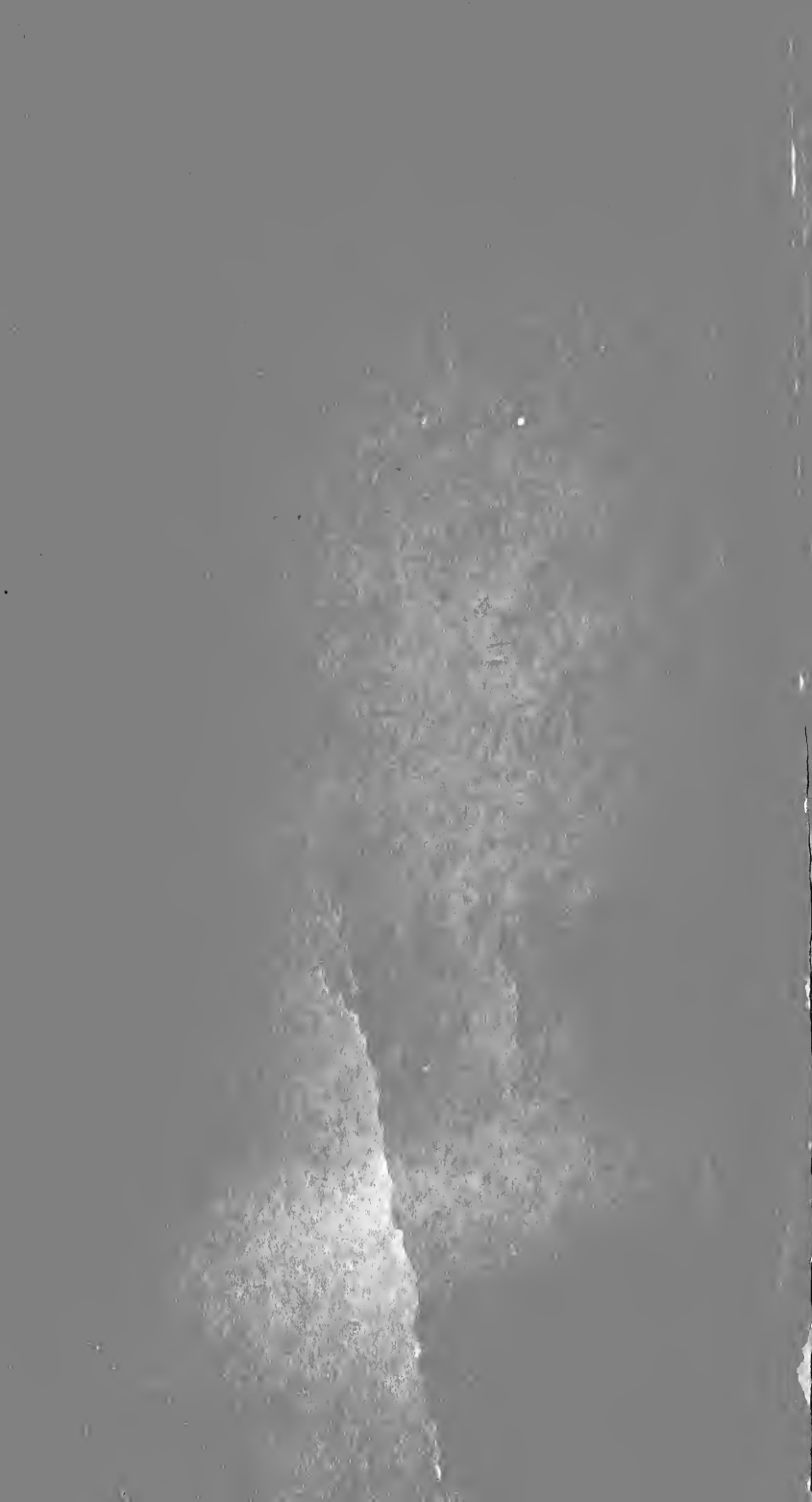


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P A P E R S

RELATING TO THE

INTRODUCTION OF PURE WATER.

BOSTON:

JOHN H. EASTBURN, CITY PRINTER,

No. 18 State Street.

1838.

CITY OF BOSTON.

MR. EDDY'S COMMUNICATION.



In Common Council, March 1, 1838.

The following document submitted by Mr. Lincoln, being a communication addressed by R. H. Eddy, to the Chairman of the Committee on Water, relating to crossing Charles River by iron pipes through a brick gallery under the same, for the purpose of introducing pure water into the city, was referred to the Standing Committee on Water, and 300 copies ordered to be printed for the use of the council.

Attest, RICHARD G. WAIT, *Clerk C. C.*

To SAMUEL A. ELIOT, Mayor, and Chairman of the Standing Committee for supplying the city with Soft Water.

SIR,

Knowing the deep interest you take in the introduction of water into our city, and believing it is

your warmest desire to accomplish the same through the best system of works, I feel that any information I can impart will be cheerfully received by you, and discussed without prejudice.

Sometime about the year 1825, as you may be aware, Mr. Treadwell was appointed by the city authorities to investigate the subject and report on the best mode of supply. Spot Pond was presented to his notice, and with the assistance of Mr. Moody, he made estimates on this source. This project seems to have been abandoned through the apathy of the councils, or for some other reasons. During Mr. Lyman's administration, Mr. L. Baldwin was engaged to survey and report on the best mode of supply, according to his judgment. Of the result and nature of his report you are aware.

The generality of persons, seem either to have lost sight, or to have entirely overlooked the expense of raising water by steam power. I presume they have assumed for their standard of comparison, the old works at Fair Mount, Philadelphia, where engines and boilers ill adapted to the purpose were used, consuming immense quantities of fuel. As well might we base our calculations of the effective power of a locomotive engine and rail road, at the present day, on the performances of the same machine twenty years ago.

Disagreeing entirely with Mr. Baldwin as to the cost and propriety of a supply from the sources he recommended, I mentioned my views to your predecessor and several gentlemen of the Water Committee of 1835. The conversations with them resulted in the survey and report which were made by me to the City Government.

The ideas of combining Spot and Mystic Ponds ; of using the former for the *high service forever*, and also for both *high and low*, until such time as it might be requisite to employ the latter for the low service, were original with me. According to my plan, the water was to be forced into a reservoir on Bunker Hill, 60 feet above high tide ; of course, at about *one half the expenditure* of fuel required to raise the same 120 feet. The coal used could be delivered at the mouth of the furnace from the vessel, without any expense of transportation to a distance from the wharf.

The only plausible objection, to my knowledge, ever offered against my project, consisted in the mode of passing Charles River, near Warren Bridge.

At the time I made my report, I had in contemplation various methods of crossing these navigable waters, but being ordered to make the survey and report during the winter season, I had not proper opportunities to make such examinations as I could have desired. For my own part, I could perceive then no very alarming difficulties attending any of the various ways presented. I therefore reported on one, and supposed should the city authorities or Hydraulic Company undertake the erection of works from these ponds, time and reflection would develop the best and most economical mode of crossing the river.

In conversation with some of my friends, since my report was made, I originated the idea of a small tunnel, gallery or drift under the bed of the river, and I also informed them that by a cursory examination of the subject, I was satisfied the river might be crossed for a sum not far from fifty thousand dollars.

Having since communicated with many practical miners and intelligent persons, and submitted my plans to their inspection, I *have found several, one gentleman in particular, who will readily undertake to build the wells and gallery for \$60,000. They are also ready to give any reasonable security for the full and faithful performance of the same.*

On recurring to data in my possession, relative to the great tunnel under the Thames River, at Rotherhithe, I find the different strata of earth in a transverse section of the river are as follows.

	ft.	in.
Upper or stratum No. 1, consisting of brown clay,	9	0
No. 2. Loose gravel, with a large quantity of water,	26	8
No. 3. Blue alluvial earth, inclining to clay,	3	0
No. 4. Loam,	5	1
No. 5. Blue alluvial earth, inclining to clay, mixed with shells,	3	9
No. 6. Calcareous rock, in which are imbedded gravel stones, and so hard as to resist the pickaxe, and to be broken only by wedges,	7	6
No. 7. Light colored muddy shale, in which are embeded pyrites, &c.	4	6
No. 8. Green sand, with gravel and little water,	0	6
No. 9. Green sand,	8	4
	<hr/>	<hr/>
	68	4

The top of the brick work of the Thames tunnel is represented by the section to be but 10 feet below the river bed in the deepest part of the stream, over which at high tide rests a depth of water of thirty-

five feet. The excavation is 38 feet in breadth, and $22\frac{1}{2}$ feet in height, presenting a sectional area of 850 square feet, which will be found to be more than *ten times* the area of the proposed drift under Charles River. The greatest depth of the top of the Thames tunnel below the bed of the river appears not to exceed 20 feet, varying to ten, as above mentioned. Thus it will be observed that nearly the whole of this great work is carried through stratum No. 2, consisting of loose gravel, with a large quantity of water. The stratum No. 1, of brown clay, 9 feet thick, is the only covering above, which prevents any irruption of top water.

By careful soundings made near Warren Bridge at 50 feet apart, the rod near Charlestown side struck hard blue clay in 5 feet below low water mark, after passing through two feet of mud. At 450 feet further, the clay was reached in 25 feet below low water mark, the rod passing through one foot of mud. Between the draw and Boston abutment at a distance of 300 feet from the point last mentioned, the clay was reached at 34 feet 4 inches below low water mark, the rod passing through 9 feet of mud. At 250 feet further it touched clay 28 feet below low water, after penetrating 2 feet of loose gravel.

At Boston shore, 150 feet further distant, the clay was found at 25 feet, with a stratum of mud of 15 feet over the same. The whole distance across the river is about 1400 feet. From the above it will be seen that the clay in the deepest part of the river lays about 50 feet below the top of the bridge. Then, if for full security against accident, we place the top of the brick gallery at 20 feet below the top of the

clay, we shall have double the thickness of clay above our excavation, (only 9 feet wide) that there is over the top of the arch of the Thames tunnel, where the excavation is 38 feet wide.

Knowing the character of the earth on each side of the river, there can be no apprehensions of meeting with any serious difficulty from water.

Prior to the commencement of the Thames tunnel a drift way was carried under the river at Rotherhithe, a distance of 1,010 feet and within 130 feet of the opposite shore. Meeting with a body of quicksand, being interrupted in the operation by the influx of water, and having no very great inducement to fill the breach, and continue the excavation, it was abandoned. The above drift proceeded at the rate of 4 to 10 feet per day, only one man being employed in digging the same.

The top and sides were shored with timber and plank similar to the present mode of drifting in mines, no brick arch being turned therein.

The success which was met with in this undertaking laid the foundation for the present magnificent work now erecting under the direction of M. J. Brunel, Esq.

The plan which I propose of crossing the river at some suitable place in the vicinity of Warren or Charles River Bridges is more fully explained as follows.

On the shore at each side of the river a well of 10 feet internal diameter, is sunk to a depth of 80 feet. A small circular gallery or tunnel of masonry 6 feet internal diameter proceeds in a horizontal direction from one of these wells to the other on the opposite

side. The water pipes pass down the well on the Charlestown side; thence through the under ground passage or gallery to the opposite well; rising up through the same and continuing from thence to any desired part of the city.

As the excavation for this drift way would only be about 9 feet diameter, in order to construct therein a brick gallery of 6 feet internal diameter; and as the earth removed would in all probability be a compact stiff clay, *it will at once be evident that it is in point of magnitude and cost, no Thames tunnel affair, but perfectly feasible and of simple construction.*

By a project of this nature every foot of the mains leading from the pond into the city, can be inspected and repaired whenever necessary.

A brick gallery 6 feet internal diameter will be sufficient for two trains of water pipes of 22 inches diameter, a main gas pipe for lighting Charlestown from the Boston Gas works, and sufficient space for workmen to pass throughout the same at any time for the purpose of repairing or examining the pipes.

Estimate of cost of a circular arched gallery under Charles River, 6 feet internal diameter, 3 courses of bricks, sides 12 inches thick, length 1500 feet.*

851 M of bricks a \$8,	\$6,808 00
------------------------	------------

Amount carried forward,

6,808 00

* Since the above was written it has been discovered that by crossing under the bed of the stream below or east of Charles River Bridge, or from the solid part of Gray's Wharf in Charlestown to the solid part of Brown's Wharf on the Boston side—the distance or length of brick gallery may be reduced to about 1,000 feet, thus saving from four to five hundred feet, which would materially lessen the above estimate of cost.

<i>Amount brought forward,</i>	6,808 00
Cement 2,127 bbls. a \$3,	6,381 00
Sand and clay, for puddling,	330 00
Laying bricks and tending per M, \$10,	8,510 00
Excavation a \$7 per lineal foot,	10,500 00
140 M brick or wells a \$8,	1,120 00
Digging each well at \$1,000,	2,000 00
350 bbls. Cement a \$3,	1,050 00
Sand,	35 00
Laying bricks and tending a \$5 per M,	700 00
Cost of two steam engines with pumps for raising water, and fuel for same, deducting sale of same after com- pletion of work,	5,000 00
To which add for contingencies and extra work not enumerated,	15,000 00
	<hr/>
	\$57,434 00

The above sum of \$7 per lineal foot for the excavation of the drift, is obtained from data furnished me by one of the agents of the mining companies at Mansfield, and is the sum it costs them per foot for this size of drift. They pay about \$9 per foot when the excavation is through rock. Therefore if in our future calculations we assume the arched gallery to cost \$60,000, in all probability we shall not be far from truth.

In the late report of the Water Commissioners, we find it stated that the distance from the proposed reservoir on Walnut Tree Hill, to the reservoir on Beacon Hill, is 39707 feet, or 7, $\frac{52}{100}$ miles, by the way of the route over the Mill Dam. *All other things being the same*, if, instead of adopting this route, we

lay a pipe from the reservoir at Walnut Tree Hill, by the shortest route through Charlestown, under the river in the brick gallery; to the reservoir at Beacon Hill, we shall have saved a distance of at least $2\frac{1}{4}$ miles of pipe; which according to their estimate will cost	\$107,152 00
Stone Bridge over Charles River	14,000 00
Arches and additions required to cross sluice ways at Mill Dam	8,493 00
2 Culverts	1,000 00
Contingencies, 10 per cent.	13,064 50
	<hr style="width: 100%; border: 0.5px solid black;"/>
	\$143,709 50
From which subtract the cost of brick gallery under Charles River	60,000 00
	<hr style="width: 100%; border: 0.5px solid black;"/>
	\$83,709 50
	<hr style="width: 100%; border: 0.5px solid black;"/>

Thus is left a clear saving of 83,709 $\frac{50}{100}$ dollars at *the first outlay*, by the route through Charlestown, if a pipe of 22 inches is used.

