

United States Department of the Interior
National Park Service

New York State Barge Canal Historic District
Albany, Cayuga, Erie, Herkimer, Madison, Monroe, Montgomery,
Niagara, Oneida, Onondaga, Orleans, Oswego, Rensselaer, Saratoga,
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Summary Paragraph:

The New York State Barge Canal is a nationally significant work of early twentieth century engineering and construction that affected transportation and maritime commerce across the eastern third of the continent for nearly half a century. It was also an embodiment of Progressive Era beliefs that public works and public control of transportation infrastructure could counterbalance the growing monopoly power of railroads and other corporations. The Barge Canal system's four main branches, the Erie, Champlain, Oswego, and Cayuga-Seneca canals, are much enlarged versions of waterways that were initially constructed during the 1820s. The Erie Canal, first opened in 1825, was America's most successful and influential manmade waterway, facilitating and shaping the course of settlement in the Northeast, Midwest, and Great Plains; connecting the Atlantic seaboard with territories west of the Appalachian Mountains, and establishing New York City as the nation's premiere seaport and commercial center. Built to take advantage of the only natural lowlands between Georgia and Labrador, New York's canals were enormously successful and had to be enlarged repeatedly during the nineteenth century to accommodate larger boats and increased traffic. The Barge Canal, constructed 1905-18, is the latest and most ambitious enlargement. When completed, it featured 57 concrete locks with electrically operated gates and valves (not the first examples, but certainly the most extensive application of a still new technology); dedicated power plants at each lock; the highest single lift lock in the world (Lock E17, Little Falls); a group of five closely spaced locks that collectively formed the highest lift in the shortest distance in the world (Locks E2 through E6 of the Waterford Flight); eight movable dams on the Mohawk River that were based on creative adaptation and combination of new European designs and were unlike any others in North America; fifteen lift bridges of unusual design; dozens of highway bridges designed with standardized features that allowed rapid and comparatively inexpensive construction; and a number of innovative water control structures. Collectively these features establish the character of a five-hundred-mile system of navigable waterways that remains in service today, passing commercial and pleasure vessels between the Atlantic Ocean and the Great Lakes. Compared with the Panama Canal, which was under construction under federal direction at the same time (1904-14), New York's Barge Canal system was more than ten times longer, required nearly ten times as many locks and many more bridges and ancillary structures, involved about 60 percent of the excavation and concrete, and had about a third of the overall budget, all paid by the State of New York with no federal assistance. In an era when most of the country's canals had been abandoned and railroads dominated inland transportation, New Yorkers voted to rebuild their canals on a massive scale, both to protect the maritime commerce of New York and Buffalo and as a check on the growing stranglehold that railroad trusts exerted over the American economy. The period of significance is defined as beginning with the initiation of canal construction in 1905 and extending through its last large scale improvements in 1963.

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New York State Barge Canal

The Barge Canal opened in 1918. Its four branches are direct successors to the Erie, Champlain, Oswego, and Cayuga-Seneca canals – waterways built by the State of New York, opened in the 1820s, enlarged during the nineteenth century, and in continuous operation to this day. New York’s canal system was the largest public works project in nineteenth-century North America and was so successful that it inspired a nationwide canal building boom that lasted for the next quarter-century. It was built and operated by New York State after requests for federal assistance were rebuffed by presidents Thomas Jefferson and James Madison (both Virginians). New York’s main canals were enlarged between 1836 and 1862 with additional improvements during the 1870s and 80s. The Erie and connecting waterways repaid their cost of construction and maintenance many times over and in 1882 New York voters abolished canal tolls in the state constitution. The current system, built between 1905 and 1918, was the nation’s largest state-funded public works project in its time, just as the original Erie Canal had been 90 years before.

Today, navigable portions of New York’s Barge Canal system include the Erie Canal, which connects the Hudson River with the Niagara River and Lake Erie, 340 miles to the west; the Champlain Canal, which connects the tidal portion of the Hudson River with Lake Champlain, 63 miles to the north; the Oswego Canal, which branches off from the Erie and descends along the Oswego River to connect with Lake Ontario, 23 miles to the north; and the Cayuga-Seneca Canal, which follows the Seneca River to connect the Erie Canal with Cayuga and Seneca Lakes. The Barge Canal system upgraded the four branches with some significant differences in routing and technology. The original Erie Canal (commonly known as Clinton’s Ditch), the Enlarged Erie, and the nineteenth-century laterals were towpath canals on which boats were pulled by mules or horses. Small steamboats and tugs started to operate on the canals during the late nineteenth century but their use was not promoted because of traffic conflicts with animal-drawn boats and bank erosion caused by their wakes. By contrast, the Barge Canal system was designed expressly for motorized vessels – self-propelled motorships and barges pulled (later pushed) by tugboats.

The new system needed wider and deeper channels but no longer required a towpath, so state engineers canalized portions of the Hudson, Mohawk, Oneida, Oswego, Seneca, and Clyde Rivers as well as Oneida, Onondaga, and Cross Lakes. When it opened in 1918, the Barge Canal system was 12 feet deep and had 35 locks on the Erie, five on the Cayuga-Seneca, seven on the Oswego, and eleven on the Champlain. All locks were 328’ long by 45’ wide with lifts ranging between 6’ and 40.5’ and could pass 300’ long vessels of 3,000

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ton capacity. Lock gates and valves were driven by electric motors and most lock sites had their own hydroelectric or gasoline driven power plants.

New York's First Canals

In its current form, the components of the Barge Canal system follow alignments and utilize structures that were placed in service between 1915 and 1918, but all four have direct ancestors that opened to navigation in the 1820s and followed major rivers that native peoples used for thousands of years to transport goods and people. At the time of initial European contact, the upper Hudson Valley, including both the confluence with the Mohawk River and the overland route to the Champlain Valley, was occupied by Mahican (a.k.a. Mohican) people. The rest of Upstate New York was homeland to the five nations of the Haudenosaunee (Iroquois) Confederacy, the Mohawk, Oneida, Onondaga, Cayuga, and Seneca. By the mid-1600s the Haudenosaunee controlled trade in the Hudson, Champlain, and upper Saint Lawrence River valleys, west through what is now Ohio, most of Pennsylvania, and southern Ontario. The Mohawk River, Wood Creek, Oneida Lake and River, Oswego River, Seneca River, and Finger Lakes were heavily used routes for Haudenosaunee commerce and diplomacy.

The river corridors also served as migration paths for early non-native settlers and invasion routes for colonial armies. The trip west required an overland carry from Albany to Schenectady to avoid the Cohoes Falls; travel by canoe or bateau – thirty-foot flat-bottomed boats capable of carrying up to one and one-half tons each – up the Mohawk River to Little Falls; a one-mile carry around rapids there; a further push up the Mohawk to the ancient “Great Carry” over the low drainage divide between the Mohawk River and Wood Creek at Fort Stanwix; and a final downstream leg along the winding Wood Creek to Oneida Lake, across the lake to its outlet, and down the Oneida River to its confluence with the Seneca River. From there, travelers could continue north, down the rapids of the Oswego River to Lake Ontario; or west, up the Seneca River through marshes separated by waterfalls to the heads of Seneca and Cayuga lakes.

In 1792 the New York Legislature chartered the Western Inland Lock Navigation Company, promoted by former Revolutionary War General Philip Schuyler, to build a series of weirs, short bypass channels, and a handful of locks to improve navigation on the Mohawk River and Wood Creek between Schenectady and Oneida Lake.¹ By 1798 the Western Inland Lock Navigation Company had completed canals at Little Falls,

¹ The Northern Inland Lock Navigation Company was chartered at the same time to improve navigation on the Hudson River between Troy and Fort Edward, but nothing was ever built.

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Rome, and German Flatts near Herkimer and had deepened and straightened Wood Creek to the point that sixty-foot Durham boats, capable of carrying up to ten tons each, could carry salt from the springs near Onondaga Lake and wheat from the Finger Lakes to Schenectady.

Agitation for a cross-state canal that would connect the tidal Hudson River with the Great Lakes, without the need for carries, grew during the first decade of the nineteenth century. The New York State Legislature authorized surveys of routes between the Hudson and Lake Erie in 1808 and 1810. Construction of the Erie Canal started in 1817 and the waterway opened from Albany to Buffalo in 1825. The first iteration of the Erie Canal was 363 miles long and had 86 locks to make up the 571-foot difference in elevation between the Hudson River and Lake Erie. Locks were 90 feet long by 15 feet wide; the channel was a minimum of four feet deep and 40 feet wide at the surface. Boats built to fit the waterway could carry up to 70 tons. The Champlain Canal was also started in 1817 and opened in 1823 from Albany to Whitehall at the southern end of Lake Champlain. It was 66 miles long and had 19 locks of the same dimension as the Erie. Construction of the Oswego and Cayuga-Seneca Canals started in 1825 and both were completed by 1828. The Oswego Canal was 38 miles long and had 21 locks; the Cayuga-Seneca was 27 miles long with 12 locks. Unlike the Erie and Champlain, which were designed as wholly independent channels, parallel to but independent of flood- and drought-prone natural rivers, the Oswego and Cayuga-Seneca Canals made use of dredged river channels with towing paths on the bank to connect land-cut sections and locks.²

Enlargement – 1836-62

Work to enlarge the system was authorized in 1836, proceeded fitfully due to state budget limitations, and was declared complete in 1862, even though considerable work remained to be done. Locks on the Erie, Champlain, and Oswego Canals were rebuilt with new dimensions of 110 feet long by 18 feet wide. Channels were deepened to seven feet and widened to at least 70 feet. Locks on the Erie were “doubled” with two side-by-side chambers to ease traffic delays. All aqueducts were replaced or substantially rebuilt to accommodate the new channel dimensions and to allow boats to pass. New aqueducts were built across the Seneca River at Montezuma and across Schoharie Creek at Fort Hunter, replacing troublesome slackwater crossings and guard locks. Boats built to the new maximum dimensions could carry up to 240 tons of cargo. Channel straightening and minor realignments reduced the length of the Erie Canal from 363 to 350 miles. Although the total change

² W.B. Langbein, *Hydrology and Environmental Aspects of the Erie Canal (1817-99)* (Washington: GPO, 1976, Geological Survey Water-Supply Paper 2038).

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in elevation between the Hudson and Lake Erie remained the same, taller lifts at individual locks allowed the number on the Erie Canal to be reduced from 83 to 71.

New York State built several other lateral canals that connected to the Erie, including the Chemung (opened 1833), Crooked Lake (1833), Chenango (1836), Genesee Valley (partially opened 1841, completed 1857) and Black River (1855) canals. The Delaware & Hudson Canal, connecting the Hudson River at Kingston to the Delaware at Port Jervis and the anthracite coal fields of northern Pennsylvania, was constructed by a private company and opened to navigation in 1828. All but the Black River and Delaware & Hudson were closed by the State of New York in 1877-78. The D&H was abandoned in 1899 but a portion was reopened for navigation from 1902 to 1912. The last boat descended the locks of the Black River Canal in 1924.

Canals & Railroads

By the time the first Erie enlargement was declared complete in 1862, canals throughout the country were experiencing growing competition from railroads. New York chartered its first railway, the Mohawk & Hudson (later renamed the Albany & Schenectady) in 1826. The line started operation in 1831, utilizing both horse teams and the steam locomotive *DeWitt Clinton* to haul passengers and freight 16 miles between Albany and Schenectady, bypassing about 35 miles of Erie Canal, 27 locks and eliminating many hours needed to bypass Cohoes Falls and climb out of the deep Hudson Valley.³ The M&H reduced a day-long boat trip to about an hour and quickly captured the traffic of well-heeled passengers who could afford the extra fare. Other short-line routes built during the ensuing decade included the Utica & Schenectady (completed 1836), Syracuse & Utica (1839), Auburn & Syracuse (1838), Lockport & Niagara Falls (1838), Troy & Schenectady (1842), the Rochester & Syracuse (1850), and a number of other short-lines. Initially, the New York legislature regarded railroads as feeders to the state canal system. Lines that carried cargo to canal ports were encouraged while lines that paralleled the Erie Canal paid toll to the state during the navigation season. New York lifted canal tolls on parallel railroads in 1851, the same year that the Hudson River RR opened from New York to Rensselaer and the New York & Erie (later Erie RR) connected Piermont on the Hudson to Dunkirk on Lake Erie.

By 1869, Cornelius Vanderbilt had consolidated railroad lines between New York and Chicago to form the New York Central. In that year, combined tonnage of the New York Central and Erie railroads between the Atlantic and Lake Erie exceeded that of the Erie Canal for the first time. The Pennsylvania Railroad also reached

³ Canal engineer John B. Jervis of Rome was the chief engineer for the Mohawk & Hudson Railroad.

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Chicago from Philadelphia in 1869 and the Baltimore and Ohio established another rail link between the Atlantic and the Midwest five years later. Railroad freight tonnage rose dramatically through the remainder of the century. Although canal tonnage continued to climb for another decade, peaking in 1880, its proportion relative to the railroads steadily declined. As railroads consolidated and extended their lines across the continent, many Americans became concerned about the growing influence and control that these corporations held over the nation's economy.

In the last quarter of the nineteenth century, some argued that canals were obsolete, could be replaced by railroads, and deserved no further investment, while others countered that publicly owned canals with independent boat operators served as a vital counterbalance to railroad corporations. Canal supporters argued that the Erie Canal held railroad freight rates in check over a broad region east of Chicago from New England to the southern states along the Atlantic coast. In 1878, Minnesota Senator William Windom stated that "railroads have to play a losing game in their efforts to compete with the water." He cited a report by staff of the Illinois Central Railroad:

The outlays made to increase the carrying capacities of the railways has been improvident, and since the reduction of the tolls upon the Erie Canal by the State of New York, cheap water communication is so firmly established that the effort to take freight by rail during the summer months has failed as indicated by the reports of several of the leading railways. During the contest, freight was carried in large volume at about half the actual expense incurred.⁴

In 1880, a New York Assembly Committee chaired by Alanzo Barton Hepburn, noting that railroad rates rose during the winter but fell as soon as the Erie Canal opened to navigation each spring, concluded that:

The cost of water transportation from Chicago to New York determines the rate of rail transportation, and the rate of rail transportation from Chicago to New York is the base line upon which railroad rates are determined and fixed throughout the country.⁵

⁴ Congressional Record, 45th Congress, 2nd sess., Vol. 7. June 10, 1878, p. 4358f., Ernest A. Rueter, *All the Way to Mobile: Securing the Erie Canal as a Competitor and Regulator of Railroads in the Age of Trusts* (Bloomington: Authorhouse, 2012).

⁵ *Report of the Special Committee on Railroads, Appointed Under a Resolution of the Assembly, February 28, 1879, to Investigate Alleged Abuses in the Management of Railroads Chartered by the State of New York* (Albany: Weed & Parsons, 1880), in *New York Times*, January 23, 1880.

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The role of New York's canals in setting a "natural" limit to excessive railroad freight rates became one of the principal arguments by proponents of ongoing canal operations and enlargement. Faced with evidence of declining canal traffic, some believed that the mere presence of a publicly funded waterway helped keep rail rates in check. They argued that if railroads charged too much and gained excessive profits, someone would always be ready to launch a boat or two, haul for a lower price, and bring freight charges back into balance. The "canals as regulator" argument created an unlikely partnership of political progressives, worried about the baleful effects of monopolies, trusts, and other manifestations of post-Civil War corporate America, with business leaders in Buffalo and New York who faced a loss of revenue as railroads hauled grain and other commodities directly from the heartland to the coast, without the need to unload from lake freighters into canal boats in Buffalo and from canal boats into oceangoing vessels in New York. The shifting geography of the grain belt put Philadelphia, Baltimore, and Norfolk closer to the sources of wheat, while railroad freight sharing agreements and differential rates put New Yorkers at an even greater disadvantage. In a curious alliance, anti-trust reformers and self-interested businessmen combined with shippers, dock workers, and others who participated directly in canal commerce to become some of the most ardent proponents for improvements to New York's canals.

Tolls had extinguished initial construction debts during the Erie Canal's first seven years of operation. The state collected nearly \$121 million in canal tolls by 1882. That year, New York voters approved an amendment to the state constitution that abolished canal tolls entirely. Proponents of "Free Canals" argued that the indirect economic benefits of railroad rate control would exceed the direct revenue gained from tolls.

Although canal tonnage had peaked in 1880 and declined thereafter, there were continued cries to upgrade the system. Between 1884 and 1894 one of the two chambers at most of the Enlarged Erie's locks between Cohoes and Lockport was lengthened to accommodate "double-headed" tows of two canal boats lashed end-to-end. Water turbine driven capstans were installed at lengthened locks to help pull boats in and out of the chambers. Twelve of the 23 locks on the Oswego Canal were lengthened as part of the same program.⁶

⁶ Lock lengthening was first proposed by state engineer Horatio Seymour, Jr. The concept of enlarging New York's canals on their existing alignments came to be called the Seymour Plan. Lock 50 in Solvay was the first to be lengthened as an experiment. Locks 3-18 at Cohoes, 36-39 at Little Falls, 57-59 at Newark, and the Lockport Flight were clustered too closely to be lengthened. Noble E Whitford, *History of the Barge Canal of New York State* (Albany: J.B. Lyon, 1922), pp., 16, 19, 22.

