



History of Amesbury Water Distribution Systems

by

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Amesbury Carriage Museum
Amesbury, MA

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Municipal Water Distribution Systems

Before Amesbury

Domestic water was historically drawn from rivers, springs, and public wells, an adequate supply being relatively easily obtained using little technology. Separately, devastating fires plagued most early American towns, after which commercial rebuilding typically resorted to less combustible brick and stone construction. Water for fighting fires was required only occasionally, but in large quantities, delivered at high flow rates, and at high pressures that could reach up into increasingly taller urban buildings. Fire suppression demanded industrial methods for water delivery.

Contamination from privies and other sources (e.g. industry) encroached on many urban wells. (Paul Revere was Boston's first health inspector, assessing the safety of public wells.) Such problems favored central systems of controlled safe water quality. Mid 19th century studies in Lawrence, Massachusetts were establishing the nature of contaminants, and methods for eliminating them. Large central water distribution systems were thus becoming increasingly common.

Philadelphia's 1815 Fairmount Water Works provided an archetypical pumping station, with a large elevated reservoir, and miles of pipe throughout the city, including fire hydrants. The 3-million gallon reservoir provided a lasting supply, while the reservoir's elevation created high pressure, both being available even when the pumping station was not operating. Manhattan's 1842 mid-town Croton Reservoir, where the New York Public Library is now located, similarly stored 20-million gallons of water behind 50-foot high granite walls. Such systems provided water for both domestic consumption and fire fighting.

Progression of Amesbury Water Systems

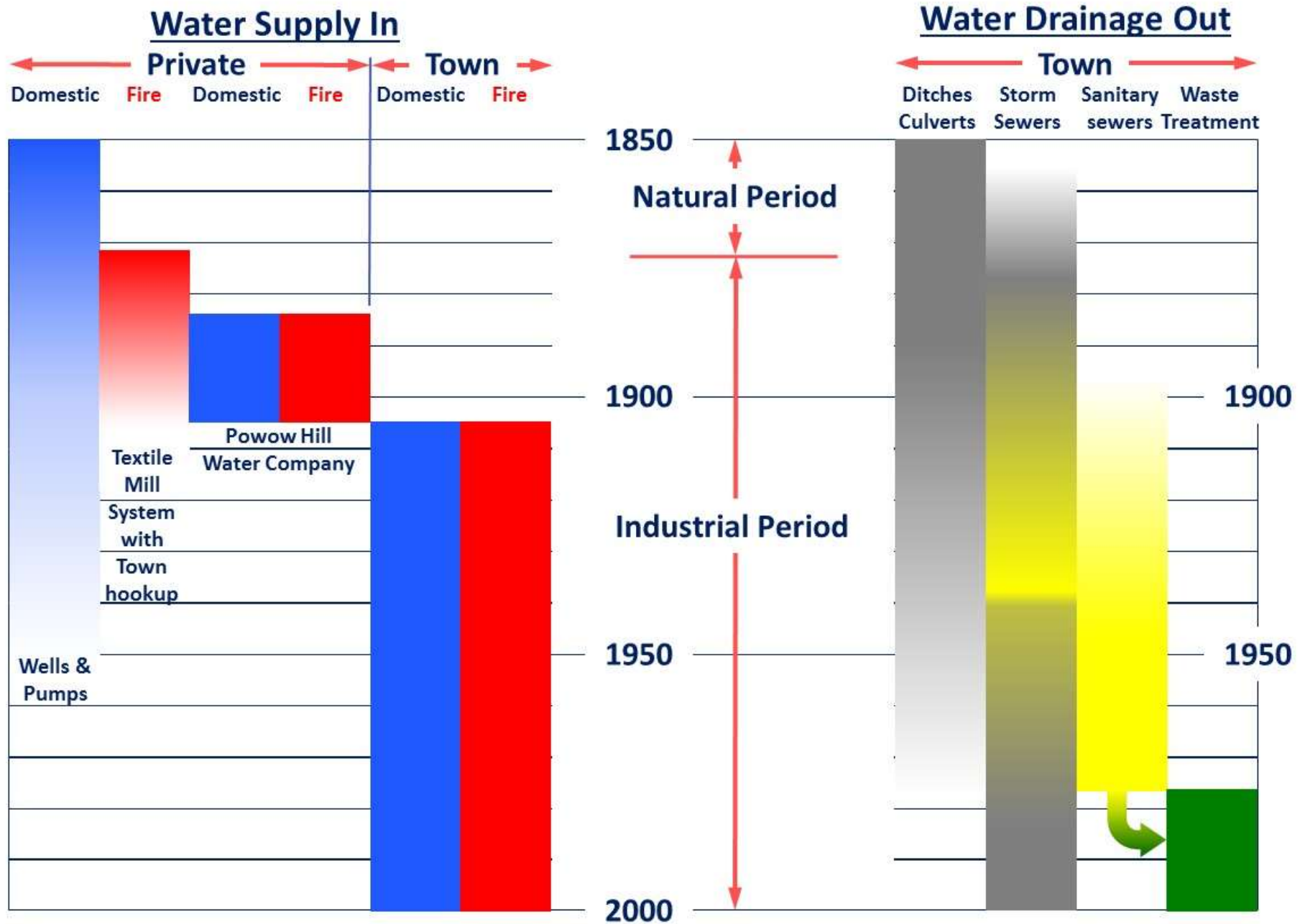
Description of the chart on the next page

The following chart describes the evolution over time, going down the page, from relatively naturally operating systems up to about 1870, to industrially boosted systems after 1870. Two sets of water flows described are water coming into town, on the left side of the chart, and water draining out of town on the right. Finally, headings differentiate between private business ownership and public town ownership.

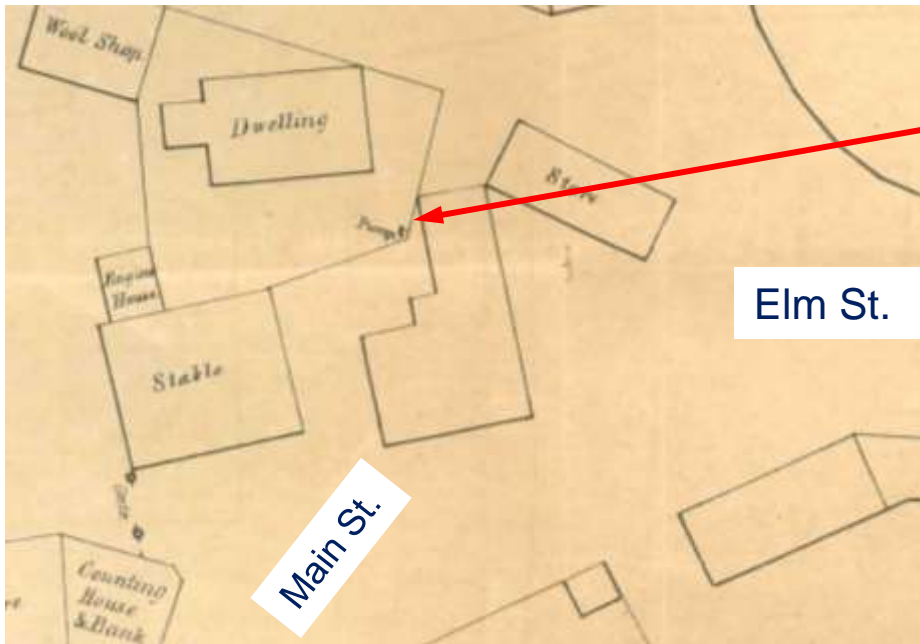
Domestic water was initially obtained by the privately owned and natural means of wells and pumps – dig a hole and water appeared. Fire suppression prompted Amesbury's largest landlord, the Hamilton Woolen Company, to build a system of industrially powered pumps, with piping throughout its buildings, and hydrants in the streets. The town installed a system of street hydrants, funded by property tax, connected to the textile mill pumps. The private Powow Hill Water Co. next created a system of both domestic and fire suppression water delivery, with central pumping stations and reservoirs, which was purchased by the town in 1905. As this convenience spread, people used increasing amounts of water, which also had to be drained.

Because roads were traditionally town responsibilities, the town handled road drainage of storm-water, and subsequent storm drain systems. This ultimately extended to sanitary sewage systems and waste treatment. Culverts and open ditches were relatively natural, but systems of buried pipes were more industrial and deliberately engineered, with new capabilities. Industrial domestic water supplies ushered in water closets, which introduced sanitary sewerage needs. Storm sewers initially doubled as sanitary sewers, which was quickly found to be unsatisfactory. The town fortunately concluded, in the early 20th century, to begin separating these systems, which led to eventually being able to introduce a sewerage waste treatment facility.

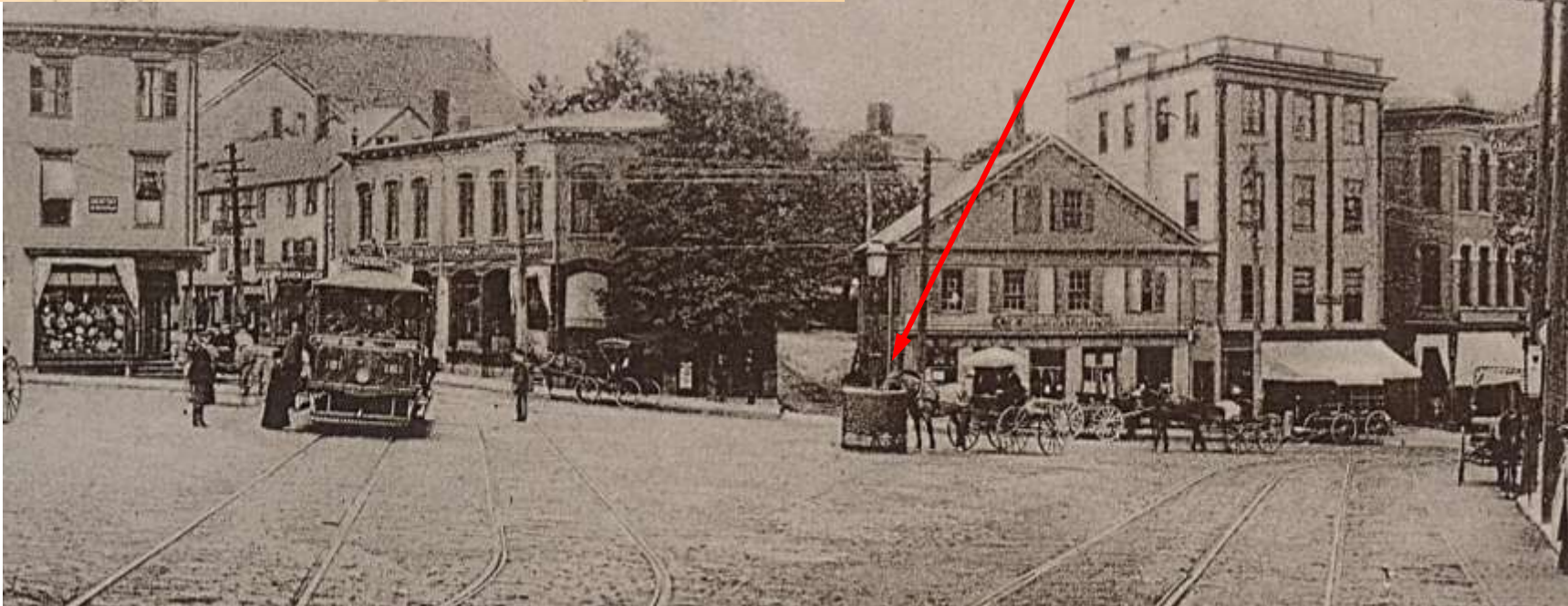
Progression of Amesbury Water Systems



Amesbury Town Pump – Market Square



Town pump in 1849 that would have been out in Market Square, compared to today's boundaries. Later in the century there was a horse trough in the square (below ca. 1890s), likely connected to the centrally supplied domestic water system.