For reasons stated in the report of the Water Commissioners, they affirm "that by means of a main pipe extending from the city reservoirs to the source, of much smaller dimensions than would be required were no reservoir provided in the city; an abundant supply will be kept up at all times of the day, and a great saving of cost attained by this expenditure;" they also state they used the formulae of Prony in the calculations of the size of their pipes, and for the delivery of 2,592,000 gallons per day, a 22 inch main would be required.

By the formula $Q=38,116\sqrt{D^5j}$, where Q =the

discharge per second = 4.0103 cubic feet, D = the theoretical diameter, and $j = \frac{h}{l}$ or $\frac{\text{head}}{\text{length}} = \frac{22}{39707}$, we deduce D , or diameter = $1\frac{820}{1000}$ feet, or say 22 inches. Now let us deduce from the formula the proper theoretical size of a pipe from the reservoir at Walnut Tree Hill through Charlestown to Beacon Hill. Then the equation becomes $Q = 33,116 \sqrt{D^5 \frac{27}{27820} \left\{ \frac{\text{length of}}{\text{Route of pipe}} \right\}}$ and $D = 1\frac{695}{1000}$ feet, or say $20\frac{1}{2}$ inches.

Then from the above it will be clearly seen that there is a saving of $1\frac{2}{3}$ inches in the diameter of the pipe, which in the distance of 27827 feet will amount to \$33,300, reckoning weight of pipe and lead saved. Contingent expenses of 10 per ct. should also be added to above which increases the same to \$42,130. Then if we deduct \$7000 the amount to be expended in the extra thickness of the main through the brick gallery, we have \$35,130, which added to the above sum of \$83,709,50 gives 118,839 $\frac{50}{100}$ dollars, as the *actual amount saved by adopting the route from Walnut Tree Hill through Charlestown instead of that over the Mill Dam.*

From the above calculations of the discharge and size of pipes, it will at once be evident that the Water Commissioners have adopted the *theoretic* size of pipe, to insure the delivery of 4 cubic feet per second throughout 24 hours at the reservoir on Beacon Hill. As all the formulae of Du Buat, Prony and Etelwyn fail in giving true results, and on the authority of Mr. F. Graff of the Philadelphia Water works, neither come up to practice; particularly in long ranges of pipes where flexures and undulations abound, and as atmospheric air and incrustations of the internal surfaces of the pipes soon materially retard the flow of

water through the same, it behooves us not to stride over nor crawl under such difficulties, without *large conduits*.

The calculations for the size of main pipes for the Fair Mount Water works utterly failed, so that the corporation have since been obliged to lay down another main of 20 inches diameter. To be *certain* of a discharge of 4 cubic feet per second, would seem to require a material addition to the size of the main, when we take into consideration the effects of incrustation and resistance from other causes.

At page 32 of the Commissioners' report we find the following. "We have assumed the population at the end of ten years (*or* 1848) requiring a supply of water, will be 105,000, and that it will increase in ten more years to become 150,000. There will be required then on the average for that ten years (*or from 1848 to 1858*) 3,619,000 gallons a day; or about 1,119,000 a day more than the average quantity provided for, "during the first ten years. To furnish this quantity, *there will be required in 1848, a new steam engine and pumps at Mystic Pond, which with buildings will cost 45,000; and a pipe from Walnut Tree Hill reservoir to the reservoir on Beacon Hill, which will cost \$358,157.*" They also affirm in another part of the report that the *waters of Mystic Pond will not be required for four years or until 1842*, from which time to 1848 there will be an average of 650,000 gallons per day pumped into the reservoir from Mystic Pond.

Now let us compare the cost of a brick aqueduct proceeding from the pond to steam-works at Bunker Hill, (where the water is to be forced into a reservoir

thereon,) with the cost of this extra pipe from the Walnut tree hill reservoir, in 1848, the time when the latter must be laid.

Cost of brick aqueduct from Mystic Pond to Bunker Hill, calculated to discharge $8, \frac{161}{1000}$ cubic feet per second, or 5,288,328 gallons per day.

4,333½ M bricks, at \$8,	\$34,668 00
Cement and laying same,	49,315 00
Trenching and filling,	32,100 00
Crossing Mystic River, &c.	3,500 00
Pipes from end of aqueduct to reservoir,	2,000 00
To which add for expenses not enumerated,	12,158 30
	<hr/>
	\$133,741 30

The above sum $133,741 \frac{30}{100}$ dollars would be expended in 1842; from which time to 1848, an interval of six years will elapse, when it will become requisite for the city to expend \$358,157 for the pipe from Walnut tree Hill to Beacon Hill. Then $\$133,741 \frac{30}{100}$ at interest for six years at 5 per cent., will amount to $\$173,863 \frac{69}{100}$; to which add \$7000 for extra thickness of pipe through brick gallery under Charles River, equals $\$180,863 \frac{69}{100}$; which subtracted from \$358,157, leaves $\$177,293 \frac{69}{100}$ *gained by the brick aqueduct at the expiration of ten years or 1848.* Moreover we have at command 7,388,328 gallons of water per day if required; so that if there should be any deficiency from Spot Pond, the same can always be relied on from Mystic Pond.

It is unnecessary for us in the above to take into account the pipe from the Bunker Hill reservoir to the Boston side of Warren Bridge; for this may be considered as belonging to the distribution of Charles-

town, and as its course would be through the Main street or that portion of Charlestown where the water would be mostly taken, it would undoubtedly afford as good interest on its cost as any other main pipe.

Next let us examine the difference in cost between a main pipe from Spot Pond [via Medford turnpike, through reservoir on Bunker Hill] to the Boston shore near Warren or Charles River Bridge; and one from the same source through Walnut tree Hill reservoir [over the Mill Dam] to reservoir on Beacon Hill.

If we examine the estimate for the main of 22 inches diameter, as exhibited by report of commissioners, we shall find by making a proper allowance for teaming pipes, and for air and stop cocks, that they would estimate the pipe to cost, laid, (contingencies 10 per cent. included) to be \$601,414 ⁶⁹/₁₀₀, the distance being 56,496 feet.

The distance from Spot Pond to the Boston shore near Warren Bridge, may be taken at 34,534 feet, and a conduit pipe on this route would cost as follows.

33,174 feet of pipe, 22 inches diameter, a \$9,02 per foot, (the sum such pipe is estimated by the Commissioners to cost)	\$299,229 48
Pipe under Charles River, (extra thickness)	17,416 44
Damages to land,	1,000 00
Air and stop cocks, teaming pipes, &c.	4,000 00
Brick gallery and wells at Medford River, near Medford Bridge, crossing canals, &c.	14,000 00

Contingent expenses, at 10 per cent. 33,514 59

\$369,210 41

Therefore the whole cost of this pipe, is the above sum of \$369,210 $\frac{41}{100}$; to which add \$60,000 cost of gallery under Charles River, equals \$429,210 $\frac{41}{100}$, which subtracted from the cost of main on route through Walnut Tree Hill, and over Mill Dam, as proposed by the Water Commissioners, leaves the sum of \$172,204 $\frac{19}{100}$ *actually saved*.

Let us suppose for the sake of fair comparison the pipe to be 34,534 feet long, or that the distance between Spot Pond and Bunker Hill Reservoir is equal to 34,534 feet, that the head between the pond and reservoir is 35 feet. Then by formula of Prony, $Q = 38,116 \sqrt{D^5 h}$; $D = 1 \frac{613}{100}$ feet or $19\frac{1}{3}$ inches = diameter of a pipe calculated to deliver 4 cubic feet per second, or 2,592,000 gallons per day. From whence it will be discovered there is a difference of $2\frac{2}{3}$ inches between the diameters of the two conduits; which will be found to be equal to a difference of cost of \$57,326 $\frac{44}{100}$, which should be added to the above sum of \$172,204 $\frac{19}{100}$ = \$229,530 $\frac{63}{100}$, *or the saving at the first outlay in iron conduit pipes*.

It must be understood, as was before mentioned, that the theoretic discharges and sizes of pipes are compared; as we may infer, from the commissioners assertions, that such pipes will be of sufficient diameters to ensure a supply when the water is continually running through the same for 24 hours.

The above difference of cost between the two routes, viz. \$229,530 $\frac{63}{100}$ put at interest at 5 per cent. for four years, amounts to \$275,436 $\frac{75}{100}$. This may

be more properly considered as the amount saved between the routes at the period where it shall become necessary to erect steam works to supply water from Mystic Pond. If we continue the calculation of interest on $\$229,530 \frac{63}{100}$, the amount at the end of ten years, or 1848, will be $\$344,295 \frac{94}{100}$.

Then by combining the amounts saved by the brick aqueduct, from Mystic Pond to Bunker Hill, and the conduit pipe from Spot Pond, through Charlestown, as follows,—

Brick Aqueduct,	\$177,293 31
Iron Conduit Pipe,	344,295 94
	<hr/>
	\$521,589 25

we obtain $521,589 \frac{25}{100}$ the sum saved the city at the end of ten years, (or 1848) *in conduits alone by adopting the route through Charlestown, or through the brick gallery as proposed under Charles River.*

The next subject requiring examination, is the *saving of cost of reservoirs.*

It is stated in the report of the Commissioners, that a reservoir 250 feet square and 10 feet deep will be required at Walnut Tree Hill, and that this reservoir will cost \$13,000. The price to be paid for the land for the above reservoir, is not stated in a manner to enable us to ascertain what the same would amount to. In all probability, we shall not be far from truth, if we assume it, together with the cost of land at Mystic Pond, required for steam works, to be equal to \$5,000. The reservoir will then cost \$18,000. If we then consider a sufficient quantity of land and flats at Bunker Hill, together with a wharf, to cost

\$18,000; and the same kind of reservoir to be built thereon, the expenditure for land and reservoir will be \$31,000, to which add 10 per cent. for contingencies, equals \$34,100.

The Reservoir at Bunker Hill will be situated at a less distance from the head of State street, than the Fair Mount reservoirs are from Chestnut street, Philadelphia; and thus any expenditure for reservoirs in the city may be avoided.

The Commissioners estimate the reservoirs on Beacon and Fort Hills to cost for land and structures, including the amount allowed for contingent expenses 10 per cent. = \$85,440 $\frac{84}{100}$. The difference between this latter sum and \$34,100, the cost of land and reservoir at Bunker Hill, is \$51,440 $\frac{84}{100}$, which may be considered the sum saved by the reservoirs at the first outlay. If we add to the above the interest on the same for 10 years, the amount will be \$82,305 $\frac{34}{100}$, which is the *sum saved at the end of ten years, or 1848.*

The report of the Water Commissioners also states that the actual expense of fuel for pumping 650,000 gallons of water per day for the year, will be \$790.

They assume \$10 to be the value of a chaldron of coal at Mystic Pond; from which it is evident they require 79 chaldrons per year. The same coal may be afforded, delivered at the wharf of the steam works, at Bunker Hill, for \$1 $\frac{50}{100}$ less in the chaldron, creating a saving of \$118 $\frac{50}{100}$ per year, amounting with interest, at the expiration of 6 years, or 1848, to \$806. If we continue our calculation for the next ten years, we shall find the difference would be very materially augmented, and always be an increasing

expense, as the city shall require a greater supply of water. I have thus far, in my comparison, supposed the water which is to be raised, to be elevated 120 feet. If, as I stated in my report to the city government in 1835, Spot Pond will always supply the *high service* of the city, or that part of it situated on ground of 20 feet and upwards above high tides; the waters of Mystic Pond need be raised only 60 feet, of course at one half the expenditure of fuel required to elevate the same quantity 120 feet. So that here is a subject for still further consideration, but on which I deem it unnecessary to scrutinize more particularly.

Having before shown that there will be an actual saving of $\$229,530 \frac{63}{100}$, by the iron conduit pipe from Spot Pond, through Charlestown to Boston, over that from the same pond, by the way of Walnut Tree Hill, over the Mill Dam to Boston, I shall proceed to ascertain what the city will gain at the expiration of four years, or in 1842.

The sum of $\$229,530 \frac{63}{100}$, put at interest at 5 per cent. for four years, or from 1838 to 1842, will amount to $\$275,436 \frac{75}{100}$. The estimated cost of the brick aqueduct from Mystic Pond to Bunker Hill, as before stated, is $\$133,741 \frac{30}{100}$, which subtracted from the above sum $\$275,436 \frac{75}{100}$, leaves $\$141,695 \frac{45}{100}$.

To this latter we must add the sum saved in reservoirs, together with 5 per cent. interest on the same for four years—the two latter amounting to $\$61,729$. Thus $\$141,695 \frac{45}{100}$ plus $\$61,729$, = $\$203,424 \frac{45}{100}$, which will produce yearly at 5 per cent. interest, $\$10,171 \frac{22}{100}$. The sum of $\$118,50$ per year, say in transporting fuel, should be added to $\$10,171 \frac{22}{100}$, amounting to $\$10,289 \frac{72}{100}$. On recurring to the Water Commis-

sioners report at page 72, we find they estimate the whole expenditure per year for coal, superintendant, engineman, wear and tear, insurance, &c., required to force 5,000,000 gallons 120 feet high through a 15 inch pipe, 8250 feet or $1\frac{562}{1000}$ miles long, to be \$11,808. To raise water 120 feet they assume the pressure to be overcome to be equal to a column of water 150 feet high; thus adding a pressure of a column of 30 feet, as an equivalent force for the friction and resistance of 8250 feet of pipe.

As the engines at Bunker Hill would be situated at only about 200 or 300 feet from the reservoir on top of the same, it is evident, that there will be required a much less expenditure of coal, to force any given quantity of water into Bunker Hill Reservoir, than there would be to elevate the same to the reservoir on Walnut Tree Hill. Therefore from the above examinations, the following conclusions are deduced.

