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Water Works History: A Comparison of Albany, Utica, Syracuse, and Rochester

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The author was honored, last year, by an invitation from the New York Section of the American Water Works Association to address their fall meeting at Liberty, New York, September 14-16, 1976. Like members of other professional groups, the water works men felt that the national bicentennial was an appropriate occasion for some examination of their own history, and so included a session on the "History of Water Works in New York State" during one afternoon of their convention. The other talks, devoted to up-to-date concerns in engineering and administration, were sufficiently technical to bemuse at least one attendee who left with a lasting impression of the complex problems surmounted daily in the management of New York State's outstanding water services. He had earlier been more than a little bemused at his own temerity in accepting an obligation to cover a topic as broad as the history of water works in the state. The topic was ably covered for New York City (and other large cities) some years ago in Nelson Blake's *Water for the Cities*, and, in the field of state water resources generally, in Roscoe C. Martin's *Water for New York* (see end of article for full citations).

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The challenge was handled by offering an informal discussion of the history of water works in four upstate cities: Albany, Utica, Syracuse, and Rochester. Blake McKelvey's "Water for Rochester," a monograph published in an earlier number of this series, provided a good summary of developments here. Visits to depositories in our neighbor cities led to the discovery of enough sources, largely secondary, to make sense of the history of their water works in broad terms. Like the "informal discussion" offered last fall, this article is insufficiently based in research and lacks the scholarly apparatus to be considered definitive. It does, however, attempt to treat the development of a single community function in four different cities sharing some common characteristics. Comparative approaches to the history of municipal services in America have long been on the agenda of American historians, but the amount of work accomplished along these lines is disproportionately small considering the number of times it has been urged. It is hoped that this article may be thought a modest contribution to comparative urban history as well as a very modest extension of Nelson Blake's pioneering work.

Grateful acknowledgement is made of assistance offered by the staff at the Albany Institute of History and Art; Albany (Harmanus Bleecker) Public Library; Utica Public Library; Onondaga Historical Association; and Onondaga Public Library. Mr. Roger McPherson, Director of the City of Rochester Water Bureau, and the other members of the New York Section of the American Water Works Association are owed special thanks for fostering this effort.

* * * * *

The provision of a safe and abundant public water supply is among the most basic community functions. In New York State, at least, geology and climate have also made the task a relatively easy one, from an engineering point of view. These circumstances — the importance of public water and the ease with which cities in this state have been able to tap good supplies — contrast sharply with the economic and political difficulties in securing adequate water which were typically experienced. Like New York City, the four upstate cities considered here first relied on the private initiative of corporate utilities to supply water. With the possible exception of Utica, where the engineering of a water supply was exceptionally cheap and easy, none of the cities was served particularly well by private companies. New York City's famous Manhattan Company was unique in that its charter permitted it to engage in banking, an activity which so preoccupied the company directors that the extension of water mains in the growing city was neglected. But New York was supplied with at least some water before its public system became operational in 1842 (America's earliest municipal system was Philadelphia's, completed in 1801). Rochester's several private companies discussed, debated, or authorized by the state before the Civil War never completed a connection between the logical upland watershed and the city. In Syracuse and Albany, private water companies did complete systems which proved adequate for a while, but apparent neglect of the companies' capital investment and reluctance on the part of their directors to seek enlarged and improved reservoirs led ultimately to public takeover. All four cities at last followed New York's example and established municipal systems: Albany in 1850; Rochester in 1874-76; Syracuse in 1894; and Utica, finally, in 1938.

The most private of water systems is, of course, the backyard well. Backyard wells along with nearby streams, commercial wells, occasional public cisterns and town pumps constituted the original water supplies of all the cities under consideration. These most readily available

sources of water, although convenient, never proved safe or reliable in the long run, as cholera epidemics in the 1830s and 1850s demonstrated. Ground water inevitably became contaminated from the crowded, unsanitary, and sewerless circumstances which were typical of young American cities.

Albany, by far the oldest of the cities treated here, began with some type of community water system during the years of Dutch rule. At least, archaeological evidence found near the Capitol district and some very sketchy allusions in late seventeenth century municipal records tend to indicate the existence of a system of wooden water mains. That system was long since abandoned by the time Swedish naturalist Peter Kalm visited Albany in 1748. His description of Albany water has been quoted so often that it has become something of a required text in discussions of early American sanitary conditions; the vividness of his account and its particular relevance to the subject at hand, however, justifies quoting it again at some length:

I have several times been obliged to drink water here, in which I have plainly seen monoculi swimming; but I generally felt the next day something like a pea in my throat, or as if I had a swelling there, and this continued about a week My servant, Yongstroem, likewise got a great pain in his breast, and a sensation as from a swelling after drinking water with monoculi in it Almost each house in Albany has its well, and the water of which is applied to common use; but for tea, brewing and washing they commonly take the water of the Hudson, which flows close by the town. This water is generally quite muddy, and very warm in summer; and on that account it is kept in cellars, in order that the slime may subside, and that the water may cool a little.*

That Albany's water supply was not atypical is perhaps best illustrated by a contemporary allusion to the deterioration of New York City's well water in the same year (1748). New York's 10,000 or more people were then crowded in the southernmost portion of Manhattan, where, as cemeteries and cesspools multiplied, well water became so bad that it was said "even horses refused to drink it."