Amesbury Municipal Water Distribution Systems

Various Amesbury business entities endeavored to distribute water, starting at least as early as June 27, 1798, when a charter was granted for a company at Amesbury Ferry to establish underground pipes for that purpose. It is believed that remnants of pipes and a cistern from such have been found in the Merrimac St. and Bailey's Hill area.

The 1883 state charter for another such company suggested that similar other pipe systems may have existed in the meantime, one clearly being that of the Hamilton textile mills. This 1883 charter was for the Powow Hill Water Company, created primarily by prominent carriage businessmen. That company had water rights to Clark's Pond, and permission to construct apparatus to distribute water throughout Amesbury via underground pipes. The charter also allowed that the town could purchase the company for a price to be negotiated, pending a 2/3 vote at a town meeting for that purpose.

In 1905 the town purchased all assets and rights of the Powow Hill Water Company. Several years later, the town bought assets of a small local water system at Ring's Corner, on Newton Road, which provided direct access to the Powow River at a clean upstream location. This became the town's main water works, with an electrically powered pumping station that came on-line in 1910.

Amesbury Town Pump – Huntington Square



Old Town Pump in Huntington Square

The Ordway town pump was located on an island in the Huntington Square intersection of Main and School Streets. The Ordway family held land around the northeast corner of that intersection, including from the site of the current library back to the fire station. The well had reportedly been dug in 1735

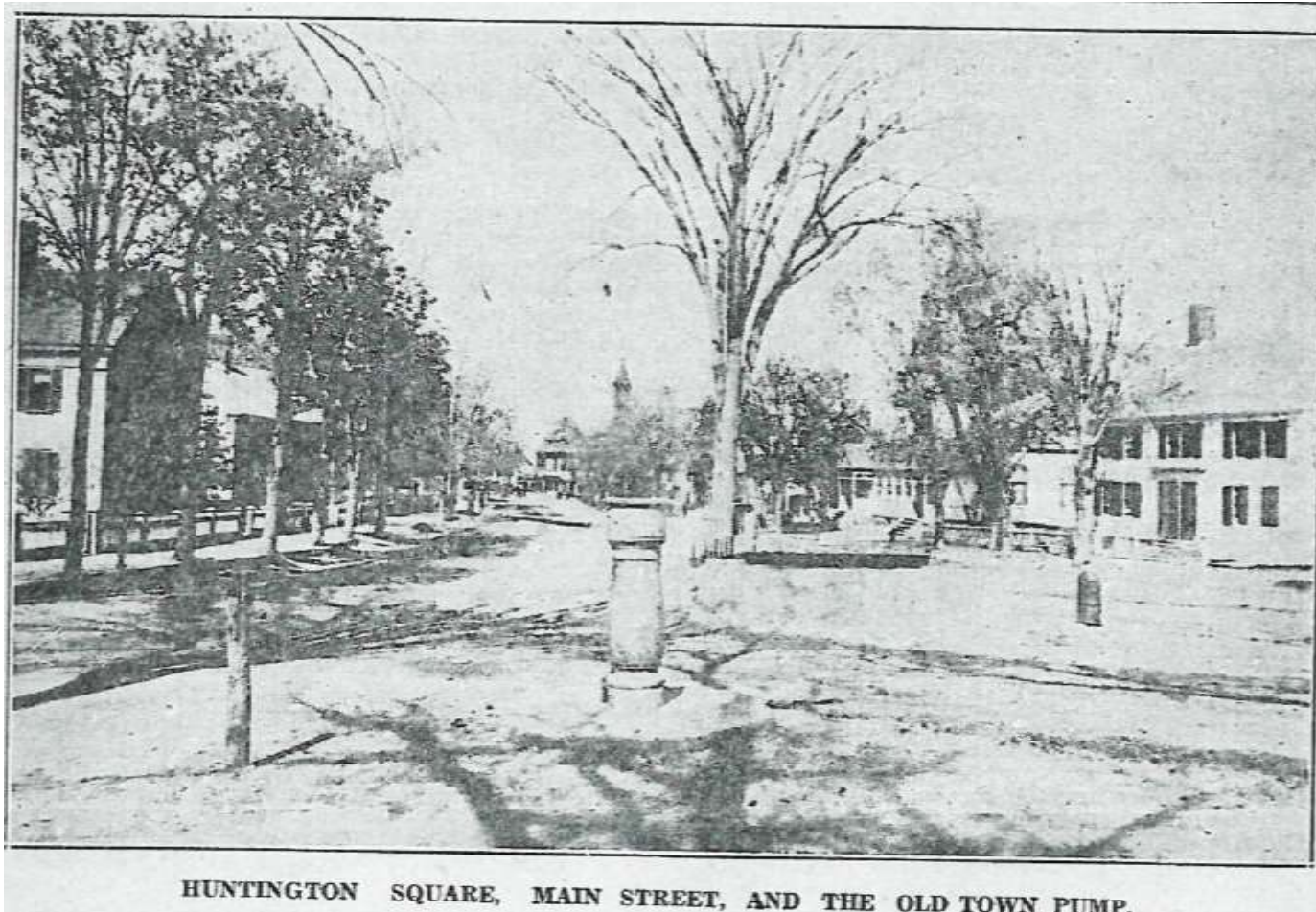
The well was capped in 1885 by a large round millstone, allegedly from first corn mill of 1641 along the Powow River.

The view at right is looking toward the steps in front of St. Joseph's church on School Street.

Smith reports that in this same year (1885) a town pump was removed from Wadleigh's block, which may have been in the first block Elm Street.

Details of pump history were found in *A Chronological Record of Principal Events in Amesbury, Massachusetts*, Emily B. Smith, Amesbury, 1901, pg. 28.

Amesbury Town Pump – Huntington Square



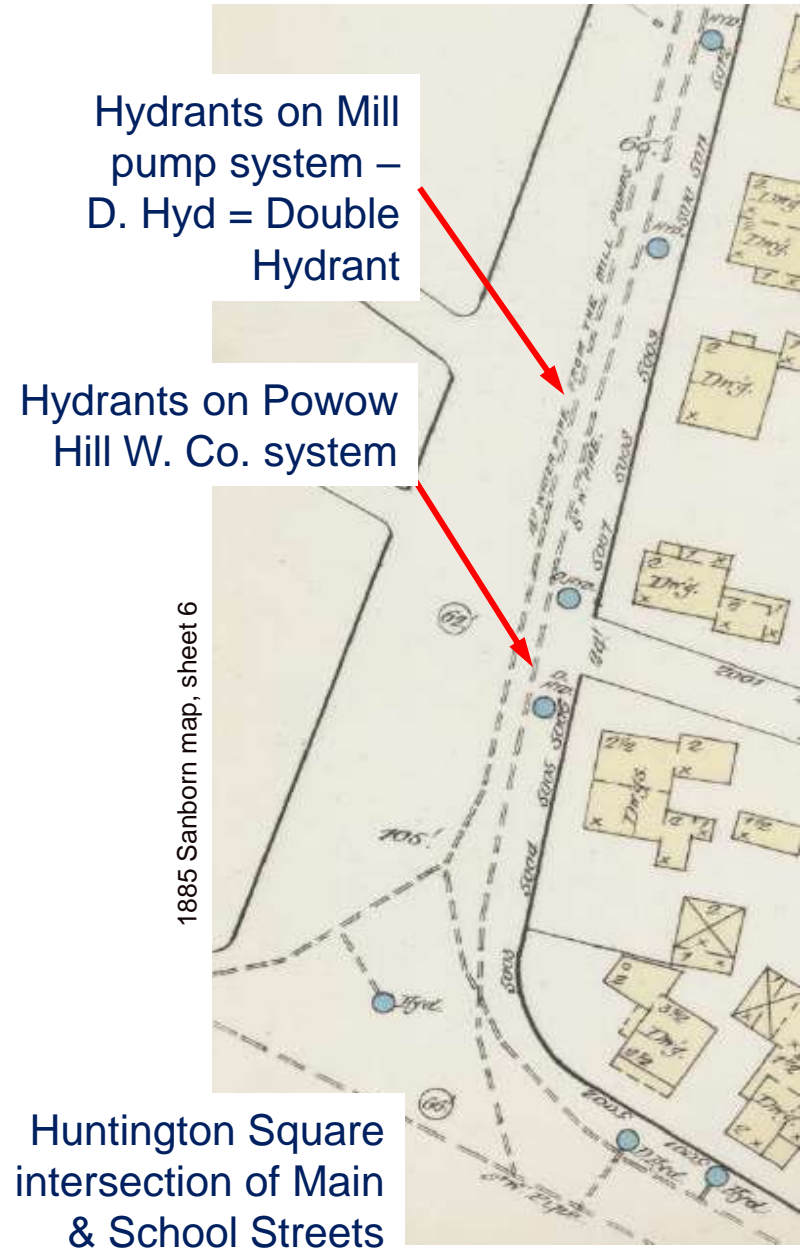
Town pump at Huntington Square, looking up Main St. into central downtown. Photo taken some time after 1888, when the Methodist church was completed, just beyond the Colonial duplex house on far right. The colonial duplex is located on the site of the late T. D. Bank. A fire hydrant supplied by the Powow Hill water system can be seen near the curb in front of the house.

The Textile Mill Water System

After 1853, the brick textile mill buildings along the Powow River were all owned at any given time by one of four companies in series. By the 1870s, the mills had their own water pumping and fire safety facilities. Inside mill buildings, this system powered sprinkler systems on each floor.

In 1873 the town constructed a system of 4-inch and 5-inch pipes throughout downtown, with street-side fire hydrants, which was connected to the textile mill pumps. An 1882 news item (Appendix 1) suggests that the city levied property taxes to pay for this system. It appears that the system had no domestic use, except for employee conveniences that may have been installed inside mill buildings.

The Powow Hill Water Co. built a new system of 8-inch pipes and fire hydrants, along with their domestic water connections. At that point, the old system of pipes and hydrants seemingly went into disuse.



Powow Hill Water Company

The Powow Hill Water Co. built in 1884 a gravity and direct pumping system, having wells and a steam powered pumping station on Market Street (current school maintenance building) and a 1.8 million gallon open reservoir off Powow St. near the top of Powow Hill. This was the high pressure reservoir where covered water tanks are located today. Its state charter seems to grant the company considerable power to force land and asset acquisitions in functioning as a public utility.

Sometime between 1884 and 1890, the company also constructed wells and a steam powered pumping station at 250 Main St. adjacent to the current CVS parking lot and called the Powow Hill pumping station. That station directly fed water mains and fire hydrants in south Amesbury and The Ferry. It is unclear if this was originally connected to the central downtown system. If not, it was solely an active pressure system with little stored water, perhaps having only standpipes for passive pressure maintenance. Wells at this site were expanded in 1893. Behind the pumping station were several shallow settling reservoirs. After 1900 this station had two large pumps, suggesting that it was, by then, connected to the central system and provided much of the town pumping capacity, while the Market St. station both filled the reservoirs and was connected to the mains.

Powow Hill Water Company Services & Billing

SPECIAL NOTICE.
The supply of water will be cut off from all persons whose water rates are not paid promptly, according to the regulations upon the back of this bill. No further notice will be given.

Registry No. *54* No. *Friend* Street.

Mr John Huntington

To POWOW HILL WATER CO., DR.