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In 1894, New York voters affirmed recommendations of that year's Constitutional Convention, adding a clause to the state constitution stating that the Erie, Champlain, Oswego, Cayuga-Seneca, and Black River canals "shall remain the property of the state and under its management forever" and that funds derived from the lease sale of other canals shall be dedicated to improvement and repair of the remaining branches.⁷

Nine Million Dollar Improvement – 1895-98

The New York Legislature passed the "Nine Million Dollar Act" in 1895 to lengthen remaining locks and deepen the Erie Canal channel from 7 to 9 feet. Construction of the "second enlargement" started immediately, even though initial estimates and bids indicated that it would cost \$13.5 to \$15 million to deepen the 350-mile-long channel (or raise the banks) and modify 75 locks, 32 aqueducts, and a substantial number of the 642 bridges that crossed the canal between Albany and Buffalo. Engineers proposed replacing the twin five-lock flight at Lockport and the 16 locks at Cohoes with dual chamber pneumatic boat lifts.⁸

Unfortunately, the \$9 million budget was based on inadequate and outdated surveys and cost estimates, some almost 20 years old. Less than a year after work was authorized, it became clear that at least \$7 million more would be needed to complete the job. When asked why they had only asked for \$9 million and started work, knowing that they needed almost that much again in order to complete the project, state engineer Campbell W. Adams and superintendent of public works George W. Aldridge suggested that if they had asked for the full amount New York's voters would have not approved any enlargement.⁹ The money ran out and work stopped on the partially completed project during the winter of 1897-98 amid allegations of mismanagement, misappropriation of funds, and contracts awarded to favored bidders.

The ensuing scandal hobbled Governor Frank S. Black and led Thomas Collier "Boss" Platt, the U.S. senator who ruled New York's Republican machine, to anoint young Theodore Roosevelt, just back from Spanish American War service in Cuba, to be Black's replacement as Republican candidate for governor in 1898.¹⁰ The canal scandal badly damaged the party's reputation across New York. Despite unusually robust campaigning,

⁷ 6th NYS Constitutional Convention (1894) Article VII § 8. The convention reaffirmed abolition of tolls (VII § 9) and the state's right to issue bonds for canal improvements (VII §10). Article VII of the 1894 Constitution also introduced the famous "Forever Wild" clause protecting Forest Preserve Lands in the Adirondacks and Catskills (VII § 7). Peter J. Galie, *The New York State Constitution*, (New York: Oxford University Press, 2011), p. 23.

⁸ "The Proposed Pneumatic Balance Locks for the Erie Canal," *Scientific American*, LXXXII:5 (February 3, 1900), Cover & p. 74.

⁹ "The Canal Scandal," *New York Times*, December 28, 1897.

¹⁰ Paul Grondahl, *I Rose Like a Rocket: The Political Education of Theodore Roosevelt* (New York: Free Press, 2004), p. 288.

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Roosevelt defeated Democratic candidate August Van Wyck by a mere 1.4 percent margin.¹¹ On January 9, 1899, ten days after he was sworn in, Roosevelt appointed a special counsel, led by two Democratic attorneys, to investigate allegations of wrongdoing on the Nine Million Dollar Improvement and a separate bipartisan commission of engineers and business leaders to evaluate the canal system and make recommendations for its future. Shortly thereafter, he nominated Colonel John Nelson Partridge to be superintendent of public works, in charge of canal operations (among other things), despite Boss Platt's attempts to secure the position, with its abundant opportunities for patronage appointments, for a party loyalist.¹² Partridge and Roosevelt agreed to focus on qualifications and performance rather than affiliation and worked to fill vacancies by promotion from civil service rather than political appointments. Traffic on New York's canals increased during the first nine months under Partridge, while the expenses of the Department of Public Works declined by a quarter, and New York newspapers identified the superintendent as a model by which other state officials should be judged.¹³

Committee on Canals – 1899-1900

On March 8, 1899, Roosevelt appointed a Committee on Canals and charged it with evaluating the advantages and disadvantages of canal alternatives and recommending a canal policy for the state. The committee included engineers and businessmen. With an eye toward balance, Roosevelt was careful to appoint canal critics (or at least skeptics) in addition to proponents. The committee was chaired by General Francis V. Greene of the US Army Corps of Engineers, based in New York City, and included George E. Green, ex-mayor of Binghamton and a long-time canal skeptic; John N. Scatcherd, a wholesale lumber merchant in Buffalo; Frank S. Witherbee, who owned iron mines and mills near Port Henry on Lake Champlain; Major Thomas W. Symons, head of the Corps of Engineers Buffalo District; Edward A. Bond, state engineer and surveyor; and John N. Partridge, superintendent of public works.¹⁴ The committee considered four principal alternatives: abandonment of the canal altogether; completion of the proposed 1895 Second Enlargement/Nine Million Dollar Improvement of the Erie and Champlain canals; a much enlarged Erie Canal, capable of passing 1,000-ton barges, utilizing canalized sections of Mohawk and Seneca Rivers and Oneida Lake; or a cross-state ship canal, capable of carrying ocean-going vessels from tidewater to the upper Great Lakes.

¹¹ 18,000 votes out of 1.3 million cast, Grondahl, p. 298.

¹² Grondahl, p 308-9. Partridge was a Civil War veteran who had served as police commissioner and fire commissioner for Brooklyn and president of the Brooklyn and Newtown Railroad during the 1880s. "Col. J.N. Partridge Dies at 82 Years," *New York Times*, April 9, 1920.

¹³ *New York Evening Post*, February 18, 1899, as cited in G. Wallace Chessman, *Governor Theodore Roosevelt: the Albany Apprenticeship, 1898-1900* (Cambridge: Harvard University Press, 1965), pp. 178-9.

¹⁴ *Report of the Committee on Canals of New York State* (New York, 1900), Appendix 1, pp., 45-6.

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Each of these alternatives had been proposed before, in various forms, and each had strong proponents and detractors. Not surprisingly, railroad operators and newspaper editors in railroad towns and New York communities far removed from the waterway called for abandonment. They were acknowledged by the committee but paid little heed. Some argued that completion of the nine-foot deep waterway would be the least expensive alternative (other than abandonment) and that it should suffice for a transportation system that was already on its way out. The committee evaluated this option, based on new estimates and discoveries made during the interrupted first phase of that work, and determined that additional expenditures to deepen channels and lengthen locks on the existing waterway would not be worthwhile because many of the aqueducts, culverts, and other structures would have to be replaced entirely, rather than simply modified. They estimated that deepening the Erie and Champlain along their existing alignments would cost an additional \$16 to \$21 million on top of the \$9 million expended 1895-98.

Many people had previously advocated construction of a ship canal between the Hudson and the Great Lakes. In 1863 President Lincoln directed engineer C.B. Stuart to propose canal improvements that would allow Union gunboats to pass from tidewater to the upper lakes. Stuart examined several routes and recommended locks 275' long, 45' wide, by 12' deep (dimensions very similar to those later adopted for the Barge Canal). During the same year, state engineer William B. Taylor proposed construction of 225' x 26' gunboat locks along the existing alignment.¹⁵ In June 1884, state engineer Elnathan Sweet proposed a cross-state ship canal at the annual meeting of the American Society of Civil Engineers (ASCE). He envisioned an 18' deep waterway with locks 450' long by 60' wide and a continuous descent from Lake Erie to the Hudson. That would have required carrying the alignment south near Clyde in order to follow a contour south of and higher than the Montezuma Marshes, crossing the Seneca River on a tall aqueduct and embankment near the outlet of the Cayuga Lake, and altering the route through Rome in order to reduce the elevation of that level by 10.'¹⁶

U.S. and Canadian businessmen and engineers held meetings in Toronto (1894), Cleveland (1895), and Detroit (1896) to examine and promote deep water connections between the upper lakes and the sea, and the United

¹⁵ Thomas W. Symons, "The United States Government and the New York State Canals," Frank H. Severance, ed., *Canal Enlargement in New York State: Papers on the Barge Canal Campaign and Related topics* (Buffalo: Buffalo Historical Society, 1909) Buffalo Historical Society Publications, Volume 13, p. 132-3; Whitford (1922), p. 22.

¹⁶ Thomas W. Symons, "Preliminary Examination for a Ship Canal by the Most Practicable Route, Wholly Within the United States, From the Great Lakes to the Navigable Waters of the Hudson River, of Sufficient Capacity to Transport the Tonnage of the Lakes to the Sea," July 13, 1897, in *Annual Reports of the War Department for the Fiscal Year Ending June 30, 1897: Report of the Chief of Engineers, Part 4* (Washington: GPO, 1897), p. 3147.

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States Deep Waterways Commission was established in 1896, staffed in large part by the U.S. Army Corps of Engineers. That commission examined ship canal routes between Lake Michigan and the upper Mississippi, canals on the American side of Niagara Falls, diverting a portion of the St. Lawrence at Lake St. Francis to flow into the northern end of a raised Lake Champlain, as well as enlargement and rerouting of the Erie, Oswego, and Champlain canals to accommodate ship traffic.¹⁷

Some routes were driven more by geopolitics than topography, hydraulics, or practical engineering. Ever since initial authorization of the Erie Canal in 1817, New Yorkers and others in the U.S. feared that a canal around Niagara Falls and navigation improvements on the St. Lawrence River would divert cargo to Montreal at the expense of Buffalo and the Port of New York. Those fears were reinforced during the 1890s as the Canadian government embarked on a campaign to upgrade and increase lock dimensions of the Welland Canal around Niagara Falls and a number of short canals around rapids in the St. Lawrence. Canada was still very much part of the British Empire and occasional European conflicts, tariff battles, or threats of preferential tolls for US or Canadian products inspired jingoistic demands for an “all American” waterway. At the same time, lock and dam improvements and dredging on the Illinois and Mississippi rivers proposed by the Army Corps of Engineers raised the specter of larger quantities of Midwestern grain going to market by way of New Orleans rather than New York or other eastern ports.

The ship canal held broad appeal and was supported by newspapers throughout the Great Lakes and along the Atlantic Seaboard. “The Glamor of the Ship Canal from the Lakes to the Sea, like a brilliant aurora borealis, shone brightly over the whole lake region.”¹⁸ Ironically, the political drumbeat for a ship canal generated some of the strongest evidence in favor of a more modest barge canal. Section 8 of the Rivers and Harbors Act of 1896 directed the secretary of war to produce “accurate examinations and estimates of cost of construction of a ship canal by the most practicable route, wholly within the United States, from the Great Lakes to the navigable waters of the Hudson River, of sufficient capacity to transport the tonnage of the lakes to the sea.”¹⁹ As often happens, Congress supplied direction but no appropriation, so the army chief of engineers assigned Major Thomas W. Symons, head of the Corps of Engineers Buffalo District, to conduct a preliminary investigation and prepare a report based on the best information at hand. Symons investigated two routes in detail. The “Oswego

¹⁷ *Report of the Board of Engineers on Deep Waterways Between the Great Lakes and the Atlantic Tidewaters* (Washington: GPO, 1900, 56th Congress, 2nd Session, Document 149).

¹⁸ Symons (1909), p. 122.

¹⁹ Symons (1897), p. 3129.

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Route” involved improvements to the Niagara River, a new canal around Niagara Falls on the American side from Tonawanda to Olcott, Lake Ontario passage from Olcott to Oswego, canalization of the Oswego River from Oswego to Phoenix, a new overland canal from Phoenix to Brewerton at the outlet of Oneida Lake, a dredged channel across the shallow lake, a short canal over the summit level at Rome, canalization of the Mohawk River, a new route around Cohoes Falls, and improvements to the Hudson River from Troy to Coxsackie that would increase channel depth from 12’ to 20.’ Symons acknowledged a proposal made the previous year by William Pearson Judson of the American Deep Waterways Commission to eliminate the Rome summit level by cutting a 50-mile long trench, 60-100’ deep, from Oneida Lake to Little Falls, but he did not evaluate the proposal in detail.²⁰ Symons’ “Erie Canal Route” was based largely on that proposed by state engineer Elnathan Sweet in 1884 with some modifications of detail for canalization of the Mohawk River.²¹ Symons gave little attention to the “St. Lawrence-Champlain Route” suggested by Verplank Colvin, New York’s head of the Adirondack Survey, because the topography between Ogdensburg on the St. Lawrence and Rouses Point at the northern end of Lake Champlain was not suitable for canal construction. He acknowledged that a canal could be built from Lake St. Francis on the St. Lawrence to Lake Champlain, but that would violate the “wholly within the United States” clause of his orders, and concluded that “it is absurd to suppose that products of the Northwest destined for foreign ports, having reached within 10 miles of tide water at Montreal, would turn to the right-about and be passed through 350 miles of contracted navigation to another port still further away from the European markets. . . .”²²

Based on vessels then in use and projected on the upper Great Lakes, Symons calculated that a ship canal that would allow them free passage to the sea would have to be at least 24’ deep, 200’ wide on the surface, 138’ wide at the bottom, with locks 530’ long, 60’ wide, and 22’ deep. He estimated that construction of either the Oswego route or the Erie Canal route to those dimensions would cost something in excess of \$200 million to build and \$2 million per year thereafter to maintain. Symons concluded that a ship canal of those dimensions would have “no military value” and was “not a project worthy of being undertaken by the General Government, as the benefits to be derived therefrom would not properly commensurate the cost.”²³

²⁰ Symons (1897), p. 3135, 3141-6.

²¹ Symons (1897), p. 3147-8.

²² Symons (1897), p. 3153.

²³ Symons (1897), p. 3159, 3130.

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Symons then examined the second clause of the Rivers and Harbors Act directive: “of sufficient capacity to transport the tonnage of the lakes to the sea,” analyzed the volume, nature, direction, and destinations of lake traffic, and concluded that an enlarged and modified version of the Erie Canal, capable of passing 150,000 ton barges, would cost about \$50 million to build, far less to operate, and could carry more freight at lower cost than a ship canal. Calls for a lake to sea ship canal had always focused on the value of grain exports from the Midwest to Europe but Symons pointed out that American domestic grain use was eighteen times that of exported and that virtually all of the nation’s lumber, ore, coal, wool, and hides (products typically shipped by canal) were used domestically, along with 90 percent of its iron and steel.

(T)he value of the Eastern domestic market is much greater than the value of the foreign market, and should receive the first consideration in the canal question. . . . (A) canal which cheapens transportation only on foreign-bound produce benefits chiefly the producer, while a canal which cheapens transportation in domestic products and manufactures used at home benefits both producers and consumers, both the people of the East and the people of the West.²⁴

Symons also recognized that ocean, lake, and canal vessels operated in fundamentally different environments with different construction, equipment, crewing requirements and associated costs.

He later wrote:

The study was convincing that for the highest economy in transportation, special types of vessels are needed for use on the ocean, on the lakes, and on the canals, and neither can replace the other in its proper waters without suffering loss of economic efficiency. Ocean vessels could not, as a general rule, engage in the business of passing through a ship canal and the lakes to the upper lake ports, and lake vessels are not fitted for use upon the ocean, and if they made use of a canal they would have to transfer their cargoes at the seaboard, ordinarily by means of lighter, floating elevators, etc., at a higher expense than such transfers would cost at the lower lake ports. For economical transportation through a canal from the Great Lakes to the sea special vessels, differing from and far less costly than ocean or lake vessels, are required. . . . even if a ship canal were built, the greater cheapness of barge transportation would prevent its use by large ships, and cause it to be used almost entirely by fleets of barges which could almost equally as well be accommodated in a smaller and cheaper canal.²⁵

²⁴ Symons (1897), p. 3154, 3156.

²⁵ Symons (1909), pp. 128-9.

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Symons proposed expanding upon New York's "Nine Million Dollar Improvement" (then underway but not yet a source of scandal) to construct locks 12' deep, 420' long, and 33' wide. Symons's conclusions appeared to please his commanding officers, based on the letters of endorsement that accompanied its publication in the 1897 *Chief of Engineers Annual Report*, but they did not satisfy Midwestern congressmen, who appropriated more and more money for detailed ship canal surveys over the next several years, culminating in publication in 1900 of the two-volume report.²⁶

Despite the glamor of a ship canal, Symons and his colleagues on the Committee on Canals appointed by Governor Roosevelt decided that an enlarged and slightly rerouted canal, capable of passing 1000-ton barges (roughly six times the capacity of those then in use on the New York system) would be far more practical and provide a greater return on the state's investment. They reasoned that a ship canal of sufficient capacity would be enormously expensive, beyond New York's capacity to build on its own. Even as a federal project, a cross-state ship canal would be disruptive, requiring that all bridges be draw or swing spans to allow passage of tall ocean-going and lake vessels. They also calculated that it would be uneconomical and would see less use than its promoters envisioned. Greene's committee expanded on Symons's earlier report to the corps, pointing out that ocean-going ships, lake freighters, and canal boats were fundamentally different vessels, built for different conditions. Using ships built for ocean service on a multi-day passage through a narrow ship canal was a slow accident-prone use of expensive marine hardware. Given the suitability of lake, canal, and ocean vessels to their intended environments and the low cost of canal boat construction and operation, the committee concluded that the lake freighter to canal boat to ocean steamer transit that had been the norm since the Erie Canal opened in 1825 was still the most economical way to move grain and other bulk cargos from the interior for export, even with transshipment costs at Buffalo and New York.