*Jonathan Tenney, *History of the City of Albany*, Part II of Howell and Tenney, *History of Albany County* (Albany, 1886), pp. 512-515.

In comparison with its three sister cities which would later arise west of Albany, however, the city's ground water was especially poor. In Edward Oliphant, *History of North America and its United States* (1800), Albany's well water is described as "extremely bad, scarcely drinkable by those not accustomed to it." The water, said Oliphant,

oozes through a stiff blue clay and it imbibes in its passage the fine particles common to that kind of soil. This discolors it, and when exposed any length of time to the air it acquires a disagreeable taste. Indeed all the water for cooking is brought from the river*

Contemporary observers were sharply divided over the question of whether Hudson River water was a desirable alternative, a question which was destined to animate future debates over the planning of Albany's water supply.

It is small wonder that efforts to organize an Albany water company occurred nearly simultaneously with similar developments in New York City. A few ill-fated attempts in the 1790s were followed by the incorporation of the Albany Water-works Company, in 1802. At that time Albany's population was still quite small, numbering about 5,500 persons. As the historic northern seat of Dutch and English colonial power in New York, Albany's major economic role had long been centered in the fur trade, an activity overshadowed in fact by the town's administrative and military functions. At the time the water company was organized western transportation routes had undergone some improvement by the Inland Lock Navigation Company, a forerunner of the state's own Erie Canal project. Within the next few decades, Albany would grow dramatically because of new commercial and manufacturing activities and the city's

*Quoted in Joel Munsell, *Collections on the History of Albany*, Vol. II (Albany, 1867), p. 419.

strategic location at the junction of the canal and the Hudson River. Its population of 13,000 in 1820, when the canal was partially completed, grew steadily to 34,000 in 1840 and 62,000 in 1860.

Perhaps Albany's steady growth, though not as fast as New York City's, was a factor in producing serious public discontent with the Albany Water-works Company's efforts at meeting the challenge. Philip Van Rensselaer was one of several prominent citizens who numbered among the company's original trustees. Despite such leadership, the company repeatedly made short-sighted engineering decisions, prompted in part by the easy availability of small surface supplies in the close vicinity. The company chose for its first source the Maezlandt Kill. In 1811, water was brought in an iron main to a receiving reservoir on the site of the future Albany High School (and later, the County Court building) and was distributed through the principal streets in wooden mains. The Maezlandt Kill proved adequate as a source of very hard water until 1837. The company subsequently tapped the Middle Creek and a portion of Patroon's Creek, developing additional supply in a piecemeal fashion. The Albany Water-works Company's capitalization was never very large, amounting to \$40,000 in 1802 and \$80,000 in 1844.

Prompted in part no doubt by the example of New York City, the citizens of Albany demanded a publicly owned and controlled water system. In 1850 the state legislature authorized the city's common council to appoint a Board of Water Commissioners. The new commissioners were empowered to use up to \$600,000 of the city's credit to develop an improved water works. However, after purchasing the property of the private company for \$150,000, the board postponed consideration of enlarged supplies from the Hudson River or streams in the Helderburg Mountains some twenty miles south of Albany. Instead, they constructed a dam about six miles west of the city where three streams joined to

form Patroon's Creek. The resulting impoundment and related works, undertaken by engineer William J. McAlpine, created a forty acre reservoir known as Rensselaer Lake. An egg-shaped brick conduit, four feet high and four miles long, carried the water to Bleecker Reservoir, a distributing reservoir with 30,000,000 gallons capacity. Two small reservoirs, colorfully named Upper and Lower Tivoli Lakes, were also constructed a short distance to the west. McAlpine's improvements were completed in the early 1850s.

In retrospect, the decision by Albany's new water commissioners — effectively, a continuation of the private company's policy of tapping nearby surface water — seems shortsighted. Within twenty years, as the city's population continued to mount (from 62,000 in 1860 to 91,000 in 1880), the local water supply again proved inadequate. In the early 1870s, the board had another opportunity to consider use of the Helderburg watershed. Instead, the commissioners, in 1873, fixed upon the Hudson River as a future inexhaustible supply of Albany's water.