For use of Water from October 1st, 1884, to April 1st, 1885, — —	<i>2 Months</i>	\$	<i>2.00</i>
“ “ “ April 1st, 1885, to October 1st, 1885, — —	— —	\$	
Permit to use Hose { For Sprinkling not over one hour per day, — —	— —	\$	
{ For Washing Carriages, — —	— —	\$	
For <i>5-6 in</i> feet of extra pipe, at <i>25</i> per foot, — —	— —	\$	<i>1.37</i>
Payable in Advance at the Company's Office, (at store of S. J. Brown) 22 Market Street.			\$ <u><i>8.37</i></u>

Amesbury, Mass., *Dec. 14* 1884

RECEIVED PAYMENT, *E. R. Sibley* Treasurer.

Office Hours—9 a. m., to 12.30 p. m.; 2 to 5 p. m. For the Treasurer.

Village Steam Print. PLEASE BRING THIS BILL WHEN YOU PAY.

Dating from the first year (1884) of Powow Hill Water Company operation, this receipt (& following 2 pages) describes a one year contract for supplying domestic water to Mr. John Huntington of Friend Street, Amesbury. Water is not metered, but rather charges are added to the annual rate for various added uses that the customer may exercise, such as sprinkling lawns and washing carriages.

While the client is generally granted an honor system for water uses, contract details on the following page (from the back of this ticket) allow the water company access to client households to verify properly purchased water usage and waste prevention. Water is not permitted to be left running to prevent pipes from freezing during winter.

The Powow Hill Water Company Services & Billing

REGULATIONS.

The following regulations will be considered a part of the contract with every person who uses water.

All applications for the use of water must be made at the office, and the various uses to which the water is to be applied must be stated fully and truly; and should use for any other purpose be required notice must be given before it will be allowed.

Persons taking water must keep their water-pipes and fixtures in good repair and protected from frost at their own expense, and will be held liable for any damage resulting from their failure to do so.

They will prevent any unnecessary waste, and the water must not be left running to prevent freezing.

Free access to the premises shall be permitted, to examine the apparatus and to ascertain the quantity of water used, the manner of its use, and whether there is any unnecessary waste.

There shall be no concealment of the purpose for which it is used.

Service pipes will be laid to the line of the street without charge, and all applicants for whom the pipe is laid will be charged for the use of one faucet, whether the water is used or not.

The regular rent for the use of water shall be payable semi-annually in advance, on the first days of October and April in each year. In all cases of the non-payment of the water rent in thirty days after the rent is due, or of violation of the foregoing rules the supply will be cut off and the water will not be again let on except on payment of the rent due and the sum of two dollars for cutting off and letting on the water.

Notice is hereby given that the above regulations will be strictly enforced.

The Powow Hill Water Company Services & Billing

These tables on the back of the ticket show annual water rates as applied to dwellings and other manner of buildings, businesses, and uses, such as steam engines, horses, and bath houses.

Period apparatus listed are piping, faucets, bath tubs, water closets, and hoses. Plumbing infrastructure and plumbers seem already to be common, such that this is not leading edge technology. It is a general state of affairs that is making its way into Amesbury daily life. Newburyport seemingly had a water system slightly earlier than did Amesbury.

While the contract describes house connections for supplying water, there is no discussion of another connection for waste-water disposal, seemingly left to client discretion and creativity.

Rates of the Powow Hill Water Company	
<i>The following rates will be charged for the use of water; to be collected semi-annually.</i>	
DWELLING HOUSES.	
<i>Dwelling Houses occupied by one family, for first faucet,</i>	\$ 7 00
<i>For each additional faucet, to be used by same family,</i>	2 50
<i>When a house is occupied by more than one family, one faucet only being used by all, for each family,</i>	5 00
<i>When a house is occupied by more than one family, the highest rates will be charged for each family having the water carried in their part of the house,</i>	7 00
<i>For the first bath tub,</i>	5 00
<i>For each additional bath tub,</i>	2 00
<i>For the first water closet,</i>	5 00
<i>For each additional water closet,</i>	2 00
<i>For hopper water closets, special rates will be made.</i>	
<i>Where bath tubs or water closets are used by more than one family, for each family,</i>	4 00
<i>Where two faucets are used, one for hot and one for cold water, and both emptying into one basin, but one charge will be made for both.</i>	
<i>Provided that in no case shall the charge for the use of water by a private family exclusive of horse and stable, be more than</i>	25 00
BOARDING HOUSES.	
<i>For the first faucet,</i>	10 00
<i>For each additional faucet,</i>	3 00
<i>Water closet or bath tub,</i>	10 00
<i>Each additional bath tub or water closet,</i>	3 00
STORES, OFFICES.	
<i>First faucet,</i>	6 00
<i>Where two or more tenants are supplied from the same faucet, each,</i>	5 00
<i>Water closet used by occupants of one tenement, only,</i>	6 00
<i>When used by occupants of more than one tenement, for each tenant,</i>	4 00
<i>For each additional faucet or water closet half of the above rates will be charged.</i>	
MARKETS, SALOONS, WORKSHOPS & RESTAURANTS.	
<i>For markets, saloons, workshops and restaurants, or for purposes not included in any other classification, and not requiring more than an ordinary supply of water, from</i>	6 00 to 25 00
PUBLIC BATHS.	
<i>For each tub in a public bath house or hotel,</i>	15 00
<i>For each water closet in a public bath house,</i>	10 00
STABLES.	
PRIVATE STABLES:	
<i>For the first horse,</i>	5 00
<i>For each additional horse,</i>	2 00
<i>For each cow,</i>	2 00
LIVERY, CLUB & BOARDING STABLE:	
<i>For not exceeding five horses, the same as private stables,</i>	15 00
<i>For horse additional,</i>	2 00
TRUCK & CART STABLE:	
<i>For each horse,</i>	3 00
<i>Provided that in no case shall any stable be charged less than</i>	8 00
<i>The rates for stables include water for washing carriages without hose.</i>	
HOSE.	
<i>For not over one-quarter inch orifice, used for washing windows, sprinkling streets, or watering gardens, (and the use of the same shall be limited to one hour a day) not less than</i>	6 00
STEAM ENGINES.	
<i>For each engine working not over twelve hours a day, for each horse power, from</i>	7 00 to 10 00
BUILDING PURPOSES.	
<i>For each cask of lime or cement used,</i>	7 cents.
For all purposes not herein enumerated special rates will be made on application.	

Chronology of Amesbury Water Systems

		Sanborn Maps of Amesbury Water Distribution Systems - Powow Hill Water Co. Chartered 1883 & Town of Amesbury								
		1885	1889	1894	1904	1909	1918	1930	1958	Current
General	Population	10,000	10,000	11,000	11,500	10,000	10000	11,400	11,139	16,283 in 2010
	Facility Ownership	Private	Private	Private	Private	Town	Town	Town	Town	Town
	qty. of double hydrants	40	120	140	142	143	161	200		
	miles of pipes	8	8	14	17	19	24	35		
	Avg. gal/day pumped					350,000	580,000	850,000	730,000	
Also	Textile mill pumps & hydrants	Textile mill pumps & hydrants	Textile mill pumps & hydrants							
3 Pumping Stations	Market St. Station	1884 still extant							decommissioned	
	Wells	35 2" driven wells steam	35 2" driven wells steam	driven wells steam	wells & comp. air steam	3 driven wells steam	1 dug well steam	1 dug well electric		
	Power									
	Pumps	1 double Worthington	1 double Worthington	1 double Worthington	1 double Worthington	1 double Worthington	1 Rumsey pump	1 Rumsey pump	Water Dep't Maintenance Bldg.	School Dep't Maintenance Bldg.
	Pumps to	Reservoir & local mains	Reservoir & local mains	Reservoir & local mains	Reservoirs & local mains	Reservoirs & local mains	High reservoir & local mains	High reservoir & local mains		
	Powow Main St. Station		#88 on 1890 aerial map, built ca. 1889	built ca. 1889			decommissioned 1911, bldg. extant			
	Wells			driven wells steam	wells & comp. air steam	3 driven wells steam				
	Power									
	Pumps			1 double Worthington	1 double Worthington	2 double Worthingtons	vacant	vacant	vacant	brass foundry currently vacant
	Pumps to			local mains	local mains	perhaps total system				
	Ring's Corner Station					Private Local System	Town System Built 1910		Replaced 1985 demolished 2006	New treatment plant 1985
	Wells					13 driven wells	45 2-1/2 driven wells electric	102 2-1/2 driven wells electric	102 2-1/2 driven wells electric	2 well fields
Power					40 HP gas engine				elec. & backup gen.	
Pumps					Rumsey 3 cylinder piston pump	1 Deane pump 1 Rumsey triplex pump	1 Deane pump 1 Morris pump	1 Deane pump 1 Morris pump	2004 upgraded plant & filtration system	
Pumps to					Ring's Corner	Market St. Station & low reservoirs	Market St. Station & low reservoirs	Market St. Station & low reservoirs	High reservoir & town mains	
3 Reservoirs	High Service Reservoir	1884 near top of Powow Hill					physical resesvoir changes		decommissioned 1964	1 new tank 1964 2nd new tank 2004
	Elevation	248	245	260	260	260	277	277	277	ca. 300
	Gallons Capacity	1,800,000	1,800,000	1,800,000	1,800,000	1,800,000	1,000,000	1000000	1000000	1 million & 2 million
	Press. @ Market Sqr. (psi)			120	120	120	104	104	104	ca. 120
	Style	open	open	open	open	open	open	open	open	above ground covered
	Low service Reservoir 1				ca. 1900 - Rowell St. & Prospect		physical resesvoir changes		built over by housing	
	Elevation				128 assumed	128	133	133		
	Gallons Capacity				1,000,000	1,000,000	700,000	700000		
	Press. @ Market Sqr. (psi)				55	55	49	49		
	Style				open	open	open	open		
	Low service Reservoir 2				ca. 1900 - west side Powow St. at Rowell		physical resesvoir changes		physical resesvoir changes - 1936	extant but unused
	Elevation				128	128	139	139		
Gallons Capacity				1,000,000	1,000,000	300,000	300,000			
Press. @ Market Sqr. (psi)				55	55	49	49			
Style				open	open	open	open	underground covered	underground covered	

Additional Powow Hill Water Company Reservoirs

Around 1900, the company built two low pressure open reservoirs lower down Powow hill, of one million gallons each, adding storage capacity still at adequate pressure for daily use. For fire emergencies, the upper reservoir could increase pressure and flow. The exact date of the lower reservoirs is uncertain, but seems to be between 1900 and 1904. The reservoir at Allston (now Rowell St.) and Prospect Streets was swallowed by neighborhood growth, and no longer exists. The Powow Street lower reservoir was later converted to an underground covered tank that remains there today, but unused for several decades. All reservoirs were physically altered and reduced in volume sometime after 1910, as Amesbury's Ring's Corner pumping station came on-line, the high system reservoir then having a slightly higher effective altitude. Changes were perhaps possible because of increased capacity and reliability of new active pumping.

