows that Milton Adams went to the PWA meeting in Washington on May 23, 1935, and sent a letter to Ickes on July 22.¹²⁴

Adams brought up the fact to Hackett that the Edwards Island Plant in New York, the Chicago Sanitary District, the Easterly Plant in Cleveland, and numerous lesser projects were proceeding to completion with the aid and assistance of the PWA. Then he asked “Why not Detroit?” He mentioned the Boundary Waters Treaty with Canada and he mentioned that the proposal had been sent in August 1934.¹²⁵ PWA officials quickly informed Adams that they would do everything possible to expedite final action of Wayne County’s \$23 million project. They said that their engineering and legal divisions had submitted reports recommending approval and their finance division was considering it.¹²⁶

Lenhardt was summoned back to Washington by the PWA on August 7, 1935, and learned that the PWA was not receiving any project applications, as many communities were now trying to obtain all of their jobs from the WPA’s \$4.88 billion fund. In June 1935, Ickes had sent a substantial letter to President Roosevelt saying that the June 15 circular from the WPA was causing confusion as to which agency would fund projects. He said, “There is already competition between these agencies [PWA and WPA] for projects which state, city, and other local government are using to their advantage and is slowing up the program.” Roosevelt forwarded this letter to Hopkins saying, “I hope you and Harold have been able to work out some plan... so that this

¹²⁴ *Third Biennial Report 1935-1936, The Stream Control Commission, Franklin DeKleine Company, Lansing, Michigan 1937, p. 11.*

¹²⁵ “River Clean Up Asked of U.S.,” *Detroit News*, 28 July 1935, sec. 1, p. 16.

¹²⁶ “Wayne Sewage Project Gets Attention of U.S.,” *Detroit News*, 7 August 1935, p. 2.

whole matter will be taken out of the competitive field....” Ickes pointed out that the WPA could contribute 100 percent whereas the PWA was limited to a 45 percent grant. He said municipalities that can afford to finance on a 45-55 percent basis are not filing applications with the PWA. They are holding back in the expectation of a 100 percent Federal grant. He noted that under these circumstances practically none of the \$4 billion would ever come back into the Federal Treasury. He said that under the previous Public Works Allotment in 1933-1934, the applicants raised \$344 million from outside sources and borrowed \$450 million from the PWA.¹²⁷

Ickes once again defended his organization in a September 7, 1935 letter to President Roosevelt, and made disparaging remarks about the PWA and the Works Relief Program. He said “ Communities are begging for an opportunity to build public works on a loan and grant basis and their applications are being turned down by a group of employees whose qualifications to pass on these applications, in many instances, I seriously doubt.” Ickes was concerned that the advisory committee on allotments had a veto power over projects that the PWA approved.¹²⁸

Enclosed with an Ickes letter was a draft document with an unfilled July 1935 date. In Part II it was very specific in saying (1) Works Projects: Construction projects where the aggregate cost upon completion is estimated to be more than \$25,000 shall be submitted to the Federal Emergency Administration of Public Works. Part III said applications shall be submitted to the Works Progress Administration for: (1) non construction projects, and (2) small works projects: Projects of any type where the

¹²⁷ Harold Ickes to President Roosevelt, June 1935, Presidential Secretary’s File, record group 135, National Archives, Roosevelt Library, Hyde Park, New York.

¹²⁸ Harold Ickes to President Roosevelt, 7 September 1935, Presidential Secretary’s File, record group 135, National Archives, Roosevelt Library, Hyde Park, New York.

aggregate cost upon completion is estimated to be \$25,000 or less. Part IV said applications rejected by the Federal Emergency Administration of Public Works shall be submitted immediately to the Works Progress Administration. Part V said all loan application shall be submitted to Federal Emergency Administration of Public Works.¹²⁹

Because of the drop in the number of applications, the PWA could now finance the 55 percent loan that the city needed, and the 45 percent grant would come from the WPA.¹³⁰ The PWA instructed Lenhardt to resubmit the application as a City of Detroit only project, because the PWA attorneys could not find any Michigan law that authorized building a city plant through county financing. As the city was required to finance the loan through revenue bonds, this would require a resolution of the Common Council under the provisions of Michigan P.A. 94 of 1933, the Revenue Bond Act, which allowed the city or the county to finance a sewage disposal plant. This act said that the revenue from a municipality providing water, sewage or other services and charging users for these services could use this revenue to pay off the bonds used initially to finance the building of the structures, i.e., the sewage disposal plant or the incinerators for garbage disposal.¹³¹

Another consideration of the PWA not revealed until Wayne County received their loan approval for \$1.1 million in July 1937 was this statement in a letter to Prentiss M. Brown US Senator from Michigan from the Board of Supervisors, County of Wayne:

The occasion for the separation of the original project into two parts was the inability to obtain a satisfactory method

¹²⁹ Sec. Ickes to FDR re PWA and WPA (June 1935), Hopkins Papers Box 50, record group 135, National Archives, Roosevelt Library, Hyde Park, New York.

¹³⁰ "Disposal Plant Hope Renewed," *Detroit News*, 8 August 1935, p. 16.

¹³¹ *Journal of the Common Council of the City of Detroit*, 3 July 1934, Detroit, Michigan, 1935, p. 1286.

for financing the cost of the project by obtaining revenues from the several communities in the 'down river' district of the County of Wayne.¹³²

Lenhardt consulted with Perry A. Fellows of the WPA and they calculated that the "Jobs per Dollar" of \$1,125 was now well within the limit that President Roosevelt had prescribed.¹³³ The Detroit plant project was for \$20 million; the Detroit-Wayne County plant had been for \$23 million. A *Detroit News* editorial noted that the Detroit sewage disposal plant was to be a joint project of the WPA and the PWA.¹³⁴

The *Detroit News* Sunday edition headlines read: "City Wins 2-Year Fight For U.S. Sewage Cash." Lenhardt was quoted as saying, "The revived sewage project is virtually certain to be approved within the next ten days as a joint PWA and WPA undertaking." Harold Ickes was said to have definitely approved the project. It had been sent to Harry Hopkins of the WPA for his approval before being sent to the Works Allotment Board and then to President Roosevelt for his signature. Lenhardt noted that the WPA would give an outright grant of \$9 million - 45 percent of the cost - and the PWA would loan \$11 million or 55 percent.

The Detroit Common Council and the Wayne County Sewer Commission both passed resolutions, as changing the form of the application was required immediately, so that the Works Allotment Board could have them by Tuesday's August 13 meeting.¹³⁵ The PWA wanted a resolution from the Sewer Commission of the Wayne County Board

¹³² Folder 114A 1936-1937, Inland Waterways-Water Pollution, Roosevelt Library, Hyde Park New York.

¹³³ "Sewage Plant Approval Near," *Detroit News*, 9 August 1935, p. 19.

¹³⁴ Editorial, "Our Sewage Disposal Project," *Detroit News*, 10 August 1935, p. 6.

¹³⁵ "City Wins 2-Year Fight for U.S. Sewage Cash," *Detroit News*, 11 August 1935, sec 1, p. 11.

of Supervisors stating they had no objection to Detroit filing the project as separate from the Wayne County project.¹³⁶ Councilman Dingeman on August 13, 1935 had proposed a resolution authorizing the Commissioner of the DPW to file an application with the federal government for \$20 million to construct a plant and intercepting sewers. This resolution authorized the DPW Commissioner to supply any information that the Federal Emergency Administration of Public Works requested.¹³⁷

The Works Allotment Board approved the proposal on Wednesday, August 14. By August 15, it was at the White House waiting on Roosevelt's signature. The city was to receive \$6 million from the grant before it had to loan any money; the remaining \$3 million was to be given when the project was 85 percent completed.¹³⁸ Roosevelt gave his approval on August 16, and Harold L. Ickes authorized the \$11 million loan from his revolving fund.¹³⁹

The Wayne County part of the project was not dead, however, and Charles P. O'Neill, Attorney for the Michigan PWA office, was instructed to contact county officials about the \$3 million sewage disposal project.¹⁴⁰ In 1935, Wayne County applied for a \$900,000 grant from the PWA for partial funding of a \$2 million plant with the remaining \$1.1 million to come from county funds. President Roosevelt sent a memo to

¹³⁶ *Annual Report of the Department of Public Works, 1935*, City of Detroit, Detroit, Michigan, 1936, p. 13.

¹³⁷ *Journal of the Common Council of the City of Detroit*, 13 August 1935, Detroit, Michigan, 1936, p. 1566.

¹³⁸ "City Sewage Project Wins," *Detroit News*, 15 August 1935, p. 1.

¹³⁹ "Detroit Sewer Project Given Roosevelt's O.K.," *Detroit News*, 17 August 1935, p. 9; "Sewage Project Clears Last Legal Hurdle," *Detroit News*, 24 August 1935, p. 1.

¹⁴⁰ "Sewage Plan to be United," *Detroit News*, 16 August 1935, p. 9.

Congressmen John D. Dingell, Senior of Michigan on August 12, 1937, saying that he had approved the \$900,000.¹⁴¹

The City of Detroit had to prepare a plan to issue \$11 million in revenue bonds with a thirty-year life paying 4 percent annually. The cost of these bonds would be \$670,000 a year and the estimated annual operating costs of the plant would be \$340,000. This required the city to raise over \$1 million a year to pay for the sewage plant. Lenhardt calculated that if these sewage treatment costs were added to water bills the additional homeowner's cost would be three to four dollars a year. The Common Council had to quickly approve a financing plan so that the federal government would not withdraw the allocation.¹⁴² The \$1 million annual cost estimate was then revised upwards to between \$1.5 million and \$1.75 million. Lenhardt suggested that fees, charged to the users of water in the area to be covered by the sewage plant, would range from two cents to two and one half cents for every 1,000 gallons of water that they used. With the two-cent rate, property owners would also be charged one hundredth of a cent for every square foot of property.¹⁴³

Lenhardt proposed two financing plans to the Common Council in September 1935. The first plan was to charge 23 percent against the land at \$0.1805 per thousand square feet and 77 percent against water usage at \$0.0187 per thousand gallons of water. This plan required billing 476,000 parcels of land, with most bills assessed at 45 to 50 cents per year. Lenhardt expected a large amount of delinquencies. The second plan

¹⁴¹ Folder 114A, 1936-1937, Inland Waterways-Water Pollution, Roosevelt Library, Hyde Park, New York. Dingell was a Congressman from the 17th District from 1932 until 1955.

¹⁴² "City Weighs Sewage Fee," *Detroit News*, 28 August 1935, p. 11.

¹⁴³ "City Studies Sewer Cost," *Detroit News*, 31 August 1935, p. 7.

proposed charging \$0.0242 per thousand gallons of water used. Discussions between the controller, the corporation counsel, and the DPW raised the issue of a charge based on graduated water consumption creating a third plan. This plan envisioned that the cost of sewage disposal would be 32 percent of the present water bill. This plan would “cause a decided increase” to the small homeowner and no “appreciable increase” to the large consumer.¹⁴⁴

Milton Adams of the Stream Control Commission wrote “An open letter to the people of Detroit” asking for public support for the project. He asked them to familiarize themselves with the project and to communicate with the council.¹⁴⁵ With reference to the Boundary Waters Treaty, he added, “During the boom years Detroit’s expansion attracted its public funds into other channels. During the depression period, the State and lesser public and private interest have not pressed unduly for the meeting of this obligation.”¹⁴⁶ Adams also told the Common Council that if they did not proceed with the sewage disposal project the State would go to court and force them to build a plant at their own expense. Adams was concerned that any delay by the Common Council would jeopardize the PWA’s offer. The City of Wyandotte also wrote to the Common Council urging that the project be undertaken, noting that the Bacillus Coli count taken at the

¹⁴⁴ *Journal of the Common Council of the City of Detroit*, 24 September 1935, Detroit, Michigan, 1936, p. 1803.

¹⁴⁵ “Build Sewer State Urges,” *Detroit News*, 30 August 1935, p. 10. This letter is printed in its entirety on page 30, 31 of the *Fifth Biennial Report 1939–1940*, The Stream Control Commission, Franklin DeKleine Company, Lansing, Michigan, 1941.

¹⁴⁶ *Fifth Biennial Report 1939-1940*, The Stream Control Commission, Franklin DeKleine Printers, Lansing, Michigan, 1941, p. 30.

Wyandotte water pumping station had reached over 100,000 parts per million on several occasions during the last week.¹⁴⁷

The PWA warned Detroit that it would lose its \$20 million allocation if the Common Council failed to approve the remaining legal details, as contracts had to be let by December 15 of 1935 or the project would be rescinded. There was a government stipulation that projects had to be completed within 12 months, and it was feared that if there was any wrangling on the part of the Common Council, causing high visibility to the project, and given that it had a high dollar cost per job, Ickes might rescind the allocation.¹⁴⁸ A *Detroit News* editorial questioned the Common Council's lack of action on the basis that they did not have a signed copy of the contract in their possession. It advised them to estimate the amortization of the bonds, act on that basis, and fix the fee schedule later.¹⁴⁹

While Adams of the Stream Control Commission and Cooley of the State's PWA Advisory Board were urging speed, Lenhardt of the DPW had assured the Common Council there was no hurry about deciding on a financing plan. William M. Walker, the Secretary of the DPW, said that the PWA had not submitted its formal offer to buy the revenue bonds, so there was nothing the Common Council could do. Councilman Bradley refuted suggestions that they did not want to vote in new taxes within weeks of a general election. He said, "We want to do whatever we are supposed to do to speed this project up."¹⁵⁰

¹⁴⁷ "Sewage Plant Called Urgent," *Detroit News*, 2 September 1935, p. 24.

¹⁴⁸ "Sewage Plant Up To Council," *Detroit News*, 14 September 1935, p. 5.

¹⁴⁹ "Editorial, "Grab This Bargain," *Detroit News*, 16 September 1935, p. 16.

¹⁵⁰ "Sewage Plan Action Urged," *Detroit News*, 17 September 1935, p. 5.

The Common Council approved a plan on Tuesday September 24, 1935, to finance the sewage disposal project. It called for charging water users \$0.0242 for every 1,000 gallons of water they consumed.¹⁵¹ The Corporation Counsel gave the Common Council the ordinance authorizing the construction and operation of the sewage disposal plant on October 22, 1935. The Common Council passed an ordinance authorizing the construction and operation of the plant, and providing for revenue by the rate of \$0.195 per 1,000 cubic feet of water on October 23, 1935.¹⁵² Section 4 stated that “said bonds shall not be general obligation or indebtedness of the City of Detroit but shall be payable solely from the revenue derived from the operation of said sewage disposal system.”¹⁵³ Section 6 said that construction and operation shall be under the immediate supervision of the DPW. The charge of \$0.195 per 1,000 cubic feet of water used was estimated to be sufficient to pay for a bond and interest redemption fund, an operation and maintenance fund, a depreciation fund and a contingency fund. Any excess in the operation, depreciation or contingency funds was to be transferred to the bond fund to purchase outstanding bonds. The city was to issue 11,000, \$1,000 bonds. A proposal that the controller could advertise the sale of \$11 million in bonds passed. The proposals to purchase were to be received up to November 4, 1935.¹⁵⁴

¹⁵¹ “Water Levy Is Proposed,” *Detroit News*, 20 September 1935, p. 4; “Air Clearing On Disposal,” *Detroit News*, 22 September 1935, sec. 1, p. 18; “OK’s Sewage Finance Plan,” *Detroit News*, 25 September 1935, p. 16.

¹⁵² *Annual Report of the Department of Public Works*, 1935, Detroit, Michigan, 1936, p. 15. There are 7.48 U.S. gallons to 1 cubic foot.

¹⁵³ *Journal of the Common Council of the City of Detroit*, 22 October 1935, Detroit, Michigan, 1936, p. 1955.

¹⁵⁴ *Journal of the Common Council of the City of Detroit*, 24 October 1935, Detroit, Michigan, 1936, pp. 1981-1982.

The PWA's offer to buy the revenue bonds had the provisions that the city would begin to retire the bonds in 1959, with complete retirement by 1965. The first retirement payment of \$230,000 would be due in 1959 and rise to \$670,000 a year by 1965.¹⁵⁵ The maturity date and payment accepted by Detroit were as follows: every October 15 from 1939 to 1965 rising from \$230,000 to \$570,000 with increments of \$10 or \$20 thousand, except for years 1962 through 1965, where there was no increase.¹⁵⁶

A *Detroit News* editorial noted that Ickes had announced that projects not underway by December 15, 1935 would be cancelled and the funds allotted to them transferred to other projects. It pointed out that with only ten weeks before the deadline the quick actions of the Common Council had saved the project.¹⁵⁷

Even though there were several inquiries by investment houses, no private buyers made offers to purchase Detroit's disposal project bonds. Detroit City Controller, William J. Curran, said that the Federal Government would purchase them.¹⁵⁸

The State PWA Director, Cooley, said that the City should hire recognized civil engineers to approve the design and engineering of the wastewater plant. Lenhardt pointed out that three nationally known civil engineers had originally made the preliminary report back in 1925 and it was the City's intention to hire these men when the funds became available. As of December 16, 1935, the funds were available because of a \$500,000 advance draw. Lenhardt requested that the Common Council allow him to

¹⁵⁵ "PWA To Buy Bonds To Finance Sewer," *Detroit News*, 2 October 1935, p. 7.

¹⁵⁶ *Journal of the Common Council of the City of Detroit*, 8 October 1935, Detroit, Michigan, 1936, pp. 1884-1885.

¹⁵⁷ Editorial, "The Wise Council," *Detroit News*, 4 October 1935, p. 22.

¹⁵⁸ "Sewer Bond Bids Hinted," *Detroit News*, 24 October 1935, p. 9; "U.S. To Be Buyer of Bonds," *Detroit News*, 4 November 1935, p. 9.

employ Clarence W. Hubbell, John H. Gregory, and Harrison P. Eddy for \$100 a day each plus expenses.¹⁵⁹ He also requested that the Common Council allow him to hire employees to fill civil service positions now that the \$500,000 advance had been received. The positions were for design, engineering, and inspection. The highest paid at \$4,200 per annum were for mechanical, civil, electrical, architectural, and structural engineers; draftsmen had a pay grade of \$2,880.¹⁶⁰

The December 15 deadline was met as the first advertised bids issued by the city were for a section of the intercepting sewer from Brush Street to Sixth Street. They were opened on December 3, 1935, and the S.A. Healy Company was the low bidder at \$720,916. Bids for the next section from Traver Street to Scotten Avenue were scheduled to be advertised the week of December 9, 1935.¹⁶¹

The final *Detroit News* story for 1935 said that work was expected to start on the first section of the sewer from Brush Street to Sixth Street about January 15. The board of consulting engineers would have their first meeting the same day, and a large group of engineers and drafters were going to be taken off the Civil Service waiting list to work on the plans.¹⁶²

Summary

The chosen location of the plant in River Rouge was disputed by the City of River Rouge, which passed an ordinance prohibiting the construction of a sewage disposal plant

¹⁵⁹ *Journal of the Common Council of the City of Detroit*, 17 December 1935, Detroit, Michigan, 1936, p. 2299.

¹⁶⁰ *Journal of the Common Council of the City of Detroit*, 17 December 1935, Detroit, Michigan, 1936, p. 2301.

¹⁶¹ "Bids on Sewage Plant Opened," *Detroit News*, 4 December 1935, p. 7.

¹⁶² "PWA Money to Flow Soon," *Detroit News*, 30 December 1935, p. 15.

within the city. At the State level, Public Act 261 of 1927 prohibited the construction of a sewage disposal plant within the city limit of any city unless it was sanctioned by a majority vote of that city. Detroit thus decided not to use the River Rouge Site and proposed a Metropolitan Sewage District. Under this plan Wayne County should build the sewage plant and accommodate all the down-river communities as well as Detroit and adjacent municipalities. There was no activity by Wayne County and the project was pigeonholed. After a lapse of several years Detroit restarted the project and began applying for WPA/PWA money to finance it. This process took from 1933 to 1935, as regulations at the federal level required a responsible entity to guarantee the loan. Eventually Detroit was able to negotiate the loan with assurances of repayment through legislation that provided a revenue stream by assessing additional sewage charges on the water utility bill.

Conclusion

River Rouge did not want Detroit's wastewater treatment plant within their orders. The selected site would have reduced their tax base \$3 million. The presence of such a large potentially air polluting plant would have also reduced property values, further reducing its tax base.¹⁶³ They did however want Detroit's sewage treated, as the potential for Typhoid epidemics in their city, downriver from Detroit was very high. Detroit was already supplying them with water as the bacterial load in the Detroit River just south of the Rouge River was extremely high and no water treatment plant could safely process raw water at this location.

The Motivation for the Detroit Common Council in their voting record is varied, and some of their positions changed over time. Initially the council members who

¹⁶³ "Rouge Fights Waste Plant," *Detroit News*, 22 December 1926.

avored tanks were Bradley, Lodge, Castator and Dingeman. In favor of screens were Nagel, Littlefield and Callahan. Stevenson and Ewald were undecided. Stevenson was wavering towards Nagel's position. He did not believe that the water inlet was threatened by sewage and said he had watched the river for 50 years and that only at times did the surface water run backwards. Stevenson and Ewald were not convinced that the tank system was superior. Callahan switched his position towards activated sludge and did not then support either tanks or screens.¹⁶⁴ Eventually it was disclosed that while Nagel wanted screens, the other three council members who voted against the tanks were also voting against the chosen site of the wastewater treatment plant, in River Rouge. Littlefield, Stevenson and Callahan wanted the intercepting sewer to carry the sewage to a treatment plant to be located downriver in the Village of Trenton.¹⁶⁵

After so many years of delay, once the council finally voted on a plan, the authorities could not be dissuaded from following through with it. River Rouge was adamant against having the plant built in their city and wanted it built on Lake Erie. The Downriver League of Municipalities wanted it built there as well. Detroit already had plans in place to build the plant in River Rouge and any deviation would mean extra costs. Plans would need to be revised with considerable cost in new engineering studies. The Lake Erie site necessitated an additional expenditure of \$35,700,000, an increase of 100%.¹⁶⁶

It was only after a very determined effort by the River Rouge representative Frank P. Darin, who was able to get legislation passed forbidding construction in a municipality

¹⁶⁴ "W.F. Connolly In Sewer Case," *Detroit Free Press*, 18 November 1926, p. 18.

¹⁶⁵ "City To Build Sewage Tanks Vote Indicates," *Detroit Free Press*, 27 November 1926, p. 1.

¹⁶⁶ "Reid Defends Site On River," *Detroit News*, 21 January 1927, p. 18.

without the consent of the populace and then continual pressure from River Rouge and the Downriver League that Detroit eventually dropped the River Rouge site in 1928.¹⁶⁷ Evidence as early as January of that year shows that Detroit was reconsidering abandoning the River Rouge site.¹⁶⁸ There was a movement towards a metropolitan district with certain council members saying that the plant should be on Lake Erie. Mayor Lodge of Detroit was also endorsing a metropolitan plan

With the advent of John C. Lodge as the new Mayor in November 1927, the proposal to build on Lake Erie with county funding broke the impasse that had existed. The county could float a bigger bond issue than Detroit could with its limited funding.¹⁶⁹ Giving the project to Wayne County when the country was entering the Depression was just bad timing. Consequently it was never given the attention it needed as more pressing matters had to be handled.

I am sure that under the direction of Governor Comstock, southeastern Michigan would have eventually built a regional wastewater treatment facility. In March 1929 there was an active effort by him to craft legislation to pave the way for \$100,000,000 in financing to provide a sewage treatment plant as a Wayne County project.¹⁷⁰ This plan did not reach fruition. Acts authorizing metropolitan districts and to provide financing for construction through revenue bonds were passed during his administration, as was the Darin bill.

¹⁶⁷ "River Rouge Winner In Sewage Warfare," *Detroit News*, 25 May 1927.

¹⁶⁸ "Council Turns on Dodge Site," *Detroit News*, 13 January 1928, p. 11.

¹⁶⁹ "Bill May Break Sewage Tie-Up," *Detroit News*, 18 December 1928, p. 20.

¹⁷⁰ "Sewage Plant Bill Is Drawn," *Detroit News*, 12 March 1929.

There were attempts during the last years of the Hoover administration to get funding but the financial situation was so precarious that no money was available from city, state or private sources.

With the advent of the Roosevelt administration financing civil works became a priority to get the American economy moving. The creation of so much new bureaucracy, both in Washington, and at the state level worked to the disadvantage of many applicants for funding. As the system evolved the route that proposals were required to follow, and where the initial application should be submitted were changed. This did not help Detroit in their requests.

A more serious problem for Detroit that took a long time to resolve was the question of fiscal responsibility. Harold Ickes the PWA administrator, during this period rejected Detroit's plans because they were not fiscally sound. His statements to the State Advisory Boards reflected this thinking. He said "These boards must keep the financial status of their communities in mind at all time. They must not send to Washington projects, which are not financed adequately. The tax payer who is paying this public works bill must be protected at every step." Ickes told the Detroit delegation and Mayor Smith that Detroit should enact a "Sewage Rental Law", which would allow the city to finance a sewage disposal project without the issuance of bonds.¹⁷¹

Ickes was determined in that he would not give funds to any project unless he had assurance that they would be repaid, so that the funds could be then used to finance other projects. Detroit, in their proposals did not have sufficient information, or solid fiscal procedures to assure Ickes. It was only after Detroit put specific details into their proposals was Ickes satisfied. I also think that the changing relationship between Ickes,

¹⁷¹ "Detroit Works Plans Delayed," *Detroit News*, 27 July 1933.

Roosevelt and Hopkins, with Hopkins's organization getting the majority of the new funding in 1935 was important.

Applications to Ickes organization had declined as it was easier to get funds from the WPA and there was no requirement for repayment. Municipalities making payments on loans for completed PWA projects were replenishing Ickes funds. Lessened demands and increased availability of funds combined with the detailed proposal from Detroit that contained explicit information on the repayment of the loan through a source of revenue already authorized by the state and city legislatures gave Ickes the assurance he needed that the loan was safe. I do not think that Ickes had an anti Detroit bias, he was just as demanding on Chicago with their requests. He was a fiscal conservative and did not want to risk taxpayer's money.

Chapter Six-Site Acquisition, Plant Construction, and Operations

A new site was identified on land that was annexed in 1925 on the extreme southwest of the city. Condemnation and a dispute with the property owners about the value of their holdings ended up in the courts. This jeopardized the whole project because of the time limits set by the PWA. The resulting delay while the matter was settled, and the fear of litigation by a contractor, from a property owner required new bidding on contracts that had already been awarded.

Rising prices because of inflation and the complexity of incorporating many contractors work into the final completed plant required Detroit to apply for both additional funds and extensions of time.

Eventually the plant became operational. There were very few startup problems encountered and the resulting statistical reports were encouraging. Some planned operational features were not implemented and many others modified to improve efficiency or to reduce the bacterial load on the Detroit River.

Laurence G. Lenhardt had identified a new site for the sewage disposal plant: “We want to take all the property between the Rouge River, Jefferson Avenue and the two Michigan Central Railroad rights of way because our plant is going to be very large.” To acquire this land the city had to condemn eighty acres.¹ In December 1935, he asked the Common Council to authorize the Corporation Counsel to prepare a condemnation resolution for this Jefferson Avenue location. The area was 94.75 acres with the city already owning 13.56 acres. It had a frontage of 2,300 feet on West Jefferson, 1,950 feet

¹ “Sewage Plant Site Is Chosen,” *Detroit News*, 27 December 1935, p. 10.

on the River Rouge, and 4,150 feet on the Michigan Central Rail Road. The assessed value of the land was \$726,000 and that of the buildings \$233,000.²

The acreage the city wanted to condemn was later increased to 109.3 acres. This property had 450 owners, and there were 120 parcels including 91 residential lots. The condemnation suit, filed in May 1936, was not expected to commence until September because of the large number of individuals involved.³ It started earlier, however, on August 11 before Judge Joseph A. Moynihan.⁴ After consideration, the city had decided to take only 80 acres for the site as the soil conditions on the west end of the proposed site were not favorable.⁵ A jury on December 24, 1936, awarded \$1.47 million in the condemnation suit, including an award to Adolph A. Marion and his wife for \$570,537. The city had estimated the value of the property at \$1.2 million and the property owners had estimated it at \$3.2 million. Marion obtained a restraining order in February 1937 from the Circuit Court and appealed to the Michigan Supreme Court, contending that he should have received \$1.6 million for his property alone. The restraining order halted city engineers from surveying and boring the 43 acres involved in the dispute.⁶

Lenhardt expressed concern about the delay, because the work on the site had to be underway by the spring under PWA regulations. He noted that construction costs were rising and the city had millions of dollars in contracts advertised, but unless the

² *Journal of the Common Council of the City of Detroit*, 6 January 1935, Detroit, Michigan, 1936, pp. 2394-2395.

³ "City Sues Property Owners for Sewage Site," *Detroit News*, 5 May 1936, p. 11.

⁴ "City Sues for Site of Plant Site at Jefferson and River Rouge," *Detroit News*, 11 August 1936, p. 15.

⁵ "To Take Only 80 Acre for Sewage Plant Site," *Detroit News*, 15 August 1936, p. 3.

⁶ "Disposal Plant Award," *Detroit News*, 25 December 1936, p. 7; "City OK's Award For Sewage Site," *Detroit News*, 30 December 1936, p. 11; "Court Order Halts City Sewage Work," *Detroit News*, 10 February 1937, p. 35.

litigation was settled, the bids could not be awarded. Assistant Corporation Counsel, John Atkinson said the litigant, Marion, had until March 10 to file his appeal with the State Supreme Court and how long it would take after that is hard to say. Atkinson wanted Marion to have his award put in escrow while the case was decided; this would allow the city to continue with its work on the site. Judge Joseph A. Moynihan of the Circuit Court dissolved the temporary injunction on March 10 and this allowed work to resume.⁷

A site plan of the plant was published in the *Detroit News* on Friday January 3, 1936. The first meeting of the consulting engineers and the Department of Public Works had taken place the previous day, and at this meeting a tentative site plan had been revealed by Joseph B. Stringham, City Engineer. The plan called for a pumping station to lift the sewage from the Detroit River Interceptor to ground level. Then the sewage would go through a detritor (grit separator), where the grit would settle out, and the solids would be skimmed off. From there the effluent would go to clarifiers where the water and sludge would separate. The water would then be returned to the Detroit River after treatment with chlorine, while the sludge would be dried and incinerated.⁸ Lenhardt Commissioner of Public Works said that the degree of purification had been fixed at 55 percent removal of suspended solids. The eight grit chambers were to be 105 feet long, 15 feet deep and 16 feet wide. The sedimentation tanks (clarifiers) were to be 270 feet long and 120 feet wide.⁹

⁷ "Suit Imperils Sewage Plan," *Detroit News*, 11 February 1937, p. 11.

⁸ "Hold Sewage Plant Parley," *Detroit News*, 3 January 1936, p. 4.