Albany's fifty-five year long experiment with the use of the Hudson River might be called the central event in the history of its water system. Although the Hudson was indeed "inexhaustible," it was not clear, and the use of river water from 1875 to 1930 represented a return to eighteenth century practices. It was not long before complaints over "Albany water" resembled those heard during the previous century, at least in intensity.

For a brief time, however, some civic pride was exhibited by supporters of the commission's decision; the engineering of the Hudson River pumping system was impressive. In Tenney's *History of the City of Albany* (1886), we read

By the system then adopted, water is taken from the river outside the pier, opposite Quackenbush street, where the channel current strikes. In the center of the pier is a well-chamber, 6 feet in diameter and 80 feet deep. Into this the water, screened by copper-wire, 100 meshes to the square inch, pours through a culvert below low-water mark. A tunnel, 5 feet in diameter and nearly 900

feet long, extends from this well-chamber, under the basin, to the pumping works, corner of Quackenbush and Montgomery streets. Here are two engines capable of sending up to Bleecker Reservoir, 245 feet above tide, 10,000,000 gallons of water every twenty-four hours. The force-main through which it goes is 30 inches in diameter, 7,723 feet long, and is laid under Quackenbush street and Clinton avenue.

.....
Much discussion has been had in the daily newspapers concerning the wholesomeness and purity of the water drawn from the Hudson, and prejudice against its use exists But the Water Commissioners assert that no city in the United States has a better or purer supply of water than Albany.*

The commissioners' assertion was soon debatable. By 1878 the Prospect Hill Pumping Station had developed a capacity of 10 million gallons per day (mgd). A scientific report by William P. Mason, *Report on the Albany Water Supply made to the Albany Board of Health*, (Albany, 1885), pointed out that Troy's discharge of sewage was 8 mgd. Mason's two major conclusions were that "*First*, The influence of the addition of Troy sewage is felt in the river just below Troy" and that "*Second*, There is no material change for the better by the time the water reaches Albany." The rival city was not alone in contaminating the river, because, as Mason pointed out, the discharge from Albany's own sewer outlets was "refluxing" upstream towards the water intake. Mason recommended that steps be taken immediately to filter the water (with at least 24 inches of sand, 18 inches of gravel, and 30 inches of broken stone), and that the Albany sewage system should be improved by an interceptor which would carry water more effectively downstream. As other writers would point out, Albany's case against more northerly communities would remain weak as long as Albany failed to take steps against its own pollution of the river; but effective sewage treatment lay far in the future.

During the period when Albany continued using Hudson River water, the city became a leader in improved techniques of water filtration. Installation of the

*Tenney, pp. 514-515

city's first effective filtering station was delayed, however, until 1898. The delay seems partly to have been caused by ongoing debate over abandonment of the Hudson River supply; one scheme for the use of gang wells, recommended by the water commissioners, was vetoed by the mayor in 1885. The situation was, in fact, no laughing matter. Albany's deaths from typhoid fever averaged 85 annually during the 9 years ending in 1898. After 4 months of filtration, a 1900 report in *Scientific American* said, there had been "only" 7 typhoid deaths.

More years of discussion and agitation for improvement concluded in 1926 with the passage of state legislation creating a new three-member Board of Water Supply to supervise replacement of Albany's river water. The new source of supply chosen was Hannacrois and Basic Creeks in the Helderburgs. Almost a century after this highland source had first been proposed, the difficult task of constructing a 48-inch cast iron conduit 20 miles long was at last undertaken. Construction of roads, railroad tracks, and farms during the intervening years made the task more difficult; a stretch of state road 25 miles in length had to be relocated, as were the inhabitants of Indian Springs, a hamlet which in 1930 contained a hotel, church, two cemeteries, and 25 houses. The new Alcove Reservoir, impounded behind an earthen dam 68 feet high, required clearing nearly 2,000 acres. It is not surprising that even at the time of its construction, the estimated \$6,000,000 cost of the Helderburg supply (later revised to \$11,000,000) was considered unusually high for a city the size of Albany, which numbered 127,000 in 1930. The Albany system now serves a population of about 142,000 and like the water systems of Utica, Syracuse, and Rochester, serves some municipalities outside the city.

In contrast to the checkered history of water supply in Albany, Utica's experience was relatively uneventful. Unlike all the other cities under discussion, Utica enjoyed a fairly happy relationship with its private water company (or companies). When the decision to purchase the

private company was finally reached, the city acquired a mature and adequate system; in fact the reasons for purchase were economic considerations rather than concerns for public safety and convenience. Part of the explanation for Utica's untroubled water history is related to geographic advantages. Situated in a basin of the Mohawk Valley, Utica is overlooked by steep, well-watered hills on both the north and south sides. Perhaps another factor which helped enable the water company to keep pace with the demands placed on it was Utica's relatively small size and slow growth during most of the nineteenth century.