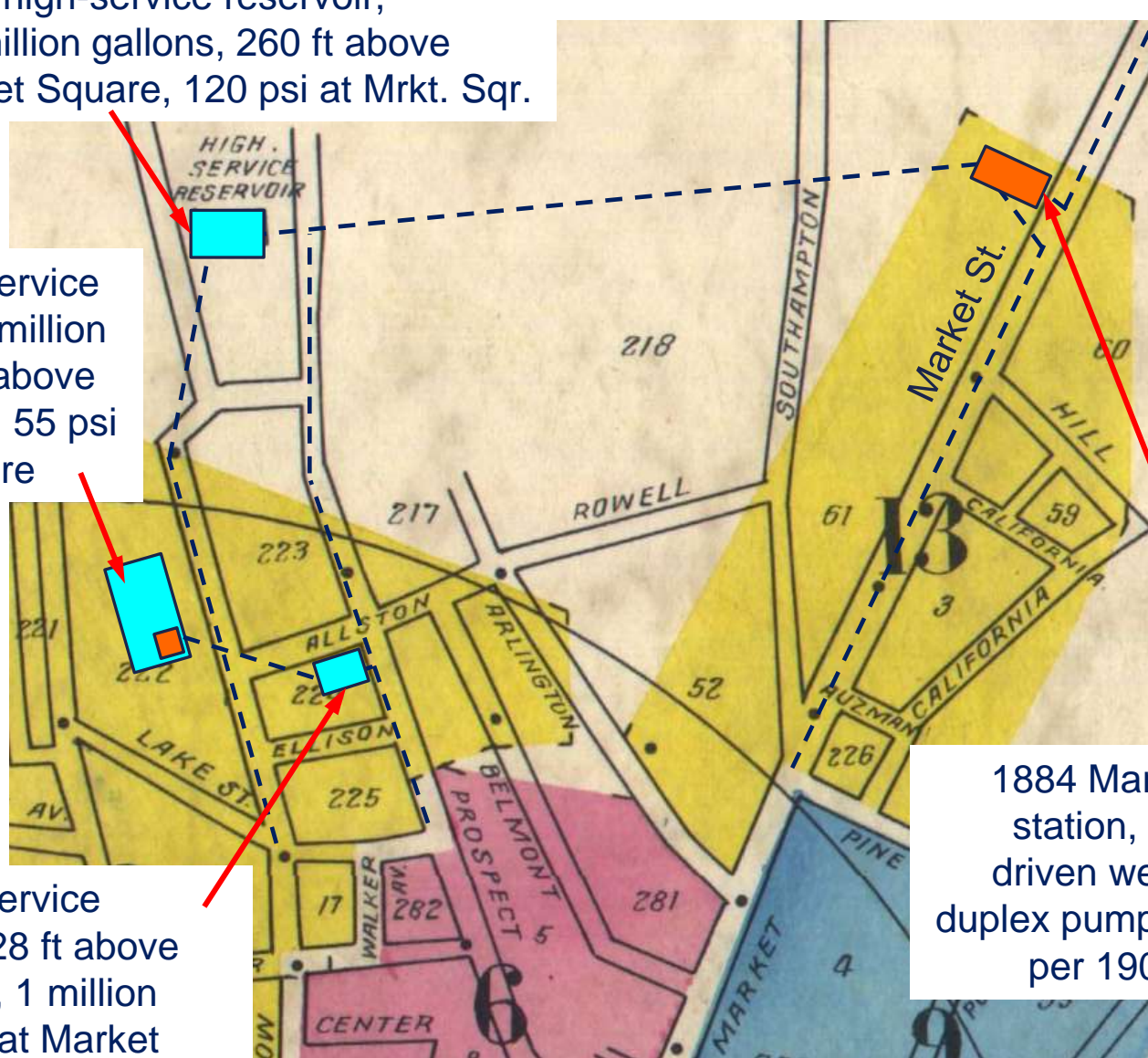
Powow St. Reservoir System & Market St. Pump Station

Diagram based on 1930 Sanborn map, Shts. 1 & 13, data below from 1904-1909 notes

1884 high-service reservoir,
1.8 million gallons, 260 ft above
Market Square, 120 psi at Mrkt. Sqr.

Ca. 1900 low-service
reservoir #2, 1 million
gallons, 128 ft above
Market Square, 55 psi
at Market Square

Ca. 1900 low-service
reservoir #1, 128 ft above
Market Square, 1 million
gallons, 55 psi at Market
Square



1884 Market St. pumping
station, steam engine, 3
driven wells, Worthington
duplex pump, Russell pump,
per 1909 Sanborn Map

Powow Hill Water Co. Market St. Pumping Station

Built 1884, converted to 30 foot dug well ca. 1912, decommissioned ca. 1940s
steam engine, 3 driven wells, 1 Worthington duplex pump, per 1909 Sanborn map

When viewed from the left side (per this view) this pumping station had a layout somewhat like that of the lower Main St. station, with a large loading door in the middle, and chimney behind (right side as seen here). In its original form the Main St. facility was probably a slightly larger installation.

Wells for this facility were to the right of the building, closer to the nearby creek.

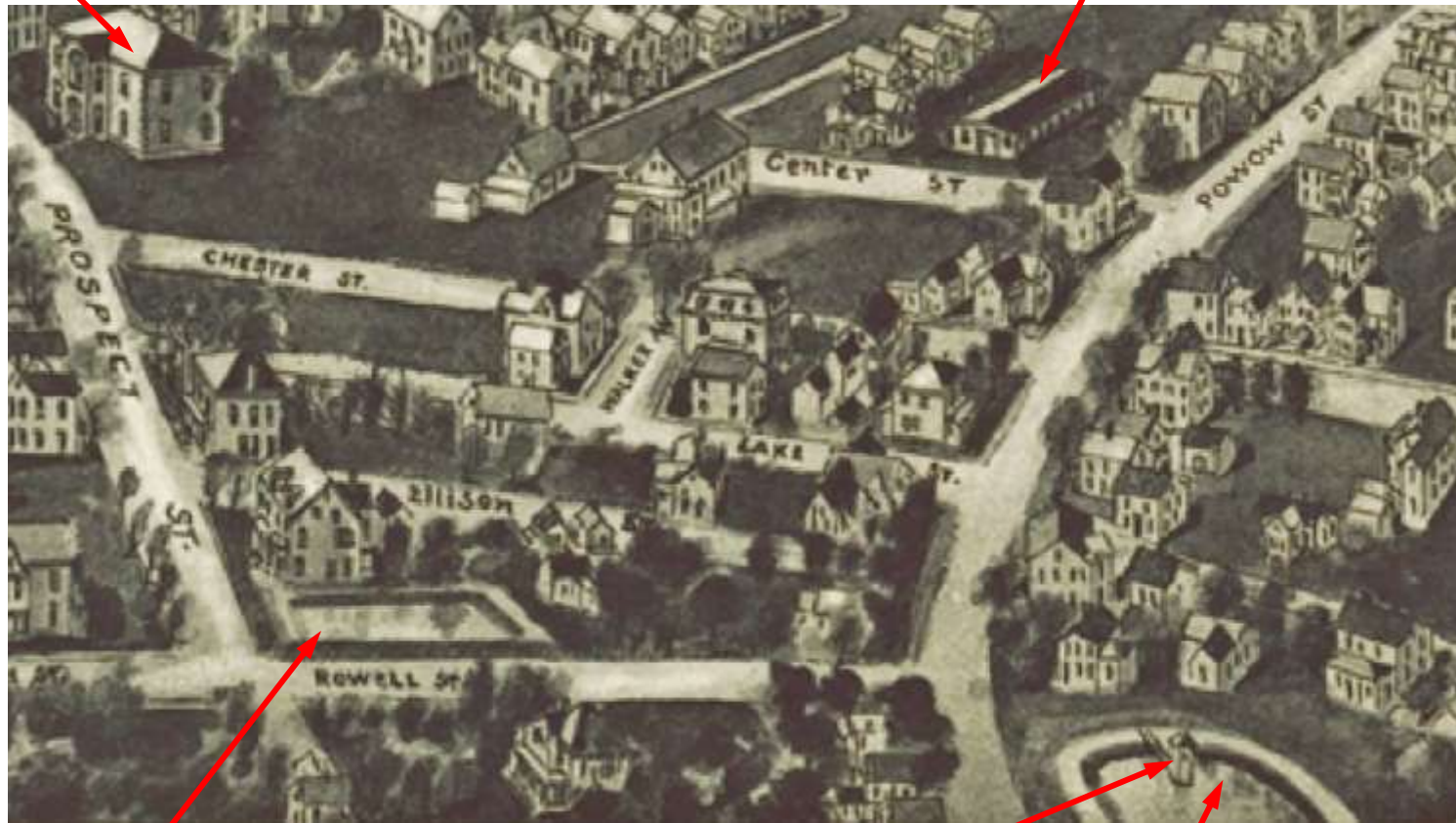


Powow St. Low-System Reservoirs – Built ca. 1900

As shown on 1914 Aerial map

Old Salisbury high school, bldg. still exits

Storage bldg. remnant of George Osgood Carriage Co.

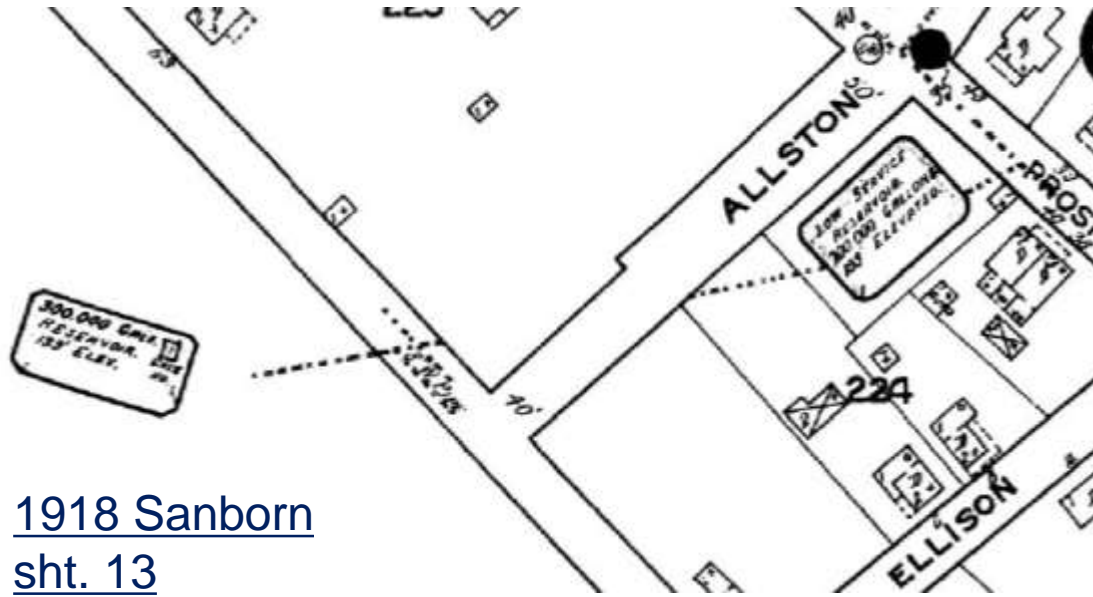


low-service reservoir #1, 128 ft above Market Sqr., 1 million gallons, 55 psi at Market Square

Brick gate (valve) house, may be the bldg. still existing on this site.

low-service reservoir #2, 1 million gallons, 128 ft above Market Square, 55 psi at Market Square

Powow St. Low-System Reservoirs – Built ca. 1900



1918 Sanborn
sht. 13

The reservoirs are identical on 1918 and 1930 maps, perhaps showing the modified reservoirs of reduced size. Unfortunately, they were never previously pictured, so that no comparison can be made.

It is also unclear whether they differ from what is shown on the 1914 aerial map.

1930 Sanborn
sht. 13



Along with the 1918 Sanborn report that these reservoirs have become smaller, by about half, it also states that the Market St. pumping station then has a dug well of 33,840 gallons capacity, and a new Rumsey pump rather than the old Worthington.

Low-System Reservoir on West Side of Powow St.

As shown on 1958 Sanborn map



In 1936, the open rectangular reservoir was replaced by a round underground concrete reservoir that remains there today, but not in use. The small structure is here described as a pump house, rather than gate house, but is still a gate house.