The question became one of dimensions and route. In 1892, state engineer Martin Schenck had proposed a barge canal, very much along the route eventually adopted, utilizing Oneida Lake, a summit level near Rome and canalized versions of the Mohawk, Oswego, Seneca and Clyde rivers. Schenck envisioned a canal that could pass barges 250' long by 25' beam with 10' draft, capable of carrying 50,000 bushels of wheat. He deemed a ship canal "only a pleasing idea to contemplate and not a practical plan to consummate."²⁷ In August

²⁶ *Report of the Board of Engineers on Deep Waterways Between the Great Lakes and the Atlantic Tide Waters* (Washington: GPO, 1900).

²⁷ *Annual Report of the State Engineer and Surveyor of the State of New York for the Fiscal Year ended in September 30, 1892, Vol. 1* (Albany: J.B. Lyon Company, 1893)[henceforth AR-SES, (fiscal year)], in Whitford (1922), p 23.

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1895, state engineer Campbell W. Adams directed Albert J. Hines, resident engineer of the eastern division, to examine the "Oswego Route," from Watervliet to Lake Ontario, utilizing the Mohawk River, Oneida Lake, and Oswego River with a land-cut summit level near Rome. Hines estimated that a 20' channel with locks 450' long by 60' wide would cost just over \$82 million.²⁸

The Committee on Canals concluded that a canal capable of passing thousand-ton barges between Lake Erie and the Hudson utilizing canalized lakes and rivers, while many times more expensive than enlargement of the existing waterway, offered the best prospects for New York's future. They argued that it was "unwise to spend large sums of money in a mere betterment of the existing canal" and that a "radical change, both in size and management" was warranted in order to effect "a complete and permanent solution of the canal problem."²⁹ Greene's committee submitted its report and recommendations to the governor in January 1900. Roosevelt forwarded it to the legislature on January 25 in combination with the recently delivered report of the Commerce Commission that had been appointed in 1898 by his predecessor Frank S. Black. The Commerce Commission had been charged with determining the extent, causes, and remedies for the decline of business at New York ports relative to those in other states. It found that while New York was still the largest export port on the continent, its business was declining; at the same time business was rising at Montreal, Boston, Philadelphia, Baltimore, Newport News, New Orleans, and Galveston. New York's share of wheat exports declined from 58 percent in 1895 to 42 percent in 1899 and its share of exports of more perishable flour fell from 45 percent to 32 percent during the same period.³⁰ The commission blamed much of that decline on differential freight rates, agreed among railroads, that made it two cents per hundred pounds cheaper to ship grain from Chicago to Philadelphia and three cents cheaper to ship it to Baltimore or Norfolk. Because this was interstate commerce, nominally under federal jurisdiction, New York's Commerce Commission averred that there was little the legislature could do to change differential freight rates other than apply limited pressure on railroad companies that were incorporated in New York and participated in the pooling arrangement.³¹

While it could do little to influence discriminatory railroad rates by out-of-state firms, particularly ones like the Pennsylvania, Baltimore & Ohio, and Norfolk & Western (railroads that were in the business of promoting their own home ports), the Commerce Commission pointed out that the New York Legislature had complete

²⁸ Whitford (1922), p. 28.

²⁹ Canals Committee Report, p. 30.

³⁰ *Report of the New York Commerce Commission* (New York, 1900), pp. 9-10.

³¹ *Ibid.*, pp 30-64.

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authority over the state's canal system. The report quoted a recent Interstate Commerce Commission decision that rebuffed a challenge by the New York Produce Exchange to the rate setting practices of Trunk Line Railroads: "The great supremacy of New York in the past has been measurably due to its canals. If it would hold that supremacy in the future, it must give attention to that same waterway."³² The Commerce Commission recommended several actions to improve the canal system and New York's competitiveness: complete the 1895 improvement along the existing alignment (The Commerce Commission estimated it would cost \$15 million. Greene's Committee on Canals estimated it would be closer to \$21 million); develop canal terminals with pier sheds in New York and Buffalo to facilitate shipment of package freight; eliminate the \$50,000 capitalization limit on canal navigation companies (which had been established to protect small and family-run canal boat operators but hindered investment in new vessels); reduce port charges and regulate grain elevator and lighterage fees in New York City; stop the practice of transferring underwater land from state and municipal governments to private interests and replace it with leasing to preserve public control over the waterfront.³³

In his messages forwarding reports of the Commerce Commission and Greene's Committee on Canals to the legislature, Governor Roosevelt endorsed most of the Commerce Commission's recommendations but came out in favor of the thousand-ton barge canal proposed by Greene's committee rather than the more modest completion of the 1895 improvement recommended by the Commerce Commission. "The State of New York is rich and can afford to pay heavily for a great and real improvement in her transportation facilities. But it cannot afford an inadequate improvement."³⁴

Although Roosevelt was anxious to move forward with a new canal, both his political advisors and the engineers urged restraint and more detailed study. Nobody wanted to repeat the debacle of 1895's "Nine Million Dollar Improvement," where work started based on out-of-date estimates, without a clear understanding of the engineering and construction challenges, and no public knowledge that the work would cost nearly three times the amount originally proposed and authorized. With time running short in the legislative session, Roosevelt asked for a \$200,000 appropriation for the state engineer to conduct a detailed survey and cost estimates for alternate routes with emphasis on a thousand-ton barge canal along the path proposed by Greene's Committee on Canals. "It is evident that there will be no chance of passing the referendum resolution this

³² Ibid., p. 64.

³³ Ibid., pp 64-115, summarized 120-2.

³⁴ Theodore Roosevelt to the Legislature, January 25, 1900 transmitting Canal Committee report, *Messages from the Governors, Volume X 1899-1906* (Albany: J.B. Lyon, 1909), p. 138; transmitting Commerce Commission report, pp. 130-4.

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session, [yet] to be idle in the matter would be little short of criminal.”³⁵ That survey was authorized in the final days of the session, following political arm twisting by Roosevelt, Boss Platt, and the New York City and Buffalo delegations and some creative parliamentary maneuvers.³⁶

The Bond Report - 1901

State engineer and surveyor Edward A. Bond headed the survey project, assisted by his staff and a team of consulting engineers led by David J. Howell and Trevor C. Leutzé. The two-volume report with drawings that they submitted to the governor on February 12, 1901, commonly known as the “Bond Report,” is one of the most important archival sources on the history and design of the Barge Canal. The report examined routes, structures, and water supplies for three alternatives: the existing Enlarged Erie alignment with modifications at the eastern end to speed passage around Cohoes Falls; canalization of the Mohawk River, Oneida Lake, and Oneida, Seneca, and Clyde rivers (generally along the lines eventually adopted); and a new canal around Niagara Falls between Tonawanda and Olcott on the New York side followed by passage along Lake Ontario to Oswego, leading to canalized versions of the Oswego, Oneida, and Mohawk rivers. All were designed to pass barges 150’ long by 25’ beam with a 10’ draft and incorporated locks to be 328’ long (the dimension later selected for Barge Canal locks) by 28’ wide. Although they examined all three alternatives, like Greene’s Committee on Canals, the Bond team devoted most of its attention to the Mohawk, Oneida, Seneca, Clyde route.³⁷ Among the advantages of canalized rivers extolled in the report were the opportunities for the Mohawk Valley communities of Schenectady, Fultonville, Sprakers, Canajoharie, Fort Plain, Mohawk, Ilion, Frankfort, Utica, and Rome to fill in the old canal through their centers, eliminate bridges, and replace “unsightly canal structures” with new commercial buildings. Amsterdam and Saint Johnsville would gain access to the canal and Syracuse might be able to eliminate railroad grade crossings in the center of the city by laying tracks in the old canal bed.³⁸

Bond’s team investigated three methods to do-away with the “Cohoes Sixteens,” a notoriously slow series of Enlarged Erie locks around Cohoes Falls at the eastern end of the Mohawk River. They listened to proposals for a 112’ tall boat lift on the south (Cohoes) side of the gorge, which would have been built roughly where the

³⁵ Theodore Roosevelt to George E. Matthews to Francis Vinton Greene, February 26, 1900, in Chessman, pp. 194-5.

³⁶ Chapter 411, Laws of 1900; Chessman, pp. 197-99.

³⁷ *Report on the Barge Canal from the Hudson River to the Great Lakes, February 12, 1901* (Albany: James B. Lyon, 1901) (Bond Report). Volume 1 contains text & tables. Volume 2 is a folio of maps & drawings.

³⁸ *Ibid.*, pp. 30-1.

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School Street hydroelectric plant stands today, but concluded that an electrically, hydraulically, or pneumatically powered lift had greater chances of failure than conventional locks. They considered a massive side-by-side staircase of locks to be built into the gorge wall at the north end of the falls, but decided that going up the Mohawk below Cohoes Falls would be too difficult and risky during times of high water. Eventually, they settled on a preferred alternative that utilized an ancient glacial outwash channel through the Village of Waterford about a mile north of the falls.³⁹ That route required a new lock and dam between Troy and Green Island at the head of tidal navigation. The Bond Report included that structure in its estimates as Lock 1. Troy Lock and Dam were eventually built by the federal government rather than the state, leading to the peculiarity that Erie Canal numbering starts at Lock E2. (Although it forms the eastern gateway to the system, the federal dam is not part of the Barge Canal and is not included in this nomination.)

The Bond Report discussed several advantages of installing movable dams at locks on the Mohawk but did not provide cost estimates or recommend specific configurations. None of the existing designs fit all of the requirements so the report recommended further investigation and study.⁴⁰

In the middle of the state, Bond proposed running the Erie Canal across the northern edge of the Montezuma Marsh on a fairly straight line from Weedsport, through the hamlet of Savannah, to Lyons. He acknowledged that lowering the water table by 4' would affect waterpower at Baldwinsville and on the Oswego but suggested that the supply of Niagara River water via the canal and the increase of arable land would offset any power losses.⁴¹

Bond examined five routes through and around Rochester (A through E). Following the existing canal through downtown would have required replacing the Genesee Aqueduct with a steel trough to allow deeper draft vessels and demolishing several blocks in the central business district to eliminate sharp bends in the existing channel that could not be negotiated by Barge Canal boats. Another would have run north of downtown, requiring a 1,050' long steel aqueduct across the lower falls of the Genesee, crossing 215' above the riverbed.

³⁹ Ibid., pp. 4-8; 78-88; Appendix III – “Report of Board on High Lift Locks,” pp. 519-30; Appendix V “Report on Mechanical Lift Locks at Cohoes, N.Y.,” pp. 539-68; Plate XXIV.

⁴⁰ Ibid., pp 122-3.

⁴¹ Ibid., p. 33. The state had been working since the 1820s to drain the marshes north of Cayuga Lake so that farmers could plant in the rich muck soil. It is therefore not surprising that Bond did not anticipate the alteration of habitat that would result from lowering the Seneca River. Montezuma National Wildlife Refuge was created during the 1920s with elevated marsh lagoons maintained behind dikes in an effort to simulate the vast wetlands that once extended north from the outlet of Cayuga Lake.

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The others went south of downtown, following various routes to cross the broad valley of Irondequoit Creek between Fairport and Pittsford and the Genesee on the southern outskirts of Rochester. The route selected, a variation on "Route D," was the furthest from downtown and would require long, deep rock-cut into the shoulder of the Medina Escarpment. Bond preferred "Route A," which utilized portions of the old canal through the southeastern sections of the city with a new channel along the east bank of the Genesee, through the area now occupied by the University of Rochester. He argued that "it brings the canal into that part of the city where it will have the least interference with business, yet giving the city easy access for freight handling. It also leaves the city on the main line of the canal."⁴² Some Rochester business leaders thought otherwise and submitted a letter through the Chamber of Commerce (which soon became the headquarters of the statewide anti-Barge Canal campaign) strongly favoring the southern route, as far from their city as possible.⁴³

The Bond Report identified needs and provided estimates for dams, bridges, spillways and sediment traps at stream crossings, and aids to navigation. It examined water supplies and recommended construction of reservoirs at Hinckley and Delta to feed the Rome summit level. The report included calculations for optimum speeds and the amount of power needed to move boats through channels of different dimensions. Bond's team estimated that construction of a new Erie Canal on canalized rivers and lakes, capable of passing boats with 10' draft, and improvements to the Oswego and Champlain Canals with smaller locks and drafts of 8,' would cost about \$76.5 million. The Niagara-Oswego route would have cost less because it involved less digging, \$55-57 million depending on variations in route, but the report cautioned strongly against exposing canal boats to the open water rigors of Lake Ontario. Enlarging the existing route to pass 150' x 25' barges drawing 10' would cost the most - \$87.3 - mainly because of the extra costs of construction and land acquisition through the centers of some of the state's busiest villages and cities.⁴⁴

Not all Barge Canal structures were built as Bond and his associates envisioned: movable bridge dams appeared on the Mohawk River in place of the proposed timber dams; a couple of locks were built in slightly different locations than envisioned and some were combined, reducing the overall number; the Erie followed an altered route across the Montezuma Marshes; electrical equipment did not incorporate storage batteries; steel lock gates were installed rather than solid timber; the locks themselves were twice as wide; and architectural embellishments that appear in the report's illustrations fell by the wayside. Despite these minor differences, the

⁴² Ibid., p. 36; detailed descriptions of alternate routes and structures, pp. 141-57.

⁴³ "Report of the Committee of Rochester Chamber of Commerce, July 2, 1900," Bond Report, Appendix X, pp. 989-993.

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Bond Report's detailed route descriptions read like a travelogue of today's canal system and the cost estimates were remarkably accurate. Later, even Bond's political rivals admitted that "seldom if ever has a work approximating the magnitude of the Barge Canal improvement been carried to completion at a final cost for construction so near to that originally estimated."⁴⁵

Bond's study had been requested by Governor Theodore Roosevelt, but the report (completed within ten months of authorization at 75 percent of its allocation) was delivered to his successor, Benjamin B. Odell. In the meantime, Boss Platt, chafing under Roosevelt's reform efforts, had engineered nomination of the brash young politician to be William McKinley's vice presidential running mate in the election of 1900. With T.R. banished to an obscure national office that traditionally had little function and no power or influence, Platt's New York Republican machine nominated party chairman Odell as its candidate for governor. Receiving the Bond Report about a month after he was inaugurated, Odell showed little interest in canal matters. His letter transmitting the report to the legislature ignored its recommendations for a thousand-ton barge canal and instead proposed completion of the 1895 enlargement along the existing route. Odell believed that the advantages of a new larger waterway "are not commensurate with the expense involved, and that the purposes for which the canals should be maintained are more for protection against unfair discrimination than they are for actual use." That suggestion pleased neither canal proponents nor anti-canal forces, led by the railroads and southern-tier politicians who advocated abandoning the canals and laying tracks in their beds.⁴⁶

The next three years saw intense political and public relations battles between pro-canal and anti-canal forces. Canal advocates were strongest in Buffalo and New York City, where owners and workers who depended on wharfs, grain elevators, commodity exchanges, and other port functions were most concerned about the loss of export trade to other U.S. ports via rail and to Montreal via the recently enlarged series of locks along the St. Lawrence River. The New York Produce Exchange, New York Merchants' Association, New York Board of Trade and Transportation, and the Chamber of Commerce led advocacy efforts in the eastern part of the state; the Buffalo Merchants' Exchange and Chamber of Commerce championed the project in the west. John I. Platt, editor of the *Poughkeepsie Daily Eagle*, was one of the most implacable foes. (The New York Central & Hudson River Railroad had a major presence in Poughkeepsie and Platt later admitted that the railroad paid his

⁴⁴ Ibid., p. 52.

⁴⁵ Unattributed quote from Whitford (1922), p. 455.

⁴⁶ B.B. Odell, Jr., to the Legislature, March 15, 1901, *Messages from the Governors*, pp. 244-52; Chessman, p. 197-9.

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expenses during the anti-canal campaign.)⁴⁷ Opinions along the canal route were mixed. Newspapers in Rome and Utica were generally in favor of enlargement, although the editor of the *Utica Herald* opined that upstate communities occupied a position that Manhattan would if a tunnel were proposed to directly link New Jersey with Brooklyn.⁴⁸ Newspapers in Rochester and surrounding Monroe County opposed any spending for canal enlargement. The *Fairport Herald* stated, “We do not believe the expenditure will produce an equal return” and offered a dim view of the existing state of appointed canal employees: “The Erie Canal has not opened yet, but it is faithfully promised that the big ditch will be active soon. In the meantime, the same old bunch of canal dependents who are forever pulling their wires for a canal job are whittling another stick apiece and waiting for orders from headquarters.”⁴⁹

Both the Republican and Democratic parties included planks pledging construction of a 1,000-ton barge canal in their 1902 platforms, but opposition and delaying tactics continued.⁵⁰ Several anti-canal resolutions were introduced in the New York State Legislature during 1903, including one to drain the canal and convert it to a rail bed and another to amend the state constitution to allow transfer of canal lands to the federal government for the eventual (and highly unlikely) construction of a ship canal. The International Towing and Power Company argued that the state could save the cost of enlargement if the company were granted a charter to build tracks along the canal and tow barges at higher speed using electric locomotives. International Towing and Power built an experimental track on the section of the Erie Canal that ran through the General Electric works in Schenectady and demonstrated their electric mules three days before the vote on the Barge Canal. General Electric was a major supplier of electric railway and subway locomotives so their motives were deeply suspect.⁵¹

Barge Canal Law & Referendum – 1903

On April 7, 1903 the state legislature passed an act authorizing issuance of \$101 million in bonds for improvement of the Erie, Champlain, and Oswego canals (Chapter 147, Laws of 1903, commonly known as the

⁴⁷ Henry Wayland Hill, *Waterways and Canal Construction in New York State* (Buffalo: Buffalo Historical Society Publications Volume XII, 1908), Chapter XXIV.