⁹ "Primary Incineration And Treatment For Detroit's New Sewage Plant," *Engineering News-Record*, vol. 117, 3 September, 1936, p. 330.

A Sunday *Detroit News* article of May 1936 summed up the details of the treatment plant project. It would consist of the construction of the Detroit River Interceptor from Brush to the plant site, a distance of five and one half miles with an estimated cost of \$5 million and the construction of the Lonyo and Oakwood interceptors to the plant site, a distance of about 20,000 feet, with an estimated cost \$2 million. The construction of the disposal plant was estimated at \$8 million, and the construction of the out-fall sewer from the disposal plant to the Detroit River and 600 feet into the river with a total distance of 6,000 feet estimated to cost \$2 million. Land for the disposal plant would cost \$1.5 million and another \$1.5 million would be required for interest charges during construction, contingencies, and engineering costs.

Employment problems arose when the disposal plant needed more engineers. The economic situation had improved, government projects and private industry had rehired so many engineers that the Civil Service Commission was having difficulty finding any to work on the plant. It held examinations in twenty-six cities throughout the country to find 104 engineers. Local engineers complained that there were many unemployed in the Detroit area, and that the Civil Service Commission was so strict that only twelve of the sixty-eight men who took the test passed. They said that exams in some cities were much less strict, where political pull had some effect, and those people who were no more qualified than Detroiters would get the jobs.¹⁰

Rising prices became a concern for Lenhardt as the estimated cost of the project increased by \$1.8 million. When Lenhardt told the Common Council this, the discussion then centered on who would pay the excess, the city or the PWA. Major I. D. Brent, the

¹⁰ "City Seeks Engineers for Sewer Project," *Detroit News*, 9 September 1936, p. 4; "Asks Civil Service Engineer Report," *Detroit News*, 15 September 1936, p. 8.

State PWA Administrator, said the city would have to commit itself to that effect, or the PWA would hold up pending contracts. Lenhardt asked Brent if the PWA would pay 45 percent of the excess and Brent said, “The PWA could not continue the project until a financial plan insuring its completion was agreed on.” Lenhardt said the cost increase of 10 percent reflected the increase in labor, materials, and land since 1933. He said they had to increase their original construction estimates from \$17 million to \$18.2 million, and their engineering costs from \$730,000 to \$1.6 million.¹¹ Later that week the Common Council adopted a resolution that the city would put up the \$1.7 million if the PWA would not share the cost.¹²

Construction

When the temporary injunction against working on the plant site was lifted on March 10, 1937, John Atkinson, the Assistant Corporation Counsel, had instructed Lenhardt to resume awarding contracts for the disposal plant. The Michigan Supreme Court had dismissed the injunction suit of Marion in just five days after hearing the arguments, but the time delay had caused several bids to be voided. Re-advertising these took several weeks and it was anticipated that the new bids would be \$200,000 higher.¹³ In April, the city rescinded a contract awarded to the S. A. Healy Company after Healy refused to sign it. The city had awarded him the contract on March 16, 1937 just prior to Marion filing his suit.¹⁴ Marion, who owned the land that was in dispute, had threatened legal action against him if he attempted to work on the property. Healy said, “The city

¹¹ “Sewage Plant Cost Going Up,” *Detroit News*, 11 March 1937, p. 12. Brent is later referred to as Brett.

¹² “Council Lets Contracts For Sewage Plant,” *Detroit News*, 17 March 1937, p. 14.

¹³ “New Bids Needed On Sewage Plant,” *Detroit News*, 1 July 1937, p. 16.

¹⁴ “Council Lets Contracts for Sewage Plant Jobs,” *Detroit News*, 17 March 1937, p. 14.

got me in one legal jam on the Ford Motor Co. tunnel that may cost me \$200,000 in damages”, and “Hereafter I am following the advice of my own lawyers and they are telling me the Marion property is tied up and I can’t proceed.” Lenhardt said that this would cost the city hundreds of thousands of dollars extra for the big pumping station. Healy was the low bidder at \$1.4 million, \$400,000 below the next bidder and \$1 million under the high bid.¹⁵

Other changes in planning resulted in the city asking the PWA if it could transfer the allocation granted for the Lonyo Road sewer to a more expensive Baby Creek sewer. The PWA assured them that the \$360,000 allocation would transfer. Major I.D. Brent, the State PWA Administrator, approved the work on the Baby Creek sewer, and when the work was completed, Detroit was to apply to the PWA for the 45 percent of the added cost.¹⁶ Lenhardt said that the city could save \$1 million by soliciting the aid of the PWA to enclose the Baby Creek sewer. As he noted, “If we enclose the creek now as part of the sewage disposal project we will save at least \$500,000 on construction costs and the PWA will contribute at least \$360,000 towards the remaining costs.” He estimated that with PWA aid it would cost \$2.14 million, where as if the city did it on its own the cost would be \$3.1 million.¹⁷

The pumping station was the subject of a *Sunday Detroit News* article in January 1938. The construction entailed sinking a giant concrete ring, called a caisson, 113 feet in diameter into the earth down to bedrock 85 feet below the surface. The caisson that was seven feet thick had a three-foot thick steel cutting edge on its base. By digging the

¹⁵ “Suit to Cost City Big Sum,” *Detroit News*, 20 April 1937, p. 4.

¹⁶ “Sewage Plant Delay at an End,” *Detroit News*, 16 March 1937, p. 30.

¹⁷ “WPA Offers Power Aid,” *Detroit News*, 6 October 1936, p. 32.

earth from the center, and pouring concrete in twelve-foot sections around its top, the caisson pushed through the earth under its own weight. Once the caisson was at the proper depth, with its circular twenty-foot openings aligned with the Detroit River Interceptor and the Oakwood sewer, a seven-foot thick concrete floor was to be added, and a seven-foot thick inner wall. It would then have a diameter of ninety-nine feet and weight 16,000 tons. After all of the pumping machinery was installed, a control room was to be added.¹⁸

In 1936, the PWA had told Louis J. Schrenk, Public Lighting Commission Superintendent, that they would pay 45 percent, or \$201,000, towards the cost of the \$471,000 city power line extension to the new sewage plant. At a Common Council meeting, Schrenk had said that the Public Lighting Commission (PLC) would supply electricity at one quarter of a cent per kilowatt-hour and this was less than the Detroit Edison Company would charge. The plant was expected to use thirty five million kilowatt hours annually starting in 1938. However, the PWA did not provide this money in 1936 due to dwindling funds. Schrenk re-appeared before the Common Council in late 1937 and told them that the PWA had now approved the funds. The new cost of \$456,000 was to be funded by \$185,000 from the WPA in labor costs and \$271,000 from the PLC in materials. Lead and copper prices had fallen and this would realize a saving \$15,000.¹⁹

In 1936, contracts were awarded for soil borings, pumping equipment, rack and grit equipment, and sludge dewatering equipment, totaling \$5 million in all. In the

¹⁸ "Own Weight Sinks Caisson For Builders Of Sewage Plant," *Detroit News*, 16 January 1938, sec. 4, p. 16.

¹⁹ "WPA Offers Power Aid," *Detroit News*, 6 October 1936, p. 32; "\$456,000 Power Project Assured," *Detroit News*, 21 December 1937, p. 11.

planning stage were the outlet conduit, pumping station and grit chambers, sedimentation tanks, incinerator and filter building, office and laboratory, and electrical equipment for \$8.128 million.²⁰

In 1937, plans were completed for the outlet conduit 5,560 feet and the outlet crib. The bids accepted for these projects were for \$3.45 million.²¹ \$4.86 million was spent in 1937 for plant construction; included in this was \$1.7 million for the pumping station and grit chambers and \$1.8 million for sedimentation tanks.²² At the end of 1937, \$3.6 million remained in the fund and \$16.36 million had been spent. The sludge gas engine, the sludge digestion tank, and the elutriation tanks cost \$291,000. Bids were received for the sludge filter and incinerator buildings for \$1.1 million. Plans for further areas of the plant - sedimentation heating, chlorination equipment, heating, and ventilation for the sludge filter - were out for bids. The plans for the administration buildings and the ash storage lagoons were not yet completed.²³ By the end of 1937, the sedimentation tanks were 25 percent complete, and the pumping station and the grit chambers were 11 percent complete.²⁴ In 1938, contracts were awarded for the administration building, the sludge filter and incinerator building, the sludge digestion tank and various other construction totaling \$2.5 million. The state of the entire project at the end of 1938 was 82 percent complete.²⁵

²⁰ *Annual Report of the Department of Public Works*, 1936, Detroit, Michigan 1937, p. 28, p. 40.

²¹ *Annual Report of the Department of Public Works*, 1937, Detroit, Michigan 1938, p. 37.

²² *Annual Report of the Department of Public Works* 1937, Detroit, Michigan 1938, p. 37.

²³ *Annual Report of the Department of Public Works* 1937, Detroit, Michigan 1938, pp. 38-39.

²⁴ *Annual Report of the Department of Public Works* 1937, Detroit, Michigan 1938, p. 41.

²⁵ *Annual Report of the Department of Public Works*, 1938, Detroit, Michigan 1939, pp. 33-34.

In March of 1938 both the Detroit River Interceptor and the Oakwood Interceptor sewers were completed and work was proceeding on the outlet conduit running from the treatment plant to the outlet crib in the middle of the Detroit River, 800 feet from the shoreline. The tunnel was under the riverbed and there was concern it would collapse, so the engineers had sixty thousand cubic yards of clay dumped onto the riverbed to reinforce it. The outlet conduit construction was difficult and dangerous. As the yearly report stated, “Conduit traversed unusually poor soil conditions with a hydrogen sulphide laden water bearing strata immediately underneath the sewer.”²⁶ Councilman, Eugene I. Van Antwerp questioned George R. Thompson, City Engineer, about the safety of this procedure. In January 1938 six men died in a tunnel drilling accident under West Jefferson at Fort Wayne. Thompson reassured Van Antwerp, saying that only the last forty feet of tunnel would go through the new fill, and a concrete blanket would be built over the tunnel at that point to give it greater strength. Thompson said that the tunnel would be completed in three months.²⁷

The method used to stop the tunnel from collapsing - compressed air - was the same at both sites. However, in the January accident the air pressure inside the tunnel was too high causing a blow out. Van Antwerp said, “I know other engineers who agree with me that you are not following the best method out there.” Thompson explained that this method, chosen by himself and Laurence G. Lenhardt, was used in preference to methods that were more expensive. After the January incident, he said that “quite probably” more men would die before the job was completed. In fact, there were no more deaths, and on April 26, 1938, the outlet tunnel under the Detroit River reached the

²⁶ *Annual Report of the Department of Public Works, 1937, Detroit, Michigan 1938, p. 95.*

²⁷ “Sewer Outlet Job Defended,” *Detroit News*, 16 March 1935, p. 6.

submerged steel and concrete “crib”, which was the terminus, without any further deaths or serious injuries

On three previous occasions prior to April 1939, the city had asked the PWA to grant it an extension of time to build the plant, and had received those extensions. The Common Council had passed a resolution requesting the PWA to extend the completion date to December 31, 1939. In July 1938, the completion date had been extended to June 30, 1939, then to September 30, 1939.

The underlying cause for the extension of the completion dates was the inter-relationship between projects, or groups of projects, and the difficulty in accurately forecasting start and finish times. By January 1939, the DPW was confident that the newly requested completion date was accurate since so little was left to be done. Some contracts had been awarded “before full information and structural design were available,” resulting, for example, in numerous structural changes to the sludge filter and incinerator building. Further, this required a contractor to “Tie in his work to contracts” from another thirty-one completed contracts. The contract for plant piping was similar in complexity and required one contractor to connect equipment installed under twenty-seven other contracts.²⁸ The Oakwood connecting sewer contract had been let using plans completed based on soil borings taken using common established methods. After new soil borings were taken using a newer method, it was revealed that the route was more hazardous than previously shown. This required revisions to the tunneling method, increasing construction costs and time requirements.

²⁸ *Journal of the Common Council of the City of Detroit*, 24 January 1939, Detroit, Michigan 1940, pp. 140-144.

The DPW Commissioner, Henry C. Beyster had taken the complexity of these three contracts into account and projected a completion later than originally forecast. This was a problem given that the PWA agreement did not allow funds to be disbursed by the city after the agreed upon completion date.²⁹

In April 1939, a fourth request for a time extension was met with silence. City Controller John N. Daley refused to approve contracts for the plant that would extend beyond the September 30, 1939 completion date. The agreement between Detroit and the Federal Government prohibited the PWA from paying its share of the cost after this date.³⁰ The new anticipated completion date was now January 1, 1940. Daley also insisted, under the law, he could not approve payments to contractors without having the funds to pay them. The PWA contract had specified that \$2 million would be held back from the city until the project was finished. The city had received all but the last \$2 million and now Daley did not have the working capital to pay the contractors. Henry C. Beyster, the DPW Commissioner, said they had been sending contracts to Daley to approve, the contractors had started work, and the DPW assumed everything had been approved.³¹ Eventually the PWA gave the city time to finish by granting them a six-month extension in late September, thereby assuring the city that they would receive the final \$2 million payment.³² In 1939, 95.5 percent of the electrical service installation was completed, and all of the plant structures were completed.³³

²⁹ *Journal of the Common Council of the City of Detroit*, 24 January 1939, Detroit, Michigan 1940, pp. 140-144.

³⁰ "Delay Feared on Sewer Job," *Detroit Free Press*, 6 April 1939.

³¹ "Sewage Job Strikes Snag," *Detroit News*, 11 April 1939, p. 6.

³² "PWA Gives City Time To Finish Sewage Plant," *Detroit News*, 28 September 1939.

Mayor Jeffries, Lenhardt of the Department of Water Supply, and DPW Commissioner William M. Walker recommended to the Common Council that the Department of Water Supply should run the disposal plant, following a suggestion made by Water Board President Dow that they could run it more economically.³⁴ Walker also suggested that Arthur B. Morrill and Leo V. Garrity should direct the operation of the plant.³⁵ In November 1939, the decision was made that Morrill, a thirty-year veteran of the sewage disposal field and MIT graduate, would run the disposal plant. He was the Assistant Civil Engineer of Sanitary Design at the DPW and had designed the Springwells filtration plant. He placed first in the promotional examination given by the Civil Service Commission.³⁶

Operations

The Detroit Wastewater treatment plant was completed on January 1, 1940. Forty main sewers were then hooked up to the Detroit River Interceptor. The DPW dismantled temporary concrete bulkheads in the interceptor at Woodbridge and Brush and at Concord Avenue, and sewer gates were raised to block the outlet to the Detroit River at East Grand Boulevard.³⁷ This connected the Fairview pumping station with the treatment plant and sent all the sewage there. Pumping from Fairview was successful. The Lonyo

³³ *Annual Report of the Department of Public Works, 1939, Detroit, Michigan 1940.*

³⁴ "Water Board Plans Change," *Detroit News*, 7 December 1937.

³⁵ "Conferees Agree On Sewage Plant," *Detroit Free Press*, 8 February 1940; "Mayor Stops Water Board," *Detroit News*, 24 January 1940.

³⁶ "Morrill To Run Disposal Plant," *Detroit News*, 2 November 1939, p. 2.

³⁷ "New Sewage Plant To Open Wednesday," *Detroit News*, 26 February 1940, p 25.

station discharge to the plant, however, failed as the Baby Creek gates had been damaged, necessitating continued operation of the Lonyo Road station pump.³⁸

The Common Council wanted to have a formal dedication of the plant, and Mayor Jeffries concurred.³⁹ Four thousand dollars was set aside to dedicate the plant and to inform the public of its function by distributing 350,000 pamphlets, some of which were sent out with the first water bills containing the sewage charge.⁴⁰ The plant was dedicated on Saturday, June 1, 1940. The Common Council President, John W. Smith, who as Mayor in 1925 had initiated the campaign to build the plant, presided over the ceremony. Among the officials present was the Speaker of the Ontario Legislature, James A. Clark, Mayor Jeffries, Regional Director of the PWA, David R. Kennicot, and Michigan Secretary of State, Harry F. Kelly.⁴¹ Laurence G. Lenhardt stressed the benefits of health, recreation, and riverfront beautification to be accrued from the plant.⁴² He said that eventually the riverfront would be developed as a resort, recreational, and parkway area.⁴³ Mayor Smith said, "This plant is a great silent tribute to our ingenuity in providing a way for hundreds and thousands of people to live a little better and a little easier in this part of the world."⁴⁴

³⁸ *Annual Report of the Department of Public Works*, Detroit, Michigan 1941, p. 46.

³⁹ "Ceremonies Will Mark Sewer Plant Opening," *Detroit News*, 4 March 1940, p. 25.

⁴⁰ "Sewage Dedication Fund Appropriated," *Detroit News*, 8 May 1940, p. 33; "Council O.K.'s Pamphlet," *Detroit News*, 22 May 1940, p. 11.

⁴¹ "City Dedicates Sewage Plant," *Detroit Free Press*, 2 June 1940, sec. 1, p. 1; *The Detroit Sunday Times* named James A. Clark, James H. Clark.

⁴² "Sewage Disposal Plant Dedicated," *Detroit Sunday Times*, 2 June 1940, sec. 1, p. 7.

⁴³ "27 Million Plant Is Officially Dedicated," *Detroit News*, 2 June 1940, p. 16.

⁴⁴ "City Dedicates Sewage Plant," *Detroit Free Press*, 2 June 1940, sec. 1, p. 1.

The final cost of the wastewater treatment plant and completion of the interceptor sewers was \$22,635,000, \$2.6 million higher than originally estimated when the PWA agreed partially to finance the plant in 1935. The pumping station cost \$2.3 million, the incineration building cost \$1.6 million, and the sedimentation tanks and heating cost \$2.1 million.⁴⁵ Detroit became the largest city served by a single disposal plant; other larger cities had several plants. Detroit's plant was designed to serve a population of 2.4 million and, with additional equipment, could handle four million. The plant occupied a seventy-three-acre site in Detroit at West Jefferson and the River Rouge. It was connected to the Detroit River Interceptor, which was nine feet in diameter at Parkview on the east side of Detroit and sixteen feet in diameter where it joined the plant. The slope toward the plant took it fifteen feet underground.

The designers did a considerable amount of work estimating the load that would be placed on the disposal plant. This ensured that the plant would have the capacity to handle the initial sewage volumes, accommodate future volumes up to its planned capacity, and allow for expansion. To this end, it was necessary to monitor sewage flows at forty sewer outlets to estimate the volume of sewage per capita, which was determined to be 175 gallons per day. This monitoring took place in the summer and fall of 1936.

The installation of water-cooled air conditioning in many of the downtown office buildings produced enormous discharges on hot days, causing a concern that if installations increased, the sewer capacity in the downtown area would be overloaded.⁴⁶ The suspended solids in the sewage were calculated at between 0.16 to 0.20 pounds per

⁴⁵ "22,635,000 Disposal Plant Nearly Ready For Operation," *Detroit News*, 10 December 1939.

⁴⁶ George R. Thompson, "Outline of History and General Considerations Leading Up to the Design and Operation of the Detroit Plant," *Michigan Sewage Works Operators Bulletin* 84, January 1939, p. 33.

capita per day. The assumed removal rate was 55 percent of the suspended solids. Projecting forward until 1970, and with an expected population of four million, the estimated treated sewage flow would still be only 1:150 of the Detroit River's flow. This would not deplete the oxygen in the river sufficiently to be a danger.⁴⁷

Operation And Performance

The sewage disposal plant began operations on February 28, 1940. In March 1940, John Hetmanski of the *Detroit Free Press* summarized the history of the wastewater treatment plant by saying that after the November 1926 vote, work on the interceptor sewer proceeded and by 1928 was completed to Brush and Jefferson. "Problems connected with acquisition of the site, however, made it impracticable to continue the interceptor." This delayed planning until the Depression hit in 1929, leaving the city without funds or the means of raising them. Talk of construction ceased until 1933 and the New Deal. Hetmanski stated that the delays served a good purpose in that it allowed the city to get the benefit of other cities' experience with sewage treatment plants. "As a result, the new plant utilizes the most modern method of treatment-sedimentation and incineration."⁴⁸

A *Detroit News* editorial in March proclaimed "River Pollution Ends" and went on to say that Detroit had complied with an urgent requirement of the times and had contributed in large part to ridding the Great Lakes of pollution.⁴⁹ Albert Stoll wrote in the March 8, 1940 *Detroit News* that it would not be long before the residents of the

⁴⁷ Arthur B. Morrill, "The Detroit Sewage Treatment Plant," *Sewage Works Journal*, vol. 11 no. 4, July 1939, pp. 609-610.

⁴⁸ John Hetmanski, "Dedication of Detroit's New Sewage Plant Will Bring to Conclusion 30 Years of Delay," *Detroit Free Press*, 10 March 1940.

⁴⁹ Editorial, "River Pollution Ends," *Detroit News*, 1 March 1940, p. 20.

Detroit River and upper Lake Erie would reap the benefits of the sewage disposal plant. He noted it would take some years before conditions were restored to somewhere near normal.⁵⁰

By April 1940, Arthur Morrill, Superintendent of the sewage disposal plant, said at the Sportsman's Luncheon Club "The Detroit River shows such an improvement in the water that the Ford Motor Company was able to discern a decided difference in its industrial water supply."⁵¹

There were, nonetheless, a few difficulties at startup. The pumps experienced problems during their acceptance tests in establishing and maintaining heads and in inaccuracies in the Venturi tube.⁵² The 3,000 KWA transformers were leaking oil at the primary and secondary cables. The grease ejection pits needed heaters. The sludge gas generator exhaust gasket leaked and was replaced with an asbestos one, and the gas injection-mixing valve could not supply enough gas to generate more than 175 KW. The screening grinder No 2's 150-hp motor had a short in its starter and this caused the control wiring and control transformer to be destroyed.⁵³

There had been a tremendous amount of material deposited in the intercepting sewers prior to startup. Because of the slow-moving current in the interceptor, there was a lot of sedimentation. The Department of Public Works had considered removing this material but the cost and danger precluded doing so. Instead, they changed interceptor

⁵⁰ Albert Stoll Jr., "Clean Shores," *Detroit News*, 8 March 1940.

⁵¹ "Sportsmen Get Big Laugh," *Detroit Free Press*, 5 May 1940.

⁵² *Annual Report of the Board of Water Commissioners of the City of Detroit, 1940-1941*, Detroit, Michigan, p. 74.

⁵³ *Annual Report of the Board of Water Commissioners of the City of Detroit, 1940-1941*, Detroit, Michigan, pp. 75-76.

velocities to flush the accumulation of deposits from the system. Rags and, in the fall, leaves were a big problem requiring manual intervention to remove them from the screening racks. The raw sludge for the first four months of operation was a lot higher than expected at 12.8 percent solid with sludge cake averaging twelve tons per hour per filter.

The first year of plant operation, reports show, was successful. By June 1940, statistics published by the Detroit Water Board for the three months since the Detroit wastewater treatment plant's inception showed that a daily average of 315 million gallons of sewage was being processed, containing 600 tons of solids. These solids were reduced to eighty-five tons of ash through incineration.⁵⁴ Chlorine usage in the first year of operation was 10 percent of the total operation and maintenance budget instead of the 20 percent estimated. The Detroit wastewater plant had earned \$1.725 million in its first year of operation.⁵⁵

The plant was serving 1.7 million people by 1941, with an average daily flow of 256 million gallons. Except for rare occasions, the entire sewage and storm water flow for the year was handled. This required the pumps to handle up to 650 million gallons a day. Sludge from two of the sedimentation tanks was pumped to the digester tank, and the remainder of the sludge was dewatered and incinerated. One and a half tons of scum and grease was collected daily and incinerated. Sewage processing averaged 277 million gallons per day in 1941 and 303 million gallons per day in 1942. There was a downturn in the fourth quarter of 1941 and the first quarter of 1942 when manufacturing production

⁵⁴ "27 Million Sewage Plant Is Officially Dedicated," *Detroit News*, 2 June 1940, p. 6.

⁵⁵ W. M. Wallace and Arthur B. Morrill. "Public Health Aspects of Sewage Treatment in Detroit," *Sewage Works Journal*, vol. 13 no 2, March 1941, p. 266.; "Engel's Report Reveals Sewage System Pays," *Detroit Free Press*, 29 November 1941.

changed from peacetime activity to war work. The system experienced a high of 593 million gallons on December 27, 1942 because of melting snow and rain. The population being served by this time was estimated at 2 million. Because of the war induction, higher wages in war industries, and dismissals for ineptitude, turnover in personnel in 1941 averaged 55.8 percent of the work force, and this turnover was even higher in 1942.

The quantity of branches and leaves raked daily averaged 4 tons, along with 41.3 tons of grit and sand. On days of heavy rains, grit that was removed was sluiced directly to the ash lagoons without incineration. This caused a problem later during an experiment when an attempt was made to use ash, with its high silica content, in cement products, and the organic content was too high. In 1942, 37 percent or 6,605 tons of grit was handled this way. This caused both objectionable conditions around the lagoons and ash disposal problems.

Only seven of the eight sedimentation tanks were placed in service. The retention time in the tanks using a 300-million-gallon-a-day average flow was ninety minutes. For the first two years, suspended solids were 232 parts per million in the influent and 122 parts per million in the effluent, a removal rate of 47.5 percent. By 1942, the influent had 132 parts per million and the effluent 80.6 parts per million or a 38.9 percent reduction. By maintaining a three-to-four-foot sludge depth at the inlet end of the tank, a much denser sludge was delivered to the filter building on the conveyor system, averaging between 7.5 and 13 percent solids. Two tons of scum, mostly grease, was removed from the sedimentation tanks daily, an increase from the previous years.

The digester started operations in October 1940, when it was filled with sewage, and in November, 156,000 gallons of raw sludge was added. The liquid from this tank

was pumped back into the Oakwood Interceptor, and the gas produced was burned in the waste burner. No digested sludge was filtered until June 1941. The digested sludge was used to cover low spots in the grounds for top dressing prior to landscaping, and the sedimentation tank area was filled to a depth of nine inches with this material. By July 1941, the rate of addition of dry solids had increased to seventeen tons daily. Maximum gas production increased to 383,000 cubic feet per day and 16,000 cubic feet per hour.

In 1942, the average daily loading rate of dry solids into the digester was twenty to twenty-five tons. In November and December, this was increased to thirty tons daily to increase gas production during the heating season. The one digester, which was planned to handle 12.5 percent of the total plant sludge, was handling seventeen to eighteen percent. The gas that was produced was 30 percent CO_2 , 65 percent CH_4 , 3 percent N_2 and 1 percent H_2 with a BTU value of 650 per cubic foot.

In October 1941, the scum depth in the digester tank was eight feet thick, consisting of solid particles trapped in mineral oil. Three thousand gallons of clean-looking oil were drawn off into a dyked area in the ash lagoon where they were ignited. In 1941–1942, there were nearly 400,000 gallons of relatively clean oil present in the digestion tank. There was a tremendous amount of oil coming in through the sewer system from manufacturing plants.

The steam engine was placed in service in November 1940.⁵⁶ The gas engine was started up in June 1941, ran for seven months, and produced 794,000-kilowatt hours of electricity. In 1942, barring a long maintenance period from May through September, it

⁵⁶ *Annual Report of the Board of Water Commissioners of the City of Detroit, 1940-1941*, Detroit, Michigan, p. 95.

ran continuously. During this eight-month period, it produced 1.77 million kilowatt hours, or 7 percent of the plant's requirements.

Incineration statistics for 1941 show that 161 thousand tons of wet loadings were incinerated, including 1,100 tons of rakings and 8,600 tons of grit. For 1942 these figures increased to 167 thousand tons, 1,700 tons of rakings and 11,000 tons of grit. In 1941, 152,000 tons of sludge were incinerated, with 153,500 tons incinerated in 1942. One steel incinerator stack had to be relined with refractory material.⁵⁷ Only two incinerators were used in 1941, three in 1942, the third one for a thirty-day period for catch up. It was necessary to use 58,707 gallons of fuel oil during 1942. This oil was used either to warm up an incinerator or maintain temperatures during filter room cake production stoppages. There were problems with the incinerators because of frequent changes in operators and because the stacks were not lined against high temperatures that they encountered on occasion.

Chlorination was started on July 4, 1940 and this required twenty-four hour control by a shift chemist. Chlorine demand tests were made hourly. The effluent's time in the 6,000-foot channel from the plant to the outlet crib gave a contact time of one hour. Pre- and post-chlorination had both been provided for in the plant's design. Post-chlorination was practiced until October 1941, as it was found to be more efficient and more economical. When the post-chlorination diffuser needed repair, pre-chlorination was adopted until July 1942, while the diffuser was replaced.

The effluent sampler that had been installed, 1,000 feet inside the outlet conduit, did not work due to a plugged sampling line. A second line was installed, but the

⁵⁷ *Annual Report of the Board of Water Commissioners of the City of Detroit, 1940-1941*, Detroit, Michigan, p. 73.

sampling pump also did not work properly. It was only after October 1942 that samples were mechanically delivered. Beginning on August 1, six samples a day were manually collected by lowering a weighted hose through a manhole eighty feet down into the outlet conduit. It took seventy-five pumps on a hand cistern handle to get a representative sample.

The nine-month period of pre-chlorination showed that this was not the best policy. The diffuser would not allow more than 30,000 pounds of chlorine a day—55 percent of requirements—to be fed into the sewage. A design flaw did not allow the adjustment of the flow of chlorine to the two input conduits going into the sedimentation tanks. This meant that some tanks received either too much or too little chlorine. Samples collected for bacterial analysis showed widely divergent results. Another problem causing varying chlorine demand was slugs of ferrous iron that were entering the sewer system and ending up in the sedimentation tanks. The origin of these slugs was unknown. Because of this, the demand for chlorine rose to over fifty parts per million on some occasions.

After returning to the post-chlorination routine in July 1942, there was a further change made to test the influent, rather than only the effluent, for chlorine demand. This gave the operators a ninety-minute period to test the input samples and change the chlorine feed machinery. This change in testing and chlorine application improved the bacteria kills. In 1942, the bacterial reduction was over 97 percent and chlorine demand was six parts per million, using 238 tons monthly. These results were better (lower) than what Hubbell had estimated in 1938. He had estimated ten parts per million of chlorine and 534 tons of chlorine a month.