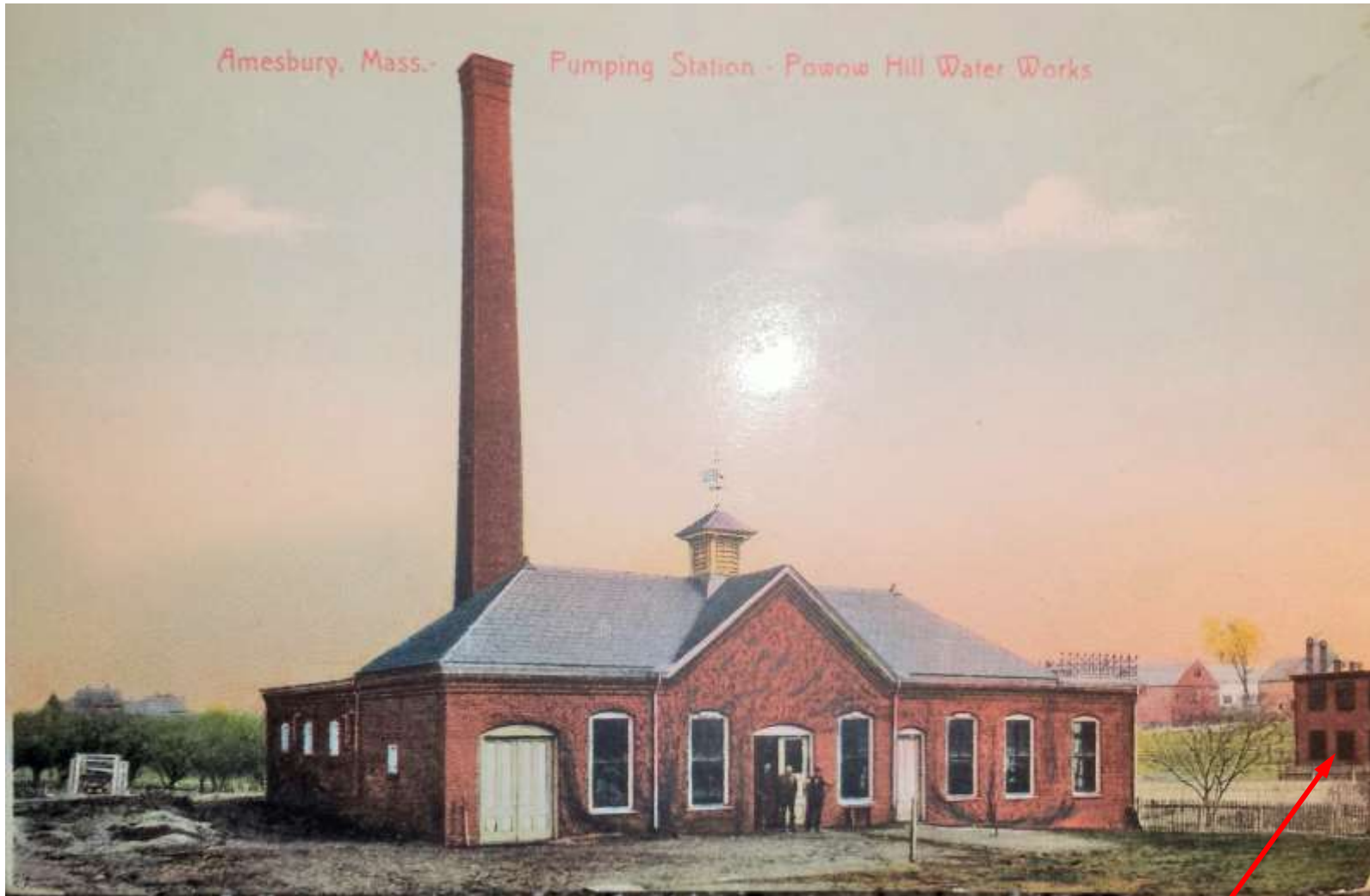
Courtesy of Tom Murphy

The Powow St. gate house, January, 2018. Amesbury Water Dep't. verifies that this is a gate house, gate valves being a style of sliding wedge valve, capable of holding and sealing significant pressure forces in large pipes.

Powow Hill Water Co. Lower Main St. Pumping Station

Built ca. 1888, wells expanded in 1893, decommissioned in 1911
steam engine, 3 driven wells, 2 Worthington duplex pumps, per 1909 Sanborn map

Post card from private collection

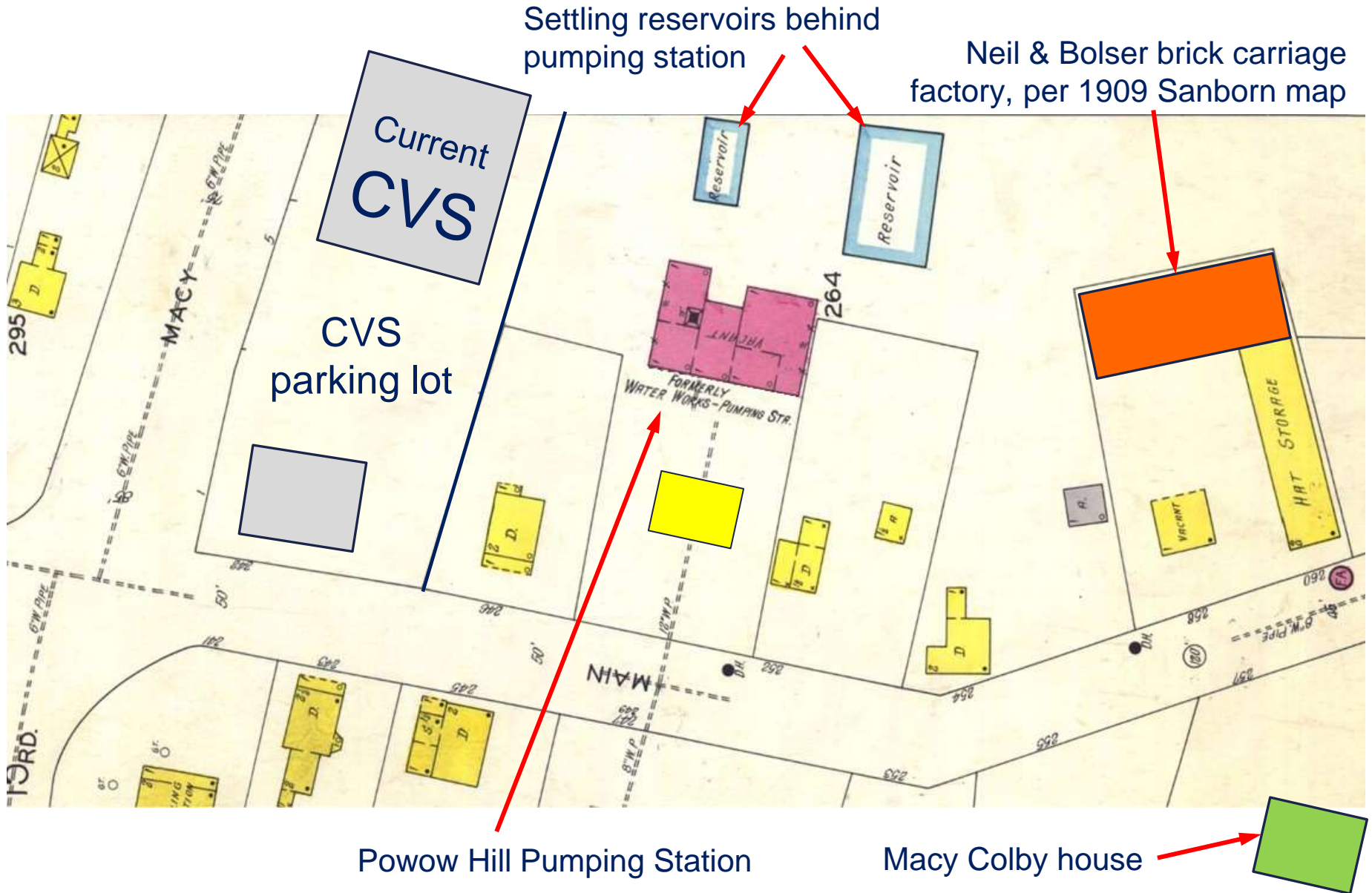


This Main St. system seems originally independent of the Market St. powered network. Systems must later have been joined. The new 1910 Ring's Corner pumping station likely allowed Main St. to be closed.

Neil & Bolser carriage
factory 1890-1910

Powow Hill Water Co. Lower Main St. Pumping Station

Diagram based on 1930 Sanborn map, Sht. 17



Ring's Corner Water Facility on Newton Road

Jonathan Ring's land on Newton Road had a small private water system of driven wells, a 40 HP Hornsby-Ackroyd engine made by De La Vergne Engine Co. of NY, a three-cylinder piston pump by Rumsey & Co. Seneca Falls, New York, and a 12 inch pipe feeding fire hydrants. Ring must also have had water rights, separate from water rights owned by the mill company. This location and its water system is never mentioned on Sanborn maps, through 1909. After purchasing the Powow Hill Water Co. in 1905, the town purchased this Ring's Corner facility and water rights, bringing on-line a new electrically powered pumping station in 1910. This was connected to the Market St. pumping station by 12-inch pipe, thus being able to feed the Powow Hill reservoirs, as well as the town mains from Market Street. At this point, the downtown water system clearly must have been connected to users originally serviced by the old Main St. pumping station, decommissioned the following year, 1911.

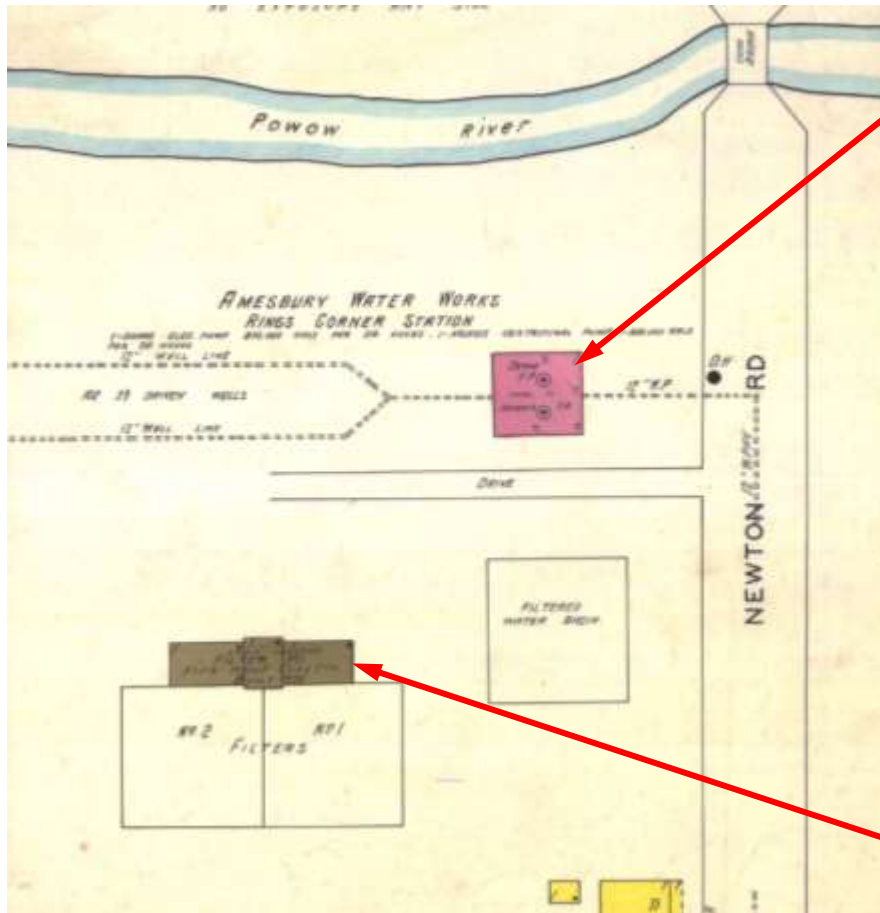
Development of Ring's Corner Water Facility

The Sanborn map edition in 1918 describes the Ring's Corner facility, without picturing it. That includes a Rumsey triplex pump, which superficially matches the pump described under Jonathan Ring, but must be larger than anything Ring would have needed. In the same 1918 note, Sanborn describes changes to all three reservoirs that reduce their capacity by about half. There is little change described in the 1930 Sanborn, most town water system effort likely being devoted to extending pipes and range of the system, and on sewage capacity. Otherwise, Ring's Corner had added the 1926 concrete filtering building that still remains, now unused.