⁴⁸ *Utica Herald*, January 26, 1900, in Chessman, p. 193.

⁴⁹ *Fairport Herald*, October 7, 1903, April 22, 1903, in McFee, p. 46.

⁵⁰ George H. Raymond, “New York State Canals From 1895-1903: A Chronicle of Achievement.” Frank H. Severance, ed., *Canal Enlargement in New York State: Papers on the Barge Canal Campaign and Related Topics* (Buffalo: Buffalo Historical Society Publications Volume XIII, 1909), p. 173.

⁵¹ Whitford (1922), p. 92-3, 132.

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“Barge Canal Law”), based in large part on the recommendations of the Bond Report. The law specified locks 328’ long between quoins, 28’ wide, with 11’ depth of water over the sills. It called for side-by side locks at Waterford and Lockport and specified that other locks be sited so that a second chamber could be added later as traffic warranted. It identified the route in detail but authorized the state engineer to make derivations “for bettering the alignment, reducing curvature, better placing of structures and their approaches, securing better foundations, or generally for any purpose tending to improve the canal and render its navigation safer and easier.”⁵²

The Barge Canal Law required ratification in a general election, so both pro- and anti-canal forces focused directly on voters between April and November 1903. Advocates promoted the new waterways in Buffalo, New York City, and favorable communities along the canal route under the auspices of the Canal Improvement State Committee and the Canal Improvement League. Opponents set up headquarters and held anti-canal rallies in Rochester. The Rochester Chamber of Commerce compiled a pamphlet of anti-canal editorials and circulated it throughout the state under the title: “Twenty good reasons why you should vote NO,” along with a handbill posted in railway and transit stations:

Vote, but vote NO on the Barge canal scheme.

Beneficiaries: Grain speculators, the contractors, the padrones

Who pays for it? You.

This means higher taxes, direct and indirect. The latter touch everybody. Higher rents, higher licenses, heavier expenses, with no return. Vote No

If there is any intelligent man who thinks it will benefit the State or any section thereof or any citizen thereof, save only for the beneficiaries of the most stupendous graft ever suggested, let him vote for the Barge canal. If he is not a grafter and if he has any regard for his own interest let him vote No.⁵³

Despite opposition, the Barge Canal Law was ratified by voters in November with a quarter-million majority. It authorized a \$101 million bond issue – the largest issue by any single state up to that time -- and reaffirmed the 1882 decision that the canal system should remain toll free.⁵⁴ The population centers of New York City’s five

⁵² Chapter 147, Laws of 1903, §3.

⁵³ Whitford (1922), pp. 125-6.

⁵⁴ Later bond issues in 1909, 1911, and 1915 raised total construction appropriations to \$154.8 million and included provisions to increase the Cayuga-Seneca Canal to Barge Canal dimensions and for the construction of freight terminals.

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counties and Buffalo and Erie County carried the referendum. Canal counties of Albany, Cayuga, Niagara, Orleans, and Oswego also voted in favor, along with six off-line counties. Herkimer, Madison, Montgomery, Oneida, Onondaga, Rensselaer, Saratoga, Schenectady, Washington, Wayne, and more than three-quarters of the voters in Rochester and Monroe County voted against, along with residents of 34 other counties in the north country, southern tier, and Hudson Valley, where there were no canals.⁵⁵

Planning, Engineering & Construction Administration

Canal operations and maintenance fell under New York's Department of Public Works (DPW), while design and construction of new works was supervised by the office of the state engineer and surveyor. The superintendent of public works was appointed by the governor; the state engineer and surveyor was independently elected to a two-year term. The Barge Canal Law established the positions of special deputy engineer and special resident engineer to supervise all matters of Barge Canal improvement.⁵⁶ The law also codified a number of procedures to preclude accusations of favoritism that had plagued the ill-starred "Nine Million Dollar Improvement" of 1895. Engineers in divisions and residencies (field offices) across the system prepared maps and surveys, transmitting them to the special deputy engineer's office in Albany where they were combined with structure drawings, specifications, and cost estimates. That office was divided into bureaus that specialized in bridge, lock, river, general drafting, computing, and checking. After the contract package was completed and approved by the special deputy state engineer, it was sent to the state engineer for approval, from there to the Advisory Board of Consulting Engineers, and on to the Canal Board for final approval. The superintendent of public works advertised for and selected the lowest bid. Contractors' work proceeded under the direction of the state engineer's division and residency engineers. Final approval for completed work moved up through the chain from the field to the state engineer, who forwarded his approval to the superintendent of public works to be accepted and payment authorized by the comptroller. Acceptance by the superintendent also marked the shift in responsibility for operation and maintenance of completed segments from the state engineer's office to the DPW. The design, review, approval, and procurement procedure was cumbersome and

⁵⁵ M.M. Wilner, "The New York State Press in the Campaign for Enlargement of the Canals," Frank H. Severance, ed., *Canal Enlargement in New York State: Papers on the Barge Canal Campaign and Related Topics* (Buffalo: Buffalo Historical Society Publications Volume 13, 1909), pp. 192-3.

⁵⁶ Chapter 147, Laws of 1903, §8.

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contractors and politicians sometimes called for it to be streamlined, but the multi-level checks kept Barge Canal construction largely scandal-free.⁵⁷

The Canal Board had been in existence since 1826. By the early twentieth century its members included the lieutenant governor, secretary of state, attorney general, comptroller, treasurer, superintendent of public works, and state engineer and surveyor. The five-member Advisory Board of Consulting Engineers was established under the 1903 Barge Canal Law to provide consistent professional oversight and smooth-out variations in leadership that resulted from two-year terms of elected state engineers, attorneys general, comptrollers, and governors, and their appointees.⁵⁸ Edwin A. Bond resigned as state engineer in May 1904 to chair the Advisory Board, where he was joined by Col. Thomas W. Symons, the army engineer stationed in Buffalo who had worked with Bond on the Committee on Canals appointed by Governor Roosevelt, along with William A. Brackenridge, a specialist in water power; Dr. Elmer L. Corthell; and Commander Alfred Brook Fry.⁵⁹

Throughout 1904-05 the state engineer's office developed plans and specifications for the new waterway. The Bureau of Bridges designed a new style of reinforced concrete bridge piers with integral approach ramps that used far less material than the traditional configuration of abutments with wings backed by fill.⁶⁰ Specialists in fabricated steel and structural timber construction in the Bureau of Bridges also developed designs for the superstructures of movable dams and steel and timber lock gates, along with a design for radial lock valves that was not adopted.⁶¹ A concrete testing lab was established in the basement of the New York State Capitol and geared-up for the most extensive analysis of the comparatively new material to be done at a state level.⁶²

Resident engineer William B. Landreth conducted an extended tour of the American Midwest to study the uses of concrete in river, harbor, canal, and railroad structures and to consult with military and civilian engineers who were familiar with its use. New York had active quarrying and stone working businesses, many of which had prospered from construction and enlargement of tow-path era canal structures. Not surprisingly, they advocated

⁵⁷ AR-SES, 1905, pp. 25-6; Frank M. Williams, state engineer and surveyor to Governor Horace White, December 19, 1910, reprinted in *Barge Canal Bulletin*, III:12 (December 1910), pp. 514-15.

⁵⁸ Chapter 147, Laws of 1903 §8. Despite its non-partisan origins, the advisory board was abolished in 1911 after a change in administrations. Whitford (1922), p. 298.

⁵⁹ Whitford (1922), p. 141.

⁶⁰ AR-SES 1905, illustration opposite p. 34.

⁶¹ AR-SES 1904, pp. 281-84.

⁶² AR-SES, 1904, pp. 270-76.

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for the use of stone on Barge Canal structures and protested the use of concrete, but the Advisory Board of Consulting Engineers unanimously concurred with Landreth's conclusions:

1. That concrete built of proper materials, well selected and properly placed, has proven as strong and durable as cut-stone masonry.
2. That its use in locks, dams, retaining walls, bridge piers and abutments, and in fact in all places where cut-stone masonry was formerly used, is becoming universal.
3. That the cost of concrete masonry is from one-fourth to one-third that of cut-stone.
4. That work can be built of concrete much more expeditiously than of cut stone, owing to the great difficulty in preparing the stone as rapidly as needed in the work.
5. That the adoption and use of concrete in the masonry on the proposed canal improvement will result in the construction of permanent structures, at reasonable cost, and will prove successful.⁶³

David Alexander Watt, co-author of the then recently published *The Improvement of Rivers*, visited canal and river navigations in France, Italy, Austria, Germany, Holland, and England and reported on current practices and new structures there.⁶⁴ He noted that concrete had not come into general use and that few locks used electrical or hydraulic machinery to operate gates and valves. Those that did have electric power used hydroelectric or internal combustion generators to charge storage batteries. The highest lift locks in Europe were on the St. Denis canal in Paris (32.2') and at Horin on the Moldau (30'). Many of the European engineers that Watt encountered were dubious that the 42' lock proposed for the New York canal at Little Falls would work.⁶⁵

Based on a number of movable dams that he visited during that tour Watt recommended a new design for bridge dams on the Mohawk River that combined features of several recent European structures.⁶⁶ French engineers had developed a number of movable dam designs. Their support systems fell into two broad categories – either a row of upright frames, called trestles, spaced about 4' apart, that were hinged so they could be lowered to the riverbed during the off season, or a row of uprights, suspended from a bridge, that rested against shoes in the riverbed to support dam panels during the navigation season but could be hoisted clear of the water during the

⁶³ AR-SES, 1903, p. 80, longer discussion with accounts of sites visited, pp. 67-80.

⁶⁴ B.F. Thomas & D.A. Watt, *The Improvement of Rivers* (New York: John Wiley & Sons, 1903) [2nd edition in 2 volumes published 1913].

⁶⁵ D[avid] A. Watt, "European Practice in Waterways," AR-SES, 1905, Appendix V, pp. 136-150.

⁶⁶ D[avid] A. Watt, "Report on the Proposed Canalization of the Mohawk River," AR-SES, 1905, Appendix IV, pp. 132-35.

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off season. Watt found trestles and bridge suspended uprights supporting various combinations of removable structures built to hold the water back – vertical needle beams, pivoting shutters, vertical sliding panels, horizontal sliding panels, even rolling curtains of interlocking wood slats.⁶⁷ Watt was especially impressed by a bridge dam with Boulé gates constructed in 1904 at Mirowicz (also spelled Mirowitz) on the Moldau River in Bohemia (now known as the Vltava River in the Czech Republic). Gates at the Mirowicz dam were 7½' wide by 17' tall, fitted with rollers along the downstream edges to make them easier to move up and down on the frames.

New York's engineers adopted the system of chain operated uprights used at Mirowicz (which had been pioneered in 1885 on a curtain dam at Poses on the lower Seine) but replaced the tall narrow movable panels with three-high stacks of wide panels. At previous Boulé gate dams the vertical edges of each panel were supported by an upright. On New York's Barge Canal dams the ends of the panels are cantilevered past the uprights and abut end-to-end in the middle of a bay. Small hinged "flaps" are closed over the gaps, once a row of panels is in place, reducing leakage more effectively than other Boulé gate configurations.

The state engineer's office initially retained Watt on a monthly basis and paid his travel expenses as "Expert designer, movable dams," but within a year he was listed as a full-time resident engineer. They also brought in Captain W.L. Sibert of the Army Corps of Engineers, Pittsburgh District, who had worked on movable dams in the Ohio River basin for a one-time consultancy as "expert on movable dams."⁶⁸ Published reports do not specify whether Watt was responsible for all of the design and details of Mohawk River movable dams, based on his observations and adaptations of European practice, or if others in the state engineers' office played a role. It is clear, however, that the unique configuration of movable bridge dams on the New York system was largely established by the fall of 1905.⁶⁹ In addition to investigations of American and European innovations in lock and movable dam design and applications of concrete and electric power, state engineer Henry Van Alstyne

⁶⁷ For a discussion of the broad scope of French Movable dam designs see: Emory L. Kemp, "French Movable Dams on the Great Kanawha River," *Canal History and Technology Proceedings* 17 (March 1998), pp. 51-71; Kemp, "French and Movable Dams in America," *Canal History and Technology Proceedings* 26 (2007) and F.A. Allner, "Movable Dams: A Synopsis of their Development and some Critical Comparisons of their Operating Features," *Journal of the Engineers' Society of Pennsylvania* VI:3 (March 1914), pp. 73-97. For an examination of a Canadian movable dam, built about the same time as those on the Mohawk, with a similar overhead mechanism but very different closure system, see Robert W. Passfield, "St. Andrew's Caméré Curtin Bridge Dam, Lockport, Manitoba," *IA: The Journal of the Society for Industrial Archeology*, 33:2 (2007), pp. 5-34.

⁶⁸ AR-SES, 1905, p. 262.

⁶⁹ "General Design of Bridge Dam with Boulé Gates, Proposed for Mohawk River," AR-SES, 1905, plate opposite p. 28.

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commissioned naval architect Horace See of New York City to develop designs for thousand net-ton steel barges that could be used on the new waterway.⁷⁰

Barge Canal Law required that all construction work be done by contract. The first six contracts to be advertised were on parts of the system with very different construction conditions and were treated as test cases that could help refine specifications and estimates for subsequent jobs. Contract 1 involved dredging seven miles of navigation channels for the Champlain Canal in the Hudson River from Northumberland Dam to Fort Miller and from Crockers Reef to Fort Edward along with construction of a new dam across the Hudson at Crockers Reef. Contract 3 connected those river channels with a two-mile land cut with a guard gate at the head and a lock (Lock C6) at the lower end. Contract 2 included Erie Canal locks E2 and E3 and the channel between lines with concrete walls at the lower end of the Erie Canal's Waterford Flight. Contract 4 included dredging a 4.8 mile-long channel across the meander bends of Wood Creek at the eastern end of Oneida Lake and construction of the breakwater at Sylvan Beach. Contract 5 on the Erie involved channel improvements to the Seneca River and cutting across portions of the Montezuma Marsh. Contract 6 was a vertical cut through rock on the bypass route around Rochester between the New York Central mainline and South Greece. Contracts 1 through 6 were awarded in early April 1905.⁷¹

The Barge Canal project introduced new procedures for state contracting. It cost more to excavate rock and hardpan than earth, marl, or gravel. The state's specifications and bid documents traditionally included estimates of how much of each type of material was present in a section of prism and contractors' bids specified levels of payment for each type. This led to debates in the field about the actual character of material encountered. Some of the loudest accusations of malfeasance in the wake of the abortive Nine Million Dollar Improvement were that contractors submitted, and state inspectors accepted, bills for high-priced rock excavation when they had simply moved earth. Barge Canal bid documents identified the quantity of material to be removed (a simple geometric calculation) but left it to bidders to examine core samples at the state engineer's office, evaluate the character of material to be excavated and difficulty of work, and submit their bids for the entire job with a simple price per cubic yard removed as the basis for progress payments. This put more

⁷⁰ AR-SES, 1904, pp 46-50 and plate opposite page 44.

⁷¹ AR-SES, 1904, p. 56. More than a year passed between award of the first six contracts and the next batch, probably a byproduct of the state fiscal year, which, at that time, ran from October 1 through September 30. Contracts were generally awarded between April and December throughout the construction period.

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responsibility for accurate estimating on contractors, while reducing opportunities to accuse state officials of corruption. It also led to bids that were generally lower than government estimates.⁷²

Specifications Change & Construction Begins - 1905

In 1905 the legislature restated the lock dimensions specified in the 1903 Barge Canal Law as minimums rather than absolute numbers (chapter 740, Laws of 1905). The state engineer, Advisory Board of Engineers, and Canal Association of Greater New York advocated increasing lock width to 45' with at least 14' of water over the sills to maximize the potential for interchange of vessels and cargos between waterways. Those dimensions would match the width and depth of recently completed Canadian canals along the St. Lawrence River and 14' deep improvements to the Ohio, Illinois, and Mississippi rivers proposed by the Army Corps of Engineers. State officials on the Canal Board accepted the increased width but balked at the prospect of having to build and maintain a deeper channel. By August 1905, the dimensions of Barge Canal locks were established at 328' between quoins, 45' wide, with 12' of water over the sills.⁷³ Contracts had already been let for three 28' wide 11' deep locks. Specifications for Contract 1, which included Lock C6 at Fort Miller on the Champlain Canal were revised without incident but Ferguson Contracting Company, the firm that had been awarded Contract 2 to build locks E2 and E3 at the lower end of the Waterford Flight, refused to submit a proposal under the new specifications and the job was re-let to Holler & Shepherd in 1909 under Contract 2-E.⁷⁴

Wider locks and the larger vessels that would use them required proportionately wider canal channels but superintendent of public works Nicholas Van Vranken Franchot insisted that channels already under contract be completed as originally specified, arguing that they could be deepened and widened as traffic warranted. This and Franchot's insistence that locks be no deeper than 12' proved costly in the long run. Throughout the 1920s tugs and barges ran aground in narrow channel sections that had been contracted before August 1905 and never widened.⁷⁵ Starting in 1935, the federal government subsidized lowering the sills, extending or replacing lock gates, and dredging channels on the eastern Erie and Oswego canals to provide a 14' channel between the

⁷² AR-SES, 1906, p.33.