Over 100,000 chemical tests and 50,000 bacterial tests were made yearly. Water samples were taken weekly from six stations nine miles downriver in the Trenton channel. This channel accounted for 20 percent of the river's flow but received in excess of 95 percent of the bacteria of American origin. It was also close to two water intakes for municipal water treatment plants. During ice-free periods, sampling was done on the whole river from Lake St. Clair to Lake Erie and the Rouge River. The Rouge River had an average *B. Coli* count of 470,000 per 100 cc of water. At a rate of 100 cubic feet per second, this contributed 11,750 *B. Coli* per 100 cc of water to the Trenton channel. The Trenton channel averaged 21,300 *B. Coli* per 100 cc of water in 1942 compared to 108,800 in the two years of sampling before the wastewater treatment plant went into operation. A 1939 analysis of raw water at the Wyandotte water inlet had shown *B. Coli* counts that exceeded 200,000 per 100 cc 50 percent of the time; exceeded 220,000 per 100 cc 10 percent of the time; and exceeded 1 million per 100 cc 2 percent of the time. These numbers were reduced after the treatment plant went into operation. There was a reduction of 75 percent in bacteria numbers since the Detroit and Wyandotte sewage treatment plants began operating.⁵⁸ They were still well above the safe limits of 5,000 *B. Coli* per 100 cc that water purification plants could safely handle.⁵⁹

After four years of service, statistical information revealed that there was some growth in volumes, but the percentages remained somewhat consistent. Tons of wet

⁵⁸ W. M. Wallace and C. A. Habermehl. "Two Years of Operation of the Detroit Sewage Treatment Plant," *Michigan Sewage Works Papers*, Bulletin 98, July 1943, pp. 29-41; A. T. Kunze. "Operation of the Wayne County Sewage Disposal System," *Michigan Sewage Works Papers*, Bulletin 95, July 1942, pp. 16-28. A detailed physical description of the Wyandotte Disposal Plant appears on pages 20-28.

⁵⁹ Morrill, "Detroit Sewage Treatment Plant," pp. 610-611; George R. Thompson and Arthur B. Morrill "Detroit's Answer To A 30 Year Pollution Problem," *Municipal Sanitation*, November 1939, p. 540; W. M. Wallace and Arthur B. Morrill, "Public Health Aspects of Sewage Treatment in Detroit," *Sewage Works Journal*, March 1941, p. 1.

solids increased from 165,787 in 1942 to 202,840 in 1944, and then decreased to 167,488 in 1945. Ash volumes ranged from 25,703 tons in 1941 to 23,400 in 1945. The average percentage of ash to solids ranged from 12.9 percent to 14.3 percent. Ash contained 17 percent calcium.

By 1945, the plant was serving a combined population of 2.2 million with an average flow of 315 million gallons a day. There had been a maximum one-day flow of 472 million gallons.

The elutriation tank was used for its designed purpose in a three-month test starting in June 1944, with disappointing results. Operational costs rose without a decrease in chemicals required. After that the elutriation tank was used to mix raw and digested sludge prior to sludge filtration. The digestion tank had proved satisfactory, not to completely digest the sludge but to produce gas at the rate of 20,000 cubic feet per hour. This was accomplished by adding thirty tons of raw sludge daily.

Partially digested sludge, raw sludge from the sedimentation tanks, scum from the sedimentation tanks, and grit were mixed together. This mixture was filtered and the cake produced burned very well. The ash that was produced, 2,000 tons monthly, was sluiced into one of the two lagoons where it dried out. Each lagoon took one year's production of ash. It cost \$184,000 in the first five years to remove the ash to landfills, an average of \$1.51 per ton for 121,133 tons. Clarence Hubbell expressed hope that the ash could be used in manufacturing cement products, but an experiment producing 1,500 barrels of cement was unsuccessful. The ash contained too much organic matter, as the grit had not been incinerated before being added to the ash. Hubbell spoke of barging ash out into Lake Erie and dumping it. At the February 28, 1938 meeting of the Stream

Control Commission, City Engineer George R. Thompson applied to the commission to be allowed “Permission to discharge incinerated sewage sludge ash to the Detroit River.” At the March 15 meeting, the commission adopted a motion reserving its approval until the decision of the War Department was received.⁶⁰ In 1948, the ash was being used as fill in the low-lying areas south and west of Detroit, where it was covered with a six-inch layer of black soil.⁶¹

The sewage treatment plant was transferred on May 2, 1940 to the Department of Water Supply. At that time it had incurred \$270,000 in expenditure borrowed from the sewer fund. The Department of Water Supply gave it an advance payment for an estimated six-month need. During the first fiscal year, it paid off its preliminary expenses, met its debt requirements, and established working capital. Maintenance expenses were low as was expected in the first year, but were expected to rise.⁶² The Water Board’s fiscal year ran from July 1 to June 30. The first year’s results showed that \$1.15 million was generated from sewage disposal with \$243,000 from suburban users.⁶³ Revenues from January 1, 1940 to June 30, 1941 were \$1.98 million, expenses were \$1.72 million, and debt retirement was \$508,800. Because of this, the first period from January to May 1940 saw a negative balance of \$338,000, May to June 1940 saw a positive balance of \$91,500, and July 1940 to June 1941 saw a positive balance of

⁶⁰ *Fourth Biennial Report 1937-1938*, The Stream Control Commission, Franklin DeKleine Company, Lansing, Michigan 1939.

⁶¹ “Better Sludge Filtration in Detroit,” *Sewage Works Engineering*, November 1948, p. 590.

⁶² *Annual Report of the Board of Water Commissioners of the City of Detroit, 1940-1941*, Detroit, Michigan, p. 88.

⁶³ *Annual Report of the Board of Water Commissioners of the City of Detroit, 1940-1941*, Detroit, Michigan, p. 15.

\$174,000. The balance sheet shows that \$4.85 million in bonds were payable.⁶⁴ In addition, \$2.78 million in interest was payable through 1966 for a total of \$7.64 million.

Financial data revealed that for the fiscal year ending in June 1944, the plant's operating expenses were \$1,082,220. The largest cost was incineration and ash hauling at \$282, 870, followed by chlorination at \$170,334.⁶⁵

The Detroit River was still very polluted despite the vast amount of money spent on the sewage plant. Wyandotte and other downriver communities still had polluted water sources. Statistics in the January 1936 *Wayne Engineer* show that while Detroit had an average *B. Coli* count of 32 for the years 1930 – 1935, Wyandotte had an average of 302 and Trenton had 398. From 1934 to 1938 inclusive, the level of *B. Coli* was 19,900 per 100 cc of water.⁶⁶

The southern area of Macomb County was still polluting the Clinton River and Lake St. Clair. Down river, Melvindale was still putting untreated sewage into the river, and Dearborn was treating sewage but was not chlorinating it, resulting in a high bacterial count in the waste. Several large downriver industrial plants were still dumping untreated waste directly into the river.⁶⁷ Melvindale, in May 1941, was given until July 1942 to start treating its sewage waste.⁶⁸

⁶⁴ *Annual Report of the Department of Water Supply, 1940-1941*, Detroit, Michigan, pp. 90-92.

⁶⁵ Clarence W. Hubbell. "Sludge Disposal Practices in Detroit," *Sewage Works Journal*, vol. 18 no. 2, March 1946, pp. 212-215; *Annual Report of Department of Water Supply, 1940-1941*, Detroit, Michigan, pp. 97-99.

⁶⁶ Morrill, "Detroit Sewage Treatment Plant," pp. 610-611; George R. Thompson and Arthur B. Morrill, "Detroit's Answer To A 30 Year Pollution Problem," *Municipal Sanitation*, November 1939, p. 540; George E. Hubbell, "Detroit River Pollution," *Wayne Engineer* January 1936 , p 5; W. M. Wallace and Arthur B. Morrill. "Public Health Aspects of Sewage Treatment in Detroit," *Sewage Works Journal*, March 1941, p 1.

⁶⁷ "Detroit River Still Polluted," *Detroit News*, 19 April 1941, p. 3.

A 1951 report of the IJC discussing the Detroit River said:

Despite the partial treatment afforded the major portion of domestic sewage, the bacterial concentration in these waters is in places three to four times greater, on an average, than it was in 1912. Industrial wastes, which were of little concern in 1912, are now a major problem.⁶⁹ The primary treatment of municipal wastes which has been provided has neither reduced the bacterial load below the 1913 level nor has it even kept pace with the increase resulting from expansion of municipal populations and industrial activities.⁷⁰

This was in contrast to the conditions on the Niagara River where the Buffalo treatment plants were located.

The bacterial pollution of the main body of Lake Erie is the same as in 1913. However, the load in the Upper Niagara River on the United States side shows a marked reduction. The sewage treatment plants placed in operations since 1913 are responsible for this reduction in bacterial pollution.⁷¹

Summary

Site procurement went ahead with a legal interruption when property owners disagreed with their settlements. This caused the re-bidding of settled contracts, jeopardizing the project as the federal government strictly enforced time limits. Eventually all of the contracts in each phase were granted and construction continued to completion. The plant went into operation on February 29, 1940. The official opening

⁶⁸ "End Sewage Nuisance Melvindale Is Ordered," *Detroit News*, 20 May 1941, p. 24.

⁶⁹ *Report of the International Joint Commission on the Pollution of Boundary Waters*, (Washington, D.C. and Ottawa, Ontario: 1951), p. 16.

⁷⁰ *Report of the International Joint Commission on the Pollution of Boundary Waters*, (Washington, D.C. and Ottawa, Ontario: 1951), p. 172.

⁷¹ *Report of the International Joint Commission on the Pollution of Boundary Waters*, (Washington, D.C. and Ottawa, Ontario: 1951), p. 290.

was on June 1, 1940. First and second year operations produced a lot of procedural changes that eventually led to an efficient operation. The statistics produced show that the plant was initially reducing the sewage load on the Detroit River. However, because of the build up of war industries and the resulting rise in population, the increased sewage and the increased load of industrial waste products negated the benefits of the wastewater plant.

Conclusion

With the federal government involved at the city level approaches to time limits by necessity had to change. There was an urgency to this project that was never apparent before. State courts were involved and sensing the need to resolve the dispute acted expeditiously. Contracts were awarded promptly and it is apparent from the newspapers that multiple requests for bids were issued. Because of time limits it is also apparent that contracts were not issued when the completion date would exceed the federally agreed on end dates.

The complexity of the project is very apparent from newspaper and journal articles issued between 1936 and 1940. The end stages of construction when all the electrical and mechanical systems are being connected and tested revealed what a massive undertaking it was.

Very few problems were encountered with the actual startup, which speaks highly of the quality of the components acquired and tested during the installation phase.

The planning paid dividends in the initial operational phases as very few changes in operational procedures were reported. They mostly consisted of different percentages

of sludge and screening going into the incinerators, or different loading rates of sludge into the digester to generate methane gas.

The one exception where a major change occurred was when it was decided not to use the elutriation tank to further cleanse the effluent; this was because after a three-month test of its effectiveness there was no reduction in the chlorine requirement. Pre and post chlorination of effluent and the testing of chlorinated influent resulted in a better bacteria kill with pre chlorination.

The original Clarence Hubbell design, and his statistical calculations on the volume and consistency of untreated sewage were exceptional and the resulting treated effluent, the sludge production, the extraction of solids and the ash production were all close to his predictions.

Conclusions

Detroit became the only central city providing utility services to a large metropolitan area in the country. The majority of metropolitan areas have Metropolitan Districts that are organized to provide water or wastewater treatment. This organization required municipalities adjacent to each other, sometimes in adjoining counties, to arrange unique partnerships, laying aside political boundaries to provide utility services. These arrangements by necessity resulted in a loss of sovereignty for some functions that the municipality previously possessed.

The City of Detroit has not lost any of its autonomy in this type of arrangement. It had no compelling reason to enter into a partnership with any municipality to acquire or share any utility. Some sharing was considered in the period from 1928, when the planning was in progress for wastewater treatment for various combinations of municipalities and geographic areas in southeast Michigan. It was reviewed again in the period from 1933 to 1935, when Detroit was actively seeking federal funding for wastewater treatment. Serious consideration was given by Detroit to expand the scope of the project to include other municipalities in Wayne County and, additionally, adjoining counties. It was only through the insistence of the PWA administrator, Harold Ickes, that some fiscally responsible entity, i.e., the City of Detroit, should be responsible for repaying the loan that the final resolution was made that Detroit alone become the sole municipality that received the funding. Consequently, the wastewater treatment plant was built in Detroit, using federal funds that Detroit had to repay.

Because the Detroit Water Board had for decades provided water to Detroit and the suburbs, the decision was made by the Detroit Common Council to transfer the

management of the wastewater treatment plant to the Water Board. The expansion of wastewater treatment to the suburbs followed a similar path as the provision of water had to these same suburbs. Detroit had a fully funded water treatment and delivery system, and wastewater followed. There was never any need, either politically or financially, to alter the ownership.

It had taken almost three decades from the time that the necessity for a wastewater treatment plant was first discussed to the completion of the project. There was no sense of urgency in the first few years - approximately 1913 to 1925 - even though an intensive sewer-building project had been underway. That activity was aimed only at removing sewage from the neighborhoods and depositing it into the river.

The next period from 1925 to 1927 can be characterized as one of intense activity with the Common Council deciding on the technology and the site. Resistance to the plant's location resulted in both a search for partners in the project and an unsuccessful search for financing options. Attempting to designate the project as a metropolitan plan did not succeed.

The period between 1928 and 1933 was notable in that the state legislature authorized the Stream Control Commission. This agency became very active in enforcing pollution legislation. The advent of the Depression in 1929 curtailed civil works expenditures, and the New Deal in 1933 restored and then expanded them. The years 1934 and 1935 were a time of intensive planning, proposal writing, and negotiating to have funds released for the financing of the project. The final period, 1936 to 1940, was the culmination of the project with the final project design, planning, and building of the plant and its supporting network of sewers.

Comparative Cities

Three cities on the Great Lakes with issues similar to Detroit were Cleveland, Buffalo and Chicago. All of these cities' sewage problems were examined by the United States Public Health Service Hygienic Laboratory reports, and the International Joint Commission examined Buffalo and Cleveland along with Detroit. While Buffalo was polluting Canadian waters in the Niagara River, Cleveland was not polluting Lake Erie to the extent that the pollution went over the international boundary. Chicago did not fall under the scrutiny of the International Joint Commission because of its physical location.

Cleveland

Cleveland built its first waterworks financed by \$500,000 in bonds in 1856. It began chlorinating water in 1911, and added filtration at one pumping plant in 1917 and another in 1925. In 1858 it began building a sewer system consisting of open drains to convey wastewater towards the Cuyahoga River and Lake Erie.¹ By 1873, it had fifty-one miles of main sewers.

Similar to Detroit, Cleveland had a cap on how much it could borrow for capital expenditures. Because of growing municipal debt, the Ohio legislature had capped the debt limit at 5 percent of assessed value in 1874, and eventually raised it to 7 percent in 1896.² In 1904, the water intake was relocated four miles from shore, opposite the

¹ Mary B. Stavish, *Regionalization of Cleveland's Municipal Services, 1950-1977*, (Ph.D. diss., Case Western Reserve, 1994), p. 63.

² Mary B. Stavish, *Regionalization of Cleveland's Municipal Services, 1950-1977*, (Ph.D. diss., Case Western Reserve, 1994), p. 64; C. Dickerman Williams and Peter R. Nehemkis, "Municipal Improvements as Affected by Constitutional Debt Limitations," *Columbia Law Review*, vol. 37, no. 2, (Feb 1937), p. 177.

Cuyahoga River, when the city completed an eight-year project to build it and a new pumping station at East 49th Street.³

With the rise in its debt limit, the city issued \$750,000 in bonds to build an interceptor sewer long enough to flush contaminated water into Lake Erie. This interceptor was completed in 1905 and carried the sewage to an outfall in the village of East Cleveland, at East 140th Street. The outfall was seven miles east of the city limits.

In 1910, the City of Cleveland had a population of 560,663 and covered forty-five square miles. In March and April, there had been a very sharp rise in typhoid cases caused by pollution from the sewer outlets in the Cuyahoga River flowing westwards into the water inlet out in Lake Erie. The proof for this was reinforced because:

One of the very important points in regard to this special epidemic is that at the time of the gross pollution of the water there was at the same period definite evidence of the presence of wastes from the Standard Oil Co. works which could have come only from the river, showing beyond doubt that river water in large amounts can reach the intake under favorable weather conditions.⁴

Fifty-two percent of Cleveland's sewage went into the Cuyahoga River emptying into Lake Erie, 40 percent went directly into Lake Erie, and 8 percent into Lake Erie via a restricted path from the Cleveland Harbor. The Cuyahoga River was the most polluted river in the Lake Erie basin and the second greatest contributor to Lake Erie pollution.⁵ A 1968 report, the *Lake Erie Report; A Plan For Water Pollution Control*, said that by

³ Allan J. McLaughlin, *Sewage Pollution of Interstate and International Waters*, US Public Health Service Hygienic Laboratory Bulletin 77, July 1911, (Washington, D.C., Government Printing Office, 1911), p. 131-135; Mary B. Stavish, *Regionalization of Cleveland's Municipal Services, 1950-1977*, (Ph.D. diss., Case Western Reserve, 1994), pp. 64-66.

⁴ Allan J. McLaughlin, *Sewage Pollution of Interstate and International Waters*, Hygienic Laboratory Bulletin 77, July 1911, (Washington, D.C., Government Printing Office, 1911), p. 141.

⁵ Jonathan H. Adler, "Fables of the Cuyahoga," *Fordham Environmental Law Journal*, vol. XIV, 2002, p. 107.

the 1960's, however, Cleveland only contributed 9 percent of the municipal waste load to Lake Erie, while Detroit and South East Michigan contributed 64.4 percent.⁶

In 1910, an interceptor was built that redirected all of the west side sewage away from the Cuyahoga River where it entered Cleveland Harbor and discharged into Lake Erie, nine miles east of the river.⁷ The outlet into Cleveland Harbor had been fouling the harbor for years, so an opening was made in the harbor at its western end. This caused the sewage to leave the harbor and enter the waterworks intake. To remedy this, the waterworks intake was moved in 1904 to a position four miles offshore. Moving the intake resulted in a decrease of typhoid deaths.⁸ When the new interceptor was finished, the sewage discharge was 8.5 miles eastward of the water intake. Lake Erie's easterly flowing current was very slow, calculated at from one eighth to one sixth of a mile in twenty-four hours. Strong winds could affect the surface current and reverse the direction in which the sewage flowed.⁹

The Ohio State Board of Health ordered the city to stop polluting the Cuyahoga River in 1912, and Lake Erie in 1915.¹⁰ Cleveland set up experimental stations along the

⁶ United States Department of the Interior, Federal Water Pollution Control Administration, *Lake Erie Report; A Plan For Water Pollution Control*, (August 1968) p. 4; Jonathan H. Adler, "Fables of the Cuyahoga," *Fordham Environmental Law Journal*, vol. XIV, 2002, p. 107; Arnold W. Reitze Jr. "Wastes, Water, and Wishful Thinking," *Case Western Reserve Law Review*, (vol. 2015, 1969), p. 8, "However, the City of Detroit, Michigan, is the largest single contributor of municipal waste, contributing 64.4 percent of the total oxygen demanding wastes but to a tributary with a much larger volume of flowing water."

⁷ Allan J. McLaughlin, *Sewage Pollution of Interstate and International Waters*, Hygienic Laboratory Bulletin 77, July 1911, (Washington D.C., Government Printing Office, 1911), p. 131-135; Mary B. Stavish, *Regionalization of Cleveland's Municipal Services, 1950-1977*, (Ph.D. diss., Case Western Reserve, 1994), pp. 64-66.

⁸ Allan J. McLaughlin, *Sewage Pollution of Interstate and International Waters*, Hygienic Laboratory Bulletin 77, July 1911, (Washington D.C., Government Printing Office, 1911), pp. 136-137.

⁹ Allan J. McLaughlin, *Sewage Pollution of Interstate and International Waters*, Hygienic Laboratory Bulletin 77, July 1911, (Washington, D.C., Government Printing Office, 1911), p. 144.

lake to study the treatment of sanitary sewage. Cleveland's Department of Public Service was authorized to operate an experimental sewage treatment plant in 1911. The results of these experiments lead to the selection of three sites for treatment plants.¹¹

During this decade, the city connected its sewer collection system to large interceptor sewers at West 58th and East 140th at the lakeshore, and at East 71st on the Cuyahoga River.¹² The city then built the Westerly plant at West 58th in 1922, the Easterly plant at East 140th in 1925, and the Southerly plant at Canal Road in 1928.¹³ The Southerly and Easterly plants had primary treatment and chemical and biological secondary treatment. The Westerly plant only had primary treatment.¹⁴ The heavily industrialized Cuyahoga Valley low-level district between East 37th Street and Lake Erie had never been sewered. Industrial wastes and untreated sanitary and industrial waste from the valley were dumped directly into the Cuyahoga River. The Cuyahoga valley sewerage, first ordered by the State Board of Health in 1912, was still being planned in 1941.¹⁵

The Easterly plant started in 1905 as the Easterly Interceptor running from West 9th to East 140th. There it continued one-half mile through a 63-inch steel pipe into Lake

¹⁰ Mary B. Stavish, *Regionalization of Cleveland's Municipal Services, 1950-1977*, (Ph.D. diss., Case Western Reserve, 1994), pp. 66-67.

¹¹ The Encyclopedia of Cleveland History, <http://ech.cwrv.edu/ech-cgitarticle.PL?ID=S1>, p. 2, (Accessed 5 October 2009).

¹² Mary B. Stavish, *Regionalization of Cleveland's Municipal Services, 1950-1977*, (Ph.D. diss., Case Western Reserve, 1994), p. 67.

¹³ Mary B. Stavish, *Regionalization of Cleveland's Municipal Services, 1950-1977*, (Ph.D. diss., Case Western Reserve, 1994), p. 67.

¹⁴ Mary B. Stavish, *Regionalization of Cleveland's Municipal Services, 1950-1977*, (Ph.D. diss., Case Western Reserve, 1994), p. 73.

¹⁵ Mary B. Stavish, *Regionalization of Cleveland's Municipal Services, 1950-1977*, (Ph.D. diss., Case Western Reserve, 1994), p. 74.

Erie. In 1913, it became the site of an experimental station. In 1917, an activated sludge demonstration plant became the basis for the Easterly plant design, which became operational in 1922. Secondary treatment was installed in 1938.¹⁶ The Easterly plant was designed to serve 20,600 acres, with a 1920 population of 422,000 and an estimated 1930 population of 575,300.

The Westerly plant was also a primary and secondary plant. It was originally built in 1922 as a primary plant only, but had substantial upgrades between 1932 and 1935 to improve its removal capabilities. The Westerly plant was designed to service an area of 9,300 acres with a 1920 population of 194,000 and an anticipated 1930 population of 311,000, with a dry weather capacity of 36 million gallons per day and a wet weather capacity of 159 million gallons per day. The estimated cost was \$1.1 million.

The Southerly plant began operations in 1928 and was also a primary and secondary treatment plant. The Southerly plant served 7,200 acres for a 1930 population of 226,000, with a dry weather flow of 22 million and a wet weather flow of 131 million. The Southerly plant, seven miles from the lake on the Cuyahoga River, only had river water as a diluting agent and a higher degree of effluent removal was required.¹⁷

Cleveland's sewers, interceptors, and treatment plants were administered by the Department of Service, whose funds came from Cleveland's general revenues, general obligation bonds paid for through property taxes, and from special assessments. The three treatment plants were transferred to the Public Utilities Department in 1937. At that

¹⁶ <http://www.neosrd.org/int.-history.php>, (Accessed 2 August 2009).

¹⁷ George B. Gascoigne, "The Design of Cleveland's Sewage-Treatment Works," *Engineering News-Record*, vol. 85, no. 8, August 12, 1920, p. 344.

time additional charges were imposed on all water users for their maintenance and improvement. The sewers and interceptors remained with the Department of Service.¹⁸

The city's General Fund paid operations and maintenance. The Sewage Disposal Division inside the Utilities Department was organized to help pay the costs of sewage plant improvements made in the 1930s and paid for by PWA loans and grants. The improvements increased the amount of contaminants removed from 30 percent to 78 percent.¹⁹

The PWA had promised Cleveland \$8.3 million in loans and grants in 1934 to improve its sewage treatment plants. Because the city defaulted on its debt, the PWA refused to release these monies until the city sold \$4 million in deficiency bonds. The PWA then insisted that the city enact sewage use tax, and give the PWA a mortgage on the entire sewage disposal system if it defaulted on the government loan. After the city complied and received the money the majority went to construction of a new Easterly plant to provide secondary treatment with a removal rate of 92 - 95 percent of solids.²⁰

The Sewage Disposal Division charged users for the first time in 1938 to pay off the \$20 million in capital improvements and higher operating costs. The City Council approved a Cleveland sewage charge based on 40 percent of a user's water consumption and a suburban rate of \$0.75 per 1,000 cubic feet of water used. The Cleveland sewer charge equated to \$0.32 per thousand cubic feet or roughly half of what suburban

¹⁸ Mary B. Stavish, *Regionalization of Cleveland's Municipal Services, 1950-1977*, (Ph.D. diss., Case Western Reserve, 1994), p. 68.

¹⁹ Mary B. Stavish, *Regionalization of Cleveland's Municipal Services, 1950-1977*, (Ph.D. diss., Case Western Reserve, 1994), p. 82.

²⁰ Mary B. Stavish, *Regionalization of Cleveland's Municipal Services, 1950-1977*, (Ph.D. diss., Case Western Reserve, 1994), p. 109.

communities paid. Suburban rates were lowered to \$0.46 in 1939, and in 1940, Cleveland's users were charged \$0.18 per 1,000 cubic feet.²¹

Dry weather flow was estimated at 92 million gallons per day and wet weather at 1,055 million gallons, with an estimated cost of \$1.25 million. The total anticipated 1930 population was 1.14 million, creating 150 million gallons per day of sewage.²² The two plants on Lake Erie did not need to produce a super-clean effluent as it could be diluted with lake water. The fourth district, low-level in 1920, only had two percent of the city's population and was mainly industrial. Sewage treatment was not installed until 1940. Both the Easterly and Westerly plants design was composed of racks for screening, grit chambers, sedimentation tanks, chlorination of effluent, discharge in submersed outfalls one-half mile offshore, and incineration of the screenings. The sludge was to be either dried on drying beds or loaded into barges and dumped into Lake Erie. The sludge remained in the sedimentation tanks for six months to have complete digestion before it was removed to the United States government dumping grounds off East 105th Street.²³

Cleveland, because it did not have the enormous amounts of rapidly flowing water to dilute its sewage, had to tackle wastewater treatment much earlier than Detroit. The slower moving current of Lake Erie, affected by surface winds, caused contamination at the water inlet. The Ohio State Board of Health was instrumental in forcing Cleveland to start wastewater treatment. Pressure for Detroit to do the same never came from the Michigan Department of Public Health. The Stream Control

²¹ Mary B. Stavish, *Regionalization of Cleveland's Municipal Services, 1950-1977*, (Ph.D. diss., Case Western Reserve, 1994), p. 83-84.

²² George B. Gascoigne, "The Design of Cleveland's Sewage-Treatment Works," *Engineering News-Record*, vol. 85, no. 8, 12 August 1920, pp. 344-345.

²³ George B. Gascoigne, "The Design of Cleveland's Sewage-Treatment Works," *Engineering News-Record*, vol. 85, no. 8, August 12, 1920, pp. 348-349.

Commission of Michigan began to pressure Michigan communities after its inauguration 1929. The Depression, however, stopped it from applying extreme pressure on Detroit. Its leader, Adams realized the futility in the poor economy with no way of getting adequate funding for wastewater treatment.

Cleveland did install primary treatment, Imhoff tanks, and secondary treatment, activated sludge in two of its three treatment plants. A third plant used primary treatment. Detroit's single plant similarly used Imhoff tanks and primary treatment for the majority of its sewage. Activated sludge, secondary treatment was used on a small portion, 12 percent, only as a means of producing methane gas for heating and electrical generation.

Buffalo

Similar to Detroit, Buffalo was both late in sewage treatment and ignored downstream water quality problems. The city also moved its water intake upstream from sewer outlets. Fiscal problems inhibited it from constructing wastewater treatment plants, but the New York State Health Department forced it into building a plant using federal money.

In 1863, Buffalo constructed The Great Interceptor Sewer, running along the north side of the Buffalo River. Its intent was to channel sanitary sewage to a point beyond the city's drinking water intake.²⁴ By the twentieth century, the Niagara River was heavily polluted and both the United States Department of Health Hygienic Laboratory reports and the International Joint Commission reports identified both Buffalo and Detroit as the biggest polluters of the Great Lakes.

²⁴ Mary C. Rossi, "The History of Sewage Treatment in the City of Buffalo, New York," *Middle States Geographer*, 1995, 28:9-29, p. 9.

By 1929, the daily discharge into the Buffalo River was 50 million gallons a day. Dumping of raw wastewater caused a serious outbreak of typhoid in the downriver city of Tonawanda in the early 1930s.²⁵ There were seventy-eight outfalls discharging the city's sanitary and industrial waste to the Buffalo and the Niagara Rivers by the 1930s.²⁶

Charles E. Roesch, Mayor of Buffalo, 1930–1933, said in his January 2, 1932 annual address to the Common Council: “Obviously, the first step in planning a sewage treatment plant is the selection of a site. Plans already prepared... contemplate the purchase of Squaw Island for one site and the erection of another plant in South Buffalo.” Roesch, who was fiscally conservative, opposed the \$23 million sewer system proposed by the Buffalo Municipal Research Bureau in response to the New York Health Department's pressure, and also the creation of a sewer authority, since there were no federal funds available at the time.²⁷

By 1933, New York State Health Commissioner Thomas Parran demanded that the city stop polluting its water bodies with sewage and construct a sewage disposal facility.²⁸ The Democratic Majority of the Buffalo Common Council had drafted a comprehensive public works program and applied for the allocation of the necessary funds from the Federal Public Works Administration. The program became bogged down in red tape, and there was a difference in opinion about the procedure for sewer building. In addition, Mayor Roesch's attitude was not known, leaving the project on

²⁵ Gillman J. Leahy, “Wastewater Treatment Plant Personnel,” *Water Pollution Control Federation*, vol. 43, no. 7 (July 1971), p. 1439.

²⁶ Mary C. Rossi, “The History of Sewage Treatment in the City of Buffalo, New York,” *Middle States Geographer*, 1995, 28:9-29, p. 12.

²⁷ <http://www.buffalonion.com/history/industry/mayors/roesch.htm>, (Accessed 21 October 2009).

²⁸ Mary C. Rossi, “The History of Sewage Treatment in the City of Buffalo, New York,” *Middle States Geographer*, 1995, 28:9-29, p. 12.

hold. George J. Zimmermann, Mayor 1934–1937, who was running for Mayor in 1933, went to New York and Washington and was able to persuade the PWA to commit to \$6 million of construction money for Buffalo to be financed with federal funds.²⁹

In December of 1934, The Buffalo Common Council applied for a \$15-million loan and grant for construction of a sewage disposal plant, and the proposal was submitted to President Franklin D. Roosevelt on February 5, 1935. It was reported that Roosevelt indicated he would give serious consideration to the application.³⁰ The city was hindered by the limit on its bond indebtedness. Like Detroit, Buffalo could not build sewers and wastewater treatment without bonding for more money than allowed by the state constitution's debt limit. In October 1934, Buffalo's limit was \$96.9 million with \$88.8 outstanding in bonds. This only left \$8.1 million that the city could borrow. The city proposed that they could avoid the bonding limitation by using local assessment of real estate.³¹ A local assessment is one that is levied against all properties to pay solely for the cost of public works that benefit all those properties.³²

In 1935, the New York Health Department, led by the State Health Commissioner, summarily mandated the City of Buffalo to discontinue forthwith the nuisance of pollution of the river waters.³³ By March 1935, because of the failure to get

²⁹ <http://www.buffaloonian.com/history/industry/mayors/zimmermann.htm>, (Accessed 19 October 2009).