The *mere difference* in expense saved at first outlay by an iron conduit pipe from Spot Pond, via Charlestown (through the brick gallery under Charles River,) over the one from Spot Pond by the Mill Dam or *route recommended*, will be sufficient when it shall become necessary to use the water of Mystic Pond, (or 1842) *to build the brick aqueduct of masonry therefrom to Bunker Hill, and supply the City of Boston for ever with 5,000,000 gallons of water from Mystic Pond free of any yearly expense*: whereas by the plan devised and reported by the commissioners, the city would be subject for the succeeding six years, to the annual cost of elevating 650,000 gallons a day, which would be a continual and increasing expense in proportion to the consumption.

As we are informed by the Water Commissioners, that the expenditure in 1842, for steam works at Mystic Pond, for one engine and pumps, sufficient to elevate 2,500,000 gallons per day if required; together with the pipe from the same to Walnut Tree Hill would be \$80,640, the same sum would be sufficient to furnish two engines and pumps at Bunker Hill of the necessary power to force 5,000,000 gallons into the reservoir thereon.

Any objections which may be raised against *forcing* water at Mystic Pond through a pipe 8250 feet, or $1 \frac{562}{1000}$ miles long, will not apply to the works at Bunker Hill, as the distance between the steam engine and reservoir is only a few hundred feet. Again, if it should be desirable to *lift* the water perpendicularly, and thereby render the duty of the engine precisely equal to that of the Cornish engines described in the report of the Water Commissioners, the same can be effected at a trifling expense, by excavating a small drift into the body of the hill, through which the brick aqueduct might communicate with a perpendicular shaft or pump well sunk in the engine house on top of the hill.

The above remarks are offered, not as intending to show in this particular instance that lifting the water would be preferable to forcing the same, but are only presented to exhibit how far objections to forcing the water through a very extended pipe will apply to the steam works at Bunker Hill.

In order to rebut any objections that may be raised against the aqueduct of masonry on account of the injurious effect of the cement on the water passing through the same, I have added the cost of an iron

pipe of sufficient size and thickness, under a fifteen feet head, to convey 5,000,000 gallons of water per day to Bunker Hill. If a dam is raised at Mystic Pond, six feet high, it is evident by laying the iron conduit to a proper depth, we can command a head of 15 feet from the pond, to the pump wells at Bunker Hill. We deduce under the considerations before enumerated the size of a pipe to deliver 5,000,000 gallons per day, to be 29 inches diameter. As the head and pressure are small, the thickness may be greatly diminished beyond that of a pipe under a head of 150 feet, so that we shall find on making a very liberal allowance for contingent expenses, that such a conduit when laid, will cost \$250,000.

The sum saved at first outlay, or in 1838, by a pipe from Spot Pond [via Bunker Hill,] under Charles River to Boston, over the one proposed to be laid on the route via Mill Dam, by the Commissioners, was before stated to be \$229,530 $\frac{63}{100}$, to which add saving in reservoirs \$51,440 $\frac{84}{100}$, we have \$280,971 $\frac{49}{100}$. This sum put at interest for four years, at 5 per cent. amounts to \$337,165 $\frac{76}{100}$. From this latter subtract \$250,000, the cost of iron conduit pipe, and we obtain a remainder of \$87,165 $\frac{76}{100}$. Now add to \$87,165 $\frac{76}{100}$, the cost of the pipe from Mystic Pond to reservoir on Walnut Tree Hill=\$35,640, and we obtain the sum of \$122,805 $\frac{76}{100}$, actually saved when it becomes necessary to use the waters of Mystic Pond. The interest at 6 per cent. on the above sum is \$7,368 $\frac{33}{100}$ per year.

The Commissioners assume the duty of the engine to be 60,000,000 lbs. of water raised one foot by one bushel of coal; from which it will be found that to

force 2,500,000 gallons per day to the necessary height into a reservoir on Bunker Hill, we shall require 372 chaldrons of coal per year; which at $\$8\frac{1}{2}$ the price of coal at Bunker Hill, will cost, $\$3,162$ 00	
Superintendent of engines per year,	1,000 00
3 Firemen a $\$1,50$ per day,	1,642 00
Wear, tear and insurance,	1,500 00
	<hr/>
Whole yearly cost,	$\$7,304$ 00

Then from the above calculations we arrive at the conclusion that the saving of expense of the first outlay (1833) between the iron pipe from Spot Pond through Charlestown, and the one as recommended by the Water Commissioners to be laid on the Mill Dam route to Beacon Hill, will be sufficient to lay an *iron conduit pipe* in 1842, (or when water is required from Mystic Pond,) from Mystic Pond to Bunker Hill free of any expense to the city: so that the city may then be considered to be supplied from the two sources Spot and Mystic Ponds with 4,600,000 gallons per day *free of expense*.

By the plan of the commissioners there will be the annual and increasing expenditure required to elevate 650,000 gallons per day.

Recapitulating the results herein before obtained, the amounts saved by adopting the Spot and Mystic Pond routes, through Charlestown [under Charles River in a brick gallery] to Boston, will be as follows.

1. By adopting the nearest route through Charlestown, for the main conduit pipe from Walnut Tree Hill Reser-

voir to Beacon Hill, over the route from the same, by way of Mill Dam to Beacon Hill Reservoir, \$118,839 50

2. Amount gained by a brick aqueduct from Mystic Pond to Bunker Hill at the expiration of 10 years, (or 1848) over the second main conduit pipe proposed by the commissioners to be laid at this period, 177,293 31

3. Amount gained at *first outlay* (or 1838) by an iron conduit pipe from Spot Pond, via Medford Turnpike and Bunker Hill to Boston [near Warren Bridge,] over one from the same source through Walnut Tree Hill [by the way of Mill Dam] to Reservoir on Beacon Hill, 229,530 63

4. Amount gained by the above in 10 years, (or 1848,) 344,295 94

6. Amount gained at *first outlay* by a reservoir at Bunker Hill over the reservoirs at Walnut Tree, Beacon and Fort Hills, 51,440 84

6. Amount gained by the above at the expiration of 10 years, [or 1848,] 82,305 34

7. Amount gained at the expiration of 10 years in transportation of fuel by establishing steam works at Bunker Hill, 806 00

8. The *mere difference* in expense at the *first outlay* by an iron conduit pipe from Spot Pond via Charlestown, through the gallery under Charles River, over one from Spot Pond via Mill Dam (or route recommended by Water Commissioners) will be sufficient, when it shall become necessary to use the water of Mystic Pond (or in 1842), to build the aqueduct of masonry therefrom to Bunker Hill, and supply the City of Boston forever with 5,000,000 gallons of water from Mystic Pond *free of any yearly expense*. Whereas, by the plan devised and reported by the Water Commissioners, the city would be subject, for the succeeding six years to the annual cost of elevating 650,000 gallons per day, which would be a continual and increasing expense in proportion to the consumption. Add to the above 2,100,000 gallons from Spot Pond and the amount becomes 7,100,000 gallons per day. By plan of the commissioners, the city could only command the average supply of 2,100,000 gallons per day free of expense.

9. The *mere difference* in expense saved at *first outlay* by an iron conduit pipe from Spot Pond via Charlestown, through the brick gallery under Charles River, over the one from Spot Pond via Mill Dam, (or route recommended by Water Commissioners) will be sufficient when it shall become necessary to use the water of Mystic Pond, (or in 1842) to provide and lay an iron conduit pipe from Mystic Pond to Bunker Hill and to force 2,500,000 gallons of water per day (*for ever*) into a reservoir on Bunker Hill, *free of any expense to the city*; so that the city may be considered to be supplied from the two sources

Spot and Mystic Ponds, with 4,600,000 gallons per day free of expense. Whereas by the plan of the Water Commissioners there will be an annual and increasing expenditure of forcing 650,000 gallons per day.

10. Lastly. The whole sum which the city would gain at the expiration of 10 years from the present time by adopting the routes of conduits from Spot and Mystic Ponds through Charlestown, in manner herein proposed by me, over the routes recommended by the commissioners, would be

\$604,700 59

I have no doubt from the haste in which these calculations have been made and the little time I have devoted to them, that small errors may have crept in unobserved; but should such be the case I am fully confident there is still sufficient latitude to allow for any diminution of either of the estimates; so that the final results herein obtained cannot be seriously affected.

I have never feared the result of an examination by fair and candid minds of the several water projects which have been proposed.

It has always been my firm belief that Spot and Mystic Ponds would eventually be adopted as the cheapest sources of supply; and now as this question appears settled, I hope the Water Committee will institute a careful comparison of the plan herein recommended, with that devised and reported by the commissioners.

The only subject at variance seems to be the mode of introduction, and if the Water Committee will

thoroughly examine the same, I feel as sanguine of the route through Charlestown as I alwas have been of the *mode* of introduction, by the combination of Spot and Mystic Ponds.

Another and material advantage connected with the route through Charlestown consists in supplying what may be considered in every respect other than name and government as a portion of Boston. Comparatively speaking, it must be an object of as great importance to the owners of real estate in Charlestown, as it is with us, to be able to command a copious supply of pure water for the promotion of health and protection against fire.

By the immediate distribution of water throughout the Mill Pond lands at the northern and western sections of the city, their value would be at once increased to a great extent; thus creating a large addition to the city revenue derived from taxes. Whereas if the water is introduced by the Mill Dam route, a considerable period will elapse before the pipes can be extended throughout the northern or that section suffering most for good water. As the Neck and other lands at the south end are partially supplied by the Jamaica Pond Aqueduct, it should be a subject of consideration in thus infringing on rights so long held and enjoyed to the injury of this corporation.

If one thousand families are at present receiving water by the works from Jamaica Pond, other portions of the city and such as are really suffering should receive first attention.

The naval interests of the United States at Charlestown, together with that of our shipping at the wharves in the vicinity of Commercial and India Streets, should be subjects of due consideration.

These are but few of the many advantages which might be enumerated in favor of the adoption of the project of introducing water into the city from Spot and Mystic Ponds, by a conduit pipe from the former source to Bunker Hill, and an aqueduct of masonry from Mystic Pond, together with the steam works before mentioned, and an arched gallery in the vicinity of Warren or Charles River Bridge.

In making this communication I have been solely actuated by a desire to place the subject in a true light before the Water Committee, and hoping it will receive due consideration from them,

I remain,

Your ob't servant,

R. H. EDDY, *Civil Engineer.*

IN COMMON COUNCIL, MARCH 1, 1833.

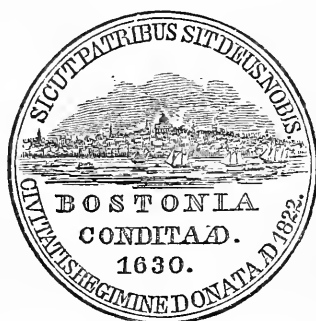
Read and referred to the Standing Committee on the Introduction of Water into the City, and ordered that 300 copies be printed for the use of the City Council.

Sent up for concurrence.

PH. MARETT, *President.*

CITY OF BOSTON.

PETITIONS AND REMONSTRANCES.



In Common Council, March 1, 1838.

The following Petitions for, and Memorials against the Introduction of Pure and Soft Water into the City, the reading of which being dispensed with, were laid on the table and ordered to be printed for the use of the Council.

Attest,

RICHARD G. WAIT, *Clerk C. C.*

To the Honorable the City Council of the City of Boston.

The undersigned, Inhabitants of the City, respectfully represent—

That in their opinion such is the scarcity of pure fresh water in Boston, and the pressing demand for it in every part of the city, that it is highly expedient

for the city to begin and complete upon its own account, the necessary works for the introduction of a supply from some one or more of the sources in the vicinity—as soon as the necessary powers can be obtained from the Legislature.

The fact that there is in our city a great scarcity of this most important necessary of life, your memorialists did not believe admitted of a single doubt, nor did they believe, after so much has been said by scientific and medical gentlemen upon this long agitated subject, and after so many complaints as have been and are constantly making about the scarcity of water, and the impurity of that now in use—that there could be a doubt in the mind of any person, at all conversant with the matter, that the health, comfort, and convenience of the citizens generally, would be greatly promoted by the introduction of an abundant supply of pure water, and it is therefore with a great deal of surprise that your memorialists have learnt that a proposition for bringing about this much desired object, after having passed one branch of the City Government by a large majority, is violently opposed by many members of the other branch, and that the principal arguments made use of by these opponents, are that there is already a sufficient quantity of pure water in the city, and consequently an additional supply from an external source, is wholly unnecessary, either for the present or future use of the inhabitants:—and that the inhabitants generally, either do not want to see the project carried into effect, or take no interest in it whatever, because they have not flooded the City Council with their petitions in its favor.

Now the undersigned, with all due deference to the gentlemen who make use of such arguments, beg leave to differ from them in opinion. They think in regard to the first position assumed by them, "that there is now such an abundance of water that no more is needed," is but mere assertion, unsupported by the facts of the case, and that an inquiry upon this point among the citizens generally, or among the inhabitants of any particular ward, would convince gentlemen entertaining such opinions that they are founded in error. With regard to the second position, "that the citizens do not approve of or take any interest in the project, because they do not petition in favor of it." Your memorialists have only to observe that they had believed such an enterprize as that of supplying the city with pure water would be so manifestly for the good of the whole people of the city, that no member of the City Government would think of opposing it, and that after the subject was once fairly before the Council, it would be brought to a successful termination at once. It is a fact, known to the citizens generally, that this subject has been directly before the City Council for three or four weeks, and that already more than a fortnight has elapsed since it was acted upon and passed with great unanimity by one branch of the government, and yet no remonstrances have been sent in against it. This fact, in the opinion of the undersigned, is worthy of much consideration. It shows most clearly, that there is little or no opposition to the measure on the part of the citizens, and denotes, more strongly the feeling of the community in regard to it, than does the absence of petitions.

In conclusion, the undersigned beg leave again to express it as their unqualified opinion, that the public good requires the introduction of a supply of pure water into the city, as soon as the proper works can be constructed, and without going into the question as to the source of this supply, but leaving that to the discretion and best judgment of the City Council, they trust that these works will be commenced and completed with all possible despatch.

Boston, February, 1838.