⁷³ Whitford (1922), p. 153-5; AR-SES 1905, pp. 30-34.

⁷⁴ Lock C6 at Fort Miller on the Champlain Canal under Contract 1 and locks E2 and E3 at the lower end of the Waterford Flight under Contract 2.

⁷⁵ "Barge Canal Survey Commission" – typescript, New York State Library, Legislative Reference Library, CAN 482-2, September 1, 1925 Public Hearing, Albany (Volume I, pp. 164-6).

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Hudson at Waterford and Lake Ontario at Oswego. That project lasted until 1963 and cost more than it would have to build 14' deep locks during initial construction.

In 1905 the legislature also directed the state engineer to survey a route for a channel with locks of Barge Canal dimensions between the Erie Canal and Cayuga Lake. Although the Bond Report did not recommend enlarging the Cayuga-Seneca Canal and construction was not authorized until 1909, the prospect that it might come into being caused state engineer Henry Van Alstyne to reevaluate the proposed route of the Erie Canal across the Montezuma Marshes. The Bond Report, the 1903 Barge Canal Act, early designs, and Contract 5, based on those documents, all contemplated running across the northern edge of the marshes, on a fairly straight line between Weedsport and Clyde, through the hamlet of Savannah. The prospect of having to connect to an enlarged Cayuga-Seneca Canal led to bending that route well south, going up the Seneca River to its confluence with the Clyde River, then up that stream through Mays Point to Clyde. The revised route added about eight miles to the length of the Erie but was expected to save a quarter million dollars in construction costs. Final approval of the route change required legislation because the river alignment differed significantly from the line specified in the 1903 Barge Canal Law. The amendment passed in 1907.⁷⁶

By the end of 1906, contracts had been awarded to construct the entire Waterford Flight (Locks E2 through E6, Contracts 2 & 11); five of the seven movable dams and locks on the Mohawk (Locks E8, E9, E10 and associated dams under Contract 8, E12 and E13 under Contract 17); and Lock E16 on the Erie Canal, as well as the northern portion of the Champlain Canal (Locks C7 through C12 – Fort Edward to Whitehall under Contracts 15, 25 & 27). The state also awarded contracts for two new locks on the Oswego Canal at Fulton (Locks O-2 & O-3, Contract 10) and for supplying and erecting bridge superstructures over the new channels created by the other contracts.⁷⁷

The state engineer employed almost 1,800 people at this peak phase of planning and design, most of them devoted to the Barge Canal, from ax-men and rod-holders on survey parties in the field to supervising engineers, hydrologists, and specialists in particular structure types at the Albany headquarters.⁷⁸ The photographic and blueprinting bureau recorded all buildings condemned for Barge Canal purposes and made photographs of construction work at the end of each month to document progress, just before monthly estimates of work were

⁷⁶ AR-SES, 1907, p. 11; Whitford (1922), pp. 150-2.

⁷⁷ Whitford (1922), p. 558.

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submitted that formed the basis for payments to contractors.⁷⁹ The photographic bureau also supplied illustrations for the monthly *Barge Canal Bulletin* that the state engineer's office started publishing in September 1907. In addition to noting progress on construction contracts, the *Bulletin* often included articles that expanded upon interesting features of the new waterway. A bureau of electrical equipment was established in 1907 to investigate means of generating, transmitting, and using electricity for lighting and to operate machinery at locks, movable dams, and guard gates.⁸⁰

By the end of 1907, contracts had been awarded for Lock E7, two large fixed-crest dams across the Mohawk at Crescent and Vischer Ferry, and the remaining movable dams and locks at E14 Canajoharie and E15 Fort Plain (all under Contract 14); the lower portion of the Oswego Canal (Locks O-7 and O-8 in the City of Oswego under Contract 35); and the middle part of the Erie from Oneida Lake to the eastern outskirts of Baldwinsville (Contract 12). As the level of activity and familiarity with new structure types, materials, and construction techniques increased, the state engineer's office revised plans and developed guidelines for new ones that standardized features in order to reduce construction costs and have spare parts that could be used at multiple locations in the event of emergencies.⁸¹

Fifteen contracts were awarded in 1908, including Contract 55 for Delta Dam and Reservoir and Contract 31 for Lock 17, the highest single lift lock in the world, and associated structures and channels in Little Falls. This brought 194 miles of Barge Canal under contract for a total of \$34.7 million – more than a third of the total mileage and budget. Although some sections and specialized structures were still being designed, construction activity ramped-up dramatically – two and one-half times that of 1907 and nearly eight times that of the first full construction season in 1906.⁸² A total of 314 miles of canal were under contract by the end of 1909, totaling over \$54 million. The Erie Canal was fully under contract from Waterford to Lyons and mostly under contract, with a few gaps, between Lyons and the Niagara River. The Champlain Canal was under contract from Waterford to Stillwater and Northumberland to Whitehall, with a 15-mile gap in the vicinity of Schuylerville. Concrete work was finished at 15 of the 53 locks on the Erie, Champlain, and Oswego canals. A contract for

⁷⁸ Whitford (1922), p. 448.

⁷⁹ AR-SES 1906, p 33. Albums of condemnation and construction photographs, housed at NYS Archives, provide an outstanding record of conditions before, during, and after Barge Canal construction.

⁸⁰ AR-SES, 1907, p. 12.

⁸¹ AR-SES, 1907, pp. 13-14.

⁸² AR-SES, 1908, p. 10.

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steel gates and valves was awarded in April and a few had been delivered and installed. Work was underway at Delta Reservoir and plans were approved and ready to go to bid for Hinckley. Frank Martin Williams, who had worked at the state engineer's office since 1898, was elected state engineer and surveyor in 1908 and was pleased to report that the combined value of contracts awarded to-date was below the estimates that state engineering staff had prepared in 1903.⁸³

Construction Workers

Nearly half of the labor force for construction of the Barge Canal was foreign born. Many contractors relied on the padrone system to secure workers. A padrone (boss in Italian) was a labor broker who recruited workers in the old country and arranged for their transport, delivery to the jobsite, housing, and food in exchange for a sizable portion of their wages. At its worst, it was a form of indentured servitude. In response to complaints about potential violations of labor law at contractors' camps, an inspector from the New York Department of Labor's Bureau of Factory Inspection visited 26 contracts in September and October 1908 and reported on 21 where work was actively going on. (At the other five, work was just getting started or was nearly completed.) A total of 4,516 workmen were employed on those 21 contracts. Of those, 2,067 (46 percent) were foreign born. Immigrants worked on 18 of the 21 contracts inspected and 16 of those contractors housed their workers in construction camps. An excerpt from the inspector's report paints an arresting portrait of conditions in those camps:

It is apparently the general rule among the contractors (to which, of course, there are exceptions) to provide "shanties" for the laborers at the job. These "shanties" or "shacks," together in some cases with outlying huts, constituted the laborers' camp. In some cases additional camps are provided for the skilled labor, mechanics, timekeepers, etc., but as a general rule the better class of employees board in nearby cities or villages or at farmhouses along the line of the canal, while the unskilled laborers live at the job. The latter method is preferred by the contractors for the reason that the help is close at hand to resume work after a storm or temporary layoff, or in case of emergency.

After erecting the shanties and building bunks therein, the contractor turns the use of the building over to the padrone, or labor agent, who is depended on to supply all necessary unskilled laborers in return for the privilege of conducting the supply store for the men. The padrone also has for

⁸³ AR-SES, 1909, pp 12-13.

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himself all moneys received for bunk space in the shanties. The charge for sleeping space averages about \$1 per month per man.

As to the manner of boarding, the Austrians and Hungarians generally engage a "board boss" who buys and cooks the food. Occasionally a married couple does this. At the end of the month the cost is assigned pro rata among the members of the mess. The Italian, however, prefers to buy his own supplies and do his own cooking. The contractor protects the padrone by deducting from the wages of the men the amount owing to him. We are thus enabled to learn about how much the bills for supplies will average, and find it to be from 12 to 15 dollars per month, including bunk space in the shanty. These bunks are merely board berths filled with straw or hay, over which the occupant throws an old blanket of some kind. It is exceptional to find cots or beds. Usually the bunks are all together in a large room which is badly ventilated, these men seemingly having a dread of fresh air for sleeping purposes, although they work in it all day. Sometimes the hay or straw is changed, at least I am so informed; but, as a matter of fact, I saw no indications that such is the case. The camps, with few exceptions, are located near running streams or lakes, but, truth to tell, the alien laborer generally remain among the great unwashed.

In several instances the padrones have taken out licenses to sell beer. In some cases whiskey is sold without a license. Arrests have been made for this violation but, so far as learned, no convictions have been obtained. The contractors, for obvious reasons, discourage the selling of beer and liquors at or near the camps.

Instances are known where the padrones charge the men for getting the jobs, charge them for sleeping room, charge for the room whether used or not (as the price of retaining a job), which is extortion pure and simple; this, together with what is derived from the sale of food and drink, enables the padrone to get about all the money the men spend. Cases are known of one padrone bidding against another by offering to supply all necessary unskilled labor at a lower rate of wages in return for the "privilege" of the shanty and the store; as a matter of fact the laborer is and has been for years at the mercy of these padrones who, next to the men's own unclean habits, are the curse of their existence. Still it has to be acknowledged that but little sickness exists among these men and they are often able to take a vacation in their foreign homes during the winter months.

In some instances medical attention is called in only when necessary; in other instances a small weekly or monthly sum for medical service is deducted from the pay, and regular visits to the men are made by the company physician and when sickness occurs no extra charge is made. The camps, as a whole, are carefully located on high ground and allow for ample drainage, altho' improvement could be made at some camps. The drinking water is usually supplied from driven

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wells of ample depth to insure a good quality of water. On all contracts water-boys are employed whose duty is to keep the men well supplied with fresh drinking water.⁸⁴

Without naming specific projects in his report, the inspector summarized conditions in 16 construction camps:

Conditions	Number of Contracts	Number of Aliens Employed
Poor	1	132
Fair	4	274
Good	10	1,537
Excellent	<u>1</u>	<u>100</u>
	16	2,043

The report summarized rates of pay for 4,030 native and foreign born workers, starting at 75¢ per day for water boys, with laborers' wages ranging from \$1.20 to \$3.00 per 8 hour day and monthly wages in the neighborhood of \$100 for blacksmiths, boilermakers, dredge and tugboat captains, cranemen, electricians, foremen, and machinists. Dredge operators and steam shovel engineers were some of the highest paid workers, averaging \$125 to \$141 per month.⁸⁵

Other reports were less sanguine. In November 1909, Lillian D. Wald of the Henry Street Settlement, Frances A. Kellor, director of the Intermunicipal Research Committee, and Mary Drier of the Women's Trade Union League embarked on a 14-day 1,286 mile auto tour of construction camps along the lines of the Barge Canal and New York City's Catskill Reservoir projects, accompanied by photographer Lewis W. Hine. Wald and Kellor's article, illustrated by Hine's photographs in *The Survey*, an organ of New York's Charity Organization Society, reinforced the findings of the previous year's Labor Department report, but described the grim state of housing, sanitation, and food in Barge Canal construction camps in more evocative language:

⁸⁴ "Alien Labor, Housing Conditions and Wages on Public Work," *State of New York Department of Labor Bulletin 1909* (Albany: J.B. Lyon, 1910) Volume XI (Nos. 40-42), pp. 26-35. The inspector also visited the construction camp at New York City's Ashokan Reservoir, where work was just getting started. A summary of the report also appeared in "Housing Conditions and Wages on the New York State Barge Canal...", *Engineering News* (August 5, 1909), volume 62, number 6, p.154.

⁸⁵ *Ibid.*, pp. 29-35. The inspector did not enumerate the countries of origin of Barge Canal workers, other to note that there were Italians, Hungarians, and Austrians on the job. His report on an inspection of a smaller workforce at Ashokan Dam in December 1908 is more detailed, showing the vast majority of foreign workers to be Italian with smaller numbers of Austrians, Russians, Poles, Swedes, and Irish with a smattering of Finns, Germans, Hungarians, and Slavs., p. 35.

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In the state camps visited, where the laborers are not near a village, the padrone is in full control. The work itself is laborious and unexciting. The native Americans and nationalities of an older immigration find it distasteful and are unwilling to perform it. Because the laborer is thus far removed in language customs and habits of thought, the power of the padrone is no small thing to reckon with. . . The average stay of the laborer is less than two months and every new job which the padrone urges upon him costs anew for another outfit, and perhaps railway fare.

There are no homes in the state camps visited at which a laborer can board; he never gets a glimpse of family life, and never comes into contact with children. There is nothing for the men to do but work, eat, stowaway the remaining food in their bunks, drink and gamble awhile, and go to sleep with their clothes on. Repeat the same round day after day.⁸⁶

Wald and Kellor reported that 5,037 laborers were working in September 1909 (about 1,000 more than the Department of Labor inspector found the year before) on 41 Barge Canal contracts. Thirty-five of those contractors maintained camps and some had as many as seven camps per contract, spread-out along the line. Wald and Keller estimated that the workforce would quadruple in the spring and that more than three-quarters of the workers were immigrants --“no small body of men for whom the state of New York represents ‘America.’”⁸⁷ Wald and Kellor continued:

The state, as employer, alone determines the terms upon which its new canal shall be built. It defines in great detail its standard of materials and workmanship but takes no thought for the workmen who must operate in great transient groups. It does not leave to chance the realization of its material standard but sends inspectors to make tests and provides a staff of engineers. It does leave to chance (in the ignorance and cupidity of padroni) the quality and price of foods and care of the men. It takes great care to prevent the freezing of cement, but permits any kind of houses to be used for its laborers. It is wholly indifferent as to how they are ventilated, lighted or heated, how many sleep in them or whether the sleeping quarters are used for cooking and eating and the bunks as cupboards. Neither does it care whether the men can keep themselves or their clothes clean.

The simplest standards which military history shows are essential in handling such artificial bodies of people are grossly violated. Sanitary conveniences are sometimes entirely omitted; the

⁸⁶ Lillian D. Wald & Frances A. Kellor, “The Construction Camps of the People: The Findings of an Automobile Tour of Investigation of Camp Conditions Along the Line of New York State’s New Barge Canal and New York City’s New Aqueduct,” *The Survey*, January 1, 1910, pp. 432-465. Original copies of Hine’s photographs are in the collections of George Eastman House, Rochester.

⁸⁷ *Ibid.*, p. 450.

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men drink any kind of water they can obtain and filthy grounds are of no evident concern. The state does not inquire whether there are hospitals or physicians, medicine, emergency aids or anything of the kind. Notice is taken of gambling, drunkenness and immorality only when they impair the efficiency of the men. There is no family life in the camp, no children to soften the rough spirit. Men left alone in these miserable uninspected shacks, where vermin and dirt prevail, under the watchful eye of the padrone, intent upon getting every cent of profit he can out of them, must inevitably deteriorate. The testimony of contractors themselves is that many of the camp laborers soon become nomads, drifting from camp to camp, drinking, quarreling and averse to steady work.

We ask the state as employer to consider its gain from the men at the most productive periods of their lives; we ask the state to measure the influence of this life upon its future citizens during their first years in the country when they are most receptive to impressions of America.⁸⁸

It is not clear that these reports had any effect on conditions in Barge Canal construction camps. The padrone system remained deeply embedded in American construction contracting into the 1930s. Although Wald and Kellor decried the separate worlds of construction camps and canal communities, fearing that the masses of mobile immigrant workers would never be properly assimilated into American society, a sizable number of canal workers chose to stay after the job was done, contributing to the cultural, agricultural, and culinary character of upstate towns in ways that remain evident today.

Cayuga-Seneca Canal & Terminals - 1909

Maintaining traffic during Barge Canal construction had been particularly difficult on the Oswego Canal. The legislature allowed the superintendent of public works to close the Oswego for the 1909 and 1910 navigation seasons and interrupt traffic for extended periods after. While there were delays, some lasting weeks, on the other parts of the system during Barge Canal construction, the Oswego Canal was the only one of the four major branches to close for entire seasons since the 1820s.⁸⁹

The legislature increased the scope of the project in in 1909. Operators of salt mines, gypsum mines, and a cement plant at the southern ends of Cayuga and Seneca lakes had been agitating for several years to have the

⁸⁸ Ibid, pp., 464-5. Wald and Kellor affirmed the Labor Department inspector's finding that housing and sanitary conditions were better on New York City's Ashokan Reservoir and Catskill Aqueduct project because the city wanted to maintain the purity of its new water supply and prevent communicable diseases from being introduced during construction.

⁸⁹ Whitford (1922), pp. 220-1.