Utica began as one of the western outposts (Fort Schuyler) of American settlement in the Revolutionary period. The site was the junction of the Mohawk River and the Seneca trail, both of which increased in importance at the close of the eighteenth century when improvements in the trail were made by the Seneca Turnpike Company. Old Fort Schuyler achieved village status, and a new name selected by lot, in 1798. At that time only about 50 houses occupied the little boom town. In 1802 the state legislature authorized the incorporation of the Utica Aqueduct Company and permitted it to raise capital not exceeding \$5,000, an unpretentious beginning. Utica's original water company successfully constructed a log aqueduct from springs at a place known as the Sandbanks (later obliterated by Spring Street) to a point at the junction of Genesee and Liberty streets, and thence along Genesee Street to Baggs Square, an early community gathering place.

This promising beginning suffered an embarrassing setback when construction work on the Erie Canal, in 1824, severed the log aqueduct. For the next ten years Uticans resorted to wells and cisterns. The situation may not have been overly burdensome, for even as late as 1840 Utica's population numbered only about 13,000, in contrast with, for example, Albany's 34,000 in the same census year or even upstart Rochester's 20,000.

Like other settlements along the route of the Erie Canal, Utica had vigorously supported its construction and had expected to reap important economic benefits from its completion. In 1819, when a celebration was held in honor of completion of the canal section between Utica and Rome, the town boasted 400 houses. But the short-lived boom lasted only until about 1825, when the canal's completion through to Buffalo presaged a decline in the growth rates of Utica and other ambitious settlements along the route. The Seneca Turnpike would maintain some importance, and Utica could survive as a manufacturing and market center, but it was quickly outstripped by Syracuse, Rochester, and Buffalo. Until the late nineteenth century, when Utica began to experience a new boom as a site for hosiery and knitwear factories, Utica consistently remained about one-third the size of Albany. Utica's population in 1880 was 34,000; in 1900, 56,000; and in 1920, 94,000. Its population today remains about 100,000, close in size to Albany's but one-third the size of Rochester's.

Three successors of the Utica Aqueduct Company were chartered, the first, named the Utica Water Works Association, in 1832. It constructed another small system which was abandoned in 1850. In 1845 the state legislature authorized a Utica citizen named Edward Brodhead to supply the city with water, but his plan to construct a log aqueduct to Starch Factory Creek, "not meeting with sufficient encouragement," was likewise given up. The quoted phrase is from Thomas Hopper's published history of "The Utica Water Works" in the *Transactions* of the Oneida Historical Society (1886). That Hopper's account was meant to be authoritative is more than suggested by the characterization in his by-line as "President, Projector, and Builder of the Works."

The business end of the water works system projected and built by Thomas Hopper was incorporated as the Utica Water Works Company in 1848. Well over a hundred individual Uticans and businesses subscribed to

shares of stock in the newly authorized company in the previous year, but the amount raised was only half of the \$75,000 required. According to Hopper,

The projector of the proposed works submitted the plans . . . to a meeting of citizens held in Mechanics Hall. Approval was very general for some means being adopted, by which the City might be supplied with pure water, but none favored the works being made by the City in its corporate capacity, and therefore they must be established by individual enterprise, if at all. Seventy-five thousand dollars at that time was a large amount to raise, and for a work for which grave doubts existed in the minds of many. Some thought it a very wild project, and of doubtful utility; others "had no money to throw away;" and many were of the opinion that the cost had been very much underestimated, and that we were launching ourselves into loss and failure.*

To shorten a long story (a feat beyond Hopper's abilities), half the required capital in the Utica Water Works Company was raised by Hopper himself, who was thereupon elected president.

Hopper's projected new source of water was located on Graffenburg Hill, south of the city in the Town of Frankfort. The collecting basin on the site was connected to a distributing reservoir located on Corn Hill, between High and Chatham Streets (later Summit and Linwood Places). Water was first supplied to subscribing customers from this system in 1849. During the next several decades the Utica Water Works Company developed a network of similar, small reservoirs drawing on southern supplies.

At the turn of the century, when Utica's mills were attracting increasing numbers of immigrant laborers and boosting the city's population, further development of the southern watershed became uneconomical. For reasons not apparent, the state chartered a second water company to develop water resources on the north side of Utica. The West Canada Water Company secured important water rights in the West Canada Creek and Black Creek watershed some twenty miles north (geographically, a portion of the southern Adirondacks).