Joseph Tilden,
 John Harriman,
 Jotham Bush,
 John A. Page,
 William Washburn,
 L. H. M. Cochran,
 Daniel Davies,
 William C. Perkins,
 Prentiss Whitney,
 Dwight Prouty,
 George Hills,
 Jacob Ulman,
 Joshua Child,
 Samuel S. Perkins,
 Alanson Rice,
 Francis Bundy,
 Alpheus Cary,
 Samuel Gragg,
 Gridley Bryant,
 Joseph Blood,
 Joel Wheeler,
 Asa Day,
 David Tillson, if the Long
 Pond is used,
 Frederick H. Manson,
 Hosea Bartlett,

Jonathan Davis,
 Nathaniel Cotton,
 M. W. Green,
 Ephraim Marsh,
 Elisha Field,
 E. W. Pike,
 John Sawyer,
 John Leavitt,
 S. Harris Hayward,
 Enos Briggs,
 Presbury Coffin,
 John Bates,
 Caleb S. Pratt,
 Charles Hersey,
 Dexter Dana,
 Nichols Town,
 C. D. Strong,
 Hosea Carthell,
 Ira Drew,
 Seth Fuller,
 I. Richardson,
 D. K. Hitchcock,
 W. G. Pierce,
 Benjamin H. Dewing,
 Benjamin T. Gould,
 N. H. Whitaker,

John McIntire,
 Isaac R. Butts,
 John Davenport,
 John H. Pray,
 George Domett,
 George W. Talbot,
 William S. Sweet,
 James S. Bruce,
 Calvin Walton,
 W. L. Wheeler,
 Otis Homer,
 George F. R. Wadleigh,
 E. Hasket Derby,
 Warren B. Thomas,
 Jos. Goodwin,
 Thomas M. J. Cargill,
 Gearfield Leonard,
 Joseph W. Tilden,
 Jos. W. Ingraham,
 A. D. Webber,
 Lott Pool,
 Frink Stratton,
 A. H. Read,
 A. W. Upham,
 J. M. Plaisted,
 Luther Mann,
 David Bryant,
 William J. Hobbs,
 Dexter Harlow,
 Phineas Dow,
 Charles Dupee,
 Edward A. Vose,
 George M. Thomson,
 Thomas T. Wyman,
 Charles S. Hunt,
 W. A. Thompson,
 Thomas Snow,

T. S. Winslow,
 George Yendell,
 Ebenezer Kenfield,
 Otis Gray Randall,
 D. H. Williams,
 Joshua Jacobs, jr.
 Josiah Capen,
 William G. Edwards,
 Robert B. Williams,
 John Sawin,
 Bodwell Sargent,
 Watson Freeman,
 Benjamin Freeman,
 Isaac H. Hazelton,
 Otis Bullard,
 E. R. Broaders,
 Charles B. F. Adams,
 George Gibson,
 Thomas Moulton,
 John Perry, jr.
 J. B. Pollard,
 S. P. Meriam,
 Walter Bryant,
 John Borrowscale,
 Caleb Pratt, jr.
 L. V. Badger,
 J. M. Thompson,
 Thomas L. Rayner,
 Theodore N. Hall,
 Osgood Hoyt,
 J. S. Stackpole,
 W. F. Haynes,
 John Waldron,
 Thomas S. Weld,
 James S. Whitney,
 William S. Baxter,
 John White,

J. H. Palmer
 John S. Trott
 Samuel O. Aborn
 Benjamin F. Stoddard
 Charles S. Smith
 Phineas Blair
 John Heard
 John Gray Rogers
 W. W. Aylwin, provided wa-
 ter be taken from Spot Pond
 in Iron pipes.
 James H. Blake
 Jonathan M. Dodd
 A. O. Bigelow
 John B. Baker
 Cornelius Driscoll
 Francis B. Brown
 Louis Dwight
 Joseph Willard
 Grenville W. Gay
 Samuel M. Hurlbert
 A. H. Rhoades
 Charles S. Clark
 Henry Alline
 Nathaniel Perkins,
 Stephen Rhoades,
 John Bigelow,
 B. H. Andrews,
 Harvey Wilson,
 L. Norcross,
 J. Merrill Kimball,
 M. Day Kimball,
 J. Francis Kimball,
 Charles L. Gibson,
 Peter Harvey,
 George A. Lord
 E. W. Brigham

Henry Bailey,
 Grenville T. Winthrop,
 William Foster,
 Richard Upjohn,
 William S. Lovell,
 Charles C. Paine, Long
 Pond, Iron pipes.
 William Gray
 A. G. Baxter
 William Foster Otis
 Alanson Bigelow
 George W. Phillips
 Jacob Rhoades
 Edward Turner
 Joseph L. Bates
 W. W. Upham
 L. Stimson, jr., goes the
 death for Long Pond.
 N. C. Cary, goes the
 death for Long Pond.
 J. L. Clendenin
 George A. Chafee
 Elnathan Holden
 W. C. Reed
 Trueman Mory
 James Wilson
 Thomas Alker
 Augustus Peobody
 H. M. Willis
 Samuet McIntire
 Samuel S. Sumner
 William Hales
 J. Webster, jr.
 F. C. Hunt
 M. M. Kellogg
 Francis Robbins
 Joseph Dean

Henry Poor
 Nathaniel Greene, jr.
 William B. Stevens
 Frederick James
 Holmes Ammidown
 Samuel Farrington
 John Brooks Fenno
 Samuel R. Payson
 Trumbull Ball
 John Bancroft
 Sewall B. Bond
 John B. Cruft
 Samuel Wentworth
 B. S. Clapp

William M. Hatstat
 B. A. Goldsmith
 Elisha Jacobs
 Richard Williams
 G. C. Lyford
 D. B. Jewett
 W. L. Allston
 E. P. Mackintire
 Austin Dunton
 Joseph L. Leach
 Charles Barrel
 W. W. Peck
 Daniel Kimball.
 David Morgan

The undersigned, citizens of Boston, respectfully petition the City Council, to adopt such measures, as in their wisdom shall be found expedient, for the immediate supply of good and wholesome water to every portion of the city.

Ichabod Macomber
 Bela Hunting
 Benjamin A. Tufts
 Richard W. Shapleigh
 John Hill
 Daniel Chamberlain
 Silas Pierce
 Isaac Means
 Joseph H. Cotton
 Joseph Cotton
 William W. Stone
 Aaron Sweet
 W. W. Tucker
 A. Tucker, jr.

John Tappan
 Pliny Cutler
 James Haughton
 Paul Whitney
 Levi B. Haskell
 E. Mears
 James L. L. F. Warren
 William A. Brewer
 Nathaniel Brewer
 Samuel N. Brewer
 William M. Wesson
 William Bradford
 Benjamin Perkins
 John Dane

J. H. Jewett
 J. B. Hutchinson
 Samuel Johnson
 Charles F. Hovey
 Paul Alden
 Henry H. Hall
 William Larned
 Edward Baldwin
 James C. Converse
 H. Amidown
 Charles Scudder
 David W. Horton
 Thomas B. Curtis
 John M. Hewes
 John L. Dimmock
 Thomas R. Sewall
 Amasa Walker
 William Blake
 Alfred Greenough
 M. R. Pollard
 George E. Cook
 George P. Bangs
 E. A. Raymond
 William Underwood
 Thomas P. Cushing
 E. Matthews
 A. W. Thaxter, jr.
 W. E. Blanchard
 J. Merrill Kimball
 Joel Thayer
 Samuel F. Morse
 Edwin Lamson
 M. H. Simpson
 George B. Blake
 E. Haskell
 Isaac Thacher
 William Davis, jr.

David Stoddard
 Elias Banks
 James Tufts
 William Page
 Arthur McAvoy
 Isaac Adams
 S. H. Barnes
 D. W. Barnes
 P. Greely, jr.
 W. L. Beal
 D. R. Chapman
 Gilbert Brownell
 William H. Foster
 H. Wainwright
 William W. Goddard
 G. P. Tewksbury
 H. S. Bascom
 Calvin Washburn
 William Thwing
 Henry Cutter
 John L. Emmons
 Benjamin Bruce
 Philo S. Shelton
 M. F. Wood
 H. B. Mather
 Edward C. White
 J. Lamson
 A. E. Belknap
 Elisha D. Winslow
 Alfred H. Pratt
 Thomas Hall
 J. C. Bates
 Wm. Jarvis Eaton
 William G. Lambert
 Thomas D. Quincy
 William B. Reynolds
 Nathaniel C. Nash

R. W. Bayley
 W. Sayles
 L. Norcross
 W. B. Spooner
 Charles Wilkins
 Wm. Lang
 E. C. Purdy
 Francis R. Bigelow
 William A. Wellman
 Charles Lane
 N. B. Gibbs
 Samuel Dana
 John Wheeler
 Benjamin Seaver
 Henry Clapp, jr.
 A. N. Moore
 James Boyd
 Smith Eldredge
 J. Thomas Stevenson
 L. Sanger, jr.
 J. T. Prince
 W. H. Delano
 Albert Adams
 Nathaniel Vinal
 Zebeon Southard
 Samuel Sanford
 John F. Robinson
 Peleg Churchill
 B. T. Reed
 P. Grant
 Julius A. Palmer
 Anson Dexter
 Amos Stevens
 John Hartshorn
 Joseph Eveleth
 Samuel Pearce
 Benjamin Rich

Nathan Rice
 Joseph Whitney
 H. Blashfield
 H. S. Chase
 E. Copeland, jr.
 Josiah Colby
 John Slade, jr.
 William Lincoln
 Jeremiah Fitch
 James Leeds, jr.
 Lot Clark
 John R. Parker
 Thomas Howe
 William E. Coffin
 Z. Cook, jr.
 William Parkman
 Robert M. Morse
 Robert J. Brown
 Thomas R. Foster
 James S. Wilder
 Charles Rice
 Alfred Slade
 David Cambell
 C. F. Baxter
 William H. McLellan
 Wyman Osborn
 Parker Fowle
 H. Oxnard
 Daniel Kimball
 J. Forbush
 E. Codman
 Charles Cunningham
 B. Thaxter
 Henry G. Rice
 Nahum Capen
 Moses Mellen
 James W. Gates

Samuel Cabot	John Gulliver
Henry B. Humphrey	D. Babcock
H. K. Horton	Jabez Fisher, 2d
Samuel B. Pierce	S. P. Blake
Henry A. Norcross	A. Cunningham
A. C. Palmer	E. B. Steason
Daniel Noyes	S. K. Putnam
Amos Coolidge	James Patten
Ephraim Lombard	Elijah Cobb
Joseph Barrell	Thomas Haven
Thomas Lamson	David Ramond
R. R. Rand	W. H. S. Jordan
George Partridge	S. Hancock jr.
Willis Howes	Samuel F. Barry
S. C. Gray	J. A. Blanchard
Edward Noyes	L. T. Stoddard
Benjamin Burgess	D. Lee Child
John D. Gardner	Edmund Munroe
Charles Brown	Daniel C. Bacon
Daniel Dole	Isaac H. Wright
H. B. Townsend	J. W. Hall
F. B. Callender	George A. Whitney
William Blake	J. W. Converse
Leonard French	Josiah Stickney
J. G. Gibson	Francis Bacon
W. C. Stimpson	Simon Clough
George C. Aitchison	Isaac Field
T. R. Marvin	Wm. F. Weld
R. D. C. Merry	R. C. Kemp
Horatio Lock	C. E. H. Richardson
George Davenport	Charles Waterman
J. B. Lincoln	Aaron Hobart
John D. Stoddard	Joshua Leach
J. B. Kimball	

To the Honorable the City Council of the City of
Boston.

The undersigned beg leave to express the following opinions on the introduction of pure water into the city, for general use.

1. Convenience, security, cleanliness, health, and the pleasure of existence, will be more promoted by accomplishing this object, than by any which can be done by the exercise of the power conferred by the citizens on the Council.

2. That it is A GOOD, desirable for all alike, and will be especially a blessing to those who cannot have pure water, without the same be brought in by the city authority.

3. That actual examination by competent men, has proved the practicability of bringing in water, and that nothing is needed but the exertion of the public officers of the city.

4. That the expense of accomplishing the object, cannot be an objection, because the money necessary may be borrowed, and the product of the investment would not only pay the interest, but maintain the works, and provide a fund to discharge the debt.

Lastly. LET THE THING BE DONE, and done as soon as by any exertion consistent with prudence and reasonable economy, is practicable.

Boston, Februrary 24, 1838.

William Appleton
Charles P. Curtis
Abbott Lawrence
Henry Williams
John Allen

William Sullivan
H. G. Otis
Samuel G. Perkins
I. P. Davis
Albert L. Lincoln

Elias Kingsley
 John Sikes
 Kimball Gibson
 E. K. Lyford
 S. Center
 Slade Luther
 Nathaniel Sweet
 Jabez Hatch
 Joseph W. Clark
 Ralph Thompson
 Wyatt Richards
 I. S. Rogers
 Stephen Dockham
 Cushing Nichols
 Benjamin Brown
 John Cowdin
 Timo. Reed
 G. M. Thacher
 Andrew Abbott
 John Hamlin
 M. W. Hopkins
 N. E. Jenkins
 Lyman Goodnow
 John Hammond
 James Bartlett
 William H. Homer
 James Stevens
 William Stearns
 E. L. Snow
 Lawrence Nichols
 John Pierce
 Nathaniel Brown
 Hamilton Smith
 James Crackbon
 E. A. Welbasky
 Charles Woodberry
 N. W. Jackson

George Hallet
 I. Ingersoll Bowditch
 P. P. F. Degrand
 James Davis
 W. P. Fisher
 James Riley
 C. N. Cummiugs
 David Marden
 William Crombie
 John Park
 M. Lee
 Reuben Frost
 James P. Snow
 Jeremiah Washburn
 David Granger
 Amasa G. Smith
 Thomas Appleton
 M. L. Wallis
 Leonard Spaulding
 Enoch Plummer
 Amos Stevens
 Stephen Titcomb
 C. C. Barney
 J. Goodnow
 G. W. Edmands
 Peter Dunbar
 Henry B. Lloyd
 H. Bosworth
 John Foster
 Eben. Weeman
 Warren Boles
 Benjamin Applin
 F. B. Winter
 F. Cambridge
 William Ray
 Charles Brown
 Joseph Limcoln, jr.