³⁰ "Buffalo Asks \$15,000,000 Loan," *New York Times*, 5 February 1935, p. 11.

³¹ "Buffalo Seeks Aid in Disposal Plant," *New York Times*, 16 December 1940, p. E7.

³² Damien Abbott, *The Shorter Encyclopedia of Real Estate Terms*, (London: Delta Alpha Publishing Company, 2004) p. 51.

³³ Mary C. Rossi, "The History of Sewage Treatment in the City of Buffalo, New York," *Middle States Geographer*, 1995, 28:9-29, p. 12.

\$15 million in grants and loans, the city proposed a sewer authority.³⁴ To raise bond money without violating the constitutional debt limit, the state officially created the Buffalo Sewer Authority (BSA), which could sell its own bonds and repay them with revenue from sewer fees.³⁵ The state legislature approved the BSA on March 28, 1935, but it was immediately challenged in the courts as an indirect way to permit the City of Buffalo to exceed its bonded indebtedness.³⁶ The Sewer Authority Act was upheld by the Court of Appeals on May 28, 1935.³⁷ As a public benefit company, the BSA was allowed to borrow money, issue bonds, and provide for their repayment.³⁸ Another bill was passed in April 1935 allowing any city in New York to create a sewer authority. The sponsor of this bill proposed it as an alternative if the BSA bill was found to be unconstitutional.³⁹

In 1936, the New York State Department of Health took legal action against the City of Buffalo and ordered it to provide sewage treatment facilities for its population, due to disease outbreaks occurring downstream that were attributed to the discharge of untreated sewage from Buffalo.⁴⁰ The BSA provided a system of intercepting sewers to bring the city's sewage to a modern and efficient primary sewage treatment plant where

³⁴ Edwin J. Leberz, "Sewage Authority Runs Into Politics," *New York Times*, 17 March 1935, p. E6.

³⁵ Eric Vogel, Buffalo Sewer Authority <http://ppg-buffalo.wikispaces.com>, (Accessed 21 October 2009).

³⁶ C. Dickerman Williams and Peter R. Nehemkis, "Municipal Improvements as Affected by Constitutional Debt Limitations," *Columbia Law Review*, vol. 37, no. 2, (Feb 1937), p. 206.

³⁷ "Sewer Authority Upheld," *New York Times*, 28 May 1935, p. 5.

³⁸ <http://www.ci.buffalo.ny.us/home/cityservices/bsa/history>, (Accessed 21 October 2009).

³⁹ "Sewer Board Bill Is Passed by Senate." *New York Times*, 3 April 1935, p. 5.

⁴⁰ Robert D. Hennigan, "Funding of Wastewater Facilities," *Clear Waters*, New York Water Environment Association, Winter, 2004, p. 10.

solid matter was removed and incinerated, and all liquid matter chlorinated.⁴¹ Bird Island was selected as the site to build a plant. In June 1936, the BSA secured a grant of \$6.75 million and a loan of \$8.25 million with four-percent interest to build the plant.⁴²

The plant and intercepting sewers were completed in June 1938. It was a primary treatment plant with a capacity of 540 million gallons a day. This was four times the normal dry weather flow and was based on a population estimate for 1950–1955. The BSA also became responsible for Buffalo’s 759 miles of existing sewers. Many of these sewers were in poor shape and were upgraded to accommodate a fifty-year projected population. By June 1939, bacteria levels in the Niagara River were reduced by 97 percent.⁴³

The city wanted to pay back the loan over a twenty-year period, and hoped that the Federal Government would someday assume the cost of the project as a national obligation. Similar to Detroit, the city administration of Buffalo felt that the violation of the Boundary Waters Treaty was an international problem that should be corrected by the United States.⁴⁴ Newspaper articles are almost the same as for Detroit in mentioning “that the Federal Government has spent billions on public works in the south and west and that the Niagara frontier job should be included in its widespread program of sectional grants.”⁴⁵ Similar to the Detroit area, the Niagara Frontier Planning Board also

⁴¹ <http://www.ci.buffalo.ny.us/home/cityservices/bsa/history>, (Accessed 21 October 2009).

⁴² <http://www.buffaloonian.com/history/industry/mayors/zimmermann.htm>, (Accessed 19 October 2009).

⁴³ Mary C. Rossi, “The History of Sewage Treatment in the City of Buffalo, New York,” *Middle States Geographer*, 1995, 28:9-29, pp. 12-13.

⁴⁴ Edwin J. Leberz, “Buffalo Seeks Aid on Disposal Plant,” *New York Times*, 16 December 1934, p. E7.

presented a comprehensive proposal for an area-wide improvement program to the New York Planning Board and the State PWA for \$135 million. Included in these improvements was a sewage disposal plant to serve Buffalo, the Tonawandas, Niagara Falls, Lackawana, and adjacent communities. This approach was similar to the Port Huron to Lake Erie proposal that Governor Comstock of Michigan had initiated in 1933, with multiple communities likely to benefit.⁴⁶

By June 1937, the State of New York had received twenty percent of the nationwide Public Works Administration funds - \$435.1 million for 490 projects had been funded and another \$107.2 million for 595 PWA projects started by different federal agencies. New York State communities had contributed \$300 million as their share.⁴⁷

The sewers, interceptors and a pumping station were designed for a fifty-year projection until 1985. Other parts of the plant that could easily be enlarged were designed for a fifteen-year projection until 1950. Population projections were 750,000 by 1950 and 1.1 million by 1985. The intercepting sewers could carry 560 million gallons per day. The Niagara River's flow was estimated at 200,000 cubic feet per second, similar to the Detroit River. The plant's design of screening, grit chambers, sedimentation tanks, sludge dewatering, and incineration and effluent discharge into the river after chlorinating was similar to the Detroit plan. The deviation was one of grinding the screenings and putting the grindings into the sedimentation tanks to be removed with the sludge for drying and incineration. In Detroit, the screenings were ground and incinerated. As there were to be no digestion tanks at Buffalo, gas production was from

⁴⁵ Edwin J. Leberz, "Buffalo Seeks Aid on Disposal Plant," *New York Times*, 16 December 1934, p. E7.

⁴⁶ "Niagara Plan Presented," *New York Times*, 27 February 1935, p. 16.

⁴⁷ "20% of PWA Work Went to N.Y. State," *New York Times*, 16 June 1937, p. 12.

the sludge holding tanks. Odor and gas problems were anticipated and these were handled through a ventilating tower where they would escape into the atmosphere. This ventilation tower was also the exhaust for the incinerators. Sedimentation tanks were expected to remove fifty percent of the solids.⁴⁸

Chicago

Similar to Detroit, Chicago's population grew at a high rate during the late nineteenth and early twentieth centuries. In 1840 it was 4,000; by 1890 it had grown to 1,000,000, by 1930 it reached 3,000,000.⁴⁹ As with Detroit and many other cities whose water inlet was close to the shoreline, sewage entered the water intake, frequently causing Typhoid and other gastrointestinal disorders. The inlet was extended into fresh water, first by 600 feet, then to two miles and then to four miles.

Another similarity with Detroit was geography: "Chicago was situated on a shallow layer of sand underlaid by a 100 foot layer of impermeable blue clay," and so sewage from privy vaults leaked into wells.⁵⁰ By 1852 water was being pumped to reservoirs in the city. By 1856 4,821 buildings in the city were tapped into the water system. There were also twenty-nine free public hydrants.⁵¹

Early attempts at draining Chicago included grading dirt roads so that they sloped into the Chicago River and Lake Michigan, and paving the roads with stones and adding gutters. The city tried in 1850 to add drains to the streets; however, the road surfaces

⁴⁸ "Buffalo Solves Its Sewage Problem." *Engineering News-Record*, 24 September 1936, pp. 438-441.

⁴⁹ James C. O'Connell. *Technology and Pollution: Chicago's Water Policy, 1835-1930*, (Ph. D. diss., University of Chicago, 1980), p. 1.

⁵⁰ O'Connell, *Technology*, p. 12.

⁵¹ O'Connell, *Technology*, p. 16.

were only two to three feet above the lake level so these attempts at drainage did not work.⁵²

By 1852 the large amounts of pumped water caused the drainage problems to get worse. In 1855 Chicago hired an engineer, C. S. Chesborough, to install a sewer system.⁵³ Chesborough's design had the sewers draining into the Chicago River, which emptied into Lake Michigan. It was a combined sewer system.⁵⁴ Because the ground level in the city was so close to the lake level this prohibited putting sewers into the ground below the frost line. Chesborough's plan, accepted by the city council, was to raise the street grade.⁵⁵ This plan was implemented from 1856 to 1860. Older buildings were raised to the new level while new buildings were constructed at the new level. Sewers were laid down the middle of the streets then covered with dirt. These new street surfaces were paved when they dried out. The sewers were laid so that they drained into the Chicago River. The grade was 1 foot every 2500 feet, compared to the usual 1 foot per 200 feet, because of the still limited height above the lake level.⁵⁶

All of the sewage going into the Chicago River, along with the refuse from the slaughter yards and packinghouses, soon made the river and Lake Michigan polluted. In 1848 the Chicago River had been linked to the Illinois River with a 97-mile canal. This connected the Great Lakes to the Mississippi River and provided for transportation of goods between the two waterways. Because of poor construction, at the point where the

⁵² O'Connell, *Technology*, p. 10.

⁵³ O'Connell, *Technology*, p. 24.

⁵⁴ O'Connell, *Technology*, p. 27.

⁵⁵ O'Connell, *Technology*, p. 29.

⁵⁶ O'Connell, *Technology*, p. 31.

Illinois and Michigan Canal crossed the drainage divide west of Chicago, it was so shallow that it required extra water pumped into it to maintain a level where it could be traversed. Water pumps were installed to supplement the water level and were operated during the summer when the Des Plaines River dried up. It was observed that the pumping of water induced a reverse current in the Chicago River and this action caused a flushing of the river with a reduction in the pollution. This practice was continued throughout the 1860's. In 1865 the Chicago City Council authorized the deepening of the canal. Once this was done in 1871 the Chicago River began to run backwards into the Illinois and Michigan Canal drawing water from Lake Michigan and emptying into the Des Plaines River. Within thirty-six hours the Chicago River was "Quite clear and entirely free from noxious odors."⁵⁷ This only happened because the lake level was high, sometimes there was no current, or the river reversed into Lake Michigan. In the spring of 1876 the Chicago River was five-and-a-half feet higher than Lake Michigan and sewage washed into the lake, affecting the water quality. In 1880 the Chicago River ran into Lake Michigan for thirty days.⁵⁸

Recommendations made in 1880 were that a new ship canal, which would double as a drainage canal, should be constructed.⁵⁹ The canal was referred to as the "Hinge of a 'great waterway to the Gulf of Mexico.'"⁶⁰ The promise of lower freight rates sold the Illinois State Legislature on this scheme and it was approved in 1889. Construction started on the canal in 1892 and it was completed in 1900. The Sanitary and Ship Canal

⁵⁷ O'Connell, *Technology*, p. 40.

⁵⁸ O'Connell, *Technology*, p. 82.

⁵⁹ O'Connell, *Technology*, p. 85.

⁶⁰ O'Connell, *Technology*, p. 95.

was twenty eight miles long, had a minimum depth of twenty-two feet, was between 110 and 220 feet wide, and cost \$45,220,588.⁶¹ The bill authorizing the canal also created the Sanitary District of Chicago (Metropolitan Sanitary District of Greater Chicago 1955 through 1988, now the Metropolitan Water Reclamation District of Greater Chicago).

The Chicago Typhoid rate from 1890 to 1892 was 92-174 per 100,000.⁶² There were twenty-nine sewage outfalls into Lake Michigan and in the 1890's the city built two more. In 1896 a Pure Water Commission recommended that an interceptor sewer should be built on the lakefront to divert all sewage into the Sanitary Canal. This recommendation was acted upon and by 1907 the last section of this sewer was completed. In 1912 Chicago's Typhoid death rate, 12 per 100,000, was still too high to be acceptable, so the water being pumped from the South Side plant was treated with Chlorine. This reduced the mortality rates to 7.5 per 100,000. By 1916 all water was chlorinated and the death rate declined to 1 per 100,000 by 1919.⁶³

The State of Missouri sued the State of Illinois and the Sanitary District of Chicago for polluting the Mississippi River in the U.S. Supreme Court right after the Sanitary and Ship Canal was opened in 1900. On April 12, 1901 the War Office told the Sanitary Board to reduce the flow of water in the Chicago River and the Sanitary Canal from 300, 000 cubic feet per minute (5,000 cfs) to 200,000 cfm (3,300 cfs). The Lake Carriers Association, who contended that the present flow was a threat to navigation, brought about this action after complaints.⁶⁴ The Sanitary District was concerned that

⁶¹ O'Connell, *Technology*, p. 100.

⁶² O'Connell, *Technology*, p. 101.

⁶³ O'Connell, *Technology*, pp. 117-118.

⁶⁴ "War Office Puts Check On River," *Chicago Daily Tribune*, 12 April 1901, p. 5.

this reduction would strengthen the State of Missouri's and the City of St Louis's case to stop putting sewage into the Chicago River and Sanitary Canal. The Sanitary District also wanted the Illinois Legislature to widen the Chicago River to stop the hazardous navigation conditions.⁶⁵ In 1906 the U.S. Supreme Court ruled in favor of the Sanitary District as "Missouri had failed to prove any discernible change in the quality of the Mississippi river that was caused by Chicago's canal."⁶⁶

The Sanitary District expanded in 1903 when it annexed areas north to Lake County and south to the Indiana line with Cook County. They then built the North Shore Channel from Wilmette to the North Branch of the Chicago River in 1910. Between 1912 and 1922 they constructed the Calumet-Sag channel to connect the Little Calumet River with the Sanitary Canal.⁶⁷ Because the Sanitary Canal was diverting 10,000 cfs of water from Lake Michigan, the War Department brought suite in 1902 to stop more than a 4,167 cfs diversion. This suite was resolved in 1925 by the U. S. Supreme Court, which upheld the War Department's right to limit water diversion.

In 1915 the Sanitary District began investigating sewage treatment as the Federal Government was concerned about the amount of water being diverted and what it was doing to the Great Lake's water levels, which had been lowered by six inches. The Sanitary District began installing settling basins to treat the waste of the stockyards; no other sewage treatment was initiated because of World War One. In 1925 the War Department granted the Sanitary District a temporary diversion of 8,500 cfs on the

⁶⁵ "Fear Loss Of Big Canal," *Chicago Daily Tribune*, 14 April 1901, p. 5.

⁶⁶ O'Connell, *Technology*, p. 133.

⁶⁷ O'Connell, *Technology*, p. 135.

condition it accelerated its building of sewage treatment facilities.⁶⁸ In 1922 Wisconsin, followed by Minnesota, Ohio and Pennsylvania in 1925 and Michigan and New York in 1926, sued the Sanitary District to stop water diversions. The U. S. Supreme Court appointed a special master, Charles Evans Hughes, to review the consolidated cases from these Great Lakes states in 1926. In 1929 Hughes recommended allowing the diversion while the treatment plants were completed. The U. S. Supreme Court disagreed and ordered the Sanitary District to stop all diversions by 31 December 1929. Upon appeal this order was modified to 6,500 cfs by 1 July 1930, 5,000 by 31 December 1935, and 1,500 cfs by 31 December 1938.⁶⁹

The Sanitary District opened its first treatment plant at the Calumet River and One Hundred Thirtieth Street in 1922; the North Side Treatment Plant in 1928; the West Side Plant in Stickney in 1931; and the Southwest Plant in Stickney in 1939. It also built facilities at the Stockyards in 1926 and 1932, and at the Argo Corn Products Plant in 1927, to treat their waste products prior to their release into the Sanitary Canal. Chicago was thus able to remove 90 to 95 percent of the pollutants prior to their release.⁷⁰

The Sanitary District was advised in 1906 to use the Sprinkling Filter system to purify effluent but instead chose the Activated Sludge system. This decision led to a protracted legal battle as the activated sludge process was owned by Activated Sludge Inc. The company sued Chicago and many other cities. Chicago was saddled with a judgment of \$7.5 million in 1937 on a suit filed against them in 1924. After many

⁶⁸ O'Connell, *Technology*, p. 142.

⁶⁹ O'Connell, *Technology*, p. 143; Louis B. Cain, "Unfouling the Public's Nest," *Technology and Culture*, vol. 15 no. 4, (October 1974), pp. 594-613. This article discusses the diversion in detail; "Ruling Satisfies Sanitary Trustees; Urge 60 Millions For Sewage Plants," *Chicago Daily Tribune*, 15 January 1929, p. 8.

⁷⁰ O'Connell, *Technology*, pp. 143-144.

appeals, in 1946 the city lost their final appeal and paid \$950,000 in compensatory damages.⁷¹

Detroit, unlike Chicago, was not constrained by a limited supply of water to dump its treated effluent into. Consequently, while Chicago's treated effluent was going into the Chicago River with its diversion of a maximum of 10,000 cfs, Detroit's treated effluent was discharged into the Detroit River with its 220,000 cfs. Because the amount was so much less in the Chicago River a much cleaner effluent with a 95 percent removal rate was required. While Detroit went with primary treatment using Imhoff sedimentation tanks, Chicago had to add secondary treatment with the activated sludge process. If Chicago had been allowed to maintain this diversion rate or increase the diversion, as it frequently requested but was denied by the War Department and ultimately the U. S. Supreme Court, there would not have been the 95 percent reduction requirement.

The 1925 settlement to limit water diversion had many conditions that the Sanitary Board had to comply with. The Secretary of War stipulated the immediate construction of \$54 million in sewage treatment plants. The City of Chicago had to start installing water meters to monitor water usage and that if a program was not adopted

⁷¹ O'Connell, *Technology*, p. 14; J. J. Cosgrove, *Sewage Purification and Disposal*, (Pittsburgh: Standard Sanitary Company, Mfg. Co., 1909), pp. 97-119; George W. Fuller, *Sewage Disposal*, (New York: McGraw-Hill Book Company, 1912), pp. 690-720; Louis B. Cain, "Unfouling the Public's Nest," *Technology and Culture*, vol. 15 no. 4, (October 1974), p. 604; "Sewage Patent Case May Cost City \$7.5 Million," *Chicago Daily Tribune*, 31 July 1937, p. 15; "Patent Decision Will Cost Sanitary Board Millions," *Chicago Daily Tribune*, 26 October 1937, p. 16; "Milwaukee Wins Cut In Sewage Disposal Award," *Chicago Daily Tribune*, 24 July 1938, p. 9; "Sanitary District's Petition To Reopen Case Denied," *Chicago Daily Tribune*, 7 July 1940, p. B7; "Sludge Firm Wins \$950,000 Judgment Suite," *Chicago Daily Tribune*, 29 January 1946, p. 24; "Appeal Filed In \$950,000 Sanitary Suite," *Chicago Daily Tribune*, 27 February 1946, p. 8; "Sanitary District Loses In \$950,000 Sewage Appeal," *Chicago Daily Tribune*, 27 October 1946, p. 24. Rudolph Hering and George W. Fuller advised them to use the sprinkler system in their 1906 report to the International Waterways Commission. The Activated Sludge Inc. Company sued 150 plus cities for patent infringement.

within six months the federal government would revoke the permit. If the Secretary of War thought that sufficient progress was not being made to install sewage treatment the permit would be revoked. The government engineer in charge of monitoring progress was Major Rufus W. Putnam. His reason for the water meter installation was that with meters, consumption would fall, reducing the costs of construction and operations in sewage treatment plants. There would be a reduction in lake water usage for domestic purposes and Chicago could then finance and install a filtration system when its water consumption was reduced to a reasonable amount. With filtration, reversals of the Chicago River would not cause dangerous conditions at the water intake.⁷² The City Council balked at creating a plan to install water meters, and finally the Mayor William Emmett Dever recalled them all from vacation on 2 September 1925 to approve a plan and beat the six-month deadline of 3 September 1925.⁷³ After the water-metering program was initiated, progress was slow: union recalcitrance only allowed one meter per fitter per day to be installed.⁷⁴

In April 1927 the new Mayor William Hale Thompson ordered the Commissioner of Public works to stop installing meters. The War Department became aware of this order and threatened to stop the water diversion. This provision for water meters was eventually dropped, after Mayor Thompson proposed an extensive program of fixing leaking mains and other repairs as a better solution. Only 42,722 meters were in use by

⁷² Arthur Sears Henning, "Week's Terms Warn City To Snap Into It," *Chicago Daily Tribune*, 7 March 1927, p. 1.

⁷³ "Chicago Likely To Win Delay On Water Meters," *Chicago Daily Tribune*, 25 July 1925, p. 3, "Lake Flow May Be Cut If City Fails To Meter," *Chicago Daily Tribune*, 20 August 1925, p. 2, "Metering Bill Passes After 5 Hour Debate," *Chicago Daily Tribune*, 2 September 1925, p. 1, p. 14.

⁷⁴ "City Caught In Meter Dilemma Officials Claim," *Chicago Daily Tribune*, 7 November 1926, p. 21.

the end of 1925. By March 1927 only 16,384 more had been installed.⁷⁵ In 1935 the Federal government re-implemented the meter requirement as a condition for a \$21 million South Side filtration plant loan.⁷⁶

Because of the 1925 diversion agreement and the 1929 U. S. Supreme Court decree to reduce diversions and treat all sewage, the Federal government was very involved with the decisions made by the Chicago Sanitary District. Both the War Department and later the U. S. Supreme Court were monitoring the Sanitary District's progress.

After the 6 March 1925 permit was granted, Major Putnam, the army district engineer, received plans for the \$59 million construction program of the Sanitary District. In May he refused to approve these plans and insisted on immediate construction of the West Side plant at a cost of \$18 to \$20 million. "To satisfy the War Department the Sanitary District must complete four major projects. Those are extension of the Des Plaines River plant, extension of the Calumet River plant, completion of the North Side plant west of Evanston, and the West Side plant."⁷⁷

After the 1929 U. S. Supreme Court decision, the special Master Charles E. Hughes, appointed by the court to oversee the decree, was approached by the Sanitary District to ask that it be allowed 15 years to complete the sewage treatment program.

⁷⁵ "Mayor's Order End Setting Of Water Meters," *Chicago Daily Tribune*, 17 April 1927, p. 1, "U. S. Keeps Eye On Thompson's Meter Proposal," *Chicago Daily Tribune*, 18 April 1927, p. 15, "Aldermen Vote To Throw Out Water Meters," *Chicago Daily Tribune*, 24 August 1927, p. 1, "Jadwin Warns City To Put In Water Meters," *Chicago Daily Tribune*, 9 September 1927, p. 1, "Water Meters," *Chicago Daily Tribune*, 3 July 1930, p. 10.

⁷⁶ "Hearing Tuesday On S. Side Water Meter Proposal," *Chicago Daily Tribune*, 8 August 1935, p. 12, "So. Side Water Meter Project Makes Headway," *Chicago Daily Tribune*, 14 August 1935, p. 14.

⁷⁷ Drainage Board Told To Change 59 Million Plan," *Chicago Daily Tribune*, 1 May 1925, p. 21; Arthur Sears Henning, "Chicago Gets Permit To Use Lake Water," *Chicago Daily Tribune*, 7 March 1925, p. 1.

Hughes expected the program to be carried out promptly when the time limits were set. The Sanitary District had no funds to purchase the site for the Southwest Side sewage plant and needed a bond issue to be approved by Illinois voters.⁷⁸ Hughes said “That the State of Illinois may be ordered by court decree to assume full responsibility for completion of the Chicago Sanitary Sewage treatment program.”⁷⁹ The lakes states of Wisconsin, Minnesota, Michigan, Ohio, Pennsylvania and New York proposed that the diversion be ended by 31 December 1935. Hughes eventually decided that the \$176 million sewage treatment program should be completed by 31 December 1938. The U. S. Supreme Court accepted his recommendation and issued the decree on 14 April 1930. The Sanitary District was required to report semi-annually on its progress.⁸⁰

The Sanitary District calculated it would need \$20 million a year for the next six years in bonds to be issued by the district, and it needed an emergency law passed by the legislature authorizing the bond issue.⁸¹ In February 1931 \$36 million in bonds was approved by Illinois voters to build the four required sewage treatment plants.⁸²

By July 1932 the Sanitary District, affected by the Depression, was ceasing construction, laying off workers, not paying bills and had defaulted on \$7.6 million in bond principal and interest. It was unable to sell any bonds, and Cook County taxes were two years in arrears. The Sanitary District informed the U. S. Supreme Court in its semi-

⁷⁸ Chicago Asks 15 Years To Finish Sewage Plant, *Chicago Daily Tribune*, 20 April 1929, p. 2.

⁷⁹ “Court May Land Chicago Sewage Task On State,” *Chicago Daily Tribune*, 25 April 1925, p. 2.

⁸⁰ Demand Chicago Finish Sewage Plant In 6 Years,” *Chicago Daily Tribune*, 5 October 1929, p. 9.; “Hughes Gives 9 Years to Finish Sewage Plants,” *Chicago Daily Tribune*, 18 December 1929, p. 1; “Supreme Court Fixes Chicago’s Water Quota,” *Chicago Daily Tribune*, 15 April 1930, p. 1.

⁸¹ “Ask \$20,000,000 A Year To Build Sewage Plants,” *Chicago Daily Tribune*, May 1930, p. 5.

⁸² “Passage Of Bond Issue To Speed Lake Drive Link,” *Chicago Daily Tribune*, 26 February 1931, p. 4.

annual report that “Until the depression lifts, or unless a Federal loan can be secured, there can be no substantial progress on the sewage treatment program.”⁸³

As with Detroit, Chicago filed a request for a Federal Reconstruction Finance Corporation Loan for \$36.5 million to finance the federally required sewage treatment program. This September 1932 request was denied in December by the RFC because the project was not self-liquidating. In February 1933 the Sanitary District asked Congress to modify the RFC Act to eliminate the self-liquidating clause.⁸⁴

In May 1933 the Illinois State Senate approved an \$18.5 Million bond issue by the Sanitary District. This and an unused bonding power of \$40 million were to be used as security to apply for a \$58.5 million loan from the federal government. There was a \$3.3 billion public works bill pending from which the loan was to be received. The U. S. Supreme Court had ruled that the State of Illinois was responsible for providing funds to build the sewage treatment plants.⁸⁵ This request for a loan did not go very far as the PWA administrator Harold Ickes would not loan the Sanitary District money as it was a very poor risk. A suggestion was made that the Government buy the SAG Canal and the Sanitary and Ship canal for \$100 million and the Sanitary District use that money to build treatment plants.⁸⁶ Ickes did not like this idea and made a counter proposal that the Sanitary District gives the plants to the federal government and the PWA would complete them. The Sanitary District would pay rent on the plants for several years to liquidate the

⁸³ “Lack Of Funds Halts Chicago Sewage Program,” *Chicago Daily Tribune*, 3 July 1932, p. 10.

⁸⁴ “Sanitary Board Files Request for R.F.C. Loan,” *Chicago Daily Tribune*, 17 September 1932, p. 7; “R.F.C. Denies Chicago Loan; Buys A Levee,” *Chicago Daily Tribune*, 21 December 1932, p. 27; “Sanitary Board Asks R.F.C. Loan To Build Plants,” *Chicago Daily Tribune*, 4 February 1933, p. 7.

⁸⁵ “Hope Increases For U.S. Loan For Sanitary Board,” *Chicago Daily Tribune*, 24 May 1933, p. 11.

⁸⁶ “A Sound Solution of The Sanitary Problem,” *Chicago Daily Tribune*, 12 September 1933, p. 14.

construction costs and then receive them back.⁸⁷ Eventually in November 1933 the PWA granted the Sanitary District a \$33.9 million loan, this followed an \$8 million loan to finish work already in progress. The government was to receive bonds from the Sanitary District bearing 4 percent interest.⁸⁸ This loan was granted a full twenty months before the \$11 million loan and \$9 million grant that Detroit received. The Chicago \$33.9 was a 30 percent \$8.845 million grant and a 70 percent \$25.103 million loan.

This initial funding was for seven sections of the Westside Interceptor, completion of the Calumet sewage plant, construction of four Calumet intercepting sewers, and for the combined West-Southwest sewage plant at Stickney, a pumping station, blower house aeration and settling tanks. The money was also forecast to create 16,000 jobs for two years.⁸⁹ Because the PWA was supervising construction of the plants under the loan agreement it appointed a board of engineers to review the Sanitary District's plans. These engineers proposed substantial changes to these plans, which increased the overall cleanup of sewage effluent from an estimated 56 percent to 72 percent. This change would come about from "1. Higher purification of Chicago's sewage at an earlier stage. 2. Immediate construction of the Northwest Side Imhoff Plant. 3. Continued use of the West Side Imhoff Plant. 4. Curtailment of water waste costing \$12 million a year that required larger sewers and treatment facilities." Once again water meters were proposed.⁹⁰

⁸⁷ "Charge Ickes Plays Politics On Canal Plans" *Chicago Daily Tribune*, 29 October 1933, p. 10.

⁸⁸ "Win \$33,000,000 Canal Loan," *Chicago Daily Tribune*, 19 November 1933, p.1.

⁸⁹ "Canal Board's Millions To Give Jobs To 16,000," *Chicago Daily Tribune*, 9 December 1933, p. 1, p. 6.

⁹⁰ "Safeguarding The Sanitary Loan," *Chicago Daily Tribune*, 21 December 1933, p. 14; "Urge Chicago Change Sewage Disposal Plan," *Chicago Daily Tribune*, 6 May 1934, p. 27.

The examination of the Sanitary District's plans by the PWA's engineers had already halted work on the new \$21 million West-Southwest plant since February 1934. The PWA's proposal had to be accepted by the U.S. Supreme Court who had approved the original plans. The district's attorneys wanted to be in compliance with the U. S. Supreme Court's decree and these changes might violate that.⁹¹

Once the finances were assured and the plans were in place construction proceeded without any major interruptions. A July 1934 semi-annual report noted, "Of the entire \$221,154,588 construction program planned to accomplish sewage treatment \$102,204,588 is completed, leaving \$118,050,000 to be completed." The North Side plant was 90 percent complete, the West Side plant was 33 percent, the Calumet plant was 50 percent and the West Southwest plant was not yet started.⁹² The Calumet plant was put into operation in December 1935. It processed 75 mgd and served 238,000, with the capability to expand to 136 mgd serving 455,000. It used the activated sludge process. The North Side plant was treating 175 mgd, for an 800,000 population and was also an activated sludge plant. The West Southwest Stickney plant treated 400 mgd for a population of 1,300,000 and it was also an activated sludge plant; it was put into full operational status in August 1939. The West Side plant that treated 467 mgd with a population of 1,850,000 was only a primary treatment plant, using Imhoff tanks.⁹³

⁹¹ "Face New Delay On \$21,000,000 West Side Works" *Chicago Daily Tribune*, 9 May 1934, p. 18; "Revised Sewage Plans Will Go To High Court," *Chicago Daily Tribune*, 16 May 1934, p. 18; "Ask State's O.K. On New Plan For Sewage Works," *Chicago Daily Tribune*, 17 May 1934, p. 14;"Change In sewer Project Aim Of Canal District," *Chicago Daily Tribune*, 24 May 1934, p. 4.