*Thomas Hopper, "The Utica Water Works," *Transactions of the Oneida Historical Society 1885-1886* (Utica, 1886), pp. 47-64.

Soon afterwards, however, stockholders of the new company and of the old Utica Water Works Company negotiated a merger. The new Consolidated Water Company proved unusually energetic. It purchased the properties of the New Hartford and Deerfield suburban water systems and negotiated with the state for diversion of 50 mgd from the Barge Canal reservoir then projected at Hinkleyville. The enormous Hinkleyville Reservoir, completed in 1911, contains 25 billion gallons, a supply estimated in the 1930s to equal a constant 12 year reserve, based on the average annual consumption of Utica and the other municipalities served. The Utica water system in its maturity early in this century boasted a more than adequate supply of clean water delivered by gravity from nearby sources, and the numerous secondary supply and distributing reservoirs on both sides of the city provided outstanding "backup" capabilities.

For these reasons it is not difficult to see why the Consolidated Water Company proved to be an attractive investment property. A controlling interest was acquired by the General Water Works and Electric Corporation, a holding company organized in Fort Worth in 1928. The price of the Utica system, one of 40 private water companies in the United States eventually controlled by the G.W.W. & E.C., was said to be \$11,000,000. Early in the Depression, after the G.W.W. & E.C. went into receivership, the Consolidated Water Company — one of the holding company's more profitable investments — was purchased by a New York capitalist.

Meanwhile, long-standing complaints over high water rates had produced frequent calls for public ownership of the system. In 1930, a study by the Utica Chamber of Commerce revealed that Utica water customers paid an average \$3.00 per thousand cubic feet, compared with prices of \$1.50 in Syracuse; \$1.35 in Rochester; \$1.00 in Albany and Binghamton; and only \$0.50 in Schenectady. Utica's protests achieved results in 1933, when the state Public Service Commission ordered a 15% reduction in

rates. The private owner of the Consolidated Water Company then expressed interest in selling the system to the city.

A special committee consisting of bankers, businessmen, and public officials was appointed by Mayor Vincent R. Corrou in 1937 to study the issue. The committee's major finding was that water could be supplied more cheaply by a publicly, rather than privately, owned system because of the city's ability to borrow capital at lower interest rates. Accordingly, Utica obtained local legislation from the state creating a city Board of Water Supply consisting of five commissioners appointed by the mayor, empowered to purchase the properties of the Consolidated Water Company. As the special committee predicted, revenues from the system were sufficient to retire the bonded debt of Utica's Board of Water Supply in 35 years. The approximately \$8,000,000 cost of the Consolidated Water System was fully amortized in 1973, and since that time Utica has enjoyed a reasonable profit from the operations of the city-owned water works, which serves a number of suburban municipalities.

Both Syracuse and Rochester, in contrast to the two older cities, enjoyed the prospect of exploiting the Finger Lakes as sources of domestic water. Two of these large, natural reservoirs were logical sources of upland water for the western cities, but the economic and engineering obstacles to tapping them were serious. Both cities were well-sized by the 1870s and 1880s when separate decisions were at last made to create publicly financed water works to draw water from Skaneateles and Hemlock lakes.

The early water works histories of all four cities contain unique features. The most extraordinary aspect of the early history of water supply in Syracuse was the granting of an exclusive water franchise to a single individual *who twice refused the privilege until the water rates written into state law suited him.*

Syracuse did not exist until construction of the Erie Canal. Nearby Salina with its important salt works

predated Syracuse, which arose at the starting place of a canal "sidecut" to Salina. Before the Erie was completed, the state determined to extend the Salina branch to Onondaga Lake and turn the Oswego outlet into the first of the lateral canals. As McKelvey points out, however, the Oswego Canal was not completed to Lake Ontario until 1829, "and the Village of Syracuse, chartered in 1825, did not develop its full stride until the thirties and did not become a city until 1847."* Syracuse is thus the youngest of the four cities considered here, but its rapid growth — due to strategic location at the junction of important transportation routes and vigorous industrial development — brought it to the rank of second largest by 1900, when Rochester's population was 163,000; Syracuse's 108,000; Albany's 94,000; and Utica's 56,000.

The act of incorporation creating the Village of Syracuse in 1825 empowered the village board to take water from springs located on nearby state land. The springs were said to be plentiful, though supplying hard water. The village having done nothing, in 1829 the state legislature passed an extraordinary act "Authorizing the Village Trustees to convey to Captain Oliver Teall, his heirs or assigns, all rights, property and powers of the village as regarded a water supply for the village." Captain Teall was invested with such rights until 1831, and the law further provided annual water rates set at \$5.00 for private families, \$10.00 for boarding houses and taverns. Teall did nothing to exercise his privileges, and in 1831 the right to supply water reverted to the village trustees. More discussion of the need for a water works took place, until the village, in 1834, again offered a franchise (this time for 35 years) to Teall, who again did nothing until after 1842, when the state legislature amended the authorizing act to set rates at \$10.00 for

*Blake McKelvey, "The Erie Canal: Mother of Cities," *New-York Historical Society Quarterly*, Vol. XXXV (January, 1951) No. 1, pp. 55-71.

private families; \$20.00 for boarding houses; and \$40.00 for taverns and hotels.