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Cayuga-Seneca Canal enlarged to Barge Canal dimensions. The legislature authorized that change and the voters approved a \$7 million bond act to pay for it in the November elections.⁹⁰

The legislature also established the Barge Canal Terminal Commission in 1909 (Chapter 438, Laws of 1909) to study American and European practice for ports, harbors, and waterway terminals where cargoes were stored, shifted from one vessel to another, and between vessels and road and rail vehicles. Terminals had not been a major concern during the towpath era when comparatively small canal boats could tie up at almost any bank and load or unload over a gangplank. Longer, deeper draft Barge Canal vessels would need more established deep-water dock walls. Terminal proponents were also alarmed by the growing tendency toward private ownership of usable waterfront, particularly by railroad companies. In continental Europe, most pier and port facilities and their materials handling equipment were publicly owned, while in Britain and North America they were generally private, and trans-shipment fees could exceed the cost of several thousand miles of water transport.

New York's Canal Terminal Commission included state engineer Frank Williams, superintendent of public works Frederick C. Stevens, chairman of the Advisory Board of Consulting Engineers Edward A. Bond, and special examiner and appraiser of canal lands Harvey J. Donaldson, assisted by Alexander R. Smith, who had served on the New York Commerce Commission in 1899, and engineers Charles Sterling and Charles Kieham. The commission visited towns and held hearings throughout the canal system to determine the location and scale of terminal facilities.⁹¹ In its 1910 report, the Terminal Commission recommended that the state appropriate \$16.5 million to build and equip terminals in Buffalo, the Tonawandas, Rochester, Syracuse, Oswego, Utica, Schenectady, Whitehall, two locations in Troy and Albany, and at thirteen locations on New York Harbor. A referendum in November 1911 authorized bonds up to \$11.8 million for terminal construction and machinery and added second sites in Buffalo, Lyons, Rome, and another site in New York to the list of required terminals. The bill also called for terminals at Lockport, Herkimer, Little Falls, Fort Plain, Canajoharie, Rouses Point, Port Henry, and Mechanicville and appropriated a sum for each, but did not specify the size or character of facilities. The law listed another two dozen communities where local officials could petition to have terminal facilities constructed. Eventually, 64 terminals were built, ranging from simple dock walls with no shore-side facilities other than mooring bollards and an access road, to concrete grain elevators and steel-framed masonry freight sheds with cranes, conveyors, and other materials handling machinery.

⁹⁰ Chapter 391, Laws of 1909.

⁹¹ Whitford, (1922), Chap. IX, pp.173-209.

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Addition of the Cayuga-Seneca Canal and terminals did nothing to diminish the levels of construction activity on the Erie, Champlain, and Oswego canals. Thirty-two new contracts were awarded in 1910 and by the end of the year almost the entire length of all four branches was under contract and about a third of the digging had been completed. There were half-mile gaps at either end of the Erie, where it would connect to the Niagara and Hudson rivers, and a two-mile gap at Medina where the state engineer's office was still reviewing designs for the reinforced concrete aqueduct over Oak Orchard Creek. The first contract for electrical equipment had been let (Contract 90) for hydroelectric generators, gate and valve operating motors, controls, and lighting at locks on the upper Champlain and Oswego canals. Work on Lockport's massive two-lock staircase had started under Contract 67, and clearing was underway for Hinckley Dam and Reservoir in the southern Adirondacks. Contracts for the Wayne County portion of the Erie -- locks E27, E28A, E28B, E29 and E30 and the channel in-between -- were awarded in December. Nearly three-quarters of the Cayuga-Seneca was under contract, a fairly remarkable feat for a project that had been authorized only a year earlier.⁹²

Lock E24 became the first Barge Canal lock to pass vessels on May 9, 1910, when crews used hand-powered chain hoists, blocks & tackle, and horses to manipulate the gates and valves in order to move a contractor's dredge with its accompanying quarters boat and deck scows up into the next level of the Seneca River. "Being new, the machinery worked somewhat stiffly, but the lock chamber filled smoothly and it appears that its operation will be satisfactory after a little wear has adjusted the several parts."⁹³ One of the most important achievements for the success of New York's Barge Canal came in 1910, when the U.S. Congress finally authorized and provided funding for the Army Corps of Engineers to dredge a channel in the Hudson River north of Coxsackie, build a new lock and dam between Troy and Green Island, and dredge a channel from there to the beginning of Barge Canal maintenance near Peebles Island, at the confluence of the Hudson and Mohawk rivers. New Yorkers had been lobbying Congress for years to dredge the upper 30 miles of unimproved channel to the head of the tide at Troy. There was new urgency to that request with the prospect of a 12' deep state Barge Canal emptying into an 8-10' deep waterway with unpredictable sandbars under federal jurisdiction. State engineer Frank Williams was clearly relieved to report that federal funds had been released on July 1 and that Corps of Engineers Colonel W.M. Black and his staff had immediately started work on designs for a new lock and dam to replace the antiquated Troy sloop lock.⁹⁴ New York's canal system connected with waterways

⁹² AR-SES, 1910, pp. 12-13.

⁹³"First Barge Canal Lock in Operation," *Barge Canal Bulletin*, III:5 (May 1910), p. 168.

⁹⁴ AR-SES, 1910, p 16; Whitford (1922) pp. 218-19. Williams' successor, John Bensel, argued that Troy lock & dam should be built by New York so that the entire Canal System could remain under state control, but it was eventually built as a federal facility.

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under federal jurisdiction at three other locations – Tonawanda, Oswego, and Whitehall. The Niagara River, from Lake Erie to the western end of the Erie Barge Canal at Tonawanda was fully navigable. The Corps of Engineers dredged portions of Oswego Harbor, but there was a hundred-yard bar between deep water in the harbor and the end of the Oswego Canal, with depths of less than eight feet. Although it fell within its jurisdiction, the federal government largely ignored the long narrow marshland at the southern end of Lake Champlain. After several years of asking the federal government to dredge channels at Oswego and Whitehall, New York finally secured permission and paid for the work to be done so that full-draft Barge Canal vessels could find their way to open water.

Frank Williams lost the November 1910 statewide election for state engineer and surveyor to John A. Bensel, and a new Democratic governor (the first since 1895) replaced superintendent of public works Frederick C. Stevens with Charles E. Treman. Historically, the DPW had been staffed with patronage appointees and changes in administration usually resulted in widespread turn-over, from managers to lock-tenders. While there were reassignments and a few changes at the top, most of the engineers who were working on Barge Canal design appear to have kept their jobs. By 1911, portions of the new waterway were in service in place of the old. Since there were no towpaths on the Barge Canal, the state started to contract with steam tugboat operators to move canal boats through sections where their draft animals could not work. The first specialized winches to operate the Mohawk River movable dams were delivered to Lock E15 at Fort Plain in March 1911, and soon thereafter these electric “mules” had lowered uprights and gates into place and a pool began to rise behind the dam. While this marked another milestone, engineers worried that the movable dam superstructures might not be strong enough and began to develop designs and contract specifications for their reinforcement.⁹⁵

Work on canal terminals started in 1912; lift bridges started to appear in western Monroe and Niagara counties (Contract 105), and the contract for construction of Lock E8 and movable dam E-4 at Scotia was re-let as Contract 8-A to allow use of hydraulic caissons for the foundations. The project’s largest construction setback occurred on September 3, 1912, when about 500’ of the tall embankment over Irondequoit Creek near Bushnells Basin collapsed and washed away. Although many predicted that traffic on the Erie was done for the season, within five weeks the state had built an 887’ long, 22’ wide timber flume, capable of carrying Enlarged Erie boats single-file across the breach.⁹⁶

⁹⁵ Whitford (1922), p. 232.

⁹⁶ Whitford (1922), pp. 233-34.

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Several important contracts were awarded in 1913, including Contract 65 for the reinforced concrete aqueduct over Oak Orchard Creek in Medina – less grand than originally envisioned due to weak foundation rock, but still an impressive piece of construction. The consortium of MacArthur Brothers Contracting & Lord Electric Company received Contracts 92, 93, 94 to build hydroelectric or gasoline-electric powerhouses and install gate and valve operating machinery, motors, and controls at 45 of the 57 lift locks on the system, three guard locks, and several guard gates. The high dam, two-lock staircase, clearing of an industrial area known as “The Flats,” and reinforcement of buildings in downtown Seneca Falls started under Cayuga-Seneca Canal Contract “C.” Terminal contracts were awarded for dock walls and grading at Plattsburg, Port Henry, Whitehall, Amsterdam, Fonda, Fort Plain, Ilion, Frankfort, Utica, and Rome. By the end of the year 250 miles of new canal were ready for use, although some sections could not be connected with the existing waterways to permit through-traffic.⁹⁷

In his 1912, 1913 and 1914 annual reports, state engineer and surveyor John Bensel warned the legislature that the \$101 million authorized in 1903 would not be sufficient to complete the Barge Canal. As an engineer, he could report that construction costs and bids were at or below estimates but complained that other factors had driven up the overall cost of the project. Courts had awarded unexpectedly large sums for land and water rights damage claims. Negotiating legal and financial details of railroad crossings caused delays at some locations and several Barge Canal construction contracts had to be suspended or cancelled until those issues could be resolved, with damages paid to the contractors. The legislature had added some requirements that were not part of the original package, like a provision that bridges on the Oswego Canal be capable of supporting draw spans in anticipation of Syracuse being able to attract ship traffic.⁹⁸

Bensel lost the 1914 election and Frank Williams returned as state engineer and surveyor in January 1915. Williams confirmed his predecessor’s contention that actual construction of the Erie, Champlain, and Oswego canals was nearly on budget. Even with change orders, Williams estimated that design and construction would total \$90 million, roughly \$6 million (7 percent) above the amount estimated in 1903, well within the 10 percent contingency. He also confirmed that legal costs, settlements, and add-ons far exceeded the amounts allocated in 1903. Over \$76 million in damage claims had been filed by the time Williams returned to office, and \$10 million had been awarded by the courts. Claims included \$19 million for land appropriation, \$38 million in

⁹⁷ Whitford (1922), p. 235.

⁹⁸ AR-SES, 1913, p. 18.

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water power damage claims, \$8.7 million for railroad crossings, and \$7 million in contractors' damage claims.⁹⁹ Williams also pointed out that the costs of maintaining navigation in the old canal throughout the construction period had been higher than anticipated and that nobody had expected or budgeted for the catastrophic breach at Bushnells Basin in 1912 and the emergency repairs that followed. He estimated that another \$27 million would be needed to complete the three principal branches. Work continued under existing contracts, but no major new ones were awarded in 1915 because there would have been no money to pay for them. New work did start on portions of the Cayuga-Seneca Canal and some canal terminals because they were authorized under different legislation, were funded by different bond acts, and were still under budget. Staff at the state engineer's office worked throughout 1915 to finalize plans and specifications for remaining work in the hope and expectation that a supplemental bond act would be approved. It was, and 33 contracts were awarded over the next twelve months.

Waterford Flight Opens – 1915

New Yorkers celebrated a milestone in Barge Canal construction on the morning of Saturday, May 15, 1915, when the eastern portion of the new Erie Canal officially opened between Waterford and Rexford. Governor Charles S. Whitman led a party that included state engineer and surveyor Frank Williams, superintendent of public works W.W. Wotherspoon, and other members of the Canal Board as they ascended the Waterford Flight aboard the motor launch *Frisbee 30*.¹⁰⁰ Other sections had been in service for a few seasons, but opening the Waterford Flight, a set of five locks providing the highest lift in the shortest distance in the world at the eastern gateway to the system, was highly symbolic. New locks and a portion of the Cayuga-Seneca Canal opened in August 1915 with completion of the dam forming Van Cleef Lake in Seneca Falls. That allowed dredges to move up and begin enlarging the prism between Seneca Falls and Waterloo.¹⁰¹

New York sent a Barge Canal exhibit to the Panama-Pacific Exposition in San Francisco that summer. Installed in the Palace of Liberal Arts, the exhibit included a 27' x 10' working model of the newly completed Waterford Flight. "The canal and rivers contain water, the lock gates are operated by [a] mechanism hidden beneath the surface and are filled and emptied by other concealed devices, and boats are drawn through the canal by a

⁹⁹ "Bensel Vindicated by his Successor," *New York Times*, January 25, 1915; Whitford (1922), pp. 245-51.

¹⁰⁰ "The Waterford Flight: A report on the notable events leading up to its opening on May 15, 1915" (Waterford: Waterford Historical Museum & Cultural Center, May 15, 1965); "Opening of the Eastern end of the Barge Canal" *Barge Canal Bulletin*, VIII:3 (March, 1915), pp. 79-81; "Official Opening of the Canal," *Barge Canal Bulletin* VIII:5 (May 1915), pp. 127-133.

¹⁰¹ "Another Section of Barge Canal Opened," *Barge Canal Bulletin* VIII:8 (August 1915), pp. 223-5.

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magnet running on a track beneath the channel.”¹⁰² There was also a 10’ x 6’ model of a terminal with working cranes, a 20’ x 3’ working model of the siphon lock at Oswego, an 11’ x 7’ model of a Mohawk River movable dam and lock with motors to raise dam sections and uprights, and a working siphon spillway. The largest fixture was a quarter-scale model of a Barge Canal lock that served as a theatre for motion pictures and lantern slide shows. New York’s canal exhibit was one of three Grand Prize winners at the exposition. The others were the United States Government exhibit and an open-air model of the Panama Canal Zone that covered more than an acre and cost \$400,000 to build. The Panama-Pacific Exposition was a celebration of the recent completion of the Panama Canal, but New York’s engineers took evident pride in the fact that their \$15,000 exhibit was judged to be more ingenious and implied that the same might be said of the waterway itself.¹⁰³

While showcasing the new system at an international exposition, canal managers also took measures to recognize and instill pride among canal employees. Superintendent of public works William Wotherspoon instituted the “Prize Lock” program in 1915 to recognize workers who took exceptional care of their structures, machinery, and grounds. Winners received a sign that they could hang on their powerhouse for the next year.¹⁰⁴ The tradition continues to this day and has been expanded to include first, second, and third place, as well as floating plant vessels. It helps explain the exceptional level of care and historical integrity that characterizes Barge Canal facilities.

Lock E17 at Little Falls opened in June 1916 and by the summer boats could use Mohawk River portions of the Erie Canal from Waterford to Lock E18 at Jacksonburg, about 4 miles below Herkimer. The state provided tugs to move canal boats through portions of the canal that lacked towpaths. Boats continued to use the Enlarged Erie channel from Jacksonburg through Utica, Rome, and Syracuse to Newark in Wayne County. They could use the new channel from Newark to Pittsford but had to use the old line through Rochester and across the Genesee aqueduct because work had been delayed on the deep cut south of the city. The new canal was open to traffic from Greece to Tonawanda, but work remained on the connection between the canal and the Niagara River, so boats used the old channel between Tonawanda and Buffalo Harbor. The full lengths of the new Champlain and Oswego canals were open, although portions of the Champlain still had a controlling depth of 7’ and the federal government had made no effort to dredge Oswego harbor or the southern end of Lake Champlain

¹⁰² “The Barge Canal Exhibit at the Panama-Pacific International Exposition,” *Barge Canal Bulletin* VIII:2 (February 1915), p. 44.

¹⁰³ “Grand Prize for the Barge Canal Exhibit,” *Barge Canal Bulletin* VIII:8 (August 1915), pp. 225-6.

¹⁰⁴ Whitford (1922), p. 301.

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to depths that would allow boats to take advantage of Barge Canal dimensions. Middle portions of the Cayuga-Seneca Canal were open but boats had to use old channels to get into the lakes or connect with the Erie.¹⁰⁵

Negotiations with the City of Rochester and several railroads regarding bridges crossing the new deep cut south of the city had dragged on for years, delaying completion of work that had been let among the first contracts in 1905. Those issues were finally resolved in 1916 and work resumed on the last portion of the Erie Canal.¹⁰⁶ Work also proceeded on the new trough for the Irondequoit Embankment to replace the section that collapsed in 1912 and on an unfinished section east of Lyons where a problem with railroad bridge clearance had delayed construction.

Completion during Wartime – 1917-18

The United States entered World War I on April 6, 1917, placing new urgency on completion of New York's Barge Canal. By the beginning of the navigation season, a month after the declaration of war, the new Erie Canal was open from Waterford to Three Rivers, where it connected with the Oswego Canal, providing navigation for vessels of Barge Canal dimensions between tidewater on the Hudson and Lake Ontario and from there to the upper Great Lakes via the Welland Canal on Ontario's Niagara Peninsula. Shipyards at Port Clinton, Ohio on Lake Erie and Clayton in New York's Thousand Islands used the new waterway to deliver fleets of submarine chasers, mine sweepers, and Navy launches to the coast that fall.¹⁰⁷ On July 4, 1917, state and city officials celebrated the centennial of the start of construction on the first Erie Canal at Rome, although the festivities were muted by wartime pressures.¹⁰⁸

Construction work pressed forward through 1917 and 18, despite dramatically increased costs for labor and construction materials, shortages, and delayed deliveries. In some instances, ironworkers were pulled from jobs erecting bridges to work in shipyards, and some bridges were delayed for want of steel. To make matters worse, the winter of 1917-18 was especially harsh. The state engineer and superintendent of public works pushed to have the entire system open by May 15, 1918. Some parts of the old canal remained in active service and could only be removed after the end of the 1917 season to make way for navigation on the Barge Canal. The dam at

¹⁰⁵ "New Sections of Barge Canal Opened," *Barge Canal Bulletin* IX:7 (July 1916), pp 182-3.