⁹² "Report Sanitary District Status Much Improved" *Chicago Daily Tribune*, 2 July 1934, p. 1.

⁹³ "Start Operations At New Sewage Plant In 10 Days," *Chicago Daily Tribune*, 24 November 1935 p. 5; "New Calumet Sewage Plant In Operation," *Chicago Daily Tribune*, 4 December 1935, p. 6;

The Sanitary District, under pressure from the U. S. Supreme Court decree, finished its wastewater treatment plans on time. The diversion rate was reduced from 5,000 cfs to 1,500 cfs on 1 January 1939. Immediately the reduced flow and the incomplete treatment of sewage from the West Side Imhoff plant allowed sludge deposits to accumulate in the Sanitary Canal. This condition became unbearable, as the sludge deposits were “Decaying and giving off miasmatic fumes that are particularly objectionable on warm days.” The Sanitary District petitioned that the diversion rate be increased to 5,000 cfs. The U. S. Supreme Court once again denied a request to increase the diversion rate. In 1941 the Sanitary District began an \$11 million update to the West and Southwest Side plant to add the activated sludge process. The West Side plant, completed in 1930, used primary treatment Imhoff tanks producing 1.85 mgd of effluent that only had about 50 percent of the sewage removed. The additional upgrades to the plant would remove an estimated 95 percent of the pollutants.⁹⁴

Chicago and Cleveland are lake cities, while Buffalo and Detroit are river cities. Because of population densities Chicago had the biggest pollution problem. As Cleveland’s population density was much lower; Lake Erie did not receive such a high load. Both Buffalo and Detroit had the 220,000 cfs river flow to dilute their sewage. Chicago, through diversion of the Great Lakes water into the Mississippi system, became entangled with the Federal Government. By building the Illinois and Michigan canal, superseded by the Sanitary and Ship Canal, Chicago joined the two water systems together. Navigation on the Chicago, Des Plaines and Illinois rivers was affected. The water level on the Great Lakes was lowered because of the diversion. This involved the

⁹⁴ “Sewage Works To Reduce Odors,” *Chicago Daily Tribune*, 1 June 1941, p. S1; “Polluted Waters,” *Chicago Daily Tribune*, 31 August 1939, p. 12; “Water Diversion To The Supreme Court,” *Chicago Daily Tribune*, 29 January 1940, p. 10.

Federal Government through “The Commerce Clause, Article 1, Section 8, Clause 3 of the U.S. Constitution which gave Congress the power to regulate commerce with foreign nations, and among the several states, and with the Indian Tribes.” Navigation was included in the powers given to Congress to regulate commerce among the states.”⁹⁵ Through the Rivers and Harbors Act the responsibility for observation and enforcement was relegated to the War Department. This department and the U.S. Supreme Court became the arbitrators of what the Sanitary District could do. This resulted in the enforcement of a Supreme Court decree limiting diversion and time limits for the diversion’s reduction. The Sanitary District was forced into building plants that removed 90 percent of the pollutants using both primary and secondary treatment. None of the other cities were forced to do this.

Cleveland, through pressure from the Ohio State Department of Health, started their treatment much earlier than Detroit. Similar to Chicago they also used activated sludge, secondary treatment to a greater degree than Detroit. When federal funds became available through New Deal programs they upgraded their plants to remove more bacterial pollutants.

Buffalo and Detroit have more in common in their endeavor for waste treatment. They both had high visibility in the U.S. Public Health Service Hygienic reports and the IJC reports. Buffalo was pressured by the New York Department of Health to commence wastewater treatment. Through legislation, because it was up against the 7 percent debt limit, the New York state legislature created the Buffalo Sewer Authority. This process enabled the Authority to apply for loans from the Federal government and guarantee their

⁹⁵ Randy E. Barnett, “The Original Meaning Of The Commerce Clause,” *University of Chicago Law Review*, Winter 2001, vol. 68, p. 125.

repayment through revenue bonds. Detroit, in similar financial straits, followed a similar path albeit without the creation of a new agency. It also used revenue bonds to assure the PWA administrator Ickes of repayment.

Detroit used Imhoff tanks and secondary treatment for one eighth of its sewage. This was precipitated more by economic considerations than environmental ones. The methane gas generated by the activated sludge process was used for heating and electrical generation. The plant design incorporated this process for economy.

Detroit was not groundbreaking in its use of technology, rather adopting methods that were already operational elsewhere. Unique design features that it made to the Imhoff tanks improved effluent flow and sedimentation, and the earth coverings on these tanks reduced building costs and odor, and also improved sedimentation.

Sewers and the Detroit River Interceptor

The sewer-building project that Detroit initiated in 1861 when a comprehensive system of parallel sewers was installed paved the way for drainage in the central and oldest part of the city until the early 20th century. As additional territory was annexed supplementary sewers were added. Eventually the original sewer outlets to the Detroit River were overloaded. The long process of building the interceptor sewers that eventually funneled all sewage to the wastewater treatment plant, started in the 1920's, was completed with federal funds in 1939. Costs rose exponentially and the last five miles of the Detroit River Interceptor, running from downtown to West Jefferson, cost over \$2 million per mile because of its increased diameter and depth underground. The plan to enclose Connors Creek on the east side eliminated an eyesore and a substantial source of pollution. Enclosure of Baby Creek on the west side accomplished similar

results. Building the Oakwood Interceptor on the west side finalized the major sewers required to deliver all of the sewage to the Jefferson Avenue plant.

The sewer building projects, gradually over a period of years, accomplished a purpose in reducing above ground pollution in the creeks that became major sewers. The building of the Detroit River Interceptor enabled the City to gradually reign in the pollution and sewage entering the Detroit River above the water intake at the head of Belle Isle. Over time the outlet for the Detroit River Interceptor was moved down the river and farther from this inlet, almost eliminating pollution of the water supply.

The sewer system for Detroit, the installation of which took decades and cost millions of dollars was essentially completed by 1940. There were 604 miles of main sewers and 2,019 miles of lateral sewers that had cost \$120.5 million. Seventy two percent of the main sewers and 84 percent of the lateral sewers were built between 1900 and 1940. It was necessary to build these sewers, to remove the sewage from the city. The wastewater plant, no matter where it was located, had to be connected to a sewer system. The plans that evolved over the early part of the century accomplished this hookup without any apparent wastage of effort.

Involvement by Federal and State Governments, Health Department, Stream Control Commission and the International Joint Commission

Pressure to build a waste water treatment plant and stop polluting the Detroit River by outside agencies never materialized the way I envisioned it would from my initial readings of newspaper articles, International Joint Commission publications, and Public Health and Marine Hospital bulletins.

The clamor that came from newspapers and journal articles, after the initial publications of both the findings of McLaughlin with the 1911 to 1913 Public Health

Bulletins of investigation of typhoid in interstate waters, and the 1914 to 1918 reports of the International Joint Commission on cross border pollution of boundary waters, never materialized into action by any legislative or regulatory body. Neither the Federal Government nor the Canadian Government ever applied any pressure on the State of Michigan or the City of Detroit to stop polluting the Detroit River. After the IJC's final publication in 1918, no further investigation by the IJC was initiated again until 1948.

The State of Michigan waited until 1929 to enact legislation to form the Stream Control Commission, whose task it was to investigate water pollution violations and enforce water pollution regulations. This Act finally gave the State leverage against pollution. By the time it was enacted the Michigan economy had disintegrated to the state that the majority of municipalities did not have the financial resources to install wastewater treatment. Milton P. Adams of the Stream Control Commission was very aware of this and did not push immediately for installations. Adams said, "Only the financial difficulties of these cities have persuaded the State to adopt a lenient attitude to them during the last four years."⁹⁶ His organization studied the situation in Michigan before pressuring municipalities to finance installations. He kept a hands off approach with Detroit while actively becoming involved with all of the proposals sent to Washington for financing. He was also involved in the various proposals where Detroit would partner with other cities and counties.

When negotiations between the Common Council and various city departments concerning the best methods to pay back the bonds began to bog down, Adams became involved and put pressure on the various parties. He was quoted in the newspapers as saying that he would force the issue if they could not agree, by suing the city. Adams

⁹⁶ "State Studies Sewage Need," *Detroit News*, 11 September 1934, p. 14.

said “Unless voluntarily assumed the matter must come before the courts, in which event delays may be expected for a time but only one result is conceivable that a decree to immediately undertake correction. The cost to you is certain to be greater at this time.”⁹⁷

The Failure to Develop a Regional System

While Detroit was planning the wastewater treatment plant, and implementing the sewer and interceptor system for the plant, as a solution for a Detroit-only system, there was a concentrated effort by other municipalities to make it a regional system.

The Downriver League of Municipalities was very active in these years, pressuring the Detroit Common Council into considering expanding the scope to include municipalities all the way down the river to Lake Erie. The Governor of the State of Michigan, Comstock, wanted the system to accommodate the whole waterway from Port Huron to Gibraltar. The City of River Rouge did not want the plant to be situated within their city limits but did want to be part of a sewage treatment system as a member of the Downriver League of Municipalities. At various times counties in the southeast area of Michigan, Wayne, Oakland, and Macomb were included with Detroit in plans. Proposals that were sent to Washington included these counties in comprehensive metropolitan systems.

Eventually the federal government contributed grants and loans to Detroit for the West Jefferson system and the interceptor and sewer system. The government also loaned money to Wayne County for smaller wastewater systems in the west and south of the county. It also loaned Oakland and Macomb Counties money to build connecting sewers to the Detroit system. Consequently a metropolitan system was built, but it was in

⁹⁷ “Build Sewer State Urges,” *Detroit News*, 30 August 1935, p. 10, Adams wanted pressure placed on the Common Council.

a piecemeal fashion and not interconnected the way that Adams and Comstock, and other planners, had envisioned with their extensive watershed proposals from the 1930's.

Revenue Bonds.

Alfred Cobo, City Treasurer, through careful budget analysis, was able to reduce the amount that was required to be paid back, through bond sales. He was also able to sell these bonds to the Federal Government. Through legislation these bonds were designated as revenue bonds and thus were not bound by the 7 percent rule. The interest on the bonds, and the bond buy back were to be paid for through charging water users for wastewater treatment calculated on water usage. This charge was added to their water utility bill.

Conclusion

For nearly 10 years from 1915 to 1925 concurrently with the rapid expansion of Detroit there was an effort by the administration through engineering studies to resolve the needs of wastewater treatment.

The studies identified the problems, recommended solutions with the best technology available and provided fairly accurate estimates of cost. Circumstances outside of Detroit's control, World War One, the rise of the automobile industry, local politics and the depression all combined to slow down the implementation of the plans.

Local politics thwarted the primary decision on the technology to be used, the location of the plant and the population to be served.

I am split in my belief as to whether the divisiveness on the part of the Detroit Common Council was due to Nagy's sincere belief that Reinsch-Wurl screen technology was the most cost effective or that D'Olier had compromised him. The other council

members who voted against tanks believed in their positions whether it was that activated sludge was the better technology or that the proposed site's location would cause problems that could not be resolved, or that the location should be on Lake Erie. River Rouge mounted such an offense that eventually the Dodge site was dropped and an area wide solution was proposed. The activated sludge option was also partially implemented in 1940 and fully adopted after 1972.

Local politics outside of Detroit managed to derail the project from 1927 until 1928 when Detroit dropped the Dodge site and instead proposed a countywide solution. The decision to pursue this Wayne County option expended time and effort but did not succeed because it was proposed at a time when financial resources were shrinking because of the onset of the depression. The many other proposals for area wide systems suffered a similar fate because of limited funding and a general disregard for the urgency of resolving the problem.

The New Deal was designed to get the economy restarted and to put men back to work, getting them off the unemployment registers. Civil works, both building and rebuilding the infrastructure of the country was one way to accomplish this. The majority of states and cities could not afford to finance their own needs. The federal government's involvement and financial aid was necessary to accomplish these needed projects. Detroit could not have built its wastewater plant without federal aid, just as many other municipalities during this period. Other massive government financed projects during this time were the Hoover Dam and the electrification of rural communities through the Tennessee Valley Authority. The post war Interstate Highway System is another

example of a project that was that was only attainable with federal government assistance.

My examination of automobile registrations between 1900 and 1940 shows a correlation between high registrations in both 1915 – 1917, of 728,000, 1.127 and 1.5 million vehicle and again in 1923 – 1925, 2.92, 2.5 and 2.45 million vehicles.⁹⁸ At the same time examining the annexation history of Detroit reveals that these are the same years when nearly 100 sq miles of territory were added. These are also the same years when increased activity to provide wastewater treatment occurs. It is conceivable that in these periods of increased economic activity the waste load on the river was so high that manufacturing activity was negatively affected. The increased costs in cleaning water that they used to run their operations would have triggered a reaction that may not have been reported in the press.

⁹⁸ U. S. census Bureau, Statistical abstract of the United States: 2003, Transportation Indicators for Motor Vehicles and Airlines Mini Historical statistics p. 77.

APPENDIX A

The City of Dearborn and Wayne, --Oakland, and Macomb Counties.

While the main objective of this research was to discover how the Detroit wastewater treatment plant was conceived and built, it is important to document adjacent areas to Detroit whose sewage entered the Detroit River. These areas were Oakland, Macomb, and Wayne Counties and the City of Dearborn. Oakland, Macomb, and northeastern Wayne County were dumping sewage into the Clinton River and Lake St. Clair, threatening the water supply north of Detroit. Southwestern Wayne County was dumping sewage into the Detroit River south of Detroit, substantially nullifying Detroit's effort to clean up the river after 1940.

Detroit was dumping sewage into the Rouge River north of Dearborn, from the Southfield Sewer, severely polluting the river and raising the wrath of industrialist Henry Ford. Because Dearborn had installed wastewater treatment in 1923, Detroit negotiated with Dearborn in 1928 to process this Southfield Sewer effluent.

Dearborn

The city of Dearborn built their East Side disposal plant in 1923, an Imhoff sedimentation plant. Prior to this, there was no sewage treatment in the metropolitan area except for a small sewage treatment plant on Belle Isle.¹ By 1929, the conditions in the Rouge River valley were very bad as the sewage from the growing population in

¹ *Journal of the Common Council of the City of Detroit, December 24 1913*, Detroit, Michigan 1914, p. 1571. There is a reference for bids to install a steam heating plant in the Belle Isle Sewage Treating Plant; *Journal of the Common Council of the City of Detroit, April 4 1916*, Detroit, Michigan 1917, p. 480; *Journal of the Common Council of the City of Detroit, April 18, 1916*, Detroit, Michigan 1917, p. 544; *Journal of the Common Council of the City of Detroit, September 12, 1916*, Detroit, Michigan 1917, p. 1340; *Annual Report of the Department of Public Works 1916-1917*, Department of Public Works of the City of Detroit, Detroit, Michigan 1917. p. 30, there is a disbursement of \$43,417 for Belle Isle Sewere (sic) system.

northwest Detroit was entering the Rouge River from the Southfield Sewer. Detroit and Dearborn were both interested in solving this problem. Detroit proposed an activated sludge plant and Dearborn a chemical precipitation magnetic filter plant.

Detroit had begun construction of the Southfield sewer in 1926. It needed a right of way across Ford Motor Company property so that the sewer could discharge into the Rouge River below Michigan Avenue. To obtain the right of way, Detroit in April 1927 consented to build a temporary wastewater treatment plant to treat the sewage before it was discharged into the Rouge River, to protect the Dearborn water supply. Instead of building this temporary plant, Detroit entered into a new agreement whereby Dearborn would construct a treatment plant and process sewage from the Southfield sewer.² By 1928, the Southfield sewer was completed from 6½ Mile Road to its outlet into the Rouge River, a distance of three-and-a-half miles. Later, it would connect with the Dearborn treatment plant. This plant was intended to treat the sewage from the Rouge, Southfield, and Dearborn districts. The Rouge Interceptor sewer from Warren Avenue north to Puritan Avenue was under construction with a completion date of March 1929.

In August of 1928, Detroit and Dearborn signed a tentative agreement for a joint sewage treatment plant at the end of the Southfield sewer at Southfield Road and Airport Drive in Dearborn, on a Ford Motor Company site. This plant was to process the sewage presently going into the Rouge River, and Dearborn's sewage.³ This Dearborn-Detroit plant was estimated to cost \$800,000 and handle forty-six million gallons of sewage a day. A vote for approval was set for the November ballot. Detroit was to pay 85 percent

² John W. Reid to the Common Council, *Journal of the Common Council of the City of Detroit, Detroit, Michigan July 31, 1928*, Detroit, Michigan 1919, p. 2037; *Journal of the Common Council of the City of Detroit August 7, 1928*, Detroit, Michigan 1929, pp. 2084-2087.

³ "Detroit And Dearborn Sewage Plant Approved," *Detroit News*, 1 August 1928, p. 15.

of the cost. The service area was to include northwest Detroit. It was to be a two-stage activated sludge plant.⁴

In September 1931, Detroit contracted with Dearborn to have Dearborn treat all sewage from the Southfield sewer, which served a thirty-three-square-mile area. The Southfield sewer's flow was to be diverted via a new sewer at Southfield Road and Kirkwood across Ford property to the Tolson Avenue sewer. Previously it flowed into the Rouge River.⁵ Dearborn's contract with Detroit was for twelve million gallons of sewage a day. Detroit was to pay Dearborn \$13.50 per million gallons treated, and to pay for the \$100,000 connecting sewer.⁶ In 1931, Dearborn hired the firm of Hubbell, Hartgering, and Roth, and they proposed both a remodeling of the East Side plant and the construction of a new West Side plant. The cost to remodel was \$600,000; capacity was increased from five to fifteen million gallons a day; and the population that it served was listed at 235,000, with 160,000 from Detroit. The East Side plant had four Imhoff tanks, thirty-three by one hundred feet, with specially designed inlets, and with daily withdrawal of raw sludge the capacity was increased.⁷

The area of approximately thirty-five square miles was expected to produce not more than forty-five million gallons of sewage a day, and the contract was for ten years. Detroit delivered the sewage to the Kirkwood pumping station at the corner of Kirkwood and Southfield via the Southfield sewer. There the sewage was measured and pumped

⁴ "Sewage Plant To Begin Soon," *Detroit News*, 15 September 1929, sec. 10, p. 5.

⁵ "City To Enter Sewer Pact," *Detroit News*, 3 September 1931, p. 39.

⁶ "Dearborn Contracts For Detroit Sewage," *Detroit News*, 23 March 1932, p. 13; *Annual Report of the Common Council of the City of Detroit, March 14 1932*, Detroit, Michigan, 1933, p. 3.

⁷ Clarence W. Hubbell, "Background And Development of Detroit's Sewage Disposal Project," *Civil Engineering*, vol. 8 no. 7, July 1938, pp. 467-8.

into the Dearborn sewer system at Colson and Palmer Avenue in Dearborn. As a temporary measure, since the sewer from Detroit to Dearborn had not been constructed, the sewage was dumped into an open ditch running across the Ford property. The treatment at the existing East Side Dearborn plant and the newly constructed West Side treatment plant was to remove 85 percent of the settleable solids. Compare this with the 55 percent that was proposed for the Detroit wastewater plant nearly a decade later. The effluent from the sedimentation tanks was to be discharged into the Rouge River. The sludge from the East Side plant was to be treated by mechanical, chemical, or other methods so that “the resulting solids and liquids [are] disposed of in a manner satisfactory to the Michigan Department of Health.” The charges were to be \$36,000 yearly and \$13.80 per million gallons. Since Detroit had to give Dearborn \$100,000 to help finance the West Side plant, \$2,500 was to be deducted from Detroit’s quarterly bill.⁸

By November 1932, the Kirkwood pumping station was inadequate; it had only been in operation since July 1929. Any time repairs were needed, it had to be shut down and all the unprocessed sewage went into the Rouge River. A new, larger pumping station was built for \$22,000.⁹

In August 1941, William M. Walker, Commissioner of the Department of Public Works, proposed to Mayor Edward Jeffries a \$3.1 million extension of the Southfield sewer. This extension would connect the northwest section of Detroit to the disposal plant and stop pollution of the Rouge River. The proposed sewer was to run from

⁸ *Journal of the Common Council of the City of Detroit, August 23 1932*, Detroit, Michigan 1933, pp. 1398-1401; “City to Enter Sewer Pact,” *Detroit News*, 3 September 1931, p. 39, the *Detroit News* said 33 sq miles, the agreement said 35 sq miles.

⁹ *Journal of the Common Council of the City of Detroit, November 22, 1932*, Detroit, Michigan, 1933, p. 1880.

Southfield Road and Michigan Avenue to the Detroit plant, a four-mile section. Walker suggested that it could be funded through the \$150 million Federal Works Agency Defense Program and city funds. Walker said that the Southfield sewer served the area of Detroit west of Meyers Road, which had experienced an increase in population of 52.7 percent in the preceding ten years, compared to 3.5 percent for the city as a whole. Part of the sewage from this area was pumped into the Dearborn sewage treatment plant at Ford Road. Considerable quantities of sewage were bypassed into the Rouge River. The City of Dearborn, the State Department of Health, and Henry Ford had all complained about the condition of the Rouge River. Walker said that about half of the sewage from this west side area was going into the Rouge. The Rouge emptied into the Detroit River downstream from the wastewater plant and this “minimized the effect” of the wastewater treatment. Walker said that this proposal would save from \$110,000 to \$118,000 annually for Detroit.¹⁰

In June 1940, Detroit’s Mayor Jeffries approved the application to the PWA for a \$2.6 million addition to the Detroit wastewater disposal plant to build a 21,000-foot intercepting sewer from Airport Road in Dearborn, through Melvindale to Bayside and Fort Streets. It would take sewage from the Southfield sewer, presently being processed by the Dearborn West Side plant, and redirect it to the Detroit plant. By this time, Detroit was paying Dearborn \$101,000 in processing costs and another \$26,000 annually in pumping costs to operate the Ford road pumping station. Detroit’s contract with Dearborn was going to expire in July 1941, whereupon their rates would increase

¹⁰ “Sewage Plant Link Advised,” *Detroit News*, 8 August 1941, p. 3.

substantially.¹¹ To increase the Dearborn plant's capacity to accommodate more Detroit sewage, the plant would have to be enlarged.

By August of 1943, however, no activity had taken place and Dearborn officials sent a letter to the State Department of Public Health decrying the situation. They said that the situation existed because Detroit could not finance more adequate pumping facilities. Detroit had eleven sewage outlets into the Rouge River between Tireman and Pembroke. There were three pumping stations used to lift the sewage into the Dearborn system and Dearborn officials said that they could not handle the volume.¹² In 1948, Dearborn was still processing some of Detroit's sewage from the northwest section.

Macomb and Oakland Counties

Even though Detroit's wastewater treatment plant was processing sewage by 1940, there were areas of northeastern Wayne County, Oakland County, and Macomb County putting sewage into Lake St. Clair. New home construction was causing the problem to get worse.¹³ By February 1941, the Stream Control Commission was considering "drastic action" against Oakland and Macomb counties because the increased population resulting from new defense industries in those areas was exacerbating the sewage disposal problem. The Health Department proposed that these counties connect their sewers to the Detroit system.¹⁴ Milton Adams of the Stream Control Commission said that these districts would need federal aid to accomplish this.¹⁵

¹¹ "Better Sludge Filtration in Detroit," *Sewage Works Engineering*, November 1948, p. 589.

¹² "Rouge River Called Sewer," *Detroit News*, 11 August 1943, p. 7.

¹³ "Boom Aggravates St. Clair Pollution," *Detroit News*, 4 November 1940, p. 25.

¹⁴ "Macomb and Oakland Face Drastic Action," *Detroit News*, 18 February 1941, p. 4.

¹⁵ "Drain Districts Need Federal Aid," *Detroit News*, 19 February 1941, p. 4.

Fears of a typhoid epidemic in Macomb County arose when the defense industries got underway in the spring of 1941. An anticipated 100,000 workers and their families could be exposed. Dr. H. Allen Moyer, State Health Commissioner, said that diseases could spread because the Clinton River carried sewage through this area. The border at the intersection of Macomb, Oakland, and Wayne County was low and flat and flooded with water draining from Oakland County. There was no natural drainage and the new Chrysler Tank Plant, the Hudson Naval Arsenal, and numerous other plants were located there. The area had private wells and septic tanks to serve the existing occupants, and with its clay base, the porosity of the soil was poor enough that septic tanks did not work properly.¹⁶

Macomb County had built a disposal plant at Nine Mile and Van Dyke in 1926–27. This plant was unused because of litigation by Lake Township taxpayers, and in 1932 it was shut down because of a State Supreme Court decision that it had been built without authority. There were two drains, the Nine Mile drain and the Martin Drain that emptied into Lake St. Clair. Moyer said that the plant could be put back into operation for \$10,000 to \$13,000.¹⁷

There was an immediate need to build a sewer near Bear Creek in the Royal Oak, Ferndale, and Hazel Park area to connect to the Nine Mile drain.¹⁸ Adams said that Macomb and Oakland Counties would be ordered to build new sewers costing an estimated \$1.5 million to relieve their sewage disposal problems. He said that the

¹⁶ Milton P. Adams, “Intercounty Sewage Treatment on Trial,” *Michigan Sewage Works Papers*, bulletin 98, July 1943, p. 50.

¹⁷ Milton P. Adams, “Intercounty Sewage Treatment on Trial,” *Michigan Sewage Works Papers*, bulletin 98, July 1943, p. 50.

¹⁸ “Epidemic Peril Seen In Macomb,” *Detroit News*, 25 February 1941, p. 1.

Jefferson Avenue Interceptor would have to be extended to Twelve or Thirteen Mile Road to serve Macomb County at a cost of \$800,000 along with an extension of the McNichols sewer to Twelve Mile in Royal Oak to serve Oakland County at a cost of \$700,000.

Alex Linn Trout, consultant to the State Planning Board, recommended a \$500,000 construction program to link the northeast suburbs with the Detroit sewage plant. He said that the Nine Mile sewage disposal plant should be reopened to stop sewage from the Nine Mile sewer going into Lake St. Clair. In earlier reports, it was stated that this plant was at Eleven Mile.¹⁹ In October 1942, the extension of the Jefferson sewer - the Lake Shore sewer - was funded through a \$338,000 grant from the PWA. The grant was for nearly three miles of sewer from 10½ Mile Road to Lake St. Clair at the Macomb-Wayne County line.²⁰

The Oakland and Macomb County sewage master plan was that sewage was to be collected and routed into Detroit for processing. There needed to be a new governmental agency acting on behalf of Oakland County's political subdivisions to contract with Detroit. There was also a need for a new governmental agency, acting on behalf of Macomb County political subdivisions, to contract with Wayne County for sewage to be delivered to Eight Mile Road, who would then contract with Detroit to process the sewage.²¹

¹⁹ "Defense Area Sewer Urged," *Detroit News*, 27 May 1941, p. 7.

²⁰ "Detroit Firm Given \$538,085 Contract," *Detroit News*, 10 October 1942.

²¹ Milton P. Adams, "Intercounty Sewage Treatment on Trial," *Michigan Sewage Works Papers*, Bulletin 98, July 1943, p. 46.

The Stream Control Commission approved this plan in March 1941 and in November 1941 “Adopted an order directing the Oakland County communities to proceed individually or jointly to solve their problems.” The communities of Ferndale, Royal Oak, Berkley, Huntington Woods, Hazel Park, Clawson, Pleasant Ridge, Oak Park, and the townships of Troy, Southfield, and Royal Oak participated in this plan.²²

The sewage from the drain outlet at Twelve Mile and Campbell flowed in a northeasterly direction across Macomb County to the Clinton River through the Red Run Drain. A new connector at Twelve Mile and Campbell and one at John R. Road were joined to a new sewer running south on Stevenson Highway to Woodward Heights (9½ Mile), then west to Pilgrim Avenue, then south to Eight Mile and east to a pumping station at Highland Avenue. After pumping and measuring the sewage, it flowed into the Seven Mile Sewer where it entered the Detroit sewer system.²³

Oakland County contracted with Detroit for thirty cubic feet per second (259,260 cubic feet a day) up to fifty cubic feet per second (432,000 cubic feet a day) for \$137,883.60 a year, with an additional \$4,596.12 for each additional cubic foot per second over thirty, plus a maintenance charge of \$689 per annum. The sewage treatment was charged at the rate of 21.61 cents per 1,000 cubic feet or \$28.90 per million gallons used, measured on master water meters where Detroit water entered Oakland County communities. The Drain Commissioner of Oakland County was designated as the agent with Detroit.²⁴

²² Milton P. Adams, “Intercounty Sewage Treatment on Trial,” *Michigan Sewage Works Papers*, bulletin 98, July 1943, p. 47.

²³ Milton P. Adams, “Intercounty Sewage Treatment on Trial,” *Michigan Sewage Works Papers*, bulletin 98, July 1943, p. 47.

Macomb County's arrangement was different from Oakland's because Wayne County was an intermediary between Macomb County's political subdivisions and Detroit. The Township of Warren, the Village of Centerline, and the City of East Detroit had used the Nine Mile drain emptying into Lake St. Clair since the Nine Mile treatment plant was closed following the Supreme Court Decision of 1932. The City of Roseville used the Martin drain emptying into Lake St. Clair. Mt. Clemens and Harrison Township used the Clinton River as a sewer. The City of St. Clair Shores used Lake St. Clair as a sewer.²⁵

In September 1941, portions of an interceptor for northeast Wayne County and Macomb County were approved by the Federal Works Agency (FWA) running from the end of the Lake Shore Interceptor along Jefferson Avenue north to the Martin drain, with a sub-drain north of that to serve Roseville and St. Clair Shores. Construction started in October 1942. A contract between Macomb County and Wayne County had Macomb paying Wayne \$43.00 per million gallons measured on the master water meters providing Macomb County communities with Detroit water. A sewage meter was installed to measure the sewage flow. When the sewage flow exceeded the water flow by 8 percent, this overage was billed at the same rate.²⁶

Wayne County paid Detroit \$28.90 per million gallons for all sewage entering the Detroit system, including not only Macomb's sewage but also any that originated in the northeast section of Wayne County from Grosse Pointe Woods and Gratiot Township.

²⁴ Milton P. Adams, "Intercounty Sewage Treatment on Trial," *Michigan Sewage Works Papers*, bulletin 98, July 1943, pp. 47-48.

²⁵ Milton P. Adams, "Intercounty Sewage Treatment on Trial," *Michigan Sewage Works Papers*, bulletin 98, July 1943, p. 50.