Teall's Syracuse City Waterworks Company, much like the Albany Water-works Company, began by relying on the closest and most easily accessible springs and streams as sources of supply. After the Civil War, the company's patchwork system of small reservoirs relying mainly on subsurface water proved inadequate to the demands of a growing population. As a consequence, in 1871 the Teall company impounded and drew pumped water from Onondaga Creek, a notoriously unsafe supply. Wilkinson Reservoir was built in 1870 to help distribute the new supply, and pumping stations were rated at a total capacity of 13 mgd.

The decision to use polluted Onondaga Creek was unpopular. A single letter from an irate citizen which appeared in the local press in 1885 provides a vivid picture:

Any day the water in the vicinity of the [glue] factory, and for a long distance below it, is discolored and stinking from the soakings of the refuse of the tan-yards of the country here converted by manufacturer's processes into a good commercial article . . . while all the nastiness is worked into the city's water supply to give it good consistency and flavor.*

By the mid-1880s water supply had become the city's hottest political issue. Not only were householders buying drinking water by the gallon, they were collecting laundry water in rain barrels because of the hardness of Syracuse City Waterworks Company's supply, and city officials worried about the adequacy of water for firefighting.

Reform, in the shape of a publicly-owned system drawing on Skaneateles Lake, was delayed by political controversy. In 1885 the Mayor and Council attempted to award a new franchise to a Central City Water Works Company, but the existing company obtained an in-

*Unidentified clipping dated May 27, 1885, *Water Supply Controversy Scrapbook* (1885-86), Onondaga Historical Association.

junction blocking the measure. The argument used to obtain the injunction pointed out the exclusive franchise granted in the company's charter; the potential danger to public health and safety if an inexperienced new company made mistakes; and, a consideration which might sound familiar to critics of the power of modern public authorities, the "rights of the bondholders." In 1886 the city conducted a special election on the question of a public water supply, but, because of charges that the political leadership had been "interested" all along in the Central City company and weakened confidence in city government, the vote was 6,368 to 2,292 against municipal ownership. The debate was greatly clouded by partisans of the Central City company and the old company; advocates of various sources of supply (some of whom feared development of Onondaga or Oneida lakes); Democrats and Republicans; and the sponsors of a bewildering array of bills and amendments in the state legislature.

There was further delay while a special commission, authorized by state law in 1888, impartially investigated the whole issue. They submitted samples of water from 11 different sources to scientific analysis. A New York City physician found 491 live bacteria per cubic centimeter of Onondaga Creek water compared with 21 per cc. in Skaneateles Lake (and 673 per cc. in Croton water!). In 1889 the commission unanimously recommended Skaneateles Lake as a source of supply, and public ownership.

The legislature accordingly approved a law authorizing the city to take water from the lake, subject to the approval of the Canal Board and on condition of a favorable referendum on municipal ownership. The water of Skaneateles Lake had long been reserved for canal purposes. The enabling legislation called for a non-partisan six-member Board of Water Commissioners, appointed by the mayor. In the second referendum, held June 4, 1889, the vote was 11,302 to 910 in favor of municipal ownership.

Another delay developed over the takeover of the private company's property. No agreement being reached on price, the plant was condemned for only \$350,000. The company's 40 miles of cement-lined water mains were said to be useless for high pressure service needed in firefighting, and it had only about 2,000 consumers. (The population of Syracuse in 1890 numbered 88,000.) Still another difficulty was opposition on the part of Buffalo-based shippers, who sought an injunction to prevent the diversion of canal water, but the new water commissioners overcame this legal obstacle as well.

To surmount the engineering challenges in bringing Skaneateles water 20 miles over rough terrain, the commissioners engaged William R. Hill, C.E., who after completing the Syracuse system resigned to become engineer for New York City's Aqueduct Commission. Work began in 1893 and proceeded rapidly. Hill's plan called for a dam two feet high to raise the level of the lake and a 54-inch intake pipe extending 6,500 feet from shore. This portion of the work was promptly completed, but contractors working on the 30-inch conduit passing through the towns of Marcellus and Camillus encountered quicksand and at least two ravines each about 100 feet deep. Work on one section where quicksand was encountered was taken over directly by the water board, whose engineers drove pilings and poured concrete to prevent the conduit from sinking. Despite these difficulties, water was let into the system and reached Syracuse in time for a celebration on the Fourth of July, 1894.