¹⁰⁶ Whitford (1922), p. 263.

¹⁰⁷ "The Barge Canal a Vital War Factor," *Barge Canal Bulletin* X:11 (November 1917), pp. 315-17, photos, p. 344; "Praise for Barge Canal by Navigator of Submarine Chasers," *Barge Canal Bulletin* XI:3 (March 1918), p.74.

¹⁰⁸ Whitford (1922), pp. 267-8.

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the mouth of Tonawanda Creek was removed to allow boats to pass directly into the Niagara River, and Richmond Aqueduct, which had carried the Erie Canal over the Seneca River near Montezuma since 1857, had to be partially dismantled to allow traffic on the canalized river that would soon serve as the main stem of the Erie Barge Canal. The *Barge Canal Bulletin* noted its passing:

[D]estruction of the famous Montezuma Aqueduct marks the passing of a perfect engineering work at a difficult location, a structure which fulfilled every expectation and which has been a source of inspiration and encouragement to engineers its removal at this time reminds us once again of the unusual engineering capabilities of those responsible for the design and construction of the old Erie canal and its first enlargement.¹⁰⁹

Rochester and Lyons remained the principal bottlenecks. When it became clear that contractors who were dredging east of Lyons and working on reconstruction of the concrete trough and earthworks at the Irondequoit Embankment between Pittsford and Fairport would be unable to meet the deadline to open in May, the superintendent of public works took the unusual step, authorized by wartime legislation, of cancelling those contracts, taking charge of forces and equipment on the ground, and marshalling men and equipment from other parts of the system to complete the work.¹¹⁰ Work remained on the Court Street Dam in Rochester, so the state engineer had a temporary wooden movable dam erected upstream to raise the pool in the Genesee River and allow use of the canal crossing and a concrete junction lock at South Greece that allowed boats of Enlarged Erie dimensions to reach Rochester while Court Street Dam and the terminal were being constructed.¹¹¹ When steel shortages delayed completion of the Pennsylvania Railroad bridge over the canal just west of the Genesee Crossing, the United States Railroad Administration (USRA, a wartime body) directed the Pennsylvania company to use tracks of the rival West Shore and Erie railroads so that a temporary earth embankment that blocked the channel could be removed before May.¹¹²

Barge Canal Opens - 1918

On May 10, 1918, state engineer Frank Williams and a small group of assistants and contractors gathered atop an earthen berm on the west bank of the Genesee River that separated the river from the dry canal bed. Williams borrowed a workman's shovel and dug a trench through the dike, allowing a stream of water to flow.

¹⁰⁹ *Barge Canal Bulletin*, XI:1 (January 1918), p. 4; (also AR-SES, 1917, p. 8)

¹¹⁰ Whitford (1922), pp. 334-6.

¹¹¹ The temporary structure was a Poirée needle dam. *Barge Canal Bulletin*, XI:5 (May 1918), pp. 143, 144, photos pp. 159-60; Whitford (1922), pp. 334-5.

¹¹² Whitford (1922), p. 336.

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A drag-line excavator finished the job, opening the last barrier in the Erie Barge Canal between Lake Erie and the Hudson. This quiet unofficial ceremony was followed by the official opening five days later.¹¹³ There were no grand celebrations to recognize the opening of New York's new canal system on May 15, 1917, as there had been in October 1825 when the original Erie Canal opened from Buffalo to Albany -- no cross-state flotilla led by the governor; no relay of cannon shots to announce the event; no parties or parades; no "Wedding of the Waters" ceremony. Twentieth-century Americans were preoccupied with the war in Europe and simply put the state's new transportation system to use. Work remained to be done. A number of bridges were incomplete. Several channel sections needed to be dredged (or re-dredged) to full dimensions. (Channels provided full 12' depth throughout the system but the bottoms of some sections were too narrow to allow two fully laden vessels to pass.) Many terminals were far from complete, especially those on New York Harbor, where goods were expected to be transferred from canal boats to ocean-going vessels bound overseas.¹¹⁴ Yet all four branches of New York's Barge Canal were open, and the emphasis shifted from design and construction under the state engineer and surveyor to operations, maintenance, and promotion of canal traffic under the DPW.¹¹⁵

Federal Control of Barge Canal Traffic – 1918-21

Now that it was open end-to-end, promoting use of the canal became a priority. An acute shortage of canal boats was one of the first problems. Traffic had declined and boat operators complained of inconveniences and delays during the construction period. Many boats were simply worn out because operators had been unwilling to invest in new boats of Enlarged Erie dimensions after 1903, knowing that they would soon be obsolete. They were even less likely to commission new boats of larger dimensions until they were certain that the new canal was going to open. Canal officials lamented the tired state of most canal boats and highlighted work by General Electric and other companies to design a new class of Barge Canal vessels, yet none of the new boats had been built before the canal opened.¹¹⁶

¹¹³ AR-SES, 1918, pp 11-12.

¹¹⁴ The Navy had taken over the Barge Canal pier at Gowanus Bay, Brooklyn for coaling ships – "Gowanus Bay Terminal Taken for U.S. Navy," *Barge Canal Bulletin*, XI:3 (March 1918), p. 67.

¹¹⁵ Although the State Engineer's office remained active in canal matters until the position was abolished by constitutional amendment in 1927, the end of publication of the monthly *Barge Canal Bulletin* in January 1919 marked a significant diminution of that office's work on waterways and a growing demand for highway and bridge engineering.

¹¹⁶ Robert H. Rogers, "Waterway Transportation for General Electric Company Traffic," *Barge Canal Bulletin* X:7 (July 1917), pp. 195-205.

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The shortage of vessels and reluctance of operators to speculate on new ones was compounded by U.S. entry into World War I just as the Barge Canal was nearing completion. Shipyards and skilled boat builders were requisitioned by the federal government to build naval vessels or transport ships for the Emergency Fleet Corporation (EFC). Boatbuilding materials were in short supply and abnormally expensive. General Electric purchased three Great Lakes schooners, removed their masts, enclosed their decks, and used tugs to move them along the eastern end of the canal, hauling wire from Rome to Schenectady, electrical machinery from Schenectady to New York for export, and raw copper from the Port of New York to Rome. While these were far more modest than the steel-hulled canal and lake freighters with steam turbine generators and electric drive originally envisioned by GE engineers, they were bigger and had more capacity than any vessels that had plied New York's towpath-era canals.¹¹⁷

With few serviceable boats and all of the materials and workmen that might build new ones being directed toward the war effort, Governor Charles Whitman asked President Wilson to extend the EFC's authority to New York's canal system in August 1917. Little came of that request until the winter of 1917, when massive traffic tie-ups on America's railroads at east coast ports threatened to hobble shipments of arms, food, and supplies to Europe. New York newspapers reacted with articles entitled: "Let the Canal Help Win the War," "How the Barge Canal Can Relieve the Freight Tie-Up," and, more to the point, "Ask the U.S. to Build Barges."¹¹⁸ On December 26, 1917, President Wilson nationalized the nation's railroads by executive order.¹¹⁹ That order was confirmed by Congress soon after and Wilson appointed his secretary of the treasury and son-in-law, William Gibbs McAdoo, to head the newly created United States Railroad Administration (USRA).¹²⁰ State engineer Frank Williams testified before the U.S. Senate Committee on Commerce on January 31, 1918, promising that the Barge Canal would be ready by May and pointing out how it could aid the war effort's transportation needs, while reminding members of the dire shortage of boats and shippers. The EFC was preparing to build tugs and barges for use on the Mississippi River and some of the senators suggested that a similar arrangement might be

¹¹⁷ "A Barge Line for the General Electric Company," *Barge Canal Bulletin* XI:7 (July 1918), p. 195.

¹¹⁸ "Let the Canal Help Win the War: Value of Waterway is Explained in Pleas for Barges," *The Evening News* (Tonawanda: December 7, 1917); "How the Barge Canal Can Relieve the Freight Tie-Up: New Waterway Open Next May but Few Boats Ready," *Brooklyn Daily Star* (December 31, 1917); "Ask the U.S. to Build Barges: \$3,000,000 Requested for new State Canal Tonnage," *The Post* (Ellicottville: January 7, 1918), in Michael Riley, "The Barge Canal and the United States Railroad Administration, 1917-1921," *Bottoming Out* 59 (Summer/Fall 2014), pp. 4-8.

¹¹⁹ Presidential Proclamation 1419, December 26, 1917, under authority of the Army Appropriation Act, 39 Stat. 45, August 29, 1916.

¹²⁰ Railway Administration Act of 1918, Pub. L. 65-107, 40 Stat. 451. Approved 1918-03-21.

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made in New York.¹²¹ On April 18, 1918, McAdoo took control of traffic on the soon to open New York State Barge Canal under the authority of the USRA.¹²² At about the same time, he established an Inland Waterways Committee within USRA and recruited George Ashley Tomlinson, who operated a large fleet of lake freighters based in Duluth, Minnesota, to head the program.¹²³ The USRA rapidly secured contracts with owners of the most serviceable canal vessels, but New Yorkers were distressed to learn that the agency initially set freight rates at the same level for railroads and the canal, eliminating the competitive advantage of low-cost water transportation. In June, the USRA increased railroad rates by 25 percent, while leaving canal rates as they were. While this reestablished something approximating the traditional cost differential between rail and canal, New Yorkers claimed that it did more to boost railroad revenue than equalize commerce and noted that most of the boats under contract to USRA were sitting idle or hauling cargo in only one direction. It took canal advocates several months to secure a meeting with Secretary McAdoo. When they met on October 25, 1918, three weeks before the Armistice, they learned that McAdoo believed that railroads were the nation's primary freight carriers and therefore vital for the war effort, that their revenues needed to be protected in order to keep them in business, and that canals would only be used when the railroads did not have sufficient capacity to meet demand. This was the antithesis of what canal proponents envisioned when they proposed incorporating New York's canals into a national transportation system during the previous winter.¹²⁴

The USRA had contracted for construction of a fleet of 150' x 21' steel barges, rated at 500 tons each and capable of passing Barge Canal locks in fleets of four, but because steel was in short supply the agency also contracted to have twenty reinforced concrete canal barges of similar dimensions built at yards in Fort Edward, Ithaca, Tonawanda, and Detroit.¹²⁵ They were designed by the Emergency Fleet Corporation's Concrete Ship Section, which had been established to promote construction of reinforced concrete vessels as a means of conserving strategic materials. A number of concrete freighters and tankers were under construction at

¹²¹ *United States Shipping Board Emergency Fleet Corporation. Hearings Before the Committee on Commerce* (Washington: GPO, 1918), p. 1337-1355.

¹²² *Annual Report of the Superintendent of Public Works for the Year Ending June 30, 1920* (Albany: J.B. Lyon, 1921) [Henceforth AR-SPW (fiscal year)], p. 217; "M'Adoo Takes Over Traffic Upon Canals: Barge Canal and Connections to be operated as Part of Railway System," *Rome Daily Sentinel*, April 18, 1918.

¹²³ Sumner Keaene, "You Do Not Have to Like a Job to Succeed in It," *American Magazine*, April 1922, pp 16-17, 168.

¹²⁴ Whitford, pp. 346-8.

¹²⁵ S.C. Hollister, "Construction of Concrete Barges for Use on the New York State Barge Canal," *American Concrete Institute, Proceedings from the Fifteenth Annual Convention, 1919*, p. 289; "How the New York Canal Concrete Barge is being Built," *Engineering News Record*, 82:6,(February 6, 1919), pp. 268-74.

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shipyards on the west coast, but neither they nor the USRA's concrete canal boats were in service by war's end in November 1918.¹²⁶

USRA retained control over the nation's transportation systems for more than a year after the war ended, ostensibly to facilitate demobilization. Control of railroad traffic and rolling stock returned to their private owners on March 1, 1920, but authority over the nation's inland waterways passed to the secretary of war. New Yorkers were quick to point out that, while continued federal control might be appropriate for rivers in the Midwest and South, where the Army Corps of Engineers had long been the primary agent of river improvement, it hardly seemed fair for the federal government to retain control over traffic on a canal system that the state had just completed at a cost of nearly \$150 million.¹²⁷ The situation became even more galling during the 1920 navigation season, when the war department experimented with operating as a commercial carrier, using fleets of the long-awaited USRA steel barges.¹²⁸ New York canal advocates argued that no private company would invest in new boats as long as they faced the prospect of competing with a government operation where profit and loss were of no concern.¹²⁹ On February 28, 1921, six days before he left office, President Wilson signed a joint resolution that exempted New York's canal system from the army control specified in the Transportation Act of 1920.¹³⁰ The federal fleet was to be sold to the highest bidder. Ironically, that turned out to be Edward Walsh, New York's former superintendent of public works, who had complained vociferously about federal control while in office, but found himself back in private life after a change of governors.¹³¹

Promoting & Refining the Barge Canal - 1920s -1930s

The three-year period of federal control over Barge Canal traffic is generally regarded as a low point in the system's history. Things began to pick up in 1921. That spring, Duluth grain wholesaler Julius H. Barnes

¹²⁶ "Promise of Success for the Concrete Ship: Emergency Fleet Corporation Optimistic Over the New Style of Marine Carrier Designed to help Nullify Germany's U-Boat War," *New York Times*, April 21, 1918.

¹²⁷ "Why New York's \$1,500,000 Barge Canal is Idle," *The Sun and New York Herald*, March 23, 1920.

¹²⁸ "Inland Waterways: Director of Division Urges Thoroughgoing Experiment in Development," *Troy Times*, February 27, 1920. By the end of the summer, 73 federal barges had been delivered and another 27 were under construction. There were 20 self-propelled barges in the water. (The government boats were designed to work in fleets of four with one self-propelled barge towing three unpowered "consorts" between locks, with all four locking together as a group.)

¹²⁹ AR-SPW, 1919, p. 328.

¹³⁰ "Canal Control Soon to Revert to the State," *Buffalo Evening News*, February 22, 1921.

¹³¹ Walsh's New York Canal and Great Lakes Corporation initially offered to pay \$1,400,000 for the fleet but negotiated to reduce the price to \$500,000 in March 1925. Eight months later he sold his company to Munson Steamship Company for \$1,000,000. Riley, p. 8.

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commissioned a fleet of five canal motorships. These were the first vessels built to Barge Canal dimensions -- scaled-down lake freighters, designed to fit through the locks and under the bridges of New York's new waterway. Barnes's Interwaterways Line International (I.L.I.) ships could haul grain and other bulk cargos between the upper Great Lakes and the Atlantic without having to break-bulk at any point along the way. The first of the fleet, *I.L.I. 101*, was launched in May 1921 and passed through the canal on its inaugural voyage that fall carrying 83,000 bushels (1,328 tons) of oats.¹³² New York's new governor, Nathan Lewis Miller, took a special interest in the canal, touring by boat that year from the terminal in New York Harbor to Buffalo, pausing along the way to try his hand at operating the new lock controls and examine other details.¹³³ The DPW purchased the *Urger*, a second-hand Great Lakes tugboat, launched in 1901. (Today, after decades of hard work, that boat remains in service as the canal system's flagship and ambassador.) New York initiated a "Ship by Canal" campaign with billboards, posters, and pamphlets to attract shippers to the new waterway and the DPW's canal traffic agent worked to connect producers with carriers. Work continued on terminals after the canal opened. By 1922 there were substantial masonry-clad steel-frame warehouses at Buffalo, Rochester, Albany, Manhattan and Brooklyn, and an enormous concrete grain elevator was rising at the Gowanus Bay terminal.

Barge Canal dams raised the possibility for new hydroelectric development at several locations. Initially, a succession of superintendents of public works were reluctant to allow any plants to be built until they could be certain that there was enough water for navigation throughout the season. After gaining a few years of operational experience, the state built two plants on the lower Mohawk at Crescent and Vischer Ferry and allowed utility companies to expand existing plants or build new ones at dams on the Oswego and Seneca rivers.

During the early years of operation, boatmen and the DPW discovered that canalized rivers posed different navigation and maintenance challenges than they had experienced on the towpath-era land-cut canals. Some channels were narrower than expected, partially an artifact of the 1905 decision to widen locks but leave until later the modification of channels that had already been contracted. Other channels had simply silted-in faster than expected. Boat operators found river currents trickier than they were used to on the placid waters of the old

¹³² Whitford (1922), p. 391; Renamed the *Richard J. Barnes* and later the *Day Peckinpaugh*, that vessel is both the first and now the last surviving example of a canal motorship. Saved from scrap and listed on the National Register in 2005, it is now the largest artifact in the collections of the New York State Museum.

¹³³ Whitford (1922), p 286; Photograph albums, compiled during that trip and housed at NYS Archives document canal structures and the early years of traffic and operations.

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ditch, particularly when they had to hold position above or below a lock while waiting for other tows to go through. They asked for longer approach walls where they could tie up and wait for traffic to ease. DPW responded at some locks by scuttling a few of the ill-starred concrete barges built for the USRA, filling them with rocks, and installing bollards.¹³⁴ Night travel had been comparatively easy at the end of a tow-rope between the regular banks of the old ditch but after-dark navigation along narrow channels incised into broad riverbeds required lighted buoys. By the mid-1920s over 2,100 white and red kerosene lanterns glowed on buoys and fixed markers across the system. They were checked, cleaned, and refilled by buoy tenders, who each patrolled about a ten-mile stretch of canal in a motor boat.