By the final 1958 Sanborn, Ring's Corner was Amesbury's only pumping station, Market St. having become the water works maintenance building. The remaining lower reservoir on Powow St. had become an underground tank in 1936. A new sand filtration building was opened at Ring's Corner in 1962, and a new Powow Hill covered tank in 1964, eliminating the old open reservoir. A new filtering building was added at Ring's Corner in 1971, joined to a new treatment and pumping station in 1985. In 2004, a new water works office and edifice was completed, plus the second large covered tank on Powow Hill.

Ring's Corner City Water Facility on Newton Rd.

Diagram based on 1930 Sanborn map, Sht. 21



Pumping station



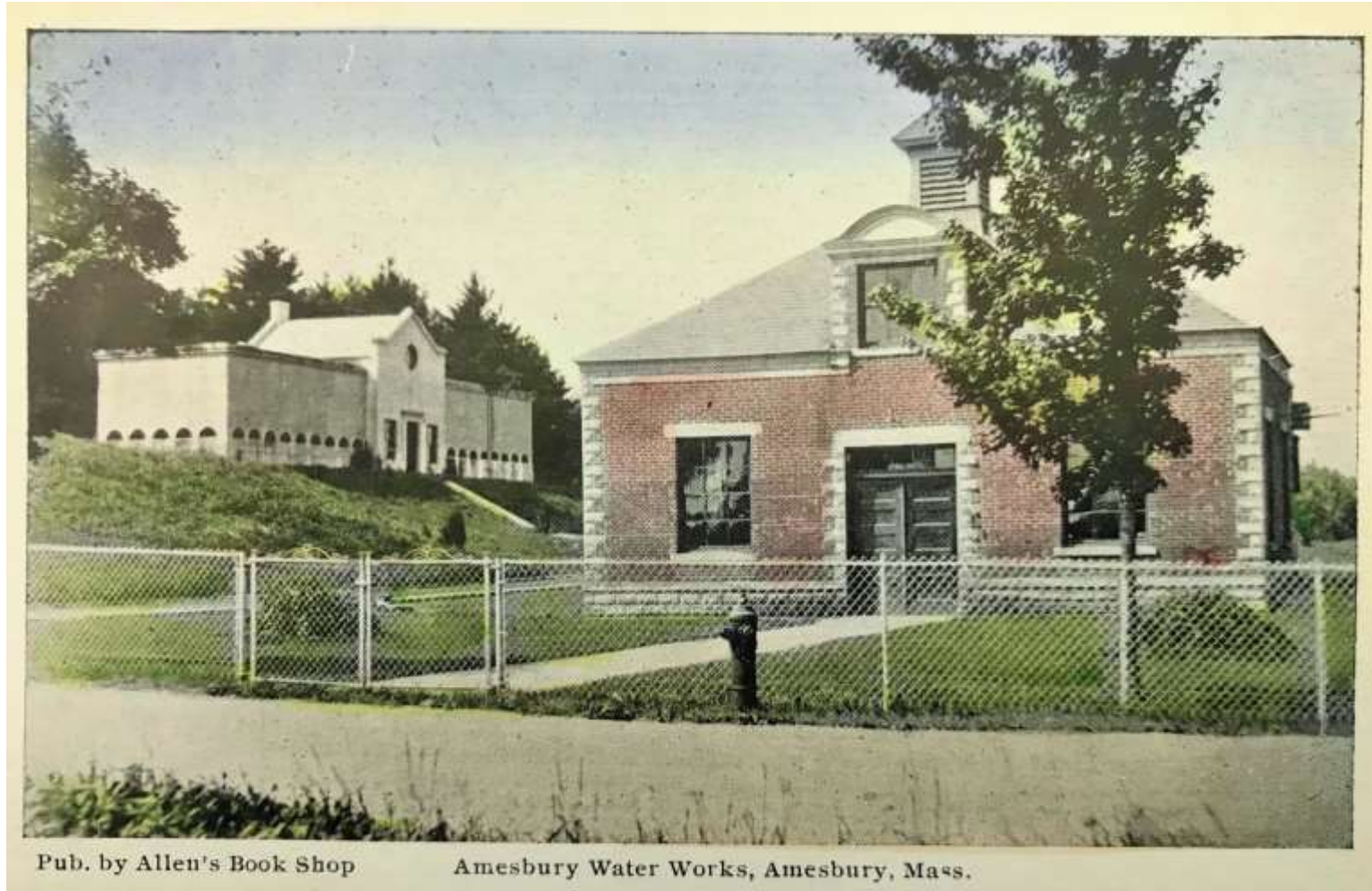
Courtesy of Robert Grodzicky

1926 filtration building

In 1905, the Town of Amesbury purchased physical assets of an older private water system at Ring's Corner, providing access to the large supply of Powow River water, compared to local wells at both of the old Powow Hill Water Co. pumping stations. Those older wells may have been becoming compromised by encroaching urban contamination. The town then built a new pumping station, connecting to the old Market St. station by 12-inch pipe. The concrete filtering building was built in 1926, and still remains, unused.

Ring's Corner City Water Facility on Newton Rd.

post card ca. 1940

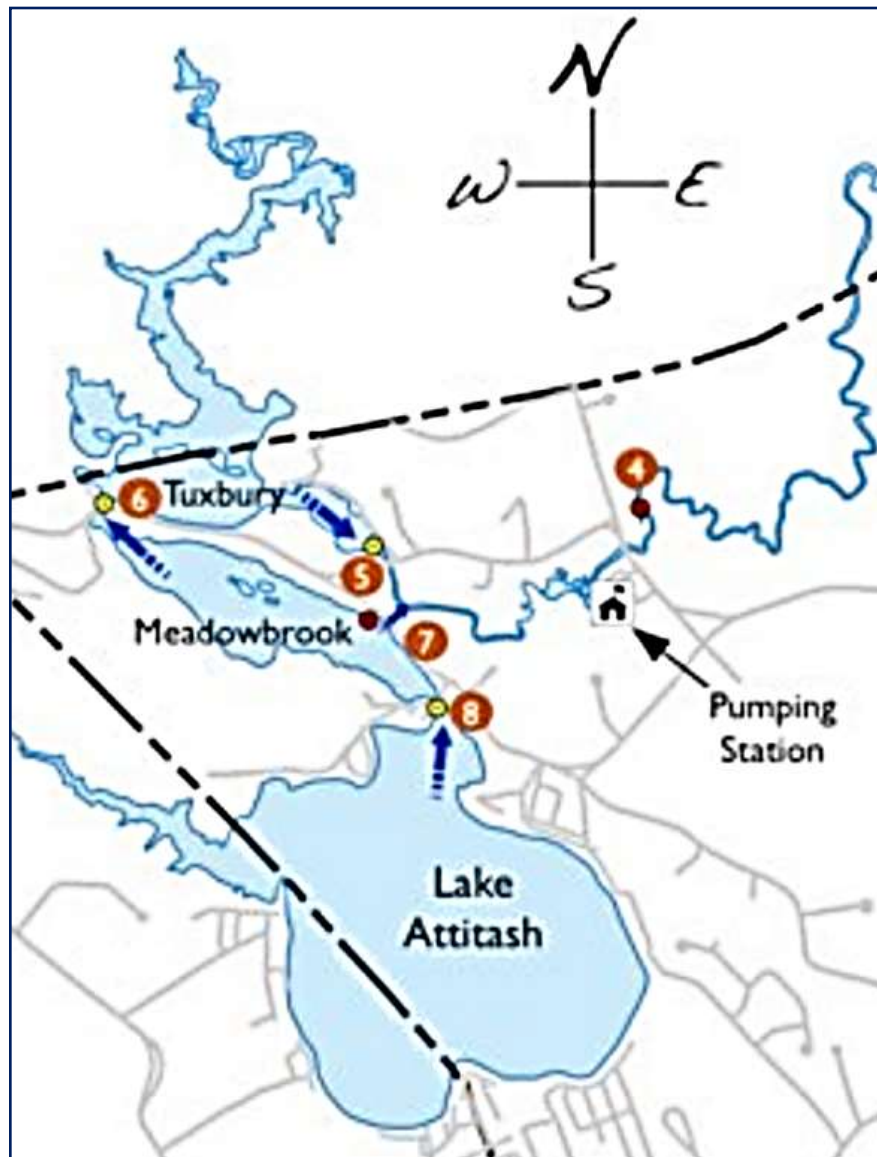


Post card courtesy of Amesbury Public Library

In front, electrically powered pumping station opened in 1910, demolished in 2006. Behind, concrete aeration and filtration building of 1926, which still exists (unused), and which bears a slight resemblance to the Fairmont Water Works in Philadelphia.

Water Flow & Control for the Ring's Corner Facility

map & information courtesy of Amesbury Lakes & Waterways Commission 2012 Watershed Tour



The Ring's Corner water treatment plant, called "Pumping Station" in the accompanying map, receives water from Lake Attitash and Meadowbrook, feeding into Tuxbury Pond, and from other waters flowing into Tuxbury Pond from further north. Below Tuxbury Pond dam, item 5 in the map, the flow constitutes the Powow River, which crosses back north into New Hampshire downstream of the pumping station, and then returns south into Lake Gardner and on into Amesbury and the Merrimack River.

95% of the water passes over Tuxbury Pond dam, the other 5% flowing through underground Archbrook culvert connecting Meadowbrook to the Powow River, between items 5 and 7 on the map. This granite lined tunnel was created in 1750, to drain for Meadowbrook for purposes of harvesting hay in season.

The final feature for controlling water at the pumping station is the low weir, built in 1952 and located at item 4 on the map, downstream of the pumping station. A weir is a low barrier across a stream to control local flow characteristics. It originally raised the river level a slight amount to help pressurize town wells. The town converted to drawing surface water in 1960, for which the weir still maintains a constant sufficient height of water for reliable feeding into the pumping station.

Sewage and Waste Water Drainage

Initially, the term *sewage* referred to storm sewers for street runoff from rain and snow that had to be drained away to avoid street and adjacent flooding. This had long been addressed in Amesbury during the 19th century, before there were industrially powered water supplies coming into town, and was periodically re-assessed. After merging with the Salisbury side of the Powow River in 1886, the town funded an 1888 survey of existing storm sewers by a Manchester, NH civil engineering firm, with recommendations for modernization and improvement.

Water centrally supplied by the Powow Hill Water Company introduced significant new water flows into town homes and buildings, and indoor plumbing quickly began replacing privies. Draining away that effluent naturally resulted in a need for domestic waste-water sewage, contaminated by cleaning solutions and indoor water closets. These were connected to the storm sewer system, which was designed to discharge into locations on Back River and the Powow River that would be thoroughly and efficiently flushed by tidal action. There was no treatment of water contaminants, further complicated by increasing industrial waste also entering these systems. Awareness of waste contamination was slow to rise and was slow to result in action.

As the town grew, its expanding sewerage system evolved to discharge directly into the Merrimack River rather than into its upstream tributaries. In addition to the expected toxicity, available oxygen in the Merrimack was depleted by the natural breakdown of organic contaminants, resulting in occasional major fish kills, which further added to decomposing organic material.