Isaac Howe	W. R. Bawle
Elias Payne	John T. Reed
F. L. Cushman	William W. Clapp
Sam'l K. Bayley	George W. Vinton
John Low	E. Forristall
J. D. Annable	J. Holbrook
Leonard Holton	J. W. Merriam
H. Simmons	A. Sawtell
Thomas O. Spring	Thomas J. Peirce
John Holton	Albert Guild
N. P. Snelling	Nathaniel Seaver
George Baird	Aaron Blood
R. O. Sevrens	James Newell
Caleb Thurston	S. D. Houghton
Thomas M. Howard	H. P. Park
Nahum Brigham	Thomas Davis
Louis Dennis	Joseph Smith
Benjamin King	James Hunkins
A. M. Brigham	Daniel Leverett, jr.
Abraham Munroe	P. Simpson, jr.
John W. Warren	John Liscom
John B. Meserve	John W. Griggs
Thomas J. Stone	James Bride
Edward Eastman	Benjamin Leeds
Uriah Proctor	George S. Tolman
Calvin P. Allen	Francis O. Watts
Isaac B. Waitt	William J. Hubbard
Daniel B. Prescott	Horace Williams
Samuel A. Allen	

To the City Council of Boston.

The undersigned, inhabitants, principally of wards 11 and 12, feeling daily the want of pure water in their families and work shops, respectfully request of

your honorable body, that immediate measures be taken by the City Government to introduce that invaluable article.

Boston, February 1838.

J. F. Curtis	Oliver S. Gordon
Daniel Deshon	John Weed
Ellis Gray Loring	P. H. Richards
Henry Plympton	Joseph Cheney
John H. Stephens	M. S. Hyde
Seth Goldsmith	L. H. Bradford
Henry Parmele	B. G. Sweetser
T. C. Stearns	R. H. Robinson
Walter E. Hill	John Holman
J. P. Clark	Frederick Brown
C. C. Coolidge	Jonathan Goddard
F. Brown	Joseph B. Sawtel
G. D. Flag	Moses Lyon
Joseph T. Brown	James C. Averill
James Kelt	John Truman
P. C. Field	Elisha Carter
Daniel Messinger, jr.	D. Brigham, jr.
L. H. Morris	Richard Sanborn
Thomas Thompson	Sewall L. Gregg
William Taylor, jr.	John Bennett
William Brown	John H. Griggs
Orlando Tompkins	Reuben Lovejoy
Gardner Edmands	George Savage
E. Weston, jr.	Daniel Goodnow
Charles F. Barnard	George Goodnow
Warren Clapp	Aaron Morse, jr.
Edward Bugbee	Stephen Sargent
James S. Marble	W. H. Tyler
Ira Canterbury	Aaron Adams, jr.
John C. Hubbard	Elisha White
C. W. Hartshorn	L. A. Cooledge
G. D. Hayward	Peleg Mann

James Barry	George M. Smith
Charles Upham, from Pond	Asa Pratt
H. G. Perkins	Benjamin Gould
Leonard Drake	James Hendley
Leonard Putney	Thomas Brewer
Henry Bowen	James McDougall
Andrew Common	William Burnett
I. M. Albert	William Defrees
J. Drake	John A. Lamson
Lewis Hersey	Joseph Leeds
Kendall P. Saunders	Dudley P. Cotton
William Huse	Joseph A. Ballard
John Osgood, jr.	Rollin Abell
Edward Coddington	Joseph L. Smith
Otis Tufts	Simeon Child
James W. Carter	Thomas Rundle
J. Brereton	Shadrach S. Pearce
Stephen Badlam	Wyman Harrington
Job Kent	Edward A. Williams
Isaac B. Sardlees	Cornelius Briggs
A. Stuart	Samuel M. Hawkes
Levi Hawkes, jr.	Henry K. Hancock
Stephen Murdock	Charles H. Ayling
Buckley A. Hastings	John Melville
George Milton	George H. Sweetser
Oliver Carter	David Miller
Albert Day	William D. Willard

To the Honorable the Mayor and Aldermen and
Common Council of the City of Boston.

The memorial of the subscribers, inhabitants and tax payers of said city, humbly represent, that they are alarmed at the prospect of having the debt of the city increased in a two or three fold ratio, for the

purpose of supplying the city with water, and this too before any measures are taken to ascertain how many families and others will take the same, and pay annually for the use of it—as your memorialists doubt the willingness of citizens to incur the expense of relinquishing their present good supply of well and aqueduct water with which use has long made them familiar.

The Hon. Mayor stated in his late inaugural address “that a private corporation has for several years been ready to undertake the work on their own account, if they could obtain permission,” your memorialists therefore would more deeply deprecate the passage of any act whereby the city should engage to accomplish this work in their corporate capacity, believing that a private corporation could perform it with much less expense. The present time does not, in the opinion of your memorialists, appear to be a suitable one to increase the taxes or debt of the city; this is a time of great commercial distress. If the debt of the city is increased two or three millions of dollars, the interest at least, must be paid, and that added to the annual expenses of the city, without any additional income absolutely known to exist to meet it, will double the present heavy taxes, thereby creating a burthen on the citizens, which, under present circumstances, they are ill able to bear. For these reasons, your memorialists pray that the project of bringing an additional supply of water into the city, may be granted to that “private corporation,” which “has for several years been ready to undertake the work,” or that the City Council will, before any further steps are taken in this extensive undertaking,

cause an accurate inquiry to be made throughout the city, and ascertain the names of all the citizens who are ready and willing to pay annually for the use of the water, at such rates as the City Council, in their wisdom, may believe it can be afforded.

And in duty bound, will ever pray.

Boston, Feb. 24, 1833.

David Ellis	Nathaniel Faxon
Josiah Bradlee	Joseph A. White
James B. Bradlee	Thomas Curtis
W. M. Stedman	John Stratton
William B. Bradford	F. B. Houghton
J. F. Priest	John Ballard
Calvin Bruce	Lemuel Pope
James Weld	Giles Lodge
Winslow Wright	Francis Welch
S. G. Priest	Jacob Hall
Henderson Inches	Samuel Torrey
John S. Ellery	Benjamin Russell
Isaac Waters	Jeremiah Briggs
Samuel Salisbury	Moses Wheeler
James Dennie	Charles Sprague
Charles Hammatt	Samuel Fales
R. Lash	John D. Williams
Thomas English	Robert G. Shaw
Henry Hall	Benjamin Willis
Samuel Hammond	John Belknap
C. C. Parsons	B. B. Appleton
Benjamin Bangs	Samuel Tenney
B. Gorham	Samuel May
C. R. Codman	Henry D. Gray
R. C. Hooper	George Homer
Henry Hubbard	Isaac Stevens
John Bryant	Eben. Chadwick
Andrew J. Allen	James Andrews
E. G. Wellington	Joseph Jones

John G. Low
Jeremiah Fitch
George Odin
Samuel Hunt
Joseph Hay
William Eayrs
Calvin Haven
F. H. Bradlee
S. H. Babcock
Andrew T. Hall
Samuel Hall
N. F. Ames
Thomas Thompson
William Reynolds
Joseph Head
Jeremiah S. Boies
James Dalton
Lemuel Crackbon
George C. Thacher
C. W. Cartwright
John Dorr
Benjamin Adams
Isaac Hall
James Sargent
Richard D. Tucker
Henry G. Chapman
Henry Chapman
Stephen Fairbanks
Henry Loring
J. H. Swett
William S. White
J. M. Smith
O. C. Greenleaf
Peter Goodnow
S. Thomas
H. M. Holbrook
J. H. Bowman
H. Lincoln
Edward L. Stevens
Richards Child
J. H. Dorr
John Waters
John O. Page
John G. Powers
J. Parker, jr.
George Pratt
Jeffery Richardson
Henry B. Stone
N. Thayer, jr.
Henry Hatch
Samuel K. Williams
Josiah Stedman
Galen Merriam
William Sturgis
Stephen Brown
Charles Knapp
William Boardman
Perrin May
P. Parker
G. Barker
P. C. Brooks, jr.
I. Packard
Windsor Fay
P. T. Homer
Robert B. Storer
John W. Langdon
William B. Spooner
H. C. Manning
James Brackett
Samuel Topliff
Henry H. Tuckerman
Edward Blanchard
Joseph Ballard
Samuel Bradlee

Henry A. Brewer
 Ebenezer T. Andrews
 John P. Whiton
 Edward D. Peters
 A. Chandler
 A. O. Wellington
 Nathaniel Tracy
 Nathaniel P. Smith
 T. A. Tirrell
 Joseph B. Wiggin
 Josiah Whitney
 S. E. Brackett
 Ebenezer Bailey
 Samuel Hill
 James M. Blaney
 Daniel Wheelwright

Benjamin W. Gage
 John Stearns
 Isaac Jackson
 Samuel M. Phillips
 Noah Brooks
 Benjamin Howard
 Alfred Wellington
 Aaron Livermore
 Harrison Fay
 Thomas Hills
 E. P. Hartshorn
 Benjamin Atkins
 Jeffrey R. Brackett
 William Lawrence
 John Eliot Thayer
 Horace Dupee

To the Honorable the Common Council of the City
 of Boston.

The subscribers, citizens of Boston, do respectfully represent, That our community have been reduced by circumstances beyond their control from a state of proud prosperity to a condition verging upon ruin. All property is greatly reduced in value ; our monied institutions and public confidence are paralyzed ; much of our floating taxable property lost ; enterprize and occupation suspended ; and with no prospect of an immediate change for the better.

Under these adverse circumstances, it appears to us that no new project, involving an increase of the city debt, and an increase of taxation ought to be sustained.

Therefore they humbly pray that you will restrict

the expenses of our city to such objects as may appear to be necessary, for the good government and health thereof, and in particular, that you will defer all action upon the project for introducing fresh water into the city, from neighboring ponds, until more prosperous times. We feel that we ought to deny ourselves this luxury in common with many others, until our means will afford their use; we are now in a diseased condition, and unable to bear an additional burthen; but restore us to health and prosperity, and we will again jog on, with such burthen as you may please to load us.

Daniel Dickinson

Cyrus Wakefield

Andrew Hanson

Charles Ranstead

Dyer Quimby

John Plaisted

Walter Jones

Samuel Boynton

Reuben Reed

Alexander Wentworth

Charles Woolley

Linus Jackson

William Gould

John T. Robinson

William Robinson

Samuel Lovell

John Milk

Stephen G. Hiler

Thomas Reed

John Rice

Benjamin Clark

Daniel Ballard, jr.

Samuel Lovell, jr.

William Cate

Joseph Hartt

Ephraim Milton

John B. Tremere

Benjamin Burrows

Henry Fowle

John H. Clark

Benjamin Pepper

Francis Low

William Learned

William C. Marden

Samuel N. Cushing

J. Sherman

Benjamin G. Brown

William Dorey

George Fenlee

Peter Black

Enoch H. Wakefield

Ezekiel Lincoln

Hiram Smith

Luke Fay

John Williams

John Smith

Levi Wilcutt

R. T. Hooton

Joseph Hayden

Edward Sargent

Francis Horton
 John Wilson
 Rufus S. Owen
 Martin Berds
 George W. Gilman
 Isaiah B. Libby
 William R. Lovejoy
 Ephraim Cunningham
 Edward Maxwell
 Reuben Coombs
 G. C. Haynes
 Gustavus Burrison
 Charles Bradford
 Joseph M. Leavitt
 William Green
 Moses Miller
 Joseph Urann
 Benjamin Dodd
 Otis Munroe
 Samuel Yendell
 Alexander P. Chandler
 Benjamin Comey
 Jesse Tuttle
 Alexander Lovett
 Elijah L. Green
 Thomas Somerby
 Samuel Bell
 Simon Wilkinson
 Oliver Chandler
 Abner Smith, jr.
 Asa Goodnow
 Charles Andre
 William Dewhurst
 Eleazar J. Howes
 John B. Hewes
 C. G. Bascom
 Simon Wilkinson, jr.

H. L. Gurney, jr.
 J. P. Snow
 Ebenezer Tasker
 E. W. Barnicoat
 Josiah G. Lovell
 Joseph F. Barber
 Edward J. Newhall
 Benjamin Gowan
 Charles H. Wellock
 William W. Kissick
 James A. Sutton
 Humphrey Chadbourn
 John Pratt
 John Davis
 Thomas Mair
 Joseph King
 Gideon Jennings
 Benjamin C. Seaver
 Nathaniel Brown
 Samuel S. Pettingil
 Benjamin Abrahams
 P. Gildersleeve
 Henry Andrews
 Charles A. Yendell
 George W. Brown
 Enos Holbrook
 Edmund Smith
 George Green
 Benson Leavitt
 William Dillaway
 William Hawes
 Charles M. Dickinson
 Nathaniel Brown
 Francis Holmes
 E. H. Little
 G. A. Godbold
 Zenas Snow

Charles E. Gay
 S. Beatley
 Samuel Hosea, jr.
 Ephraim Snow
 Ezekiel Morse
 John Hooton, jr.

Henry Gurney
 Ezra Allen
 Joseph Simmons
 John Hooton
 George Hooton

To the Hon. Mayor and Aldermen and Common
 Council of the City of Boston.

The undersigned having learned that the City Government intend incurring a debt of some millions of dollars, with a view of bringing water into the city, for the purpose of supplying the inhabitants therewith, would respectfully suggest to your Honorable bodies, whether it would not be a prudential step, first to ascertain who of our citizens want, and will pay for the water, before the same is introduced and the debt contracted.

Your memorialists, who have heretofore set their names, respectfully ask that the project may for the present be suspended, until more information may be obtained as to who wants and who will pay.