²⁶ Milton P. Adams, "Intercounty Sewage Treatment on Trial," *Michigan Sewage Works Papers*, bulletin 98, July 1943, p. 53.

The total cost was \$1.1 million \$580,000 for Wayne County, of which the Federal government paid 65 percent. In Macomb County, the Federal government paid the total amount of \$535,000.²⁷

The Oakland and Macomb County areas responsible for polluting Lake St. Clair and the Detroit River were connected with Detroit's wastewater treatment plant through sewers at Seven Mile and Highland Avenue for Oakland County, and at the northeastern end of the Jefferson Avenue Interceptor for Macomb County, in 1943–1944.²⁸

Sewage disposal in the Detroit River was considerably lessened by 1944. The majority of sewage from Detroit, Oakland, and Macomb Counties was being processed by Detroit. There were still unauthorized connections where raw sewage and industrial byproducts went into the river. Sewage overflows following rainstorms still occurred frequently with massive amounts of pollutants going into the river, and runoff of groundwater into rivers and streams still contributed to the pollutants.

Wayne County

The Wayne County request that had gone to the PWA in 1933 was part of a comprehensive sewage disposal project including the City of Detroit plant. The proposal was split in August 1935 and Detroit received \$20 million. Wayne County was still pursuing its own disposal plant. Even though the PWA had approved the Detroit plant, it had not taken action on the Wayne County proposal, so Wayne County officials continued to press for their own disposal plant with the PWA.²⁹ Charles P. O'Neill,

²⁷ Milton P. Adams, "Intercounty Sewage Treatment on Trial," *Michigan Sewage Works Papers*, bulletin 98, July 1943, p. 54.

²⁸ Milton P. Adams, "Intercounty Sewage Treatment on Trial," *Michigan Sewage Works Papers*, bulletin 98, July 1943, pp. 44-55.

²⁹ "County Cities Study Sewer," *Detroit News*, 12 January 1936, sec. 1, p. 12.

Attorney for the Michigan PWA office, was instructed to contact county officials about the \$3 million sewage disposal project. In 1935, Wayne County applied for a \$900,000 grant from the PWA for partial funding of a \$2 million plant, with the remaining \$1.1 million to come from county funds. This plant was to serve the area south and west of Detroit, the “down river district,” covering several municipalities in the Rouge Valley west of Detroit and north of Michigan Avenue and the communities in the Huron Valley in the southwest portion of Wayne County.³⁰

A letter dated July 16, 1937 to Prentiss M. Brown, United States Senator for Michigan 1936-1943, from the Board of Supervisors, County of Wayne, said that Wayne County had \$1.1 million allocated and available. Brown gave this to President Franklin D. Roosevelt on July 29, 1937. Representative John Dingell also sent a letter to Roosevelt requesting an interview and asking for immediate approval of the project. Roosevelt then turned this request over to the Acting Director of the Budget, D.W. Bell, and to Horatio B. Hackett, Assistant Administrator of Federal Emergency Administration of Public Works. On August 12, 1937, Bell reported that even though the project did not fall into any one of the five special classes of the Public Work Administration Extension Bill of 1937, the President still had the authority to approve it. Roosevelt then sent a memo to Congressmen Dingell on August 12, 1937 saying that he had approved the \$900,000.³¹

In September 1937, the PWA accepted the proposal and the Wayne County Board of Supervisors accepted the PWA’s offer. Construction began in December 1937 and

³⁰ “Sewage Plan To Be United,” *Detroit News*, 16 August 1935, p. 9.

³¹ Letter from President Roosevelt to the Honorable D. Dingell, 12 August 1937, Folder of 114A 1936-1937 Inland Waterways-Water Pollution, Presidential Library, Hyde Park, New York.

was completed by October 1939. The cost increased to \$2.2 million, and \$130,500 was spent to include the City of River Rouge in the system. This system included thirty miles of intercepting sewers and seven disposal plants. The largest of these plants at Wyandotte served the cities of River Rouge, Lincoln Park, Wyandotte, and the villages of Ecorse, Allen Park, and Riverview. This plant had a sludge disposal system, which comprised a vacuum filters and incinerators. Sludge was trucked in from the other smaller sites. There was a plant in Trenton to serve this village. The Middle Rouge Parkway plant served the communities of Plymouth and Northville. The Lola Valley plant served Redford Township. The village of Wayne was served by an extension of the Michigan Avenue sewer that was connected to the City of Dearborn's system. In the Huron Valley, Rockwood, Flat Rock, and Belleville all had their own disposal facilities because they were located on the Huron River and were too far away from each other to link with an interceptor sewer.³² These plants were operational by October 1939.³³

³² Leroy C. Smith, "The Wayne County Sewage Disposal System," *Michigan Sewage Works Papers*, bulletin 89, July 1940, pp. 38-41; A.T. Kunze, "Operation of the Wayne County Sewage Disposal System," *Michigan Sewage Works Papers*, bulletin 95, July 1947, pp. 16-20.

³³ Leroy C. Smith, "The Wayne County Sewage Disposal System," *Michigan Sewage Works Papers*, bulletin 89, July 1940, p. 42.

APPENDIX B

Interceptors and Sewers

The construction of main, or trunk sewers was an ongoing part of the work that was done by the Detroit Department of Public Works. Construction of lateral sewers serving individual streets and connecting building sewers to the main sewers was also part of their work. Interceptor sewers used to divert the sewage from main sewers to new locations—initially downstream from the water inlet and finally to the wastewater plant—were a later addition to their responsibilities

The rapid growth of the city, both in square mileage and population, required the administration to build the infrastructure in the newly annexed areas at an accelerated rate. This strained their financial resources and required them to prioritize where infrastructure improvements occurred.

Interceptors

The route of the Detroit River Interceptor, east and west on Woodbridge Street, was through fill, as the shoreline of the river extended to Woodbridge until 1807. The Brush to Sixth Street section, the Traver Street to Scotten Avenue section, and the Scotten Avenue to Military Avenue section were all under construction. The Scotten Avenue to Traver Street section of the Detroit River Interceptor was awarded to George R. Cooke and Co. with a low bid of \$599,250 on January 10, 1936.¹ The Sixth Street to Traver Avenue section was not being worked on because of negotiations between the city and the railroad that used the viaduct over Jefferson. The construction of this section of the sewer required that the existing viaduct footings had to be removed and replaced with new ones extending to sixty feet underground. The city and railroad were negotiating

¹ “County Cities Study Sewer,” *Detroit News*, 12 January 1936, sec. 1, p. 12.

how the costs for this would be split. The soil conditions over most of the Detroit River Interceptor's route were good, but as the construction neared the River Rouge, quicksand was revealed.²

Work commenced on the first section of the interceptor sewer by sinking a shaft in a vacant lot south of Cass Avenue and Woodbridge on January 29, 1936. The plan was to tunnel east and west from this location.³ The *Detroit News* editorial stated, "Today occurs one of the most important events in Detroit's history—The beginning of a project whose necessity Detroit has faced for more than a decade, without knowing how to go about it."⁴ A thirty-five-foot-deep, fourteen-foot-diameter shaft was to be sunk, followed by the excavation of a seventeen-foot-diameter tunnel, with two crews concurrently going east and west for this first 4,880-foot-long section. To complete the interceptor sewer, project bidding and construction had been split into six separate sections of approximately one mile each.⁵ In 1936, Sections 8 through 12 of the Detroit River Interceptor had working plans completed and contracts awarded. The total length was 24,606 feet. The Lonyo Interceptor, sections 1 and 2, had bids submitted for \$6.128 million. In the planning stage was the Oakwood Interceptor. As of December 30, 1936, 94% of section 7, 60% of section 9, and 43% of section 10 of the Detroit River Interceptor was completed.⁶

² "Burrow 10 Miles Of Sewers To Complete Giant Detroit System," *Detroit News*, 3 May 1936, sec. 1, p. 4.

³ "\$20,000,000 Job to Start," *Detroit News*, 28 January 1936, p. 8.

⁴ "A Big Job Starts," *Detroit News*, 29 January 1936, p. 16.

⁵ "\$20,000,000 Million Task Begins," *Detroit News*, 30 January 1936, p. 16.

⁶ *Annual Report of the Department of Public Works 1936*, Detroit, Michigan 1937, pp. 28-30.

In 1937, plans were completed for the Oakwood Interceptor, 5,830 feet long, and section 2 of the Baby Creek sewer, 4,545 feet long. The bids accepted for these projects were for \$3.45 million.⁷ By the end of 1937, Detroit River Interceptor sections 7, 9, and 10 were completed. Section 8 was 50% complete, section 11 was 99% complete, and section 12 was 96% complete. The Oakwood Interceptor was 28% complete, the sedimentation tanks were 25% complete, and the Baby Creek sewer was only 2% complete.⁸ In March of 1938, the Detroit River Interceptor was completed. In 1939, 90% of the Oakwood sewer was completed.⁹

A detailed report on the method of tunneling appeared in the July 29, 1937 *Engineering News-Record*.¹⁰ The major piece of equipment was a circular 22-foot shield 14 feet 11 inches long equipped with twenty 10-inch hydraulic jacks for shoving and carrying a steel bulkhead with six 2-foot square openings. The shield was pushed against the clay surface of the tunnel, forcing the clay out of the square openings. This clay was cut into chunks and dropped into waiting carts. Each push of the shield produced thirty-six cubic yards of spoil. At the end of a push, the hydraulic jacks were retracted. Special thirty-inch-wide by eight-inch-thick by six-foot-long interlocking concrete blocks were placed in the bottom half of the tunnel. The side and top of the tunnel were then built using the same block and special scaffolding to support it until the keystone was placed. Once this ring of interlocking concrete blocks was in place, ten in all, the shove against the new blocks started again. This activity was repeated twenty times a day in four five-

⁷ *Annual Report of the Department of Public Works 1937*, Detroit, Michigan 1938, p.37.

⁸ *Annual Report of the Department of Public Works, 1937*, Detroit, Michigan 1938, p. 41.

⁹ *Annual Report of the Department of Public Works, 1939*, Detroit, Michigan 1940, p. 17.

¹⁰ "High Speed Shield Tunneling," *Engineering News-Record*, 29 July 1937, pp. 190-191.

hour shifts. Drilling averaged fifty feet a day. During the four remaining hours, the railroad tracks for the muck carts were removed.

To build the monolithic inner lining, a fifty-foot-long steel form was attached to the block sidewalls. Concrete was poured into the form, creating the floor or invert. Another steel form to create the roof and walls was then moved into place over a cured concrete floor, after which concrete was hydraulically inserted. All of this activity occurred concurrently with the boring. There was a steel bulkhead with a nine-foot-diameter air lock placed 550 to 800 feet behind the shield. The longitudinal length when observed would have the shield with the interlocking block primary liner abutting it 300 to 500 feet back would be the invert form ready to receive concrete for fifty feet. The next 100 feet would be finished invert curing, the next fifty feet would have the steel arch form ready to receive concrete, behind that a second fifty foot arch form with curing concrete in it. Behind that was the air lock. The invert concrete was placed during the four-hour shutdown while the arch concreting was done at the same time as the excavation. The concrete interlocking blocks were made off-site and cured for twenty-eight days. Concrete for the inner lining was delivered through boreholes, equipped with air locks along the route of the tunnel on land. This delivered it to the concrete placer. If the placer was too far from a borehole, concrete was delivered by rail cars to a conveyor belt. The primary block lining was eighteen inches thick and the monolithic concrete lining was sixteen inches thick. The compressed air to stop the tunnel form collapsing was supplied by five low-air and two high-air units. Two hydraulic pumps propelled the

shield. All of this equipment was in a compressor house above ground by the shaft head.¹¹

Sewers

Sewer additions were a responsibility of the Detroit Department of Public Works. Statistics for the city show that from 1835 to 1900, there were 167 miles of main sewers installed. From 1901 to 1910, 33 miles were added; 1911 to 1920, 82 miles were added; 1921 to 1930, 304 miles were added; and 1931 to 1940, 13 were added for a total of 599 miles.¹² Lateral sewers, installed from 1835 to 1900, totaled 328 miles. From 1901 to 1910, 131 were added; 1911 to 1920, 302 were added; 1921 to 1930, 1190 were added; and 1931 to 1940, 52 were added for a total of 2003 miles.¹³

As the main sewer-building program progressed, emergency plans had to be developed to provide sewers to entire drainage areas of the city to alleviate flooding. The main part of this process involved building the Detroit River Interceptor, which eventually channeled all sewage to the Detroit Wastewater Treatment Plant on West Jefferson Avenue at the Rouge River in southwest Detroit.

The need for additional sewers was recognized before 1920, but the Capital Issues Committee, a specially created arm of the Treasury Department that controlled the issue of new securities during World War I, refused to allow Detroit to issue any bonds.¹⁴ The

¹¹ "High Speed Shield Tunneling," *Engineering News-Record*, 29 July 1937, pp. 188-191.

¹² Main sewers were the larger sewers with outfalls into rivers and creeks. Lateral sewers were sewers running at right angles to main sewers and received sewage from dwellings and delivered it into the main sewers.

¹³ *Annual Report of the Department of Public Works, City of Detroit*, Detroit, Michigan, 1942 p.17, These statistics show a large decrease 1931- 1940 as both the city's housing growth and infrastructure growth decreased because of the poor economy

¹⁴ "Securities Control To Be Ended December 31," *New York Times*, 24 December 1918.

committee was created in January 1918 and suspended its activities on December 31, 1918. “The Function of the Committee was to obtain voluntary regulation of capital issues in order that the success of Treasury Bond Sales in providing funds for World War One activities might not be impaired by the diversion of capital to unessential projects.”¹⁵ The Committee was to investigate whether a security issue (bond) was compatible with the national interest.

It was estimated, based on 1918 prices, that it would take \$60 million to build trunk sewers in the newly annexed parts of Detroit; two relief sewers in the downtown area; sanitary interceptors to the three proposed disposal plants, recommended in the 1916 Hubbell Report; and the three plants. In 1920, a sewer bond issue of \$31.57 million was authorized, consisting of \$6.57 million from the budget and \$25 million by ballot. Commissioner of the Department of Public Works John W. Reid, in the 1920 *Annual Report of the DPW*, said, “Perhaps the most urgent duty confronting the Department during the past year and for the succeeding years until the great area added to the city has been given an adequate sewer system, is the completion of the general plan laid for a new comprehensive system of sewers and sewage disposal for the City of Detroit.” Labor and materials were successive items of embarrassment during the past year.¹⁶ The \$25 million bond issue was raised with the Common Council on April 27, 1920, when Mayor Couzens asked the Council to prepare a resolution so that the people could vote on the bond issuance. He said that the total cost was \$27,695,000, but he was only requesting

¹⁵ “Capital Issues Committee,” *Committee on the History of the Federal Reserve System, Register of Papers*, Brookings Archive, http://fraser.stlouisfed.org/docs/historical/brookings/16807_01_0013.pdf, (Accessed 1 September 2008).

¹⁶ *Annual Report of the Department of Public Works*, Department of Public Works of the City of Detroit, Detroit, Michigan 1920, p. 448.

\$25 million as he thought that before the program was completed there would be lower prices.¹⁷

In his article “*Detroit’s Intensive Sewer Building Program*,” J. R. Hendry stated, “Before the war there was a tendency to under estimate either the rate of which the city was growing or the importance of keeping pace with this growth with sewer construction.”¹⁸ Forty-three miles of trunk sewers were built by the city in 1920 and 1921, plus 158 miles of lateral sewers, costing a total of \$19 million. The sewer program was nearing completion in 1921, and the 1921 *DPW Annual Report* stated that the work was originally planned in 1917 to provide for the forty square miles. This area was annexed in 1915 to relieve the older sewers, which were overtaxed due to the many extensions that were made as the city gradually developed north of the boulevard. He continued, “Very little was accomplished during the years 1917 and 1918 towards relieving the needs of the growing city in respect to its vexing sewer problem. This was primarily due to war conditions.” Contracts were awarded in 1919 “but, owing to a scarcity of labor and materials, the work was hampered to a marked degree... The same conditions prevailed until the fall of 1920.”¹⁹ The main trunk sewers were completed in 1922, allowing the construction of 138 miles of lateral sewers.²⁰ The \$25 million construction program was completed in 1923.²¹

¹⁷ *Journal of the Common Council of the City of Detroit*, April 27, 1920, Detroit, Michigan, p. 588.

¹⁸ J. R. Hendry, “Detroit’s Intensive Sewer Building Program,” *Engineering News-Record*, 2 November 1922, p.7745.

¹⁹ *City of Detroit Annual Report, 1920*, Detroit, Michigan 1921, p. 95.

²⁰ *City of Detroit Annual Report, 1922*, Detroit, Michigan 1923, p. 175.

²¹ *City of Detroit Annual Report, 1923*, Detroit, Michigan 1924, p. 170.

Estimated construction for 1922 was 40 miles of trunk and 90 miles of laterals, costing \$14.35 million. The additional sewers were depositing much more sewage in the Detroit River, and while the dilution from the river flowing at 210,000 cubic feet per second had for many years kept the nuisance within reasonable bounds, the rapid growth of the area meant that sewage treatment could not be ignored any longer. Hendry noted that the existing sewer system, limited in diameter, was overloaded when sewer extensions were added. A five-square-mile area in the southeast corner of the city was very low, with some parts two feet below the river level. There, the sewage had to be pumped. The new sewer construction was composed of sewers in the newly annexed territories of forty square miles, and storm water relief provided in the forty square miles of older territory.

Two trunk systems, Lonyo Avenue and Connors Creek, were under construction. Connors Creek sewer ran eastwards from Livernois with two parallel spurs at Six and Seven Mile Roads, running due east for seven miles and then south to Connors Creek and the river. The Lonyo Avenue sewer ran down Livernois Avenue with a parallel spur down Wyoming Avenue, joining at Lonyo Avenue, then dumping into Baby Creek and the river. Both Connors Creek and Baby Creek were enclosed. The Connors Creek sewer drained forty-one square miles and the Lonyo Avenue sewer drained just over fourteen square miles. The relief sewers were at Third Street, Bates Street, Joseph Campau, and Clark Avenue running perpendicular to the river. They were designed to carry the storm water overloads.²² Connors Creek Sewer section one was built in 1921–1922 and was 7,700 feet long, running from Kercheval Avenue to Connors Avenue.²³

²² “Detroit’s Intensive Sewer Construction Program,” *Engineering News-Record*, p. 748.

The contract for the second section was awarded in September 1922; its length was 10,550 feet.²⁴ The Connors Creek outlet sewer from south of Kercheval to south of Jefferson was completed in 1926 at a cost of \$814,969.²⁵ By the end of 1924, the Connors Creek sewer was five and a half miles long, running from south of Kercheval to Seven Mile Road. It had cost \$4.6 million. The Six and Seven Mile sewers from Connors Creek to Wyoming were also completed.²⁶

A second sewer on Ashland Avenue, one mile east of Connors Creek, was let in two sections: section one at 6,500 feet and section two at 5,600 feet. This sewer started at Fox Creek and Jefferson and ran north.²⁷ A second sewer, the Bedford Avenue system, ran from Fox Creek and Jefferson, and was 10,000 feet long.²⁸

City Engineer Perry A. Fellows recommended in January 1926 to John W. Reid, D.P.W. Commissioner, that \$61.4 million in sewer extensions into newly annexed areas and for sewer reinforcement in existing systems was needed. Reid sent this proposal to the Detroit Common Council. Fellows said that provisions should be made for the 140 square miles of city territory and for outside territory that was likely to be annexed. There was a requirement for 220 miles of main sewers.²⁹ Construction of the Detroit

²³ Carl Ashley, "Construction of Connors Creek Sewer," *Public Works*, vol. 54, no. 7, July 1923, p. 219.

²⁴ "Detroit Sewerage Program-1," *The Excavating Engineer*, vol. 17, no. 12, December 1923, p. 411.

²⁵ *City of Detroit Annual Report, 1926*, Detroit, Michigan 1927, p. 166.

²⁶ *City of Detroit Annual Report, 1924*, Detroit, Michigan 1925, p. 152.

²⁷ "The Detroit Sewage Program-II," *The Excavating Engineer*, vol. 18, no. 2, February 1924, p. 56.

²⁸ "The Detroit Sewage Program-III," *The Excavating Engineer*, vol. 18, no. 3, March 1924, p. 94.

²⁹ "\$101,028,000 Needed For Sewerage And Treatment In Detroit," *Engineering News-Record*, vol. 96, no. 3, 21 January 1926, pp. 112-113.

River Interceptor started in 1926. Three contracts totaled \$750,000 for a 9,500-foot portion from the Fairview pumping station at Parkview north to Jefferson, then west to a point west of the Belle Isle Bridge, and finally south to an outlet on the river.³⁰

In 1927, Detroit had spent \$11 million on sewers, storm drains, and the maintenance of pumping stations. Four million was spent on sewers in the Oakwood and Delray Districts and the northwest district on the west side, and another \$3.34 million was spent on the Burns and East Jefferson relief districts and extensions to the Connors Creek sewer on the east side. Altogether, 222,000 linear feet of main sewers costing \$8.1 million and 162 miles of lateral sewers costing \$2.4 million were constructed or contracted for.³¹

The last section of the Jefferson Avenue intercepting sewer had been put up for bids on November 16, 1926. When completed, this would stop all sewage except that from Connors Creek from entering the river above the Belle Isle intake.³² At this time, plans for the backwater gates at Connors Creek were also being prepared. The Connors Creek backwater gates contract for \$450,000 was awarded in 1927. This would divert the dry-weather flow of Connors Creek into the Detroit River Interceptor. Three more contracts for section of the Detroit River Interceptor, three miles in length for a cost of \$1.5 million were issued. This would allow all of the sewage flow east of Brush Street to be diverted into the river at Brush Street. The construction of the Detroit River Interceptor was such that it could be extended progressively downriver, increasing the

³⁰ *City of Detroit Annual Report 1926*, Detroit, Michigan 1927, pp. 165-166, expected completion date June 1, 1927.

³¹ "Progress On Large Sewerage Program At Detroit," *Engineering News-Record*, vol. 99, no. 24, 15 December 1927, pp. 959-960.

³² "Action Urged On Sewer Question," *Detroit Free Press*, 17 November 1926.

distance between its terminus and the intake of the water supply system.³³ This plan would stop all sewage from entering the river above Helen Avenue. On September 9, 1928, a report from City Engineer Perry A. Fellows to Department of Public Works Commissioner John W. Reid said that the East Side Intercepting Sewer was completed to Helen Avenue, carrying sewage from several sewers that had previously dumped into the river; however, the Connors Creek sewage was still going into the river. The Connors Creek sewer outlet was extended south of Jefferson to Freud Avenue in 1928. In 1929, it was to be extended to the harbor line, costing \$4 million.

At Fox Creek, an outfall sewer from Cadieux to Alter Road was to be built allowing the Rivard, Cadieux, and Bedford Road sewers to dump into it. The Rivard sewer from Mack Avenue to Eight Mile Road was under construction in 1928. This sewage could not be diverted until the backwater gates were completed, which was anticipated by the summer of 1929. Fellows said, “By next summer almost all of the sanitary sewage will be flowing through the interceptor as far west as Helen Avenue or even to Joseph Campau.”³⁴ Because of continual flooding in the Bewick Avenue, Mack Avenue, Alter Road, and East Jefferson Avenue drainage district, an emergency storm water-pumping station was constructed in 1929 for a cost of \$236,000. By 1931, this had been replaced with a permanent structure costing \$1.2 million, which served both the 2,733-acre district and an adjoining 14,733-acre Fox Creek district.³⁵ The second \$30-million sewer expansion program was completed in 1929. The DPW completed the

³³ *City of Detroit Annual Report, 1927*, Detroit, Michigan 1928, p. 167.

³⁴ “Bathing Beach Will Be Safe,” *Detroit News*, 9 September 1928, sec. 1, p. 16.

³⁵ “Emergency Storm Water Pumping Station In Detroit,” *Engineering News-Record*, vol. 102, 29 May 1929, p. 832; “Storm Water Pumping At Detroit,” *Engineering News-Record*, vol. 104, p. 182.

Connors Creek outlet from the backwater gates to Freud Avenue, and the Fox Creek outlet from the city line to the south side of Jefferson. Fox Creek sewer was covered with earth, which obscured the sewer “from the eyes of the passing world” and “changed this highly undesirable creek into level useful land.”

Public Sewers			
Year	Miles	Cost	Cost Per Mile
1835-1900	167.052	\$4,347,385.00	\$26,024.14
1901	1.46	\$42,794.36	\$29,311.21
1902	2.05	\$49,686.64	\$24,237.39
1903	3.07	\$82,748.79	\$26,954.00
1904	4.356	\$106,858.03	\$24,531.23
1905	3.1	\$69,081.25	\$22,284.27
1906	3.58	\$86,511.25	\$24,165.15
1907	2.175	\$58,998.83	\$27,125.90
1908	2.54	\$107,347.18	\$42,262.67
1909	4.161	\$109,940.04	\$26,421.54
1910	6.71	\$254,021.31	\$37,857.13
1911	4.009	\$171,252.17	\$42,716.93
1912	4.07	\$248,381.36	\$61,027.36
1913	12.09	\$835,352.24	\$69,094.48
1914	12.69	\$996,372.44	\$78,516.35
1915	4.41	\$159,652.75	\$36,202.44
1916	4.744	\$353,210.05	\$74,454.06
1917	8.765	\$542,345.24	\$61,876.24
1918	8.172	\$802,578.01	\$98,210.72
1919	7.651	\$1,299,811.80	\$169,887.83
1920	16.061	\$3,450,318.24	\$214,825.87
1921	36.676	\$12,566,804.40	\$342,643.81
1922	42.162	\$9,837,908.80	\$233,335.91
1923	24.323	\$4,610,885.63	\$189,568.95
1924	12.389	\$2,192,590.95	\$176,978.85
1925	19.705	\$2,344,536.53	\$118,981.81
1926	28.31	\$4,832,998.93	\$170,717.02
1927	40.43	\$7,871,073.01	\$194,683.97
1928	35.35	\$7,406,236.01	\$209,511.63
1929	46.22	\$10,264,175.05	\$222,072.16
1930	17.96	\$3,666,645.00	\$204,156.18
1931	3.75	\$933,877.92	\$249,034.11
1932	0.51	\$19,995.00	\$39,205.88
1933	0	\$-	\$-
1934	0.21	\$64,700.00	\$308,095.24
1935	0	\$-	\$-
1936	5.56	\$5,192,530.13	\$933,908.30
1937	3.06	\$4,439,213.56	\$1,450,723.39
1938	0.1	\$57,220.67	\$572,206.70
1939	0	\$-	\$-
1940	0.158	\$63,320.94	\$400,765.44
1941	1.41	\$236,145.50	\$167,479.08
1942	3.119	\$587,098.90	\$188,233.06
Total Miles 604.318 Total Cost \$91,362,603.91 Average Cost Per Mile \$180,721.15			

Lateral sewers			
Year	Miles	Cost	Cost Per Mile
1835-1900	328.089	\$1,794,248.32	\$5,468.79
1901	11.18	\$66,448.80	\$5,943.54
1902	7.77	\$52,960.87	\$6,816.07
1903	11.59	\$84,973.80	\$7,331.65
1904	9.637	\$56,744.84	\$5,888.23
1905	14.754	\$84,075.54	\$5,698.49
1906	9.489	\$56,798.14	\$5,985.68
1907	17.5	\$129,456.00	\$7,397.49
1908	12.04	\$64,845.42	\$5,385.83
1909	13.431	\$75,230.48	\$5,601.26
1910	23.6	\$150,249.83	\$6,366.52
1911	15.878	\$109,336.24	\$6,886.02
1912	19.56	\$156,924.03	\$8,022.70
1913	30.56	\$243,983.78	\$7,983.76
1914	33.23	\$229,600.21	\$6,909.43
1915	10.09	\$88,829.51	\$8,803.72
1916	15.07	\$199,346.62	\$13,228.0
1917	36.26	\$703,521.98	\$19,402.1
1918	34.88	\$615,143.09	\$17,635.9
1919	23.287	\$318,367.81	\$13,671.4
1920	83.337	\$1,307,103.38	\$15,684.55
1921	95.094	\$1,964,777.35	\$20,661.42
1922	120.811	\$1,720,282.78	\$14,239.45
1923	96.85	\$1,625,560.72	\$16,784.31
1924	93.196	\$1,484,566.64	\$15,929.51
1925	115.388	\$1,738,751.00	\$15,068.73
1926	118.46	\$1,950,571.77	\$16,466.08
1927	170.14	\$2,508,444.77	\$14,743.42
1928	158.04	\$1,953,273.00	\$12,359.36
1929	153.14	\$1,903,152.34	\$12,427.53
1930	68.7	\$1,032,797.00	\$15,033.44
1931	6.78	\$122,761.50	\$18,106.42
1932	1.12	\$15,878.77	\$14,177.47
1933	0.63	\$4,962.12	\$7,876.38
1934	3.96	\$394,771.57	\$99,689.79
1935	0.86	\$17,402.13	\$20,235.03
1936	4.6	\$272,150.10	\$59,163.07
1937	8.53	\$953,089.42	\$111,733.81
1938	11.07	\$907,328.39	\$81,962.82
1939	8.22	\$705,511.19	\$85,828.61
1940	7.56	\$430,442.98	\$56,936.90
1941	8.36	\$269,194.37	\$32,200.28
1942	6.084	\$539,200.05	\$88,625.91
Total Miles 2018.825 Total Cost \$29,103,058.65 Average Cost Per Mile \$24,199			

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³⁶ Annual Report City of Detroit 1942, Detroit Michigan 1943, p. 17.