Merrimac St. Waste Treatment Facility

Opened 1976, resulting from NPDES (National Pollutant Discharge Elimination System)



Such waste treatment plants came about because of the 1972 Clean Water Act (1972 amendment to the Federal Water Pollution Control Act of 1948). By this time, Amesbury had long been separating sanitary sewers from storm sewers and had brought the sanitary system to a single location on the Merrimack River. It was thus relatively convenient to create a single waste processing plant.

Waste Water Treatment

Untreated waste discharge was a widespread national condition into the 1970s that resulted in the 1972 Clean Water Act (Federal Water Pollution Control Act Amendment) and NPDES (National Pollutant Discharge Elimination System). People will recall of that time that contact with the Merrimack River was generally avoided, but the new regulations required creating treatment systems that would address both domestic and industrial contaminants. Locally, that was accomplished via the 1976 waste water treatment plant on Merrimack Street, at the downstream end of the already existing gravity powered drainage system.

The new system had to separate waste drains from storm drains, to prevent both rainwater significantly increasing treatment cost, and large storm runoffs totally overwhelming the plant. (Old such connections are still occasionally found.) Fortunately, the town had been reasonably adhering to that for much of the century. The waste system consists of about 60 miles of pipe, with 26 pumping sub-stations that collect local drainage in low areas where it must be pumped uphill to reach the gravity system. Average daily flows are 2.4 million gallons, with a peak capacity of 8.4 million gallons.

The treatment plant pumps up the pressure to screen the inflow and remove grit. Biological material is then treated by an activated sludge process, and finally is disinfected with sodium hypochlorite. The sludge is aerobically digested to reduce both organic solids and the number pathogenic micro-organisms, the sludge then settling in sedimentation tanks. It is then dewatered by centrifuge, and shipped to the Agresource compost facility in Ipswich.

Separately, an outsource program coordinates with industrial users to independently extract industrial waste and heavy metals themselves, prior to discharging their waste into the town system. These activities are periodically monitored and verified by sample testing.

Appendix 1

Water Company Charters

The Properties of Amesbury Ferry Aqueduct - 1798

1798. — Chapter 21.

[May Session, ch. 22.]

AN ACT AUTHORIZING JAMES BAYLEY AND OTHERS TO CONDUCT WATER IN SUBTERRANEAN PIPES WITHIN THE TOWN OF AMESBURY.

SECT. 1ST. *Be it enacted by the Senate and House of Representatives in General Court Assembled, & by the Authority of the same,* that James Bayley, David Lowell, Joseph Morse, Joseph Hoyt, Nathan Long, Eli Gale and Willibee Hoyt all of Amesbury in the County of Essex, with such other persons as may become proprietors in the said Water Works, be and they hereby are incorporated a body politic for the purpose of conveying Water by pipes within the Town of Amesbury, by the name of “the Proprietors of Amesbury ferry Aqueduct” and by that name may sue & be sued to final Judgment and execution, and do and suffer all matter acts and things which bodies politic may or ought to do or suffer—*provided* that nothing in this Act shall authorize said Corporation to enter upon or use for that purpose the land of any person without licence therefor first had of the proprietors of such land.

SECT. 2D. *Be it further enacted,* that any three of the persons above named, may by notification to be posted up at the house of Ezra Worthen Innholder in Amesbury call a meeting of the said Proprietors to be holden at any suitable time & place within said Town of Amesbury seven days at least after posting up such notification; And the said Proprietors by a Major vote of those present accounting one Vote to each Share, shall chuse a Clerk, agree upon a mode of calling future meetings of said Proprietors, & may also elect any other Officers which to them shall appear necessary for carrying into effect the object of thier incorporation, may enjoin & order fines & penalties for the breach of any of their rules and by-laws not exceeding ten Dollars for any one breach thereof. And all persons appearing at any of said Meetings to represent any

of said Proprietors shall have an appointment in writing Signed by the person so to be represented which shall be filed with or recorded by the Clerk of the Corporation, whose duty it shall be fairly & truly to enter & record in a book to be kept for that purpose this Act & all rules & by-laws votes & proceedings of said Corporation — And the Clerk chosen as aforesaid shall be sworn to the faithful discharge of the duties of his Office.

SECT. 3D. *Be it further enacted* that the said Proprietors be & they are hereby authorized to enter upon & dig up any High-way for the purpose of placing such pipes as may be necessary to complete said Aqueduct or for repairing the same, *provided* they do not thereby in the least impede the passing of travellers.

SECT. 4TH. *Be it further enacted* that any person who shall wilfully injure said Aqueduct shall be subject to the same penalties as are provided in the second section of an Act entitled “an Act for the more effectually preventing trespasses in divers cases” passed in the year of our Lord One thousand seven hundred & eighty five, and shall be liable to make good all damages done to said Proprietors.

SECT. 5. *And be it further enacted* that any share or shares in said Property shall be liable to attachment on Mesne Process & such attachment shall be made by leaving an attested Copy of such process with the Proprietor’s Clerk at the time of such attachment: & such share or shares may be Sold on Execution, in the same manner as is or may be provided for in the Sale of personal property by Execution, the Officer making Sale leaving a Copy of the Execution with his return on the same with the Clerk of the proprietors within ten days after such Sale.

SECT. 6TH. *And be it further Enacted* that the mode of Selling or transferring Shares in said Corporate property shall be by deed & acknowledged before a Justice of the peace & recorded by the Clerk of said Proprietors in a book kept for that purpose. *Approved June 27, 1798.*

Powow Hill Water Company – 1882 News Article

WATER WORKS. The time is at hand when this town will be called upon to decide upon the building of Water Works. We are informed on reliable authority that the necessary amount of capital has been subscribed in the village to warrant success, provided the two towns will vote \$1500 yearly for the use of the water for fire purposes. The Company will lay the pipes, build a reservoir on Powow Hill with sufficient storing capacity for all purposes and pipe the streets. The water will be of the purest quality and furnished at reasonable rates to all.

Pure water is one of the best conditions to good health, and when you can have it brought into your house, and can use it in decorating your lawns by fountain sprays, or its refreshing flow greet the thirsty traveler by the roadside, it is invaluable. If to all these inducements is added the superior protection against the fire flood it will afford you, then upon the matter of economy it commends itself to every property owner.

Seven-eighths of the valuation of the towns of Amesbury and Salisbury is located in the two mill villages. Here also is the greatest risk from fire, and while the farming communities do not share in this risk they are equally interested in voting proper protection.— Let a fire sweep out our carriage industry and the percentage of loss on the valuation must be added to real estate, and the farmers would suffer.

and the farmers would suffer.

Now, taking the valuation of the present year as a basis and the small tax of 75 cents on each \$1000 of property will give us \$1500. But with the system of water works proposed a saving of at least \$400 could be secured to the town over the present system, and the actual expense would be only \$1100. And for this sum a first-class system of water works could be built equalled only in capacity and price by the famous water works in the city of Montreal, Canada.

One other matter concerns the dwellers on the hillside—and a large portion of our dwelling are so located—that is the purity of the water you are now drinking. From personal observation we are convinced that very many wells are contaminated by foul drainage. In one locality where the water from a well was pronounced "clear and cold," there was located within two rods, four vaults and two pig pens. A few years ago a popular well on High Street, near Market Square, used many years by householders and traders, was ascertained to be badly contaminated and it was closed up. Look at the locality of your good wells and ask if it is possible to have pure water from them.

—The Massachusetts Journal, at the village

Pg. 2 of The Villager, published in Amesbury, Ma. On Thursday, June 15th, 1882.

This paragraph alludes to property tax valuations for the new water system comparing favorably to those for the current system, implying taxes levied for the fire hydrant system then connected to textile mill pumps.

Elsewhere, the article extols the virtues of clean and reliable water to be supplied by the new water works, charted the following year (1883) as the Powow Hill Water Co.

Powow Hill Water Company - 1883

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1883. — CHAPTER 161.

AN ACT TO INCORPORATE THE POWOW HILL WATER COMPANY.

Be it enacted, etc., as follows:

SECTION 1. William E. Biddle, Jacob R. Huntington, Marquis D. F. Steere, Richard F. Briggs, E. Ripley Sibley, and their associates and successors, are hereby made a corporation by the name of the Powow Hill Water Company, for the purpose of furnishing the inhabitants of the towns of Amesbury and Salisbury with water for the extinguishment of fires and for domestic and other purposes; with all the powers and privileges, and subject to all the duties, restrictions and liabilities set forth in all general laws which now are or may hereafter be in force applicable to such corporations.

SECTION 2. The said corporation, for the purposes aforesaid, may take, by purchase or otherwise, and hold, the water of the east branch of Powow River in the town of Salisbury, known as "Back River," at a point on said river known as "Clark's Pond," and the water rights connected with any such water sources, and also all lands, rights of way and easements, necessary for holding and preserving such water, and for conveying the same to any part of said towns; and may erect on the land thus taken or held, proper dams, buildings, fixtures and other structures, and may make excavations, procure and operate machinery, and provide such other means and appliances as may be necessary for the establishment and maintenance of complete and effective water works; and may construct and lay down conduits, pipes and other works under or over any lands, water courses, railroads, or public or private ways, and along any such ways in such manner as not unnecessarily to obstruct the same; and for the purpose of constructing, maintaining and repairing such conduits, pipes and other works, and for all proper purposes of this act, said corporation may dig up any such lands, and, under the direction of the board of selectmen of the town in which any such ways are situated, may enter upon and dig up any such ways in such manner as to cause the least hindrance to public travel on such ways.

SECTION 3. The said corporation shall, within sixty days after the taking of any lands, rights of way, water rights, water sources or easements as aforesaid, otherwise than by purchase, file and cause to be recorded in the registry of deeds for the county within which such lands or other property is situated, a description thereof sufficiently accurate for identification, with a statement of the purpose for which the same were taken, signed by the president of the corporation.

SECTION 4. The said corporation shall pay all damages sustained by any person in property by the taking of any land, right of way, water, water source, water right or easement, or by any other thing done by said corporation under the authority of this act. Any person sustaining damages as aforesaid under this act who fails to agree with said corporation as to the amount of damages sustained, may have the damages assessed and determined in the manner provided by law when land is taken for the laying out of highways, on application at any time within the period of three years from the taking of such land or other property, or the doing of other injury, under the authority of this act; but no such application shall be made after the expiration of said three years. No application for assessment of damages shall be made for the taking of any water, water right, or for any injury thereto, until the water is actually withdrawn or diverted by said corporation under the authority of this act.

SECTION 5. The said corporation may distribute the water through said towns or either of them; may regulate the use of said water and fix and collect rates to be paid for the use of the same; and may make such contracts with the said towns or with either of them or with any fire district that is or may hereafter be established therein, or with any individual or corporation, to supply water for the extinguishing of fire or for other purposes, as may be agreed upon by said towns or either of them, or such fire district, individual or corporation, and said corporation.

Powow Hill Water Company - 1883

SECTION 6. The said corporation may, for the purposes set forth in this act, hold real estate not exceeding in amount ten thousand dollars; and the whole capital stock of said corporation shall not exceed seventy-five thousand dollars, to be divided into shares of one hundred dollars each.

SECTION 7. Whoever wilfully or wantonly corrupts, pollutes or diverts any of the waters taken or held under this act, or injures any structure, work or other property owned, held or used by said corporation under the authority and for the purposes of this act, shall forfeit and pay to said corporation three times the amount of damages assessed therefor, to be recovered in an action of tort; and upon conviction of either of the above wilful or wanton acts shall be punished by a fine not exceeding three hundred dollars or by imprisonment not exceeding one year.