James B. Richardson
 Prentiss Hobbs
 Solomon Piper
 Jonathan Lane
 L. Snow
 Francis Bullard
 Thomas Curtis
 William Badger, jr.
 Nathaniel Grover
 James Dillon

Levi Bliss
 Andrew Drake
 John Curtis
 Frederick Curtis
 Jed. Tuttle
 Perry Brigham
 Charles French
 Robert Robbins
 Shepard Robbins
 Joseph Calfe

William D. Jenkins
 George W. Miller
 George Miller, jr
 William Rupp
 Archibald Hill
 Seth Dewing
 William Thompson
 Simon Huff
 Henry Blaney
 John Cloyd
 Thomas B. Warren
 Isaac Prescott
 Timothy Tenny
 George Farwell
 Benjamin Pike
 William Goddard
 Darius Dutton
 R. A. Newell

Nehemiah S. Calfe
 William H. Prentice
 George W. Prentice
 Thomas C. Bell
 James Bliss
 Thomas N. Kingsbury
 George W. Wilkins
 George Hall
 Caleb I. Pratt
 Anthony Hanson
 John C. Cook
 Daniel Draper
 Tisdale Drake
 Gideon L. Pease
 Joshua Mott
 Loring Gardner
 Francis Holway
 James Arnold

To the Honorable the Common Council of the City
of Boston.

The subscribers, citizens of Boston, do respectfully represent,—That our community have been reduced by circumstances beyond their control, from a state of proud prosperity, to a condition verging upon ruin. All property is greatly reduced in value; our monied institutions, and public confidence are paralyzed; much of our floating taxable proper lost; enterprize and occupation suspended; and with no prospect of an immediate change for the better.

Under these adverse circumstances it appears to us, that no new project involving an increase of the city debt, and in increase of taxation, ought to be sustained.

Therefore, they humbly pray that you will restrict the expenses of our city to such objects as may appear to be necessary for the good government and health thereof, and in particular, that you will defer all action upon the project of introducing fresh water into the city from neighboring ponds, until more prosperous times. We feel that we ought to deny ourselves this luxury in common with many others, until our means will afford their use; that we are now in a diseased condition, and unable to bear an additional burthen;—but restore us to health and prosperity, and we will again jog on with such burthen as you may please to load us, in reason.

Noah Lincoln	Henry K. May
Dexter Dickinson	William Palfrey
Nathaniel Nottage	A. B. Munroe
Samuel C. Nottage	Charles W. Woolsey
James Loring	Benjamin Kimball
William Cook	Frederick Lincoln
George A. Wilkins	William Tapley
John P. Whitwell	John B. McCleary
William Harris	Eleazar G. House
Washington Armstrong	Edward Bell
Thomas White	Samuel Millard
Daniel Lillie	John Doke
Elijah Stearns	John Lally
Michael Dutton	Jacob Jones
Christopher Gore	Nathaniel Goddard
Ezra Eaton	Asa Willbur
Benjamin Smith	Josiah Hiler
John Simmons	Timothy Dodd
Henry Leeds	N. G. Snelling
Isaac Irish	John F. Eliot
Geo. W. Almy	J. Stetson
Thomas Tirrell	George W. Simmons

James Fillebrown
 Thomas Lewis
 Isaac Cazneau
 Joseph Clark
 Noah Lincoln, jr.
 Jonathian Thaxter
 John Sargent
 Loring Sargent
 Thomas Edes
 Augustus M. Pulsifer
 Isaiah A. Rich
 John Adams
 James Steele
 William Mair
 Peter Mair
 Hugh Short
 Jonathan Loring
 Edward W. Tuttle
 Thomas Chase
 Christopher C. Gore
 Josiah Stedman, jr.
 Philip Jennins
 Samuel Aspinwall
 Henry Floyd
 William H. Greely
 George Ballard
 William P. Tenney
 John Swift
 Elijah Loring
 Thomas Thacher
 William G. Billings
 Elihu H. Reed
 N. F. Frothingham
 Thomas W. Herrick
 Geo. Thacher
 Levi Melcher
 W. B. Wilkins
 John V. Ford

Thomas Murray
 Martin Bates
 George Bradford
 William Stowe
 Robert S. Badger
 Joseph Noyes
 John Howard
 Joseph Fenno
 John McField
 Charles French
 H. H. W. Sigourney
 Thomas G. Temple
 George Bradford
 John D. Howard
 Henry Carroll
 John Torsleff
 William Duff
 George Gordon
 Charles E. Wiggin
 Theodore A. Gore
 Samuel P. Ridler
 Robert Keith
 Jacob R. Holmes
 Moses Rogers
 George Ellis
 James S. Wilder
 J. L. Loring
 Henry Wood
 James Parker
 John H. Pearson
 James H. Bennett
 Nathaniel Budd
 Joseph Ames
 Bowen Harrington
 R. L. Barrus
 Richard Brackett
 David N. Badger
 John Piper

Jabez Fisher
Mark Fisher
Nathaniel M. George
William Humphrey
Simeon Butterfield
A. D. Gamage
William Bramhall
William Wildes
Joshua Crane
William B. Oliver
J. E. Curtz
Stephen Tilton
David J. Collier
J. Parker
William Shimmin
George Low
Oliver Adams
Samuel Blake
Albert A. Bent
John H. Gray
Levi Brown
J. Cullen Ayer
Chas. Eberle
Seth W. Fowle

Joseph Austin
David W. Hill
Thomas Chamberlain
William Collier
Joseph Austin, jr.
Spencer J. Vinal
M. G. Chapin
Elijah Bigelow
George T. Cook
S. G. Shipley
George Cutter
S. G. Bowdlear
T. B. Warren
E. Wright, jr.
Newell Withington
Quincy A. Keith
Samuel Wheeler
John F. Payson
Abner Dearborn
Constant T. Benson
Wm. H. Leonard
E. F. Pratt
George Munroe

CITY OF BOSTON.

MR. SARGENT'S COMMUNICATION.



In Common Council, March 1, 1838.

The following document, submitted by Mr. Shattuck, being a letter from L. M. Sargent, Esq. relative to certain questions propounded to him by Eliphalet Williams, Esq., in reference to the Boston Aqueduct Corporation, was laid on the table and ordered to be printed for the use of the Council

Attest, RICHARD G. WAIT, *Clerk C. C.*

BOSTON, FEB. 21, 1838.

SIR,

To the questions, five in number, proposed in your letter of the 16th current, I send you the subjoined replies.

1st. When was the Boston Aqueduct Corporation incorporated?

Answer. A. D. 1795.

2d. What is its capital?

Answer. The capital, so far as can be ascertained, is \$130,000, or \$1,300 per share. The stock was originally divided into 100 shares, and has so remained. It has proved a ruinous concern to the original stockholders, many of whom sold their stock for \$300 per share, after having paid in \$1,000 per share. The present market value is from \$500 to \$600 per share, perhaps less; sales however are unfrequent.

3d. What are the average dividends?

Answer. No dividend was made, during the first ten years after the works were commenced. The average dividend for 30 years, since 1807, when the first dividend was made, is \$51 76 per annum, or a fraction less than 4 per centum per annum, on a share of \$1,300.

4th. What number of families take it?

Answer. The corporation now supplies between 1,400 and 1,500 houses.

5th. What proportion of the dwellings that it passes take the water?

Answer. According to the best judgment of the superintendent, T. A. Dexter, Esquire, about one dwelling house in every four, within its range, is supplied, on an average. In certain streets, recently laid out, where new buildings are erected, nearly all the houses take the water; and, in most of these cases, no other supply of water is afforded. This is especially true of new houses on the neck lands, and in all the new streets and avenues, extending south from Pleasant street, and in Front and Charles street, and in some of the streets north of Cambridge, and

west of Chamber streets. In many of the old streets, Washington, Tremont, Essex, Summer, &c., the aqueduct passes a large number of houses, without supplying them. In Washington street, ranging from No. 188 to No. 833, the whole number of customers is 183. In Tremont street, which numbers, as far as West street, 143 houses, we have only 30 customers. In Mason street, a main supply pipe was laid down upwards of four years ago, at the earnest solicitation of the inhabitants of Collonade row, so called, and, up to the date of my letter, four houses only, in that entire row, have requested and been supplied with the water.

I have thus, sir, replied to your enquiries. At the close of your letter, you invite me to subjoin to my replies "any other information" I "may deem important, in relation to the subject."

I have been a stockholder in the Boston Aqueduct Corporation for twelve years, and a director for a large portion of that time. An extreme reluctance to encounter the imputation of a secret and selfish motive has prevented me from taking any part in the discussion of this important question, through the medium of the public journals or otherwise. Upon your suggestion, however, I will venture a few observations, and offer one or two statements of facts. Every man will give me credit for sincerity, in the ratio of his own consciousness of an ability to speak impartially upon a matter, wherein he has a personal interest. For the accuracy of such facts as I may state, I am responsible—of my opinions you and other men may judge for yourselves. So far as these facts may be gathered from the books and papers of

the corporation, those books and papers have been tendered, for the inspection of the City Government, upon more than one occasion; and, on behalf of the directors, my associates, I tender them again.

I have patiently listened to much abuse, which has been heaped upon this corporation, in the public journals and elsewhere. It is certainly wholly undeserved. Eight water companies supply the city of London. They are not menaced, from year to year, with an overwhelming municipal interference, in the form of a grand city aqueduct. They invest their money with a feeling of security. The Boston Aqueduct Corporation is willing to do the very same thing, upon the very same encouragement. In evidence of this, permit me to revive your recollection of their memorial, presented to the City Government, Aug. 20th, 1836, in the following words.

“To the Mayor and Aldermen of the City of Boston the memorial of the Boston Aqueduct Corporation respectfully represents: that your memorialists have, for many years, supplied a considerable portion of the city with pure and soft water; that, for the purpose of meeting the increasing demands of the citizens, your memorialists have long since caused surveys and estimates to be made, by Loammi Baldwin, Esquire, whose report has been before the City Government; and by which it appears, that an additional expenditure of money and a more judicious and skilful employment of their present powers, will enable your memorialists to supply the city with “*ten times*” the quantity of water furnished at present, and at any point of elevation, where it may be reasonably required;—that your memorialists have been restrained

from the requisite extension of their works, and the necessary investment of money for that end, by an apprehension that the City Government, urged by a strong popular feeling, might, at some time, cease any longer to permit the provision of pure water to remain in the hands of private corporations, as in London and elsewhere, where it is supposed, that, by the competition of such corporations, the public is likely to be the better served. In connection with the present exhibition of popular feeling and opinion on this subject, your memorialists have thought proper to state to the City Government, in a formal manner, their perfect willingness to extend their works, agreeably to Mr. Baldwin's suggestion, upon any reasonable assurance, if such can consistently be given, that your memorialists will have no reason to fear any more formidable competition than that of a private corporation. On the other hand, should the City of Boston decide, that it will furnish a supply of pure water to the citizens, itself, your memorialists hereby tender their water works to the city, for a reasonable compensation. The books and records of the company are open for the examination of the City Government. All which is respectfully submitted."

The will and the ability of the corporation are herein sufficiently exhibited. At the present time 15 miles of lineal extent of supply or main pipe are laid in the city, which distributes the water through the whole extent of Washington street, as far as the Marlboro' Hotel, and branching off easterly through Front street, extends as far north as the Exchange Coffee House, which it supplies, as well as the Pearl Street House, the Commercial Coffee House, and

Broad street in an easterly direction. It also branches off westwardly through Pleasant and Charles streets, and supplies the Massachusetts General Hospital. All the Mill Pond Lands and South Cove Land are within the level and near the lines of supply; and the corporation will extend their supply pipes to meet the wants of these sections, whenever they can feel themselves secure from an oppressive competition with the city.

Such is this aqueduct at present. Mr. Baldwin, whose testimony should be in good odour with the city, for he is their engineer, as well as ours, has stated, as you perceive, that we can supply "*ten times*" the present amount, and carry the water to any height, which may be reasonably required. Yet sir, neither in the commissioners' report of Nov. 23, 1837, nor in the report of Jan. 29, 1838, which is now before you, is there any allusion to this corporation. In the report now before you, it is stated, as the opinion of the committee, that an aqueduct should be under the control of the city authorities, and not the property of a private corporation. Such is the opinion of the authorities of Philadelphia. In London it is otherwise, and the city is supplied, as we have stated, by eight private companies. Now sir, suppose these splendid conceptions are carried out to the uttermost—and they are sufficiently dazzling and magnificent—\$1,507,560, are invested. The city will not then have that entire control, which your committee recommends. Our corporation must still continue to offer its water. If your water rents are reduced, ours must be also. Will your water be preferred for its purity? Probably not. The water of

Jamaica Pond has a very high reputation. Your own commissioners admit the fact, and acknowledge its superior purity on page 11 of the report. One of them, Mr. James F. Baldwin appears not to entertain a very high opinion of the water, in one of the ponds, from which it is proposed to bring it to the city. His words are these, "I object to the color and character of the water, which composes this source. Much of the water is derived from the Middlesex Canal, from leaks and wastes on a larger portion of its length. This canal is fed from Concord River a larger part of whose waters lie every year nearly motionless, through the dog days, steeping the grass on the Sudbury meadows. There are also upon the streams, which flow into this pond 15 or 20 dams or water privileges, where various kinds of mills and factories are in operation; and, though there may not be, at present, any, more objectionable than hat factories, tanneries, &c., still, at some future day, they may all contribute, more or less, to render the water unfit for domestic purposes," Page 50. To this opinion of their colleague Messrs. Treadwell and Hale have replied in a manner sufficiently pointed. They differ from Mr. Baldwin, it appears, entirely, on some other points in the Report, and your Standing Committee on water differ from them. They say that they "cannot think that the sum of \$110,000, which the commissioners have named as the probable amount of damage," &c.

I have said, that we should still be obliged to offer our water for sale; and we should sincerely regret the necessity of exercising our chartered right of digging up the streets, which is certainly a public incon-

venience, likely to be trebled by the operations of two aqueducts and one gas light company, in a city not remarkable for the width or the straightness of its avenues.

There may be an end to all our humble competition with the city. This end is not absolutely invisible in the distance. Pray, sir, can you assure me, that the very same popular clamor, which is driving the city into an expenditure of an enormous sum, for the introduction of water, will not, at some future day, perhaps not very distant after all, be heard once more, demanding an universal freedom from an odious and oppressive water tax? And may there not be something like justice in the demand? Has not the postulate of the water party been this, that water should be as free as the air we breathe? I have been told by more than one respectable mechanic of this city, that he gave his vote in favor of the measure, on a presumption, that he would have the water, as he has the high way, for nothing. When this demand shall have been obtained, competition must cease, and we shall endeavor to contemplate the ruin of our property, as philosophically as possible.