APPENDIX C

Plant Specifications

The intercepting sewers were built to serve an ultimate population of 9 million and had a maximum capacity of 2,000 cubic feet per second. There was a 14,400-cubic-foot surge basin before the pumping station that would also allow any surges in the interceptor to go directly into the outlet conduit, untreated. The volumetric capacity of the interceptor sewers meant that the operators of the pumping stations, in concert, could regulate the rate of flow of sewage to the plant to even it out. The total discharge could be regulated to within 50 million gallons a day, thereby never exceeding the annual average by more than 30 percent except during rainstorms.¹

Six large centrifugal pumps would pump the sewage through the plant. The pumping capacity was 1.3 billion gallons a day. The sewage first had to go through a rack screen with three-quarter inch openings where large objects and sticks would be screened out. These would be scraped off the racks, ground up, and sent onto a conveyor to the incinerator building to be burned. The sewage would then enter the grit chamber where the grit and sand would separate; these would also be dumped onto a conveyor to go to the incinerator. The eight grit chambers were 150 feet long, 15 feet deep, and between 13 and 19 feet wide, depending on the pumps feeding them. They would have an average velocity of one foot per second and an average retention time of two and a half minutes instead of the one-minute generally used. An average day's removal was expected to be 21 cubic yards of screenings and 62 cubic yards of grit. The grit chambers also had a bypass directly to the outlet conduit. The depth of the grit chambers and their

¹ Clarence W. Hubbell, "The Detroit Sewage Treatment Plant," *Civil Engineering*, vol. 8, no. 10, October 1938, pp. 667-669.

length was a design consideration. Shallower chambers would have required more surface area, requiring that the total width of the grit chamber building be over 360 feet. By deepening the chambers, thereby keeping their volume the same, a less-expensive building was possible.²

Next, the sewage was to be pumped into eight large sedimentation tanks, where it would settle. The effluent from the tanks was to be treated with seven parts per million of chlorine. By 1950, the estimated quantity of sludge would be 240 tons of dry sludge daily.³ The tanks would cover six acres and were to be sod-covered for better tank efficiency and odor control under all weather conditions. The sedimentation tanks were also not of the usual design. Each unit of seven tanks was 270 feet long and 117 feet wide. They would have a flow of three feet per minute at average flow and five and one half feet per minute at maximum flow. This would give a retention time of 90 minutes at average flow and 49 minutes at maximum flow. The sludge collectors would operate at two feet per minute, which was twice the speed normally used. Each tank would be divided into seven contiguous compartments by smooth concrete walls with openings for scum and sludge collectors. The additional cost of walls versus rows of columns was less than four per cent and had an additional benefit of avoiding the eddies that the columns would have caused. The walls would support the concrete slab roof that was to be covered with 18 inches of earth and grass. The roof was necessary because of the proximity of the plant to the built-up areas of the city and the great area of sewage surface. From an operational and safety perspective, it would have been better to have

² George R. Thompson and Arthur B. Morrill, "Detroit's Answer To A 30 Year Problem," *Municipal Engineer*, November 1939, p. 537.

³ Clarence W. Hubbell, "The Detroit Sewage Treatment Plant," *Civil Engineering*, vol. 8, no. 10, October 1938, pp. 667-669.

open tanks, or a structure with windows, lights, heating, and thorough ventilation. Such a building would have added \$500,000 to the cost. The solution arrived at required hinged, covered openings at the inlets, the effluent exit, and over the scum collectors. Repair of the sludge collectors would require taking the tank out of service and draining it. Each tank would serve 300,000 people and hold a volume of 3.28 million gallons.⁴

The sludge collectors were designed to collect sludge at the bottom of the tank and to skim scum from the top. They were the drag-chain, wood-flight type. A separate one-half horsepower motor served each one rather than one motor serving several collectors. There were 13 miles of conveyor chains in the sedimentation tanks. The sludge collector would move the sludge to the inlet end of the tank into a trough where the cross collector would move it into a hopper. The sludge was then to be pumped into the sludge filter building or to the digestion tank. The scum was to be moved to the outlet end of the tank where skimming cross collectors would move it to a pit outside one corner of the tank. From there it was to be pumped to a grease-separating tank in the incinerating building. The remaining effluent from the tanks would flow to the deep outlet conduit tunnel where chlorine was to be introduced. Then it would be pumped into the outlet tunnel one mile to the river and 400 feet under the river to the outlet crib.⁵ Raw sewage was 99 percent liquid, and the sedimentation tanks were expected to take about 55 percent of the solids out of it.

The vacuum filter building was 198 feet long, 60 feet wide and 42 feet high. It contained eight rotary drum filters 11.5 feet in diameter and 14 feet long, having a filter

⁴ George R. Thompson and Arthur B. Morrill, "Detroit's Answer To A 30 Year Problem," *Municipal Engineer*, November 1939, p. 542.

⁵ George R. Thompson and Arthur B. Morrill, "Detroit's Answer To A 30 Year Problem," *Municipal Engineer*, November 1939, p. 542.

area of 500 square feet. The sludge from the digester, from the elutriation tanks, and from the sedimentation tanks would be kept separately in sludge wells. Keeping this sludge apart would allow the operators to determine accurately the chemical costs and filtration rates. The raw sludge was to be conditioned with 24 tons of lime and seven tons of ferric chloride so that it would coagulate. The sludge would be filtered through the vacuum filters and the extracted water pumped back into the sedimentation tanks. The sludge cakes would be sent to multiple hearth incinerators⁶

The incinerator building was to be 208 feet long, 72 feet wide and 60 feet high. It would contain four circular, multi-hearth sludge incinerators, with each unit capable of burning 300 tons of wet sludge cake a day. The anticipated average daily load at startup was 679 tons. This would consist of sludge cake with a moisture content of 70 percent, grit with a moisture content of 35 percent, and screenings with a moisture content of 80 percent. The building had space for two additional incinerators. There were 25 endless belt-troughed conveyors with a capacity of 75 tons per hour. The incinerators were expected to produce about 100 tons of dry ash and dust daily. This ash would be mixed with water and pumped to the two ash lagoons, 250 feet by 300 feet by 6 feet. Each lagoon was capable of holding six months of deposits. The water used for sluicing would drain off, leaving about 185 tons of daily deposits, as the ash would hold nearly its own weight in water.⁷

Seven-eighths of the sewage would be treated in this manner; for the remainder, secondary treatment was to be applied. This consisted of putting the sludge from the

⁶ George R. Thompson and Arthur B. Morrill, "Detroit's Answer To A 30 Year Problem," *Municipal Engineer*, November 1939, p. 542.

⁷ George R. Thompson and Arthur B. Morrill, "Detroit's Answer To A 30 Year Problem," *Municipal Engineer*, November 1939, p. 542.

sedimentation tank into a digestion tank heated to 100 degrees Fahrenheit. Through bacterial action, large quantities of gas would be generated, the sludge would be partially consumed, and the remainder would be treated similarly to undigested sludge.

It was originally planned to have eight digestion tanks, but because of the cost and the question of necessity and economy of the digestion process, only one was built. To build all eight would have cost \$1 million more but would have reduced chemical expenditure. They would have produced more methane, resulting in more low-cost electric power, and would have smoothed out the peaks in the production of raw sludge, reducing the number of filters and incinerators. The construction of the one tank was to serve as an experiment to see whether digestion should be used for the whole plant. It was 105 feet in diameter with a floating cover. It was 30 feet deep at the sides and 42.5 feet deep in the middle. It was insulated and had 18 4-inch-diameter pipe coils, 5,420 feet in length, to heat it to 80 to 90 degrees Fahrenheit. It was not expected to achieve complete digestion because of the high loading of six pounds (dry weight) of sewage solids per month for each cubic foot of capacity.⁸

The remainder of this sludge was to be treated by a process called elutriation.⁹ From the digester tank, the effluent minus the sludge would be pumped to the elutriation tanks. There were two of them, each 70 feet long, 18 feet wide, and 12.75 feet deep. They were equipped with sludge collectors. In one tank, clean water would be mixed with elutriated sludge and allowed to settle, and in the second tank, elutriating water once

⁸ Raymond J. Faust, "Recent Problems and Developments in Michigan," *Journal of the American Water Works Association*, vol. 32 no. 12, 1940, pp. 2052-2059.

⁹ Hubbell, "Detroit Sewage Treatment," p. 669; "DWSD's Waste Water Treatment Plant," *In The Flow*, vol. 6 no. 2, Spring 2006, p. ; <http://www.brittanica.com/EBchecked/topic/108875/seperation-and-purification/80501/elutriation#ref=ref169679>, (Accessed 1 June 2009).

used would be mixed with unelutriated sludge directly from the digestion tank. These tanks would have a retention time of 2.83 hours. Digested sludge, which was high in soluble nitrogenous compounds when mixed with two to three times its volume of clean water, released 75 to 80 percent of the soluble constituents. By repeating this process, more could be removed. The water was to be mixed with the digester tank effluent using compressed air. After the sludge was removed, the water used for elutriation would be pumped back into the sedimentation tanks. The elutriated sludge was then to be pumped to the filter plant.

The process of digestion, where microorganisms interact with the bacteria in the heated sludge, generates methane gas. The designer called for a 350-horsepower, six-cylinder engine that would drive a 240-kilowatt generator, plus a 36-foot storage gasholder that could contain 57,000 cubic feet of gas at 35 lbs per square inch. The gas-driven generator was to be equipped with water heat exchangers in its water jacket and exhaust system. The heated water was to be used to heat the digestion tank, at about 1.2 million BTU per hour. This heating was supplementary to steam-operated water storage heaters to be supplied from the boiler plant, as the incinerators, with their stack gases of 700 degrees Fahrenheit and high moisture content, could not be used. In addition, a steam engine would use the steam from the boiler plant to drive a 200-kilowatt generator, reducing the 150-pounds-per-square-inch steam pressure from the boilers so that it could be used in the plant's heating system. The gas generator was only expected to use about

90 percent of the 135,000 cubic feet of sludge gas that would be generated daily, and the excess was to be used for the steam boilers in the boiler plant.¹⁰

Because steam pressure was needed year-round to power soot blowers, boiler feed pumps, and other equipment there were to be three boilers operating at 150 pounds per square inch. All three could be fired using fuel oil or sludge gas. The larger ones were for winter use, when more heat would be required to heat the digester tank. The smaller one was for the summer. Fuel oil storage was to be 60,000 gallons. The estimated annual fuel use was 375,000 gallons of fuel oil and 4.97 million cubic feet of sludge gas.

The chlorination building was 35 by 50 feet and had nine chlorinators, each with a daily capacity of 6,000 pounds. When the Detroit plant was designed, there were no chlorinators of such a large capacity in existence. By 1939, these large-capacity chlorinators had been installed in Minneapolis-St. Paul and Buffalo, and 4,000-pound chlorinators had been installed in Cleveland. Chlorine would be delivered in tank cars to special stub end tracks to eliminate derailing. The chlorine was to be removed as a liquid from the tank cars and then volatilized through evaporators heated with hot water. Once it changed to gas, it was to be infused into the water. Part of the water was to be used to sterilize the effluent discharged into the Detroit River, while part would be used to add to the raw sludge to eliminate the odor while it was on the conveyor belts.¹¹ Compressed air introduced into the tank cars would force the chlorine out. A 150-pound chlorine cylinder on a scale in the outlet piping would keep the scale depressed. When empty, the

¹⁰ William C. Rudd, "Mechanical Design of The Detroit Plant Incinerators and Power Plants," *Sewage Works Journal*, vol. 11 no. 4, July 1939, pp. 620-621; George R. Thompson and Arthur B. Morrill, "Detroit's Answer To A 30 Year Problem," *Municipal Engineer*, November 1939, p. 542.

¹¹ John Hetmanski, "Great Sewage Plant Starts Monday, Purifying the River at Cost of \$10,000,000," *Detroit Free Press*, 25 February 1940, p. 4; John Hetmanski, "Dedication of Detroit's Sewage Plant Will Bring to Conclusion 30 Years of Delay," *Detroit Free Press*, 10 March 1940.

cylinder would rise, sounding an alarm to signal that the tank car was empty and that the piping would need to be reattached to a full tank. To reduce the danger of explosion the chlorine would be heated with hot water. There were two pressure release devices installed, one at 225 lbs pressure which would allow chlorine gas to escape into vents that exhausted to the outside and a secondary system that relieved at 300 lbs but would release gas inside the building. Seventeen and a half tons of chlorine would be required to treat the estimated 420 million gallons a day of effluent.¹² It was estimated that one million gallons of city water would be used daily in chlorination. Rouge River water was considered, but the amount of organic matter in it and the waste of chlorine in oxidizing it made this source economically unfeasible. Because both the water supply and the treatment plant were owned by the city, the out-of-pocket cost rather than the commercial rate for water was used in the cost calculations. Provision was made for chlorination between the grit chambers and the sedimentation tanks in the pre-chlorination phase, and between the sedimentation tanks and the entrance to the outlet conduit in the post-chlorination phase.¹³

The 18-foot-diameter outlet conduit ended 400 feet from the shore in 40 feet of water. The outlet crib was 40 feet long, 30 feet wide and 31 feet high. The crib was located 11 percent of the distance across the river; the location was selected to minimize pollution of Canadian waters and Grosse Ile, which was 10 miles below the outlet and located 23 percent across the river. The Wyandotte water inlet was located 30 percent

¹² Hubbell, "Detroit Sewage Treatment," p. 669.

¹³ George R. Thompson and Arthur B. Morrill, "Detroit's Answer To A 30 Year Problem," *Municipal Engineer*, November 1939, p. 542.

across the river. By locating the outlet crib 11 percent across the river, it was hoped that this would produce the most satisfactory sanitary results in the lower river.¹⁴

Chlorination would cost \$500 daily, and to ensure that it was effectively applied, a sampling pump was installed in the outlet conduit at a point 1,000 feet from the plant. The samplings on effluent chlorine demand and on the incoming sewage were to be monitored on a 24-hour basis to adjust chlorine demand to produce the best disinfection with the minimum expense.¹⁵

Because of the prevalence of explosive gas, the electrical system was designed using the requirements of the "National Board of Fire Underwriters." The electric motors and their controls were explosion-proof. The pumping stations, grit chambers, sedimentation tanks, digestion tank, elutriation tanks, and the filter building were all Class-1, Group-D hazardous atmospheres. All of the starters for the motors in hazardous areas were located in non-hazardous areas, such as the pumping station control house or the boiler room basement. All of the control voltages were standardized at 110 volts, eliminating the confusion of mixed voltages for the same type of service.

The power was supplied from a city-owned plant with some to be generated on site. The 24,000-volt supply came from two underground cables to two 24,000-to-4,600 volt transformers. Both the gas engine and the steam pump generators were connected to the 4,600-volt bus. The 4,600-volt buses were connected to two 4,600-to-460 volt transformers. For lighting, two 460/230/115 volt transformers were provided. Lighting

¹⁴ George R. Thompson and Arthur B. Morrill, "Detroit's Answer To A 30 Year Problem," *Municipal Engineer*, November 1939, p. 546.

¹⁵ Thompson and Morrill, "Detroit's Answer," *Municipal Engineer*, November 1939, pp. 533-550; George Thompson, "Plant Operations," *Sewage Works Journal*, vol. 11, no. 4, July 1939 pp. 607-608; Arthur B. Morrill, "The Detroit Sewage Treatment Plant," *Sewage Works Journal*, vol. 11, no 4, July 1939, pp. 609-617; William C. Rudd, "Mechanical Design of The Detroit Plant," *Sewage Works Journal*, vol. 11, no. 4, July 1939, pp. 618-623.

in hazardous areas was through enclosed, explosion-proof fixtures. The anticipated electrical bill was \$180,000 for 22.5 million kilowatt hours, expected to reach 30 million in 1950, with 60 million as the ultimate maximum for the plant. If eight digestion tanks were installed, expected gas production would provide for 60 percent of the plant's power needs.¹⁶

¹⁶ M. F. Wagnitz, "Fundamental Factors Influencing the Design of the Detroit System," *Michigan Sewage Works Journal*, bulletin 84, January 1939, p. 49.

APPENDIX D

Geography

Physical placement of the Detroit River, Geography and Geology

The Detroit River is part of the Great Lakes watershed or water basin, one of the smaller North American basins in area (308,926 square miles) but with the largest body of water contained within it: the five Great Lakes, covering about 95,000 square miles.¹

The bodies of water are interconnected, with the Detroit River connecting the upper lakes with Lake Erie and Lake Ontario: and ultimately the St. Lawrence Seaway. The rate of flow of water in the Detroit River has averaged between 180,000 to 220,000 cubic feet per second.

Diversions in and out.

There are many man-made diversions of water from the Great Lakes. The Chicago Sanitary Canal allows 11,000 cubic feet per second to be drained from Lake Michigan into the Chicago River.² This was created in 1900 to allow sewage from Chicago that was polluting Lake Michigan to be diluted and diverted into the Mississippi River via the Chicago River. The New York State Barge Canal, built in 1800, diverts between 19.5 million and 117 million gallons per day from Lake Ontario into the Hudson River for lock operations. The Village of Pleasant Prairie, Wisconsin diverts 3.2 million gallons of water per day out of Lake Michigan and eventually back into the Mississippi River through the Des Plaines River for its water treatment and sewage treatment plants.³

¹ "Management of the International Great Lakes" *Natural Resources Journal*, vol. 14, January 1974, p. 103.

² Two billion gallons per day.

³ Bert Hudgins, *Michigan Geographic Background in the Development of the Commonwealth*, 4th ed. (Ann Arbor: Edwards Brothers, 1961), p. 21.

Man-made diversions of water into the Great Lakes include the 1860s Portage Canal between the Wisconsin River and the Fox River, which diverts 64.6 million gallons a day from the Mississippi River, and the 1941 Long Lac and 1947 Ogeki diversions. These divert 3.62 billion gallons of water per day into Lake Superior, that otherwise would have gone into James Bay and by default Hudson Bay.⁴

Geology

Glacial action over millions of years formed the Great Lakes and the two peninsulas of Michigan. On the Lower Peninsula of Michigan, glaciers shaped the terrain into five distinct areas.⁵ The geology of Michigan resembles a series of concave saucers of decreasing size stacked one on top of the other.⁶ There are many river basins and lakes in Michigan: in its approximately 58,000 square miles, there are 36,000 miles of rivers and streams⁷ and over 11,000 lakes. Houghton Lake is the largest inland lake at 30 square miles. Precipitation in the Lower Peninsula can average up to 40 inches per

⁴ Bert Hudgins, *Michigan Geographic Background in the Development of the Commonwealth*, 4th ed. (Ann Arbor: Edwards Brothers, 1961), p. 21.

⁵ Bert Hudgins, *Michigan Geographic Background in the Development of the Commonwealth*, 4th ed. (Ann Arbor: Edwards Brothers, 1961), p. 21. These areas include the Michigan Lowland, the west side of the state to Cadillac; the Northern Upland; the Saginaw Lowland; the Thumb Upland and the Erie-St Clair Plain. River Valleys that can be identified are the Muskegon River Valley, the St Josephs River Valley, the Saginaw River Valley and the river valleys of the Erie-St Clair Plain, with the main rivers being the Raisin, Huron, Rouge, Clinton, Bell, Pine and Black.

⁶ Bert Hudgins, *Michigan Geographic Background in the Development of the Commonwealth*, 4th ed. (Ann Arbor: Edwards Brothers, 1961), pp. 5-7. The layers from the bottom upwards are per Cambrian, Cambrian, Ozarkian, Ordovician, Silurian, Devonian, Mississippian and Pennsylvanian. Cambrian is reddish sandstone. Ozarkian is sedimentary rock. Silurian consists of thick salt beds, some limestone and some petroleum. Devonian is limestone, sandstone and shale. Mississippian is carbonituous, sandstone, limestone and shales, salt and gypsum. Pennsylvanian is coal.

⁷ Bert Hudgins, *Michigan Geographic Background in the Development of the Commonwealth*, 4th ed. (Ann Arbor: Edwards Brothers, 1961), pp. 28-29. Grand River is the longest at 225 miles. The Saginaw River drains 6,000 sq mi. Other river drainage systems include the Black River at Cheboygan, Thunder Bay at Alpena, the Au Sable at Oscoda, the Rifle River, the Black River at Port Huron, the Belle River, the Clinton River at Pontiac, the Huron River and the Raisin River. All of these rivers are on the eastern side of the state and drain into Lake Huron, Lake St Clair or Lake Erie. Rivers on the western side draining into Lake Michigan are the Pine, Manistee, Marquette, White, Muskegon, Grand, Kalamazoo, Black, Paw Paw and St Josephs Rivers.

annum. The Lower Peninsula has a large aquifer, the Marshall, which occupies the central part of the state but does not extend into southeast Michigan.⁸

⁸ Bert Hudgins, *Michigan Geographic Background in the Development of the Commonwealth*, 4th ed. (Ann Arbor: Edwards Brothers, 1961), p. 8.

APPENDIX E

Financing Plant Operations

In 1938 the method of paying for sewage treatment was still under investigation by a committee appointed to study financing methods. The committee was made up of Henry E. Beyster, Department of Public Works Commissioner; Albert E. Cobo, City Treasurer; George Engel, Auditor General; John N. Daley, Controller; and Laurence G. Lenhardt, General Manager of the Department of Water Supply.¹ Lenhardt and Cobo were both opposed to placing it as a separate line item on the water bill. The committee visited Cleveland to study how that city billed for sewage processing services, the amounts of their minimum charges, how they charged industries whose water was not dumped back into the sewer system, and how they handled delinquent accounts.²

The Sewage Disposal Division of Cleveland charged users for the first time in 1938 to pay off the \$20 million in capital improvements and higher operating costs. The City Council approved a Cleveland sewage charge based on 40 percent of a user's water consumption and a suburban rate of \$0.75 per 1,000 cubic feet of water used. The Cleveland sewer charge equated to \$0.32 thousand cubic feet or roughly half of what suburban communities paid. In 1939, suburban rates were lowered to \$0.46, and in 1940, Cleveland's users were charged \$0.18 pr 1,000 cubic foot.³

¹ Laurence G. Lenhardt was picked by the Water Board in December of 1937 to replace George H. Fenkell as the Superintendent of the Department of Water Supply. Fenkell had been working for the Water Board for forty-four years and was sixty-five. Lenhardt's appointment took place in June 1938. The new Commissioner of the Department of Public Works was Henry E. Beyster

² "City Broadens Sewage Study," *Detroit Free Press*, 8 August 1938.

³ Mary B. Stavish, *Regionalization of Cleveland's Municipal Services, 1950-1977*, Ph. D. diss., (Case Western Reserve, 1994), pp. 83-84.

On August 17, 1938, Auditor General George Engel told the Common Council that a proposed plan to add a 20-percent “sewer use” tax to water bills to pay for the sewage system was too expensive, with clerical costs estimated at \$100,000 yearly. He suggested that it should be financed through the regular tax budget rather than through an extra charge on water consumers.⁴ On August 26, 1938, the Committee asked Assistant Corporation Counsel Clarence E. Page if the sewage disposal project could be financed through a direct increase in water rates.⁵ In December 1938, Cobo said that the cost should be levied in the general city tax levy, rather than on either city tax bills or water bills. Cobo noted that in some cases water purchased from the Water Board did not go back into the sewer system and that some water going into the sewer system came from private wells and other sources.⁶

In August 1939, City Controller John N. Daley proposed to the Common Council a 19.5-cent levy per 1,000 cubic feet of water used. He proposed billing it separately from water bills and spending \$45,000 on billing machines.⁷ Cobo objected to this proposal, since he had been opposed to the issuance of the \$5 million in sewage bonds used to finance the project when it could have been paid for as a direct tax item. He said that another tax on water would cause a decrease in the amount of water used by large manufacturers.⁸ The \$5 million in bond sales had been agreed to after a meeting in January 1939, when Detroit needed an additional \$2.7 million to complete the plant.⁹

⁴ “New Sewage System Plan Assailed As Too Costly,” *Detroit News*, 17 August 1938, p. 4.

⁵ “Financing Studied For Disposal Plant,” *Detroit News*, 26 August 1938.

⁶ “Sewer Plant Tax Proposed,” *Detroit News*, 8 December 1938.

⁷ “Water To Pay Sewage Cost,” *Detroit News*, 22 August 1939, p. 8.

Councilman John C. Lodge, in October 1939, insisted on calling a meeting in the office of the Department of Public Works Commissioner Henry C. Beyster, warning that there were only a few weeks left before the sewage disposal system would begin operations.¹⁰ In November, the committee appointed by the Common Council recommended that the \$5 million in outstanding bonds should be retired from the revenues of the Department of Water Supply and the annual \$1 million in operating costs should be included in the direct tax levy.¹¹ Lenhardt warned that Detroit had raised its water rates by 20 percent in September 1938, and another 20-25 percent increase would undoubtedly reduce water consumption, forcing an even higher increase. Auditor George Engel said that if this plan caused hardship on the homeowner, another plan should be adopted.¹² Later in the month, the committee proposed that \$765,000 be included in the regular city budget for maintenance and operation and that the bond retirement cost of \$336,000 be financed directly out of Water Department revenues. The Water Department had a \$1 million surplus in 1938.¹³

There were three proposals for financing the operation of the sewage disposal system. The first proposal was that revenue bonds would be retired through the Water

⁸ "Sewage Financing Approval Delayed," *Detroit News*, 23 August 1939, p. 6.

⁹ "PWA Gives City Hearing," *Detroit News*, 10 January 1939, p. 8.

¹⁰ "Meeting Is Called On Sewage Plans," *Detroit News*, 21 October 1939.

¹¹ **Government levy** on the **income**, **property**, or **wealth** of people or **firms**. A **direct tax** is borne entirely by the **entity** that **pays** it, and cannot be passed on to another entity; for example, **corporation tax**, **income tax**, and **national insurance contribution**. Unlike the **consumption taxes** (see **indirect tax**), direct taxes are based on '**ability to pay**' principle but (being very obvious to the tax **payer**) they sometimes **work** as a disincentive to work harder and **earn** more because that would mean **paying** more tax. <http://www.businessdictionary.com/definition/direct-tax.html>, (Accessed 30 July 2009).

¹² "Council To Get Financing Plan," *Detroit Free Press*, 1 November 1939.

¹³ "Disposal Plant Put On Budget," *Detroit Free Press*, 17 November 1939.

Board without increasing rates and that operation and maintenance would be set up as an appropriation in the city budget. Cobo said this meant the Water Board would absorb \$336,000 to pay the maturity of the bonds and interest, and the appropriation in the budget would be \$765,000, which might be done without a rise in general taxes. The second proposal was that the Water Board retire the bonds at maturity from the rate structure and add a portion of the operating cost to water bills as an increased water rate. The remainder of the operating cost would be financed by a budget appropriation. The third proposal, which was opposed by Cobo, was to finance the system through a 19.5-cent charge per 1,000 cubic feet of water used.¹⁴

In December, Corporation Counsel John P. O'Hara told Albert E. Cobo that unless the state laws were changed, Detroit water users would have to pay \$1 million in increased water charges. O'Hara said that neither the proposal to place the \$765,000 in the budget or the \$336,000 to be paid in excess of water services could be done without the Reconstruction Finance Corporation approving the plan, as they could demand observance of the original plan where the \$5 million in bonds was to be paid through charges added to the water bill.¹⁵ Cobo suggested that the Department of Water Supply provide \$850,000 of the \$1.1 million needed to pay off the bonded debt and should operate the sewage disposal plant; that the city should continue its present line item in the current budget and increase it by \$250,000 in the 1940-1941 budget; and that the Water Board should provide the remainder without increasing water rates for the next fiscal

¹⁴ "Sewage Plant Ruling Asked," *Detroit News*, 17 November 1939, p. 39.

¹⁵ "Boost Is Likely In Water Rate," *Detroit Free Press*, 12 December 1939.

year. He also suggested that sewage disposal should be included in the water bills. The committee to solve the financing issue was to consider this at their next meeting.¹⁶

The committee proposed to the Common Council that the Water Board operate and maintain the sewage disposal plant and that water users pay an additional 12 percent on their water bills. Lenhardt said that at the present time users were paying 78 cents per 1,000 cubic feet for the first 10,000 cubic feet, 60 cents per 1,000 for the next 90,000, and 48 cents per 1,000 for everything over 100,000 cubic feet used. He estimated that operations and bond repayment would be \$1.39 million annually, with \$228 000 coming from the suburbs, \$240,000 from the city, and \$916,000 collected from users.¹⁷ The Water Board told Lenhardt in January 1940 that he was not authorized to sign any report of the committee that would ask the department to contribute more than \$336,000 to the plant's operations.¹⁸

Mayor Jeffries recommended to the Common Council in March that water rates be increased by 11 cents per 1,000 cubic feet, raising an average water bill from \$11.85 to \$13.10 a year. Industrial rates would increase 17-25 percent. An alternative proposal that the Common Council was considering was for a flat 14-percent increase. The mayor said that a flat rate of 11 cents per 1,000 cubic feet would raise about \$885,000 a year, which would provide for the cost of operations and provide an excess for extensions and conversions. The original estimates of an increase of 19.5 cents per 1,000 cubic feet had been based on the city issuing \$11 million in bonds, and because they only issued \$5

¹⁶ "Sewage Debt Plan Proposed By Cobo," *Detroit News*, 15 December 1939, p. 14.

¹⁷ "Water Rate Boost Near," *Detroit News*, 6 February 1940, p. 2.

¹⁸ "Board Limiting Sewage Funds," *Detroit News*, 3 January 1940, p. 5.

million on Cobo's recommendation, the increase was much less.¹⁹ Jefferies said the 11-cent raise would affect industrial users more while the straight 14-percent raise would place a greater burden on homeowners. The breakdown of payments for the estimated \$1.39 million annual operating and debt reduction was \$240,000 from a general city tax revenue, \$228,000 from suburban communities, and \$338,000 from the Water Board. This left \$585,000 to be paid from increased water bills.²⁰

In April 1940, the Common Council settled on the first of Mayor Jeffries' proposals and voted to accept the 11 cents per 1,000 cubic feet of water as a means of paying for the sewage disposal plant operation and debt reduction. This was despite the Water Board's warning that this placed the majority of the financing on large industrial users. Oscar Wagner, President of the Water Board, said that this increase would not affect 20,000 of the smallest users; it would increase the cost of the average user by 50 cents a year and would increase the costs to the largest user by as much as 22 percent. He cited the following examples: General Motors' costs would increase from \$130,000 to \$159,000, and both Chrysler's and Packard Motor Company's increase would be from \$93,000 to \$114,000. He said that while the J.L. Hudson Company used city water to run their air conditioning system and would have to pay \$43,000, the Crowley-Milner Company, right across the street, had sunk a well for their air conditioning and that if at any time J.L. Hudson decided to change to a private well, the water board would lose revenue without decreasing our operating costs.²¹

¹⁹ "Jeffries Offers Plan On Water," *Detroit Free Press*, 20 March 1940.

²⁰ "Water Boost Up To Council," *Detroit News*, 20 March 1940, p. 17.

²¹ "Water Rate Boost Voted," *Detroit News*, 21 April 1940, p. 4.

The City of Detroit had entered into contracts with Highland Park, Hamtramck, Grosse Pointe Park, the City of Grosse Pointe, and Grosse Pointe Farms. The three Grosse Pointe communities' contracts, entered into in 1938, referred to additional charges for sewage treatment, while the Highland Park and Hamtramck contracts only referred to the use of Detroit sewers. The DPW wanted all five communities and any other outlying communities to pay 28.7 cents per 1,000 cubic feet of water used for sewage treatment and wanted the Common Council to authorize the DPW to negotiate agreements.²²

The Board of Water Commissioners set new rates for the suburbs in June 1940, with the rates for sewage disposal to be between 21 and 25 cents per 1,000 cubic feet of water used. The suburbs consisted of Grosse Pointe Park, Grosse Pointe Farms, the Cities of Grosse Pointe, Highland Park, Hamtramck, and 8,000 homes in smaller communities. In total, they were to contribute \$201,000 a year. Individual metered households were to be charged 25 cents per 1,000 cubic feet, and communities who did their own metering were to be charged 21.6 cents per 1,000 cubic feet.²³ The Water Board assumed the responsibility from the DPW in June 1940 for plant operations, while the interceptors and regulators continued under DPW authority. The Water Board assumed the responsibility for billing the suburban communities. The rates were 21.6 cents per 1,000 cubic feet of water for users who were billed through suburban mains meters and 25 cents per 1,000 to users who were charged through individual meters.