SECTION 8. The said corporation may purchase from the owner of any water pipes now used in furnishing water for the purpose of extinguishing fires in either of the said towns, all the estate, property rights and privileges of such owner, and by such purchase shall become subject to all the liabilities and duties to such owner appertaining.

SECTION 9. The said corporation may issue bonds, and secure the same by a mortgage on its franchise, and other property, to an amount not exceeding its capital stock actually paid in and applied to the purposes of its incorporation.

SECTION 10. The said towns shall have the right, at any time during the continuance of the charter hereby granted, to purchase the corporate property and all the rights and privileges of said corporation at a price which may be mutually agreed upon between said corporation and the said towns; and the said corporation is authorized to make sale of the same to said towns, or either of them.

In case said corporation and said towns are unable to agree, then the compensation to be paid shall be determined by three commissioners, to be appointed by the supreme judicial court, upon application of either party and notice to the other, whose award, when accepted by said court, shall be binding upon all parties. This authority to purchase said franchise and property is granted on condition that the same is assented to by each of said

towns, by a two-thirds vote of the voters present and voting thereon at a meeting called for that purpose.

SECTION 11. The county commissioners for the county within which any land, water or water rights taken under this act is situated, shall, upon application of the owner thereof, require said corporation to give satisfactory security for the payment of all damages and costs which may be awarded such owner for the land or other property so taken; but previous to requiring such security the county commissioners shall, if application therefor is made by either party, make an estimate of the damages which may result from such taking, and the county commissioners shall in like manner require further security, if at any time the security before required appears to them to have become insufficient; and all the right or authority of said corporation to enter upon or use such land or other property, except for making surveys, shall be suspended until it gives the security so required.

SECTION 12. This act shall take effect upon its passage.

Approved May 3, 1883.

Appendix 2

Sanborn Water System Notes

Sanborn 1885



NOTE

Water Supply: 110 DOUBLE HYDS. SUPPLIED BY A RESERVOIR, CAPACITY: 1,800,000 GAL'S, AT AN ELEVATION OF 248' ABOVE THE MARKET SQUARE. WATER IS PUMPED FROM 36 2" DRIVEN WELLS BY A DOUBLE WORTHINGTON PUMP, WHICH CAN PUMP DIRECTLY INTO THE MAINS. 8 MILES OF PIPE & 30 GATES, ALSO A NUMBER OF HYD'S FED BY THE MILL PUMPS.

Sanborn 1894

Copyright 1894 by the Sanborn-Perris Map Co. Limited.

Population 11000. Prev. Winds West.

Water Facilities. Good, Gravity System. Reservoir, 1,800,000 Galls. cap'y $\frac{3}{4}$ mile N. W. of Square, elev. 260' above Square. Water pumped from driven wells, by Worthington Duplex Pumping Engine, which also pumps direct into mains. 14 Miles of Water Pipes, 4" to 10" Diam. 140 Double Hydrants. Fire Pressure at Market Square, 120 lb. per Sq. Inch.

There is also an independent system of pipes and hydrants connected with the mill pumps.

Fire Department. Volunteer 1 Chief, 4 Assistants, 75 Call men. Gamewell Fire Alarm System. 15 Boxes. 4 Hose Ho's 10 Horses. 2 Hand Engines. 1 Hook & Ladder Truck. 4 Independent Hose Wagons. 6000' 2 1/2" Cotton Hose, in good order. Town is patrol by night watchmen. 6 Babcock Extinguishers.

Sanborn 1889



NOTE.

WATER SUPPLY: 120 DOUBLE HYDTS. SUPPLIED BY A RESERVOIR CAP 1,800,000 GALLS. AT AN ELEVATION OF 248' ABOVE THE MARKET SQ. WATER IS PUMPED FROM 36 2" DRIVEN WELLS BY A DOUBLE WORTHINGTON PUMP WHICH CAN PUMP DIRECTLY INTO THE MAINS. 8 MILES OF PIPE & 30 GATES, ALSO A NUMBER OF HYDTS. FED BY THE MILL PUMPS.

Copyright 1899, by the Sanborn-Perris Map Co. Limited.

Sanborn 1899

Population 11,500. Prev. Winds, West.

WATER FACILITIES. Gravity system of water works. Reservoir capacity 1,800,000 Galls, located $\frac{3}{5}$ Mile N.W. of Square at an elevation of 260 ft. above same. Water pumped from driven wells by Worthington Duplex Pumping Engine, which also pumps direct to mains. 17 Miles of Water Pipes, 4" to 12" diam. 141 Dble Hydrants. Fire pressure at Market Square 120 lbs per Sq. Inch.

FIRE DEPARTMENT, Volunteer, 1 Chief, 2 Assistants, 70 Call Men. Gamewell Fire Alarm System, 17 Boxes, 4 Hose Houses, 10 Horses, 2 Hand Engines, 1 Hook & Ladder Truck, 4 Independ't Hose Carts, 7000 ft $2\frac{1}{2}$ " Cotton Hose in good order, 8 Babcock Extinguishers.

Town is patrolled by night watchman.

Copyright 1904, by the Sanborn Map Co.

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Sanborn 1904

Population 11,500, Prevailing Winds, W.

WATER FACILITIES: Gravity system of Water Works through mains owned and maintained by Pawow Hill Water Co. Two pumping stations equipped with Worthington Duplex Pump at each, which draw from driven wells, equipped with Air Compressor. Water is pumped to a series of three reservoirs $\frac{3}{5}$ miles N.W. of Market Sq. the highest elevated 260ft. above grade at Square, Capacities, 1,800,000, 1,000,000 and 1,000,000 gallons respectively. 17 miles of mains 4" to 12" in diameter 142 hydrants. Normal pressure 55 lbs. per sq. in. from lower reservoir but a fire pressure of 120 lbs may be obtained by opening gate of higher level basin.

FIRE DEPT: Volunteer. One chief, two assistants, 55 call men, 10 horses. One Amoskeag second class steam fire engine. One Hook and Ladder Truck. Four independent Hose Carts. 7000 ft. $2\frac{1}{2}$ " cotton hose in good condition. 15 Babcock fire extinguishers. Gamewell fire alarm system. 22 boxes. Town is patrolled by night police.

Sanborn 1909*Population 10000 Prevailing Winds West***WATER FACILITIES**

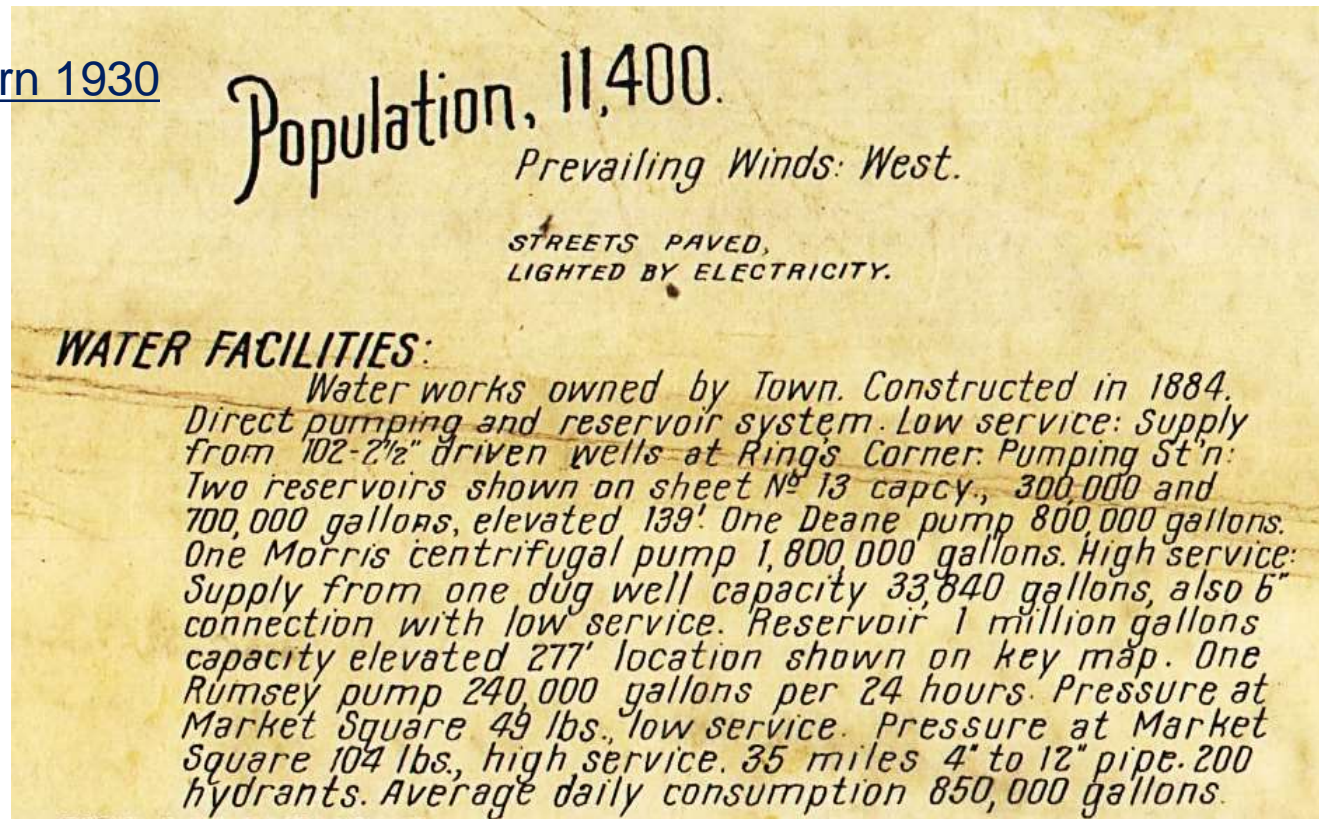
Gravity system; Water works owned by town and constructed 1884. Supply taken from six driven wells; three located at Powow Pumping Station and three at Market St. Pumping Station and pumped by three Worthington pumps of one million gallons capacity each per 24 hours, to a series of three reservoirs located $\frac{3}{4}$ of a mile N.W. of P.O. The largest has a capacity of 1,800,000 gallons & an elevation of 260 ft. above street at P.O.; remaining two have a capacity of one million gallons each and elevation of 128 ft. Average pressure from lower reservoirs about 55 lbs per sq. inch. A fire pressure of about 120 lbs. per sq. inch may be obtained by opening gate of higher level basin. 19 miles of pipe from 4" to 12" diameter. 143 hydrants. Daily consumption about 350,000 gallons.

Sanborn 1918*Population 10,000***PREVAILING WINDS, WEST**

WATER FACILITIES, Direct pumping and reservoir system of water works owned by the town, constructed in 1884. Low Service, - Supply from 45 - 2 1/2" driven wells at Rings Corner Pumping Station. Two reservoirs shown on Street N^o 13, cap's 300,000 galls. and 700,000 galls elevated 139 ft. One Deane pump, capy 500,000 galls. One Ruinsey triplex pump, capy 900,000 galls. High Service, - Supply from one dug well, capy 33,840 galls, also a 6" connection with high service reservoir 1,000,000 galls. capy, elevated 277 ft. shown on key map. One Ruinsey pump, capy 177,480 galls. per 24 hours.
24 miles of water pipe 4" to 12" diam.
161 Hydrants.

Low service pressure at Market Sq. 49 lbs
High " " " " " 104 lbs
Average daily consumption 580,000 galls.

Sanborn 1930



Sanborn 1930

<u>AMESBURY</u>	
ESSEX COUNTY, MASSACHUSETTS	
NEW REPORT, APRIL, 1958	
<u>CITY IN GENERAL</u>	
POPULATION	11,189 (1950 U. S. Census)
METEOROLOGY	Prevailing winds W.
TOPOGRAPHY	Level
STREETS	Approximately 25% streets unimproved.