The state established "Section Shops" at locations across the system where canal equipment could be built, maintained, and repaired. Some included drydocks. The DPW also upgraded its "floating plant" – the fleet of tugboats, dredges, derrick boats, buoy boats, and other canal maintenance vessels that came to be nicknamed the New York Navy. In 1928 the DPW purchased a matched pair of powerful steam tugboats, capable of icebreaking service. The *Governor Cleveland* and the *Governor Roosevelt* were converted to diesel power after World War II and remain hard at work today.

Despite worries about the decrepit state of canal cargo vessels, wooden towpath-era wooden boats proved more durable than expected. Six could fit in a Barge Canal lock with room to spare and they show up, loaded with cargo, in photographs taken throughout the 1920s and early '30s. They were gradually supplanted by larger wooden canal boats, roughly 150' x 21,' that fit four-to-a-lock and eventually by steel barges that filled the entire lock chamber and were pushed by tugboats rather than pulled. Other canal motorships joined the Barnes/I.L.I. fleet. Petroleum carriers operated tankers built to Barge Canal dimensions. Minnesota-Atlantic Transit Company of Duluth introduced the *Twin Cities* and *Twin Ports* in 1923. Larger in all dimensions than the I.L.I. boats, the diesel-electric powered "Twins" had refrigerated cargo areas and delivered fresh Midwestern butter, eggs, vegetables, and flour to New York City on their inaugural voyages for considerably less than prevailing railroad rates.¹³⁵ Ford Motor Company operated four of the largest motorships on the system during the 1930s. The *Chester*, *Edgewater*, *Norfolk*, and *Green Island* carried parts and completed automobiles between Ford's giant River Rouge plant south of Detroit to factories in Virginia, Pennsylvania, New Jersey, and at the head of tide on the Hudson. More than 40 cargo motorships operated on the system by the late 1930s,

¹³⁴ They hadn't worked well as cargo vessels but they made dandy approach structures. Several are still visible at locks E9 and E13, despite some catastrophic floods over the past 90 years.

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ranging from 250-ton vessels, originally built for the USRA, that towed three unpowered “consort” barges, to Ford’s 3,000-ton behemoths, designed to completely fill Barge Canal lock chambers. Other specialized cargo vessels included three or four 50-100 ton “eel boats” with slatted sides that converted their cargo holds into giant live wells, built to transport live eels from Quebec to the fish markets of New York.¹³⁶

The 1920s saw changes in canal administration. The independently elected office of state engineer and surveyor was abolished in 1927 and most of the department’s functions were assumed by the DPW. That department was a notorious haven for patronage appointments, from the highest official to the lowliest lock tender and bank walker. There had been periodic attempts to bring civil service reform to the department, dating at least to Grover Cleveland’s time as governor during the 1890s, but with little effect. The Bond Commission and Advisory Board of Consulting Engineers repeatedly pointed out that electrically driven locks and other Barge Canal machinery required careful maintenance and more skilled operators than their hand-powered predecessors. General William Wortherspoon asked the Civil Service Commission to develop and administer tests for lock operators during his tenure as superintendent (1915-18). He boasted that: “The new locks are now manned by young men, skilled in the various mechanical trades,” who could operate complex machinery and repair it “without any additional cost to the state” but old ways returned under his successors.¹³⁷ According to Colonel Frederick Stuart Greene, the DPW superintendent who was appointed in 1923 by Al Smith and served under three governors through 1942 (perhaps the longest tenure of any senior canal official):

When I came in. . . One man was a collector of a brewery. The other man was a prize fighter first and a bartender second, and he was in charge of the middle division, and if he knew water was in a canal I don’t know about it. The third man was a whale of a good man. He was not good as an executive particularly but he knew boats. . . .¹³⁸

Greene fired the first two and promoted the third. He renewed calls for a ship canal across New York. Arguing that fixed bridges were one of the principal obstacles keeping lake and ocean vessels from transiting the system, he proposed replacing all of the spans between the Hudson and Oswego with swing bridges or drawbridges that would allow unlimited overhead clearance. (There were more than 50 fixed road and railroad bridges between

¹³⁵ AR-SPW, 1923, p. 14-15

¹³⁶ The annual reports of the superintendents of public works through 1949 include tables listing the numbers of barges, tank barges, tankers, motorships, and other commercial vessels operating on the canal categorized by tonnage and material (steel/wood). Being small, the eel boats appeared at the head of the list from the beginning through the end of reporting in 1949.

¹³⁷ Whitford (1922), p. 300.

¹³⁸ Barge Canal Survey Commission – typescript, NYSL – Legislative Reference Library, CAN 482-2, Vol. 1., June 23, 1925.

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Waterford and Oswego. The disruption of traffic and salaries of bridge operators were staggering to contemplate.) Without apparent irony, Greene also suggested that canal boat operators should behave more like railroad companies. He argued that the \$50,000 limit on capitalization for canal carriers, enacted to protect family-owned boats from unfair competition during the towpath-era, was stifling construction of newer and larger vessels for Barge Canal service and preventing companies from offering the sort of end-to-end carriage of package freight from the lakes to the sea that railroads provided.

Like several of his predecessors (and successors), Franklin D. Roosevelt showed a special fondness for the canal during his time as governor (1929-32). He visited on several occasions and toured from Schenectady to Baldwinsville on board the state vessel *Inspector II* during the summer of 1930.¹³⁹ After FDR moved to Washington, New Deal and federal transportation projects that benefited the canal included construction of the main building at Utica Shops and a massive project that started in 1935 and lasted until 1963 in which federal funds subsidized deepening the channel, lowering lock sills, and altering or replacing lock gates to provide a 14' depth and raising or replacing bridges to provide a 20' overhead clearance between the Hudson at Troy and Lake Ontario at Oswego.

World War II - 1963

During World War II New York's Barge Canal allowed Great Lakes shipyards to build and deliver landing craft, tugboats, PT boats, sub chasers, mine sweepers, and other naval vessels – 414 military vessels passed through the canal in 1942 alone. Canal dredges, derrick boats, and tugs worked on construction of Samson Naval Training Station on Seneca Lake and others were assigned to New York Harbor.¹⁴⁰ After the war, surplus diesel engines were used to repower the state's steam-powered tugboats and gasoline-powered Tender Tugs.

Starting in 1949, the DPW changed the two-tone gray with red trim livery of its floating plant vessels and a black, white, and silver color scheme at structures to New York's now familiar "Royal Blue & Gold." The Barge Canal carried its peak tonnage in 1951 – 5,211,472 tons, about half what its designers envisioned in 1905. Grain shipments continued and the volume of petroleum carried increased during the postwar years, but the last

¹³⁹ Movie footage documenting that trip is at the FDR Library, Hyde Park.

¹⁴⁰ AR-SPW, 1942, p. 3.

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load of flour went east in 1950, the last bricks went west in 1954, iron ore stopped coming down the Champlain Canal in 1955, and coal and lumber shipments stopped during the early 1960s.¹⁴¹

The biggest change came when the St. Lawrence Seaway opened in 1959, with 860' long locks and 26' deep channels providing direct access for ocean-going freighters to Lake Ontario and from there to the Upper Lakes via the Welland Canal around Niagara Falls. New York commodity merchants, shippers, politicians, and government officials had long opposed any U.S. involvement in efforts to improve navigation on the St. Lawrence. Some even advocated developments by the New York Power Authority that would have precluded shipping. They acquiesced in 1954, only when it became clear that a long-frustrated Canadian government might build the seaway entirely on its own, cutting the U.S. and New York out of any share in ship tolls or hydropower revenues. Longstanding fears, shared by shippers in Buffalo and New York City, had finally come true. The seaway captured grain exports, and tonnage on the Erie Canal plummeted. Ironically, although New Yorkers had worried about losing market share to Montreal since the beginning of the nineteenth century, both ports suffered after the seaway opened because cargo could pass directly from the North American interior to ports overseas, without having to stop anywhere along the way.

New York's Canals 1963-2014

The Troy to Oswego deepening program concluded in 1963, but it was not enough to reverse declining freight tonnage on New York's canals. Petroleum remained the mainstay during the 1960s – heated barges of asphalt from New Jersey to Lyons, Rome, and a shingle factory in Fulton; heating oil, gasoline, with contracts for periodic deliveries of jet fuel to the Air Force Bases in Rome and Plattsburgh providing some measure of stability. Those ended after base closures in the 1990s and new requirements for double-hulled vessels in the aftermath of the Exxon Valdez disaster of 1989. Pipelines, which delivered petroleum products year-round directly from refineries in Pennsylvania and New Jersey to terminals in upstate New York, started cutting into canal traffic during the late 1950s. “Oil City” in Syracuse and other massive tank farms on the outskirts of Utica, Rome, Lyons, and Rochester started to disappear during the 1960s, along with smaller oil depots in other canal-side communities. The first canal motorship, the *I.L.I. 101*, had been renamed *Day Peckinpaugh* (NR listed) during the 1950s and modified to haul dry cement. She continued that service, making regular trips between Lake Ontario and Rome until 1994.

¹⁴¹ AR-SPW, 1951, 1955, 1956, 1963.

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The sesquicentennial of Erie Canal construction between 1967 and 1975 brought new scrutiny to the system. State historic sites were established at Schoharie Crossing in Fort Hunter and along a 32-mile section of the old channel between outskirts of Syracuse and Rome. The Weighlock Building in downtown Syracuse became a canal museum and state and local organizations erected signs at other towpath-era structures to call attention to New York's canal heritage. Opinions about what to do with the operating Barge Canal were mixed. The debate that led to Barge Canal construction revolved around the role of waterways in an age of growing railroad dominance. Now the question became one of canals and rail in relation to interstate highways. Dreams of a ship canal resurfaced. Englishman Nigel Chatty proposed a massive rebuilding of the Erie and Oswego Canals between Waterford and Oswego to carry coal, grain, and garbage to and from an artificial island to be built 20 miles off New York Harbor dubbed Island Complex Offshore New York & New Jersey (ICONN).¹⁴² In 1980, the U.S. Army Corps of Engineers investigated enlargement of Waterford to Oswego canal segments for large-scale coal shipments. Alternatives considered ranged from rehabilitation of existing structures to doubling their length or replacing them with locks 700' long, 11' wide, for vessels drawing up to 27.' The corps also examined the feasibility of new canals between the ocean and the lakes utilizing portions of the Delaware and Susquehanna valleys but found that the Appalachian topography that had frustrated the dreams of would-be Pennsylvania canal builders during the nineteenth century had not changed significantly in the years since.¹⁴³

An unexpected finding of state and federal studies that focused on navigation was how deeply the Barge Canal had become embedded in New York's infrastructure during its first half-century of operation. Hydroelectric plants, public water supplies, sewerage treatment plants, industrial users, farmers, and flood control projects all depended on water that was delivered and managed through canal structures and feeders. By the late 1980s legislators had concluded that it would cost less to keep the canals in operation than it would to abandon the system and secure alternate sources of water.¹⁴⁴

There was also a growing awareness that tourism and water-based recreation could have economic value. The Department of Commerce's "I Love New York" campaign began to boast that tourism was one of the state's

¹⁴² James Ehmann, *Chattey's Island: The Story of One Man's Breathtaking Plan to Revitalize the Northeastern U.S.A.* (New York: Ticknor & Fields, 1982).

¹⁴³ New York District, Corps of Engineers, Public Notice No. 10182, March 1918; Raber Associates, "Preliminary Cultural Resources Assessment: New York Barge Canal Study" (Cobalt, CT, 1982) MSS & maps on file, NYS-OPRHP.

¹⁴⁴ "Which Way for Our Waterways? A Report on the New York State Barge Canal and the Upstate Ports" (Albany: New York State Senate Research Service, June 1978).

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leading “industries.” Recreational boating became an increasingly important component of canal traffic. What recreational boats lacked in tonnage they made up for in numbers. People had used rowboats, canoes, and later steam and electric launches and powerboats on New York’s canals almost from the beginning and canal excursion boats offered day-trip escapes from industrial cities for turn-of-the-century urbanites, but canal authorities only started publishing statistics of pleasure boat permits in 1935. There was an understandable dip during World War II, but the number of free permits issued rose rapidly in the postwar years, paralleling boat registrations throughout the state. The Oswego River and lower sections of the Mohawk and Hudson had been heavily polluted for decades, but improving water quality helped make canal and canal-side recreation more appealing.¹⁴⁵ New passenger boats appeared on the system during the 1960s and 70s, including a pair of small cruise ships built specifically to fit in Barge Canal locks and under those troublesome low bridges. Borrowing cues from a growing enthusiasm for recreation on Britain’s canals and waterways, the Wiles family launched the first of its fleet of hire boats at Macedon in 1987. Other fleets followed.

By the late 1980s there was a growing recognition that recreation, tourism, and shore-side development might be as valuable as tonnage and that New York’s canals were essential elements of the state’s water infrastructure. In 1992, responsibilities for operation and maintenance of the system were transferred from the Department of Transportation (which had taken them on when the DPW was abolished in 1967) to the New York State Canal Corporation, a subsidiary of the New York State Thruway Authority. In addition to the traditional role of promoting canal commerce, the Canal Corporation developed harbors and facilities for recreational boaters and a cross-state trail along the banks of the Erie. It was also charged with facilitating community and economic development with a recognition of the canal system’s historical significance. Soon after it took control, the Canal Corporation took the 1901 tug *Urger* out of retirement and repurposed the old workhorse as a floating ambassador that participates in school programs and public events throughout the state’s waterways.¹⁴⁶

The system’s historical significance received more formal recognition in 1993 when the New York SHPO affirmed that all of New York’s canal features were potentially eligible for listing on the National Register if they retained historical integrity.¹⁴⁷ Two years later, a panel of scholars, convened by National Park Service as part of Special Resource Study (SRS), unanimously concluded that New York’s canal system is nationally

¹⁴⁵ How much the improvement is a result of the Clean Waters Act of 1972 and how much it is a consequence of upstate deindustrialization is open to discussion.

¹⁴⁶ The *Urger* was NR listed in 2001 as part of her 100th birthday celebration.

¹⁴⁷ Linda M. Garofalini, “New York State Canals: Statement of Significance,” NYSHPO, 11/29/1993.

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significant from the 1790s through the Barge Canal era.¹⁴⁸ That conclusion, and the SRS built upon it, formed the basis for congressional designation of Erie Canalway National Heritage Corridor in 2000. Recognizing that there was more to the canal than locks, the Federal Highway Administration, NYSDOT, NYSHPO, and the Advisory Council on Historic Preservation entered into Programmatic Agreement for identification, evaluation, and treatment of bridges over canals in 2001.¹⁴⁹

Unlike most other historic canals in North America, New York's Barge Canal system is still a working waterway carrying commercial traffic. Much of it is specialty cargo, items that are too big to move any other way or that need to be delivered to a waterfront location – steam turbine rotors, generators, wind turbine parts, cranes, and bridge trusses. Some manufacturers have established plants next to the canal so they can move large products. There has also been a recent return of commodity traffic – corn to ethanol plants, barley to upstate breweries, even some wheat to the Port of Albany for export. While a 2008 study found that canal-related tourism added about \$378 million to New York's economy every year, that figure was dwarfed by a study released in June 2014 finding that the canal system contributes \$6.2 billion to the state's annual economy through shipping, industrial and municipal water use, irrigation, hydroelectric power, and other uses unrelated to tourism and recreation.¹⁵⁰

Today, the four branches of New York's Barge Canal system retain a remarkable degree of integrity of location, design, setting, materials, workmanship, feeling, and association. The structures and channels of the Erie, Champlain, Oswego, and Cayuga-Seneca branches exist and operate today largely as they did when the system opened in 1918. Few, if any, of the nation's transportation systems retain that level of integrity on such a large scale. The Erie Canal forms its spine -- America's most famous man-made waterway – the ditch that opened a continent, gave rise to the lake ports of Cleveland, Detroit, Chicago, and Duluth, established Buffalo as the

¹⁴⁸ *Erie Canalway: A Special Resource Study of the NYS Canal System* (Boston: National Park Service-Northeast Region, 1998), pp. 23-39, 81. The scholars' significance workshop took place in Syracuse on August 9, 1995 and included Thomas Grasso, Duncan Hay, Emory Kemp, Persijs Kolberg, Daniel Larkin, Philip Lord, Partick Malone, Lance Metz, Mike Raber, Martin Reuss, Ronald Shaw, and Craig Williams with 24 observers from the National Park Service, NYS-SHPO, NY State Canal Corporation and Canal Recreationway Commission, and NYS Heritage Areas Program.

¹⁴⁹ "Programmatic Agreement concerning Bridges over the National Register Eligible New York State Canal System among the Federal Highway Administration, New York Department of Transportation, the State Historic Preservation Officer, and the Advisory Council on Historic Preservation," May 8, 2001.

¹⁵⁰ Eric Mower and Associates, "New York State Canal Corporation: Economic Impact Study of New York State Canal Tourism." (March 2008); CHA, "New York State Canal Corporation Report on Economic Benefits of Non-Tourism Use of the NYS Canal System," (June 2014).

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“Queen City of the Lakes,” made New York the “Empire State,” and confirmed New York City place as the nation’s principal seaport and commercial center.

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