²² *Journal of the Common Council of the City of Detroit*, December 26, 1939, Detroit Michigan 1940, p. 2949.

²³ "Suburbs Get Sewage Rate," *Detroit News*, 4 June 1940.

Suburban municipalities were billed for sewage disposal, which was added to their water bills starting May 3, 1940, and individual users were billed starting June 19, 1940.²⁴

It had taken well over two years and numerous meetings before the method of paying for sewage disposal was finally settled. The participants were numerous, including the mayor, city council, auditor, treasurer, Department of Public Works, Water Board, and the Reconstruction Finance Corporation (RFC).

²⁴ *Journal of the Common Council of the City of Detroit*, June 4, 1940, Detroit Michigan 1941, pp. 1599-1600.

REFERENCES

Primary Sources

Manuscript Collections

Bentley Library, Hubbell Family, Clarence W. Hubbell (Husband of Winifred)

correspondence to Winifred and family 1902-1926.

National Archives, Roosevelt Library, Hyde Park, New York. Michigan Field Report,

1933-1934, Hopkins Papers, Box 50 Record Group 135.

-- Hopkins Papers Box 50, Record Group 135.

-- Folder 114A 1936-1937 Inland Waterways-Water Pollution. Record Group 135.

-- Presidential Secretary's File. Record Group 135.

Published Reports

Published Special Reports

City of Detroit Master Plan Report, Neighborhood and Housing, January 1985,

Annexation History of Detroit

Detroit Bureau of Governmental Research, *Report on Sewer Construction*, Department of

Public Works, City of Detroit, Michigan, (Detroit, Michigan, 1916).

Eddy, Harrison P. *East Side Sewerage and Storm Water Relief for the City of Detroit*,

(Detroit, Michigan, 1926).

Hubbell, Clarence W. *Preliminary Report on Sewage Disposal for the City of Detroit*,

Made to George H Fenkell, Commissioner of Public Works, by Clarence W

Hubbell, Consulting Engineer, Detroit, Michigan: 1916.

International Joint Commission, *Progress report of the International Joint Commission*

on the reference by United States and Canada in re the pollution of boundary

waters whether or not such pollution extends across the boundary in contravention of the treaty of January 11, 1909, and if so, in what manner or by what means it is possible to prevent the same, including report of the sanitary experts. Washington, D.C.: Government Printing Office, 1914.

International Joint Commission, *Final Report of the International Joint Commission on the Pollution of Boundary Waters Reference Washington Ottawa*, Washington, D.C.: Government Printing Office, 1918.

International Joint Commission, *Report of the International Joint Commission on the Pollution of Boundary Waters*, Washington, D.C.: Government Printing Office, 1951.

McLaughlin, Allan J. *Sewage Pollution of Interstate and International Waters Hygienic Laboratory-Bulletins No. 79 1911, No. 83 1912, No. 89 1913*, (Washington, D.C.: Government Printing Office).

Place, Reid Harrington *Sewage Disposal for Detroit; A Report Prepared for the Commissioner of Public Works*, Bureau of Governmental Research, Detroit, Michigan, 1925.

Smith, E. Willard. *Report of the Board of Sewer Commissioners to the Common Council of the City of Detroit Showing the Sewers Built Under the Direction of the Present Board With Their Size and Cost Together With a Report of the Engineer For a General System of Sewerage For the City*, Detroit, Michigan: 1861.

Special Sewer Commission, *Report of the Special Sewer Commission of the City of Detroit*, Detroit, Michigan, 1920.

City of Detroit Master Plan Report, Neighborhood and Housing, January 1985,
Annexation History of Detroit.

Published Annual Reports

Annual Report, City of Detroit, Detroit Michigan.

Stream Control Commission, *Biennial Report of the Michigan Stream Control Commission 1931 – 1932*, State of Michigan, Lansing: 1933.

____. *Second Biennial Report 1933 – 1934*, The Stream Control Commission, State of Michigan, Lansing: Franklin DeKleine Printers, 1935.

____. *Third Biennial Report 1935-1936*, The Stream Control Commission, State of Michigan, Lansing: Franklin DeKleine Company, 1937.

____. *Fourth Biennial Report 1937-1938*, The Stream Control Commission, State of Michigan, Lansing: Franklin DeKleine Company, 1939.

____. *Fifth Biennial Report, 1939-1940*, The Stream Control Commission, State of Michigan, Lansing: Franklin DeKleine Printers, 1941.

Unpublished Papers

Winling, Dale. "Outside the Congested Zone: Annexation in Detroit, 1915-1926", Urban History Association Conference 2006. http://www.urbanoasis.org/UHA_2006.pdf

Newspapers

Chicago Daily Tribune.

Detroit Free Press.

Detroit News.

Detroit Sunday Times.

New York Times.

Dissertations

Hudgins, Bert. *A Geographic Study of the Water Supply Problems of Detroit Michigan*,

Ph.D. diss., Clark University, Worcester, Mass, 1930.

O'Connell, James C. *Technology and Pollution: Chicago's Water Policy, 1833-1930*,

Ph.D. diss., The University of Chicago, Chicago, Illinois, 1980.

Read, Jennifer. *Addressing a Quiet Horror: The Evolution of Ontario Pollution Control*

Policy in the International Great Lakes, 1907 – 1972, Ph.D. diss., University of Western Ontario, 1999.

Stafford, Catherine. *The Political Economy of the Great Lakes*, Ph.D. diss., George

Mason University, Fairfax, Virginia, 2000.

Stavish, Mary B., *Regionalization of Cleveland's Municipal Services, 1950-1977*, Ph.D.

diss., Case Western Reserve, Cleveland, Ohio, 1994.

Theses

Engel, Dorothea, *History of the Board of Water Commissioners*, Masters Thesis, Wayne

State University, Detroit, 1937.

Rusig, Jean. *The Works Progress Administration in Detroit*, Masters Thesis, Wayne State

University, Detroit 1974.

Secondary Sources

Armstrong, Ellis L. Ed. *History of Public Works in the United States 1776-1976*.

Chicago: American Public Works Association, 1976.

Benidickson, Jamie. *The Culture of Flushing*. Vancouver: University of British Columbia

Press, 2007.

- Bogue, Margaret Beattie. *Fishing the Great Lakes*. Madison: University of Wisconsin Press, 2000.
- Burton, Clarence M. *History of Wayne County and the City of Detroit, Michigan* vol. IV, Detroit, S. J. Clarke Publishing, 1930.
- Dreisziger, N, F. "Dreams and Disappointments", in *The International Joint Commission Seventy Years On*. ed. Robert Spencer, Johns Kirton and Kim Richard Nossall. Centre for International Studies. Toronto: University of Toronto, 1981.
- Elkind, Sarah S. *Bay Cities and Water Politics*. Lawrence: University of Kansas Press, 1998.
- Gayer, Arthur D. *Public Work in Prosperity and Depression*. New York: National Bureau of Economic Research, 1935.
- George, Rose. *The Big Necessity*. New York: Metropolitan Books, 2008.
- Goldman, Joanne Abel. *Building New York's Sewers*, West Lafayette, Ind.: Purdue University Press, 1997.
- Hudgins, Bert. *Michigan Geographic Background in the Development of the Commonwealth*, 4th ed. Ann Arbor: Edwards Brothers, 1961.
- Melosi, Martin. *Effluent America*. Pittsburgh, Pennsylvania: University of Pittsburgh Press, 2001.
- Melosi, Martin. *Pollution and Reform in American Cities*. Austin: University of Texas Press, 1980.
- Melosi, Martin. *The Sanitary City*. Baltimore: The Johns Hopkins University Press, 2000.
- Melosi, Martin. *Urban Public Policy: Historical Modes and Methods*. University Park: Pennsylvania State University Press, 1993.

- Philbrick, Edward S. *American Sanitary Engineering The Sanitary Engineer*. New York: 1881.
- Pearse, Langdon. "Organization of Metropolitan Districts" *Proceedings of the American Society for Municipal Improvements*. Menasha, Wisconsin: George Banta Publishing, 1921.
- Public Works Administration, *America Builds*. Washington D.C.: United States Government Printing Office, 1939.
- Sedgwick, William. *Principals of Sanitary Science and the Public Health*. New York: Macmillan Company, 1905.
- Sklar, Anna. *Brown Acres*. Santa Monica, California: Angel City Press, 2008.
- Streeter, H. W. "Disposal of Sewage in Inland Waterways", *Modern Sewage Disposal*. Pearse, Langdon, Ed. Federation of Sewage Works Associations. Lancaster, Pa, 1938.
- Tableman, Betty. *Governmental Organization in Metropolitan Areas*. Ann Arbor: University of Michigan Press, 1951.
- Tarr, Joel. *The Search for the Ultimate Sink*. Akron, Ohio: University of Akron Press, 1996.
- Taylor, Nick. *American Made*. New York: Bantam Books, 2008.
- Trimble, George. "Greater Detroit American Heritage River Initiative", *The Lake Pilots' Handbook*. Port Huron, Michigan: Riverside Printing Co., 1907.
- Waring, George E. *Draining for Profit and Draining for Health*. New York: Orange Judd and Company, 1867.
- Who's Who in America*, Vol. 23, 1944 – 1945.

Articles

- Adams, Milton P. "Intercounty Sewage Treatment on Trial", *Michigan Sewage Works Papers*, Bulletin 98, July 1943, p. 50.
- Adler, Jonathan H. "Fables of the Cuyahoga", *Fordham Environmental Law Journal*, vol. XIV, pp. 89-146, 2003.
- Ashley, Carl "Construction of Connors Creek Sewer", *Public Works*, vol. 54, no. 7, July 1923, p. 219.
- Bogue, Margaret Beattie. "To Save the Fish: Canada, the United States, the Great Lakes, and the Joint Commission of 1892", *The Journal of American History*, vol. 79, no. 4, (March 1993) pp. 1429-1454.
- Bromage, Albert W. "Municipal and County Home Rule for Michigan.", *Citizens Research Council of Michigan*, p. 8.
- Dreisziger, N. F., "The Great Lakes in the United States – Canadian Relations: The First Stock Taking", *Inland Seas* 28(4) 1972 pp. 259-272.
- Dworsky, Leonard B. George R Francis and Charles F Swezey, "Management of the International Great Lakes," *National Resources Journal*, Volume 14 (January 1974).
- Eames, Diane D. "The Refuse Act of 1899: Its Scope and Role in Control of Water Pollution." *Ecology Law Quarterly*, vol. 1 1971, pp. 173-202.
- Eddy, Harrison P. "Some Viewpoints on Stream Pollution", *The Canadian Engineer*, February 16, 1926, vol. 50 no. 7, p. 225.
- Elder, P. S. "Environmental Protection Through the Common Law", *Western Ontario Law Review*, vol. 12, 1973, p. 134.

- Fairlie, John A. "Home Rule in Michigan", *The American Political Review*, vol. 4, no. 1, (Feb 1910), p.123.
- Faust, Raymond J. "Recent Problems and Developments in Michigan", *Journal of the American Water Works Association*, vol. 32 no. 12, 1940, pp. 2052-2059.
- Gascoigne, George B. "The Design of Cleveland's Sewage-Treatment Works", *Engineering News-Record*, vol. 85, no. 8, August 12, 1920, p. 344.
- Gibbons, Sir George C. "The International Waterways Commission, an Address by Sir George C Gibbons, K C Chairman of the Canadian Section at the Annual Dinner of the Empire Club of Canada, Toronto, on April 6th 1911," *Published in The Empire Club of Canada Speeches 1910-1911*, Edited by Hopkins J Castell, (Toronto, Canada: The Empire Club of Canada, 1912), pp. 241-252.
- Gluek, Alvin C. Jr., "The Lake Carriers' Association and the Origins of the International Waterways Commission." *Inland Seas* 1980, 36(4), pp. 226-245.
- Gluek, Alvin C. Jr., "The Lake Carriers' Association and the Origins of the International Waterways Commission." *Inland Seas* 1981, 37(1) pp. 24-30.
- Hall, Noah A. "Bilateral Breakdown: U.S.-Canada Pollution Disputes" *Natural Resources and the Environment*. 21 18, Summer 2006, p. 472.
- Hall, Noah A. "The Centennial of the Boundary Waters Treaty: A Century of United States – Canadian Trans Boundary Water Management", *Wayne Law Review* 54, Summer 2009, pp. 1-32.
- Hall, Noah A. "Trans Boundary Pollution: Harmonizing International and Domestic Law", *University of Michigan Journal of Law Reform*. vol. 40:4, Summer 2007, pp. 681-746.

- Hendry, J. R. "Detroit's Intensive Sewer Construction Program", *Engineering News-Record*, vol. 89, no. 18, November 2, 1922, pp. 745-748.
- Heinmiller, Timothy. "Do Intergovernmental Institutions Matter? The Case of Water Diversion Regulations in the Great Lakes Basin", *Governance: An International Journal of Policy, Administration and Institutions*", vol. 20 no. 4, October 2007, pp. 655-674.
- Hennigan, Robert D. "Funding of Wastewater Facilities, *Clear Waters*, New York: Water Environment Association, Winter 2004, p. 10.
- Hubbell, Clarence W. "The Detroit Sewage Treatment Plant", *Civil Engineering*, vol. 8 no. 10, October 1938, pp. 668-669.
- Hubbell, Clarence W. "Background And Development of Detroit's Sewage Disposal Project", *Civil Engineering*, vol. 8 no. 7, July 1938, pp. 466-468.
- Hubbell, Clarence W. "The Detroit Water Works", *The Engineering Record*, vol. 47 no. 25, June 20, 1903, pp. 650-655.
- Hubbell, Clarence W. "Sludge Disposal Practices in Detroit", *Sewage Works Journal*, vol. 18 no 2, March 1946, pp. 212-215.
- Hubbell, George E. "Detroit River Pollution", *Wayne Engineer* January 1936 , pp. 4-5, p. 14.
- Hudgins, Bert, "Evolution of Metropolitan Detroit", *Economic Geography*, vol. 21, no. 3, July 1945, pp. 206-220.
- Hudgins, Bert. "Historical Geography of the Detroit Water Supply", *Michigan History Magazine*, vol. XX, 1936, pp. 351-381.

- Hudgins, Bert. "Old Detroit: Drainage and Land Forms", *Michigan Historical Review*, vol. 30 no. 2, 1946, pp. 348-368.
- Hudgins, Bert. "Waterworks Intakes of the Great Lakes", *Geographical Review*, vol. 27, no. 3, July 1937, pp. 457-466.
- Hudgins, Bert. "Weather conditions as factors in the filtration of the water supply at Detroit Michigan", *Monthly Weather Review*, September 1930, pp. 337.
- Jeffery, Michael I., "Transboundary Pollution and Cross Border Remedies", *Canada-United States Law Journal* vol. 18, 1992, pp. 173-194.
- King, W. C. "Detroit Sewer System", *Journal of the Association of Engineering Societies*, January 1903, pp. 37-40.
- Kunze, A. T. "Operation of the Wayne County Sewage Disposal System", *Michigan Sewage Works Papers*, Bulletin 95, July 1942, pp 16-28.
- Leahy, Gillman J. "Wastewater Treatment Plant Personnel," *Water Pollution Control Federation*, vol. 43, no. 7, July 1971, pp. .
- McCaffrey, Stephen. "Jurisdictional Considerations in Private Litigation Between Canada and the United States". *California Western International Law Journal*, vol. 3 1973, pp. 204-219.
- McCaffrey, Stephen. "Private Remedies for Trans Frontier Pollution Damage in Canada and the United States: A Comparative Survey", *University of Western Ontario Law Review*, vol. 19 No 1, 1981, pp. 35 - 94.
- MacDougall, Heather. "Champions of Change", Keynote Address 125th Anniversary Town Hall Festival, Toronto Public Health, 28 May 2008.

- MacDougall, Heather. "Researching Public Health Services in Ontario, 1882–1930", *Archivaria*, Number 10, Summer 1980, p. 157.
- MacKay, Robert A. "The International Joint Commission Between the United States and Canada", *The American Journal of International Law*, vol. 22, no 2, April 1928 pp. 292-318.
- Morrill, Arthur B. "The Detroit Sewage Treatment Plant", *Sewage Works Journal*, vol. 11 no 4, July 1939, pp. 609-617.
- Nuvolari, Alexandro. "Collective Invention During the British Industrial Revolution", Danish Research Unit for Industrial Dynamics, May 2001; "Haarlemmermee Cruquiu", International Historic Mechanical Engineering Landmark, American Society of Mechanical Engineers, 19 June 1991.
- Read, Jennifer. "A Sort of Destiny", *Scientia Canadensis*. vol. 22-23, 1988/1989, pp.103-129.
- Reitze, Arnold W. Jr. "Wastes, Water, and Wishful Thinking", *Case Western Reserve Law Review*, vol. 2015, 1969, p. 8.
- Rossi, Mary C. "The History of Sewage Treatment in the City of Buffalo, New York", *Middle States Geographer*, 28, 1995, pp. 9-29.
- Rudd, William C. "Mechanical Design of The Detroit Plant", *Sewage Works Journal*, vol. 11 no. 4, July 1939, pp. 618-623.
- Rutty, Christopher J. "The First Five Years", *Canadian Journal of Public Health*, May June 2009, p. 169.
- Smith, Leroy C. "The Wayne County Sewage Disposal System", *Michigan Sewage Works Papers*, bulletin 89, July 1940, pp. 38-41.

- Tarr, Joel A. and Francis C. McMichael, “The Separate vs. Combined Sewer Problem”, *Journal of Urban History*, May 1974, p. 313.
- Tarr, Joel A. and Francis C. McMichael, “Decisions about Wastewater Technology 1850-1932”, *Journal of the Water Resources Planning and Management Division*, May 1977.
- Tarr, Joel A. and Francis C. McMichael, “Historic Turning Points in Water Supply and Wastewater Disposal, 1850-1932”, *Civil Engineering – ASCE*, October 1977, pp. 82-83.
- Tarr, Joel A., James McCurley III, Francis McMichael and Terry Yosie, “Water and Wastes” *Technology and Culture*, vol. 25, no 2, Apr 1984, pp. 226-263.
- Thompson, George R. “Outline of History and General Considerations Leading Up to the Design and Operation of the Detroit Plant”, *Michigan Sewage Works Operators* , bulletin 84, January 1939, p. 33.
- Thompson, George R. “Plant Operations”, *Sewage Works Journal*, vol. 11 no, 4, July 1939, pp. 607-608.
- Thompson, George R. and Arthur B. Morrill “Detroit’s Answer to a 30 Year Pollution Problem”, *Municipal Sanitation*, November 1939, pp. 533-538.
- Wagnitz, M. F. “Fundamental Factors Influencing the Design of the Detroit System”, *Michigan Sewage Works System*, bulletin 84, January 1939, p. 49.
- Wallace, W. M. and Arthur B. Morrill. “Public Health Aspects of Sewage Treatment in Detroit”, *Sewage Works Journal*, vol. 13 no. 2, March 1941, pp. 265-269.

Wallace, W. M. and C. A. Habermehl. "Two Years of Operation of the Detroit Sewage Treatment Plant", *Michigan Sewage Works Papers*, Bulletin 98, July 1943, pp. 29-41.

Williams, C. Dickerman and Peter R. Nehemkis, "Municipal Improvements as Affected by Constitutional Debt Limitations." *Columbia Law Review*, vol. 37 no. 2, Feb 1937.

Anonymous Articles

"Better Sludge Filtration in Detroit", *Sewage Works Engineering*, November 1948, pp. 589-591.

"Buffalo Solves Its Sewage Problem", *Engineering News-Record*, 24 September 1936, pp. 438-441.

"Detroit Proposes Metropolitan Sewerage District", *Engineering News-Record*, vol. 100, no. 7, February 16 1928, p. 296.

"The Detroit Sewage Program-I", *The Excavating Engineer*, vol. 17, no. 12, December 1923, pp. 409-412.

"The Detroit Sewage Program-II", *The Excavating Engineer*, vol. 18, no. 2, February 1924, pp. 55-57.

"The Detroit Sewage Program-III", *The Excavating Engineer*, vol. 18, no. 3, March 1924, pp. 94-96.

"Detroit to apply for PWA Loan to Build Sewage Plant", *Engineering News-Record*, vol. 107 July 12 1934, p. 60.

"The Detroit Water Works", *The Engineering Record*, vol. 47 no. 25, 20 June 1903, pp. 650-655.

- “Emergency Storm Water Pumping Station In Detroit”, *Engineering News-Record*, vol. 102, May 29, 1929, pp. 832-833.
- “Government of Metropolitan Areas”, Detroit Bureau of Governmental Affairs, pp. 171-175, *Public Business*, vol. 3, no. 11, December 20, 1924.
- “High Speed Shield Tunneling”, *Engineering News-Record*, 29 July 1937, pp. 188-191.
- “Management of the International Great Lakes” vol. 14, *Natural Resources Journal*, January 1974, pp. 103-138.
- “The Metropolitan Area”, Detroit Bureau of Governmental Affairs, *Public Business*, vol. 3, no. 2, Sept 10, 1923, p. 3.
- “Primary Incineration And Treatment For Detroit’s New Sewage Plant”, *Engineering News-Record*, vol. 117, September 3, 1936, p. 330.
- “Progress On Large Sewerage Program At Detroit”, *Engineering News-Record*, vol. 99, no. 24, December 15, 1927, pp. 959-960.
- Public Business*, Detroit Bureau of Governmental Research, No 51, July 15, 1920, p. 2.
- “Stormwater Pumping Station At Detroit”, *Engineering News-Record*, vol. 107, July 30, 1931, pp. 182-184.
- “Tank Sewage Plan Adopted By Detroit City Council”, *Engineering News-Record*, vol. 97, no. 24, December 9, 1926, p. 971.
- “Treaty Between the United States and Great Britain Respecting Boundary Waters Between the United States and Canada.”, *The American Journal of International Law*, Vol. 4, No. 3, Supplement: Official Documents, July, 1910, pp. 239-249.
- “\$101,028,000 Needed For Sewerage and Treatment in Detroit”, *Engineering News-Record*, vol. 96, no. 3, January 21, 1926, pp. 112-113.

Legal Statutes

Michigan Reports: Cases Decided in the Supreme Court of Michigan, Lansing: Phelps and Stevens, 1914.

Public Acts of The Legislature of the State of Michigan.

The Revised Statutes of Ontario, 1914, Legislature of Ontario, vol. II, Toronto: L. K. Cameron Printer, 1914.

Electronic Sources

“Capital Issues Committee, 1918 – 1919”, Committee on the History of the Federal Reserve System, Register of Papers, Brookings Archive,
http://fraser.stlouisfed.org/docs/historical/brookings/16807_01_0013.pdf,
 (Accessed 1 June 2009).

“Commissioners”, International Joint Commission,
http://www.ijc.org/en/background/biogr_commiss.htm (Accessed 1 August 2009).

“Cruiquius Pumping Station (1849)”
http://www.asme.org/communities/history/landmarks/cruiquius_pumping_station_1849.cfn (Accessed 12 January 2010).

Daisy, Michael, “The First 300 Years”, Detroit Water and Sewerage Department,
http://www.dwsd.org/history/complete_history.pdf (Accessed 1 September 2009).

Dictionary.Com, <http://www.dictionary.reference.com> (Accessed 1 August 2009).

“Dilution is the Solution to Pollution”, Professor Paul Taiganades, Department of Agriculture University of Illinois Chicago
<http://www.livestocktrail.uluc.edu/gowm/paperdisplay.dfm?contentid=6527>
 (Accessed 1 October 2009).

“Direct tax”, Business Directory, <http://www.businessdictionary.com/definition/direct-tax.html> (Accessed 30 July 2009).

“Easterly Treatment Plant”, <http://www.neosrd.org/int.-history.php> (Accessed 12 September 2009).

Environmental Protection Agency, <http://www.epa.gov/volunteer/stream/ums52.html> (Accessed 1 October 2009).

Environmental Protection Agency, 3 July 1980
<http://www.epa.gov/athens/staff/members/frickwaltbre/index.html> (Accessed 1 December 2009).

Environmental Protection Agency,
<http://www.epa.gov/wed/webpages/news/dec00/lead.html> (Accessed 2 December 2009).

“Fermentation Theory”, *All Experts Encyclopedia*, beta,
http://en.allexperts.com/e/f/fe/fermentation_theory.htm (Accessed 30 September 2009).

“History of the Buffalo Sewer Authority” City of Buffalo Sewer Authority,
<http://www.ci.buffalo.ny.us/home/cityservices/bsa/history> (Accessed 21 October 2009).

“Home Rule in Michigan-Then and Now”, Michigan Municipal League,
<http://www.mml.org/advocacy/homerule-paper/pdf> (Accessed 24 November 2009).

Hsui, Shi-Ling and Austen L. Parrish, “Litigating Canada-US Trans Boundary Harm: International Environmental Lawmaking and the Threat of Extraterritorial

- Reciprocity”, 26 February 2007, <http://ssrn.com/abstract=967519> (Accessed 10 October 2009).
- “In The Flow” vol. 3 no. 2, Spring 2003, Detroit Water and Sewage Department
www.dwsd.org/announce/itfspring2003.pdf, (Accessed 1 September 2009).
- “In The Flow” vol. 6 no 2, Spring 2006, Detroit Water and Sewage Department
www.dwsd.org/announce/itfspring2006.pdf (Accessed 1 September 2009).
- “Louis Pasteur”, *Encyclopedia Britannica*, online
http://www.britannica.com/ebchecked/topic/445964/Louis_Pasteur (Accessed 1 October 2009).
- “Mayor Roesch”, <http://www.buffalonion.com/history/industry/mayors/roesch.htm>
(Accessed 21 October 2009).
- “Mayor Zimmerman”,
<http://www.buffaloonian.com/history/industry/mayors/zimmermann.htm>
(Accessed 19 October 2009).
- “The Metropolitan Water Reclamation District of Greater Chicago’s Deep Tunnel
http://www.huffingtonpost.com/debra-shore/storm-of-the-century_b_126341.html
(Accessed 16 September 2009).
- “Miasma” Definition at [medicinenet.com](http://www.medicinenet.com),
http://www.medterms.com/script/main/art.asp?article_key=19304 (Accessed 30 September 2009).
- “Milorganite”, <http://www.milorganite.com/about/history.cfm> (Accessed 15 September 2009).

“Robert Koch”, *Encyclopedia Britannica*, online,

http://www.britannica.com/ebchecked/topic/320834/Robert_Koch (Accessed 1 October 2009).

“Separation and Purification”, *Encyclopedia Britannica*, online,

<http://www.britannica.com/EBchecked/topic/108875/separation-and-purification/80501/elutriation#ref=ref169679> (Accessed 1 July 2009).

“Sewer History”, <http://www.sewerhistory.org> (Accessed 15 October 2009).

Simcoe health, http://simcoehealth.org/resources_04/board/history.asp, (Accessed 28 March 2007). [This site has changed to simcoemuskokahealth.com and this reference is no longer available.]

United States Government Census Bureau.

<http://www.census.gov/population/www/documentation/twps0027.html>
(Accessed 27 October 2007).

Vogan, Eric. “Buffalo Sewer Authority Fact Sheet; May 3 2009”,

<http://ppg.buffalo.wikispaces.com/buffalo+sewer+authority> (Accessed 21 October 2009).

“Wastewater Treatment Plants”, *The Encyclopedia of Cleveland History*.

<http://ech.cwru.edu/ech-cgitarticle.PL?ID=S1> (Accessed 10 November 2009).

“Zymotic Disease”, *All Experts Encyclopedia*, beta,

http://en.allexperts.com/e/z/zy/zymotic_disease.htm (Accessed 30 September 2009).

Sources and Discoveries

The sources that were used for this research comprised newspaper articles, journal articles, IJC publications, Public Health Bulletins, archives at the Detroit Public Library, the Library of Michigan, the Reuther Library, the Bentley Library, the Roosevelt

Archives in Hyde Park, New York, and the National Archives in Silver Springs, Maryland.

The *Detroit News* and the *Detroit Free Press* Libraries were very useful, containing indexes for many subjects relevant to the research. The Detroit Public Library collection had annual reports from the City of Detroit for all of the departments, Public Works, Water, the Mayor and the Common Council that were concerned with waste water treatment.

Some dissertations and theses supplied information on Detroit and the sewerage problem. Similar dissertations were found for Cleveland, Chicago and the Boundary Waters Treaty. Typhoid and the problems of water pollution were well documented in both the IJC publications and the Public Health Bulletins.

The records of the WPA are available and extensive; there are similar resources for Hopkins, Ickes and Roosevelt at Silver Springs and Hyde Park. Disappointingly the PWA records at both the National Archives at Silver Springs and the Michigan Archives are non-existent, having been burned at Silver Springs in 1943 and destroyed by a fire in Lansing in 1955.

ABSTRACT**WASTEWATER TREATMENT COMES TO DETROIT: LAW, POLITICS,
TECHNOLOGY AND FUNDING.**

by

BARRY N. JOHNSON**MAY 2011****Advisor:** Dr. Charles Hyde**Major:** History**Degree:** Doctor of Philosophy.

Detroit was one of the cities identified by the International Joint Commission as polluting the Great Lakes in contravention of the Boundary Waters Treaty of 1909. The United States Public Health Service also reported on the pollution that entered the Detroit River from Detroit's sewers. Pollution by sewage threatened lives with a dramatic increase in cases of Typhoid Fever and other gastro intestinal sicknesses. Chlorination of water supplies reduced these incidents to an acceptable level minimizing the arguments of sanitarians proposing wastewater treatment. Expansion of the city to encompass a rapidly rising population channeled the city's financial resources into infrastructure. Wastewater treatment was not deemed necessary to accommodate this growth. Adjacent communities, affected by the pollution attempted to create a metropolitan approach to wastewater treatment; this effort failed through a lack of political will and clearly defined objectives. Efforts by Detroit to build a plant were stymied by inter city and statewide politics, and insufficient city finances. New Deal programs and innovative legislation at the city and state level eventually provided the capital required to construct and operate a wastewater plant and provide for repayment of the loans to the federal government.

Detroit with this wastewater treatment plant and its water treatment plant is unique in that it is the only central city acting as a service provider for a metropolitan area unlike most metropolises where metropolitan districts extend beyond political boundaries to provide utilities. Federal involvement in this and other large-scale civil engineering projects during this period was the only way it was possible for them to be completed.

AUTOBIOGRAPHICAL STATEMENT

I was born in England in 1940, and emigrated to America in 1963. I graduated with a Bachelor of Arts degree in History from Oakland University, Rochester Michigan in 1970, and a Master of Arts in History in 1996. I graduated from Wayne State University with a Master of Science in Library Science in 1976. I entered the doctoral program at Wayne State University in September 1998. I researched and wrote this study under Dr. Charles Hyde.