During the next few years Syracuse also completed the Woodland distributing reservoir. Its capacity of 121,000,000 million gallons was a fifteen-day supply which, at an altitude over 200 feet above the city, provided ample high pressure service without the need for additional pumping. Even before the end of 1894, the water commissioners had completed the replacement or installation of 57 miles of new distribution pipe. After its

very long wait, Syracuse looked to the twentieth century with a public water supply that was among the best in the nation.

Limitation of space prohibits any lengthy treatment of Rochester's water supply history, to which Blake McKelvey has already devoted an entire issue of *Rochester History*. The appropriate task here is to highlight some aspects of Rochester's early water history as they relate to similar developments in the other cities.

Like Syracuse, the "Young Lion of the West" heard plans for water systems several times during its village and early city years. Or rather, as many times as the state and political leaders of Syracuse tried to launch Captain Teall's Syracuse City Water Company, someone in Rochester proposed a water system destined to remain on paper. Rochester, a waterpower boom town located above the main falls of the Genesee River, received its first village charter in 1817. In 1822-24 there was an abortive attempt to organize a Rochester Aqueduct Association, which failed in part because the village enjoyed a good supply of water from wells and springs. The river, its mill races, and the Erie Canal, completed to Rochester in 1823, were not only useful for water power and transportation, but supplied convenient sources of water for firefighting as well. These facts would help delay construction of a real water system for some time.

In the 1830s, as population growth of the "flour city" mounted steadily, community leader Elisha Johnson twice made formal proposals to supply the town with water from the upper Genesee River. His first proposal, made while he was a village trustee, was a factor in the state legislature's granting of Rochester's first city charter. The charter, approved in 1834, included authority to organize a water works, but the common council instead temporized by constructing a number of firefighting "reservoirs," which in fact were nothing more than cisterns.

Johnson was Rochester's mayor in 1838 when he again proposed a public water supply, this time in the form of a published *Report* to the common council outlining ways

and means in detail. Again, no action was taken on the plan, despite an outbreak of cholera a few years before and the mounting threat of conflagration. One of Mayor Johnson's key findings was that the absence of a good water supply cost property holders \$15,000 a year in higher insurance rates, an amount that he calculated was greater than annual maintenance of a water works.

The political obstacle was the council's reluctance to use the city's credit for a water project, a course of action which Johnson advocated and one which promoters of a private company also desired. This was true of the backers of the Rochester Water Company, chartered in 1852 in the wake of a second cholera epidemic. An amendment to the charter in 1853 authorized the city to purchase up to \$200,000 of company stock, but the common council refused to do so. The issue was further clouded by arguments between rival advocates of upland water and those who supported a pumped supply from Lake Ontario. A number of serious fires in the late 1850s kept the water issue alive and prompted the council to appoint a water works committee, similar in purpose to the special study commission later organized in Syracuse. As a result of the committee's recommendations, Hemlock Lake was determined as a source of supply, and the city entered an agreement with a reorganized Rochester Water Works Company to pay \$20,000 annually for hydrant service.

Despite the promise of that subsidy, the company was unable to raise sufficient capital to pursue work in a timely manner. The Civil War intervened, and when construction of a 16-mile conduit from Hemlock Lake finally began in 1866, the company's continued financial difficulties not only slowed the work but apparently led to a disastrous attempt to use wooden pipes. According to McKelvey, the taste of the water brought through the log conduit combined with the failure of the company's steel-riveted distribution pipes (another substitute for cast iron) forced the company into bankruptcy. Meanwhile, a committee of the common council urged the construction

of an independent "Holly" firefighting system modeled after Lockport's. Rochester's Holly system would employ the water power of Brown's Race and back-up steam engines to pump river water under high pressure through the downtown section. Some political leaders wanted the city to enter a new contract with the Holly company for this purpose.

Instead, Mayor Charles W. Briggs won state legislation to create an independent Water Works Commission similar in function to the one Albany already had and those which Syracuse and Utica would ultimately adopt. The idea of separate water systems for firefighting and domestic use was retained, and the new commission supervised construction of both. Service of the Holly system was inaugurated with impressive ceremonial tests in 1874, and the Hemlock system began operation two years later. The commission reconstructed the bankrupt company's conduit from Hemlock Lake (this time with cast iron) to a holding reservoir in Rush, and built a small distributing reservoir near Mt. Hope Avenue, now known as Highland Park Reservoir. In the twentieth century, administration of the Rochester water works became the function of a regular bureau of the city's Department of Public Works, and the upland supply has been supplemented with treated water from lake Ontario.