I see nothing at all extravagant in this anticipation. Whenever an organized city government suffers itself to be directed by the feverish expressions of a popular assembly, the people ascertain their power—they employ it, under the impulse, given by the agitators of the day—the will of a noisy and highly stimulated body prevails over the deliberations of boards of council—and the demands of the multitude become not less imperious than they are capricious and chimerical. Consider a single argument, offered at Faneuil

Hall, as a sample of a large proportion of those, which were offered to a popular assembly. It was stated, that a pump in this city, belonging to the city, as a corporation, was kept chained, and that the poor people—widows and orphans every one of them beyond a doubt—were prevented from getting a cup of cold water thereat! This was stated, by an orator of the day, as *a fact*; it operated on the feeling of the assembled multitude, as *a fact*. On the following day, diligent search was made for this pump. It was no where to be found. The tale was a sheer fabrication, credited, very probably, by the young gentleman, who related it, at Faneuil Hall, and upon whose credulity some one had imposed.

Do not suppose, sir, that I misunderstand the fact, that a reasonable demand exists in this city for pure and soft water. On the high lands and upon new made lands it assuredly exists, to a certain extent; but by no means, even there, to the extent alleged by the water party. I say this, after a careful examination, and continued enquiries for years. I have owned real estate, dwelling houses, in this city for many years. I never received from my tenants but two complaints in relation to water. In one case, the main well was in need of being cleaned, and the suction pipe, from which my tenant drew, received an earthy deposit. The evil was easily and immediately remedied, and my tenants of that house have never since complained. Upon another occasion, a gentleman, occupying a house in McLean street, whose *well* of water was excellent and abundant, desired me to furnish him the aqueduct, for washing, as his *cistern* was small. I replied, that the aqueduct

was, I believed in Eaton street ; that the corporation could not bring the main pipe into McLean street, for *one* person ; but, if three others would agree to take the water, I thought the directors would comply with his request. He stated with perfect confidence, that, in his opinion, every householder would take it, as their cisterns were all too small. I heard nothing from him for a month. When I met him, I enquired if the inhabitants of McLean street had decided to take the water. He replied that he had made the effort, but they did not seem to want it, and the main pipe has never been carried into that street.

Permit me to enquire whence the great popular excitement, upon this subject, which certainly bears the marks of agitation ? Are we in any imminent danger of being poisoned ? There are many aged people among us, who never tasted any purer or softer water than that of their wells. Medical gentlemen have been sent to the bottom of our wells ; and, though truth is said to lie there, I exceedingly doubt if they have succeeded in bringing it up. Water has been analyzed, and its impurities set forth in tabular statements. Now sir, you well know there is no such thing in common use, in any part of the world, as *pure* water. So true is this, that medical prescriptions direct it to be *distilled*, whenever it is desired to have it *pure*. Mr. James F. Baldwin, one of the commissioners, has given his opinion, already referred to, that the water of Mystic Pond, one of the approved sources, is anything rather than *pure* water. In reply to his remarks Messrs. Treadwell and Hale, his associates, observe, "It is by no means pleasant to dwell upon the sources of impurity to which all wa-

ters, which can be procured in civilized life, are exposed, whether in ponds, rivers, wells or even springs." This appears to me a very judicious observation. It seems however, that, by *dwelling* upon these sources, for some *object* or other, we are about to be taught, that our wells contain nothing better than a poisonous beverage. What may this object be? Has not the water question become a pivot, upon which municipal elections are to turn? Have we not among us a number of button holding agitators, who argue at the corner of the streets, who are the agents of a party, and who are equally indefatigable and importunate, whether the object be the procurement of *pure rum* or *pure water*? Are these men likely to suffer greatly from taxation, when the public burden shall be laid on? Are there none among us, who want a job? Your standing committee, in the report before you, as an argument for an immediate commencement of this work, remark that they see "no better means of alleviating the distresses of those, who depend upon their labor for support." This is not only a *gracious*, but a *popular* suggestion. But, for this end, is it discreet to bring the burthen of an enormous debt upon the city? A debt, whose estimate by the commissioners is, in the opinion of many judicious persons, altogether fallacious and inadequate. Your standing committee observe, that "the interest, spent upon this or any other valuable improvements, will be no intolerable addition to our burthens." I believe sir, that very little comfort will be derived from such negative consolation as this, by those, who have already thought the municipal expenditure unwarrantably prodigal, and whose taxes

are becoming a topic of *loud* and almost *universal* complaint.

The commissioners appear to anticipate that the proposed aqueduct will take the place of wells, &c. very generally. Now sir, there is a very large number of our citizens, to whom aqueduct water, as a drink, is positively disagreeable. They do not desire it. I resided for some time in Philadelphia; I took the hydrant water for washing, &c., but never drank it, preferring such as I obtained from a pump, one of the very few in that city, standing near the curb stone, and in the vicinity of my residence in So. 8th street.

There are few pumps in that city connected with wells. The vaults of privies are therefore allowed to be dug of any depth, and are commonly built up in *steened* work, or with bricks laid dry. The vault at my own house, which was not so deep as many others, was 28 feet deep. The chief dependance for water is upon the hydrant. It was introduced into that city, at an early period, and has become almost their only resource. Thus it is that your Commissioners are enabled to exhibit 13,632 customers of the aqueduct in the city proper. It is not so here, I am greatly mistaken, if those, who are satisfied with their wells and cisterns—those, who are already thus supplied and are moved by considerations of economy—those, who will not use the aqueduct water, as a drink, on any terms—those, who being already customers of the Boston Aqueduct Corporation, are contented so to remain, at whatever rent may be the city rate—those, who prefer the Jamaica Pond water, for its purity—I am greatly mistaken sir, if all these do not form an

important body, worth the consideration of the City Government, before it ventures to act upon the calculations of the Commissioners, as infallible data. These calculations are sufficiently magnificent. They seem to me, sir, less adapted to the present situation and resources of our city, than to those of Mehemmed Ali, the grand Egyptian reformer.

\$1,507,560, the first estimate, and which cannot be presumed to be a solitary exception from that never failing rule, that all such estimates fall short of the cost, in the ratio of their magnificence and complicated character. This vast amount is to be obtained at 5 per cent. ; and to meet the interest, 12,500 families are to take the water of the city—this *pure* water—at six dollars per family, an event sir, which the great grand children of the youngest of your three Commissioners will never live to witness. This is not all the good fortune in store for our favored city. We are to save, in the single item of insurance, \$100,000 per annum ! Had this proposed aqueduct been in existence in the years 1824 and 1825, property of the value of \$1,507,568 would have been saved from fire! In respect to this, the Commissioners appear not to be so entirely convinced : they say “perhaps it is *not* an extravagant opinion, &c.” It may here be stated that the engine companies of the city have ever had a right to open the fire plugs of the Boston Aqueduct in case of fire, of which right they have frequently availed themselves. The commissioners proceed to state, that, in ten years, the income from the proposed aqueduct may be estimated at 105,000 dollars per annum. If the city government have a sincere faith in the prospects, present-

ed by the commissioners, they ought not to withhold these promised blessings from their fellow-citizens. The commissioners especially advert to the great advantages to the city resulting from an aqueduct passing over their neck lands. It may not be amiss to state, that the present aqueduct passes directly through a lot of land, owned by me, within the city, lying between Suffolk and Tremont street. There is no field, more obviously adapted to the operations of the present aqueduct than the whole tract from Pleasant street to the boundary creek, and entirely across the isthmus.

I believe, most implicitly, in the ability of the Boston Aqueduct Corporation to supply all reasonable calls for "*pure and soft*" water, if such a thing there be, in all parts of the city, high and low. With the printed report of Mr. Loammi Baldwin before me, at this moment, I cannot entertain a doubt upon that point. In expressing this belief, I take into calculation a fact, established by our experience for forty years, that, of those, who are already supplied with wells and cisterns, a large majority will not receive the aqueduct. We shall not probably be able to persuade them, that those wells are poisoned, from which they and their fathers have drunken for many generations, and to a good old age. Of the capacity of Jamaica Pond, Col. Baldwin's report presents a careful calculation; and our experience has demonstrated, that the draught of the company does not equal the evaporation.

A very small sum comparatively, a few hundred thousand dollars, will enable the corporation to follow out the plan, suggested by Col. Baldwin, and carry

the water to any dwelling house, which may require it. In the present condition of public feeling, you would not deem it discreet for us to throw down our money upon a hazard. We are precisely of that opinion. We can have no security against the effects of popular clamor. After we shall have done our utmost, we shall have done very little to satisfy those, who want a job in the manufacture of \$80,000 worth of masonry, or \$30,000 worth of stop cocks, or \$9,000 worth of fire plugs, or \$47,000 worth of small pipe, or \$437,000 worth of iron pipe, or \$850,000 worth of complicated labor and materials for bringing the water to the city confines. However sufficient for the occasions of your fellow citizens, the very best of our successful labors would produce a humble result, contrasted with the splendid visions of your commissioners.

It has not been thought expedient to call the stockholders or even the directors together upon the present occasion. They have expressed their sentiments very fully and frankly, in the memorial, of which my letter contains a copy. They have respectfully tendered a proposition to the city to extend, upon agreement to save harmless against municipal competition—or to sell their franchise to the city, for a reasonable consideration. This proposition I have no doubt the corporation would renew at the present time. I speak, however, as an individual, and of course, without authority. The fault is not our own, that the suggestions of Col. Baldwin were not long since put in operation.

If I have gone into this matter, with a measure of

precision, or to an extent, beyond your wish or expectation, you have all that I can tender for any unnecessary consumption of your time, the assurance of my sincere regret.

I remain, respectfully,

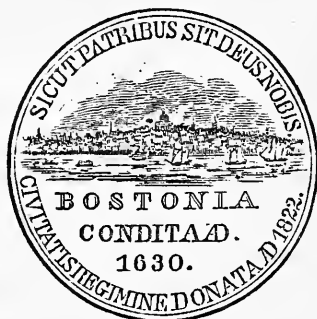
Sir, your ob't servant,

L. M. SARGENT.

ELIPHALET WILLIAMS, ESQUIRE.

CITY OF BOSTON.

FOREIGN WATER WORKS.



IN COMMON COUNCIL, MARCH 1, 1838.

The following document, submitted by Mr. Austin, was laid on the table, and ordered to be printed for the use of the Council.

Attest, R. G. WAIT, *Clerk C. C.*

Extracts from the Minutes of Evidence taken and Papers laid before the Select Committee of the House of Commons and the Commissioners on the Supply of Water to the Metropolis, in the years 1821, 1828, and 1834.

MATTHIAS K. KNIGHT,

Secretary to the West Middlesex Water Works Co.

“Is there any such understanding existing amongst the companies now, that in case of an accident hap-

pening to any one of the companies that the others would supply it with water during that time? Yes; the mains of the several works communicate with each other, so that in case of an accident happening to either of the companies, the other companies can supply till the accident is repaired.

What mains do you communicate with? With the New River on the east and the Grand Junction on the other side.

So that in fact, according to the present understanding among the companies now existing, the public have the benefit of the whole, as if they were one entire company? Yes; I conceive so.

Have any occurrences taken place in which that has been done? Yes; about two years ago an accident happened to the Grand Junction engine; the Grand Junction applied to the West Middlesex Company for assistance; a communication was opened between the mains, and the West Middlesex Company during the night worked their engines for the supply of the St. George's District, for a certain number of days, till the engine was repaired, it was no length of time. So as to remedy the defect? Yes.

Has any other accident occurred, to your knowledge? Yes; there was a temporary stoppage during the late frost, in the New River; the ice I believe was blown up by an easterly wind, and choaked it so that they could not get an adequate supply for the whole of their tenants; and the West Middlesex Company, assisted by the Grand Junction, worked through their mains, and for two days I believe, supplied their tenants.

Is that, in your belief, resulting from the arrange-

ment that has taken place, and from the pipes being now so contrived as to afford a junction with one or the other? Yes; I conceive that the three companies are so constituted as to comprise only one capital; and that the public derive the benefit of three capitals, having to pay the expense of only one."

Manchester Water Works.

Extract of a letter from Mr. Nicholas Brown addressed to Lord Wharncliffe, (1828.)

"In the latter end of the year 1823, I was called upon by the direction of the Manchester and Salford Water Works Company, to view some situations which had been pointed out for one or more reservoirs, and to state my opinion, whether I thought the situation proper for the purpose, and whether there was a probability of procuring a sufficient supply of water for so large a population.

Previous to this time, about the year 1807, an act of Parliament was obtained for supplying the towns of Manchester and Salford, with water by a company principally residing in London, at least very few of the inhabitants of Manchester were share holders, if any, and the works were then carried into effect under the directions of the late Mr. Rennie, by *pumping* water by means of *steam power* out of the river Medlock, a small stream which derives its supply from the hills above Oldham, into a reservoir of about seven Lancashire acres. The water from this river being at times *very much polluted*, that portion of it which was taken out by means of a guage-wier, was passed into two small reservoirs, in which to deposit the great-

est parts of its impurity. It was thence pumped up to the seven acre reservoirs, and pipes laid to convey it to town.

The original promoters of this scheme, having been previously engaged in manufacturing stone pipes, they were laid as mains to the town and through the various streets, (hence the name given to this company, the Stone Pipe Company.) So soon as the works were complete, the water was turned upon the mains, and the presence of the water being too powerful for the stone pipes they gave way in all directions, and the town was literally in a state of inundation.

Various attempts were made to repair the breaches partly with stone and partly with iron, but in vain, the stone pipes were obliged to be abandoned, and iron substituted. From the various expenses then incurred, the then proprietors sold their interest in the works to a number of the inhabitants of the town and neighborhood, and for a time, the works continued upon the original construction.

But the increase of population, and thereby the demand for water, and their not having the power of taking a further supply from the Medlock, without injury to the mill property, and the *increasing impurities* of that river, occasioned by the erection of various *dye, bleach, and other works upon its banks*, gave rise to an application to Parliament, in 1823, to enable the company to procure a further and more pure supply from another source.