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This very hasty overview of Rochester's early water supply history repeats a story which seems to carry the overall lesson in the experience of the four cities. The way that water supply should be administered and engineered was never obvious. In the case of every city water works construction happened after a series of decisions based on delay, trial, and error. The delays and errors were often agonizing. Given the processes that were the means of decision making, this is not surprising. In fairness to the planners of their day, however, it cannot be too strongly emphasized that nineteenth century city growth could not be anticipated; if Utica's water history was "happier" than Albany's, Syracuse's, or Rochester's, it was partly

because Utica's growth was slower. Trial and error with private water companies led, in the case of all four cities, to decisions in favor of public ownership of water works. But private water companies seemed reasonable at the time of their organization, and there are metropolitan regions today which enjoy good water service from regulated utilities. In terms of engineering achievements, the water works history of these nineteenth century American cities was impressive. The record of the early builders contains many lessons for today.

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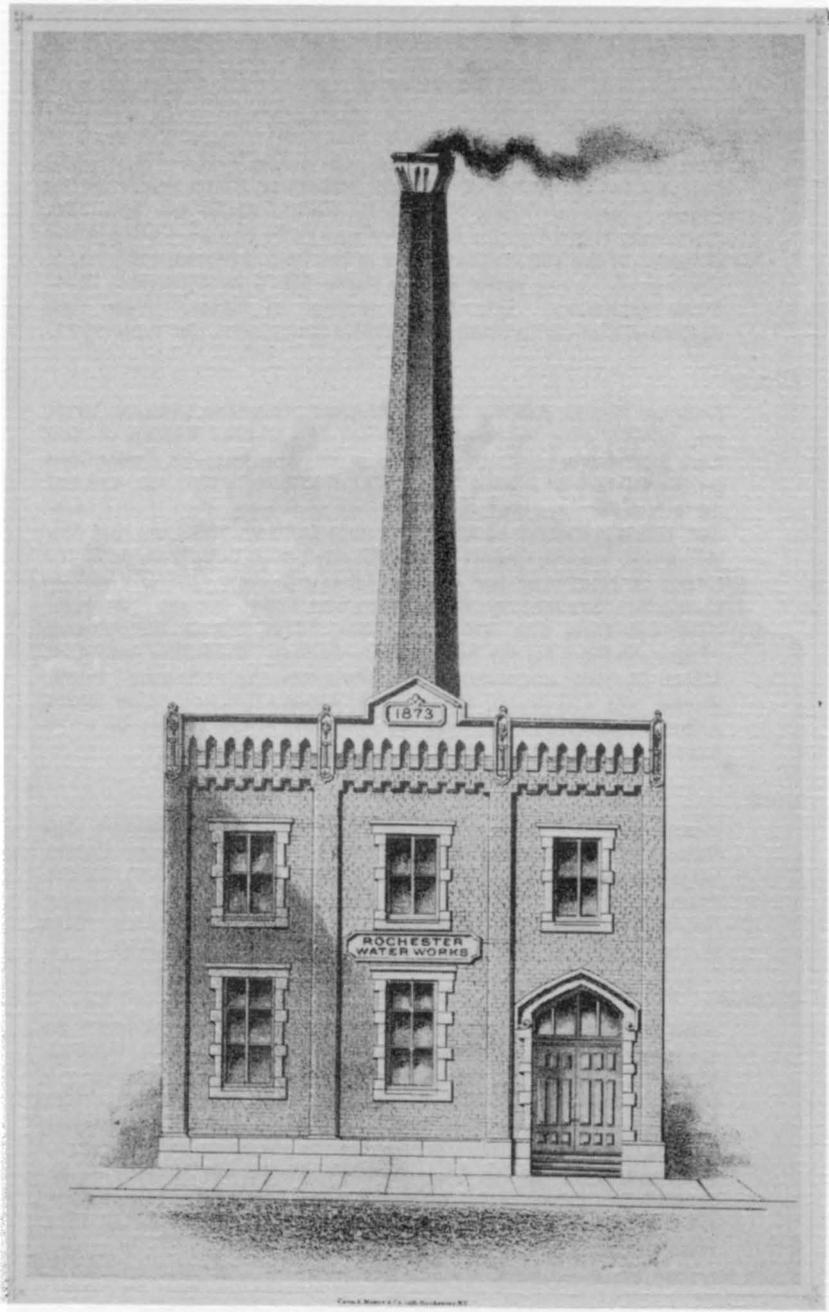
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FRONT VIEW OF ENGINE HOUSE
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Frontispiece from First Annual Report of the Board of Water Commissioners of the City of Rochester (1874)