This act of Parliament being obtained, it fell to my lot to carry the new works into execution. The two reservoirs were constructed upon some small stream

at the distance of about three miles from the town, with the necessary works to convey the water to the town, and notwithstanding our meeting with considerable delay for the want of the cast iron pipes being furnished us from the founderies, the works had so far advanced that water was drawn from the new works to the town on the 4th May, 1826, and has continued to flow from that time to the present, and the works are now complete. The *engine* as well as the *polluted water* from the river Medlock, are given up altogether, and the town is now supplied with abundance of pure water notwithstanding the large quantities there used in the various manufactories.

The two new reservoirs are situate one immediately above the other, the higher covering 31 acres, the lower $23\frac{1}{4}$, making together $54\frac{1}{4}$ statute acres, the cubical contents I calculated to hold 37,534,235 cubic feet; and taking into consideration the extent of ground which is 1,600 acres only and from which water is collected to supply the reservoirs, I was led to conclude that the two would be filled twice and a half within the year and affording a supply to the town, of 1,600,000 gallons per day.

Since these works have been completed, it is ascertained that my estimate was underrated, and that notwithstanding the very dry summer in 1826, there was two months supply in the reservoirs at the setting in of the wet season, independent of a large quantity which had been allowed to run to waste.

During the old establishment when the water was pumped out of the river Medlock, the supply given out was from 7 to 800,000 gallons per day; since the new works have been carried into effect partly

from increase of services and partly owing to the quality of water being more pure, the quantity now given out is not less than 1,200,000, a certain number of hours each day to upwards of 9,500 families, exclusive of 900 services to the different branches in trade, such as for steam engines, common brewers, dye-house, public stables, &c. &c.

I now, my Lord, come to that part of the statement to which I beg to call your Lordship's particular attention; that if 1,600,000 gallons per day can be produced from so small an extent of ground as 1,600 acres of land, surely some eligible situation can be found upon the Brent or Colne, or rather upon the feeders of one or other of those rivers upon which a reservoir of sufficient capacity may be formed, and into which a sufficient drainage can be effected, to give out that supply which may be required for that district to which the works of the Grand Junction Company have been applied, and to an extent much beyond their present power. I am aware that to a certain extent the Grand Junction Canal Company have the control of the two rivers as feeders to their canal, but I feel confident, from a reference to the county survey, the district must afford means of making sufficient provision without at all interfering with their right."

Mr. Philip Taylor's plan for supplying the metropolis with pure water from the river Thames, sent to the board, in 1828.

"I have directed my attention to the two following most important points for consideration:—First, the source from whence to obtain a sufficient quanti-

ty of pure and wholesome water ; and secondly, the best mode of producing a regular, equal and effective supply on fair and liberal terms to the public.

The modes at present resorted to for bringing water from a distance, and of raising it to reservoirs, from which mains are supplied for its distribution, are liable to various difficulties and objections.

The New River after passing through 40 miles, terminates in a reservoir only 84 feet and a half above the level of the Thames, and steam power is required to raise a portion of it to a greater height."

"Other water companies have placed their steam-engines on the banks of the Thames in London or its immediate vicinity, and have forced water from the river to reservoirs on some elevated spot at a distance.

By following such a plan much of the power exerted is lost in consequence of the friction and resistance occasioned by forcing an ascending column of water through a long extent of pipe ; and the desire of avoiding this waste of power has probably induced such companies to draw water from parts of the river too near the metropolis to obtain it of good quality, and to select situations for reservoirs not sufficiently elevated for the effectual supply of the public.

The highest reservoir supplied in this way is only 121 feet above the level of the Thames, which has been found insufficient for the purposes required ; and in consequence the water has been also forced into the mains direct from the engines. This method is liable to all the objections arising from *loss of power by friction*, to which must be added *the great evil of the supply depending on the constant action of mechanical power*, as a large quantity of water may be required

in case of an extensive fire, at a time when such power is not in operation.

To avoid these evils and objections, and to insure to the public water of the best possible quality at a moderate charge, delivered with such sure force as would produce a regular flow at an elevation that can be desired, I have projected the following plan;—

A part of the river Thames being selected from which pure and unpolluted water may be obtained, (and which I believe may be best found between Brentwood and Richmond,) I propose cutting a subterranean aqueduct from such point in a line that will terminate under an elevated spot near the metropolis; and no situation presents so many advantages as Hampstead Hill or its vicinity.”

“The situation and altitude being determined upon, engine shafts will be sunk perpendicularly, to meet the aqueduct, and the water at once raised by steam engines into the reservoir, from whence it will be distributed to the variouss parts of the metropolis with a force proportioned to the elevation.”

“The means by which I propose raising water from the aqueduct to the reservoir, for the service of the metropolis, are the most improved means now adopted in the Cornish mines; and it is obvious that, by the use of such means, a like quantity of water will be raised to a given height with the same expense of fuel. No untried plan and no doubtful calculations are involved in this part of my proposal, as printed reports are published every month, giving the return of water raised and coals consumed by every large engine in Cornwall. I have already stated that a considerable quantity of power is lost by the usual

mode of forcing water through a sufficient length of ascending pipe to reach a reservoir at a distance, which loss will be obviated by the mode I have proposed of raising it at once by a perpendicular lift."

"Mr. Taylor stated that the distance for the tunnel would be nine miles and a quarter, and he proposed *a brick aqueduct of six feet in diameter*, and with a head of one foot, there would be a flow equal to the quantity of the New River."

"Mr. Taylor was asked what power of engines would be required at Hamstead, and he replied, that the expense of engines, *on his plan*, would not be more than *one fourth* of the expense of the engines now employed by the water companies; *for the forcing of water through a great length of iron tubes, and up inclined planes*, was attended *with so much friction*, that these engines did not more duty than to lift 18 millions of pounds one foot high with the consumption of one bushel of coals; whereas the Cornish engines which were employed in pumping water from the mines by *direct and perpendicular lifts* performed the duty of raising as much as 74 millions of pounds one foot high by the consumption of the same quantity of coals; and this latter plan of employing engines, namely by a *direct perpendicular lift*, was the one and the only one that would be adopted on his plan."

Mr. Mills plans for supplying the Metropolis with water from the river Thames, (1834.)

Mr. James Mills. "You have no difficulty, I suppose, in getting people to contract upon your esti-

mate? I have no doubt Mr. McIntosh or any other respectable contractor, would furnish either of these designs upon my estimate.

Your estimate is only for a single conduit not for a double water-way, like Mr. Telford's plan; do you think it safe, in supplying this large metropolis, to trust entirely to a single conduit? Certainly; I cannot consider any thing more safe; I do not think it probable that the conduit would require any material repairs for a thousand years. The conduit is made upon those dimensions which could convey a supply in a quarter of a day so that it may be empty three quarters of a day, during which time any little repairs might be effected.

In your plan you propose to pump into a great reservoir on Wimbledon common; could you not convey the water from the point from whence you propose to take it by the conduit to stations nearly the level of the Thames, from whence the present companies might pump it by means of their present engines? Certainly; in two of the designs this is done.

Would that not materially lessen the expense? I think it would ultimately *nearly double it*.

What is your reason for thinking so?— Because *the friction of pumping between the perpendicular lift and that at which the companies are compelled at present to work is nearly one hundred per cent.*”

Mr. Mills' plan for supplying water from other sources, (1834.)

“I shall now proceed to recapitulate briefly the plan I would recommend for supplying the whole of the metropolis with pure water, abundant in quantity,

and upon the most reasonable terms. It would consist of three covered conduits to convey all the necessary supplies in a pure state. One on the north west side from my reservoir on the Verulam to a service reservoir at Primrose Hill, 150 feet above the level of high water in the Thames. One on the north east side from Hertford to Newington. One on the south side from Carshalton to Clapham common. The Primrose Hill reservoir to command the highest service, and the other two conduits, services below eighty feet. It is most essential now to take a correct view of the relative permanent cost between high and low service. High service requires no pumping and the mains to be of moderate size. Low service requires the eternal expense of pumping which must increase as the supply does, and the mains to be very large.

The actual expense of pumping $3\frac{1}{2}$ feet per second or 288,048 feet per day is stated in the Parliamentary report of 1821 by the West Middlesex Company to be £3,150 per year; about £1000 per cubic foot for water pumped 136 feet high.

The actual expense of pumping $3\frac{1}{2}$ cubic feet per second or 310,000 feet per day is stated in the same Report by the Grand Junction Company to be £3,500 per year, equal to £1,000 per cubic foot per second for water pumped 115 feet high.

The expense in the same Report by the New River engineer for pumping $18\frac{1}{2}$ cubic feet per second 84 feet high, is stated to be £16,000 per year which would amount to £1,400 per cubic foot per second for an elevation of 120 feet."

JAMES SIMPSON, Esq., to the Chelsea Company.

Can you state what expense you are at for pumping for high service? I cannot off hand.

What does it cost you? I cannot state it off hand.

Do you consider it a very expensive part of your outlay? Yes; a very expensive part.

What power have you for pumping? One hundred and fifty-five horses.

How many steam engines? Three.

What power? One of 60; one of 70 and one of 25.

How many of these are constantly at work? The whole of them."

Statement of Mr. J. G. Lynde, Secretary to the Chelsea Water Works, (1834.)

"Mean elevation at which the water is supplied is eighty five feet.

2,337,000 imperial gallons is the average quantity now pumped per diem, 45 feet to 135 feet.

What expense is your company at yearly for pumping? I should say rather more than £4000, between £4 and £5000.

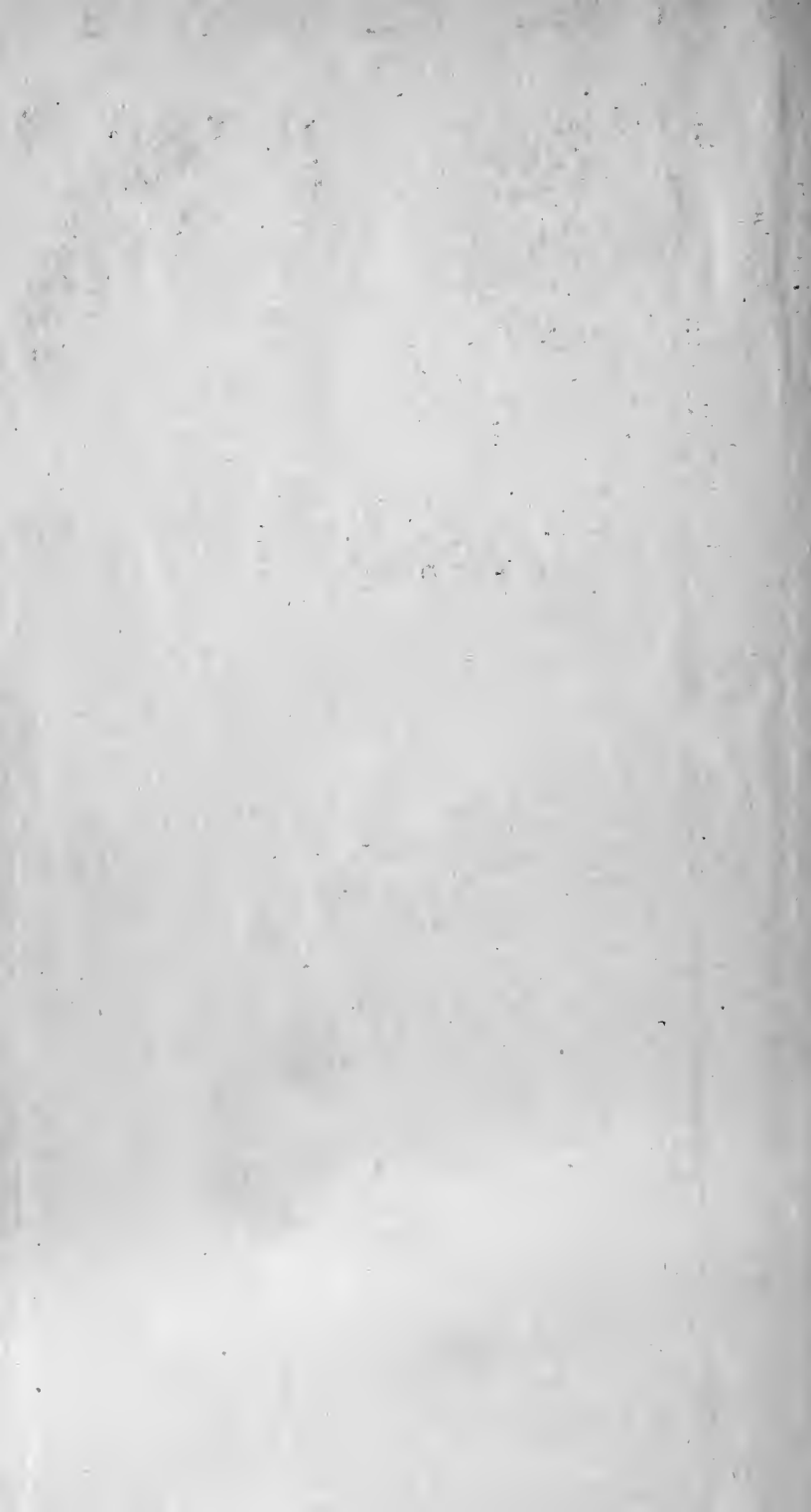
Do you include in that the expense of coals, and the expense of persons conducting the engines, and the wear and tear of the engines and the repairs of the engine houses?

Yes, including every thing attached to the engines, I should say the annual expense is about £4500.

Extract from Mr. W. Anderson's letter to the Commissioners, on the plan of taking a supply of water from the Thames, at Teddington Lock, (1828.)

“On further examination it occurred to me that the only plan would be to erect powerful engines at Teddington ; and by laying a main pipe one mile and a half in length to the ridge of the ground at the oil mill near Wilton, which is about 50 feet above the river at Teddington Lock, it would get over part of the difficulty as above stated ; it might then cross the valley of the Wilton, by an aqueduct, &c. &c.”

“From the rough survey I have made of the above plan, I do not presume to give an estimate of the expense of it ; but to pump the whole quantity at Teddington [50 feet] to supply the three companies according to their present consumption [6,734,190 imperial gallons] would cost for coals alone and wear and tear of engines, an annual expense of £7000 ; and the outlay for engine house, engines and main pipe, would amount to £76,000. These sums are exclusive of the cost of land, and making the channel or aqueduct.”



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