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ANNUAL REPORT
OF THE
COCHITUATE WATER BOARD
FOR
1862.

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CITY OF BOSTON.



R E P O R T

OF THE

COCHITUATE WATER BOARD

TO THE

CITY COUNCIL OF BOSTON,

FOR THE YEAR 1862.

CITY OF BOSTON.

In Board of Aldermen, January 12, 1863.

ORDERED: That the Cochituate Water Board be authorized to report in print.

Sent down for concurrence.

THOMAS C. AMORY, JR., *Chairman.*

In Common Council, January 15, 1863.

Concurred.

GEORGE S. HALE, *President.*

Approved, January 17, 1863.

F. W. LINCOLN, JR., *Mayor.*



R E P O R T.

OFFICE OF THE COCHITUATE WATER BOARD,
119½ WASHINGTON STREET, BOSTON, *January 15, 1863.*

TO THE CITY COUNCIL :

The Cochituate Water Board herewith present for your consideration their Annual Report for the year 1862, together with the Reports of the Clerk of this Board, the Superintendents, Water Registrar, and City Engineer, to which we invite your attention for detailed accounts of the general management and finances of the Works.

From the Report of the Clerk of this Board it will be seen that the expenditures and receipts, on account of the Water Works, from the commencement of the Works to January 1, 1863, are as follows :—

Amounts paid by the Commissioners, and by the Water Board from the time the Works came under the control of the latter,	\$ 5,663,829 86
Sundry payments by the City; and discounts and interests on loans,	3,862,291 43
	<u>\$ 9,526,121 29</u>
From which there should be deducted sundry credits by the City, and amounts received for Water Rates,	3,515,303 23
	<u>\$ 6,010,818 06</u>

Leaving the actual cost of the Works, January 1, 1863,	\$ 6,010,818 06
There has been drawn from the treasury by the Board, during the year, the sum of	\$ 86,264 22
Of this amount there is charged for extension of the Works,	55,838 72
Leaving the expense of the year,	<u>\$ 30,425 50</u>

By this it will be seen that the expenses have been less than the previous year, and had it not been for the great advance in price of all materials used on the Works, the reduction would have been still greater.

By reference to the Report of the Water Registrar, it appears that the total amount received for Water used during the year ending January 1, 1863, is \$ 364,036.37 ; being an increase over the previous year of \$ 8,599.42.

The total number of Water-takers now entered for the year 1863, is 26,289 ; being an increase over last year of 803.

The estimated income from the sales of Water, in 1863, is \$ 385,000.

All the Works under the care of the Superintendent of the *Eastern Division* are in their usual good condition.

From the Report of the Superintendent, it appears that there has been about the same number of feet of Main Pipe laid this year as last ; the total number of feet laid in 1862 was 10,429, being 140 feet less than the previous year.

The number of feet of *Service Pipe* laid, in 1862, was 18,292 ; being a slight decrease this year.

The total number of feet of *Main Pipe* laid, from the commencement of the Works up to January 1, 1863, is 702,793 ; being a little over one hundred and thirty-three miles.

The total number of *Service Pipes* laid, to January 1, 1863, is 24,340.

The number of new *Stop Cocks* is 48 ; making the whole number 1,236.

The number of new *Hydrants* established is 22, making the whole number 1,473.

The number of leaks during the year was not so large as the previous year; being 490, in 1862, against 508, in 1861; and most of them were caused by digging for sewers and drains, over which this Board have no control.

31 Fire Reservoirs have been connected with main pipes during the year, (nine in the city proper, thirteen in South Boston, and nine in East Boston,) making the whole number now connected, 55. The expense of this work is charged to the Fire Department.

The repairs on Beacon Hill Reservoir, commenced last season and postponed on account of the difficulty of procuring suitable cement, were resumed the latter part of September, when the remainder of the bottom was cemented, and the whole surface washed over with cement. The result of this work is entirely satisfactory.

The attention of the incoming Board is called to the condition of the main pipes in some of the streets where the grade has been changed since the pipes were laid, in some cases the pipes are buried *nine* feet deep, which makes it very expensive to repair them, or to lay service pipes; and, in other streets, where the grade has been lowered, they are not deep enough to protect them from frost.

The lake, reservoir, and structures in the *Western Division* are in good condition, and have been properly attended to by the Superintendent.

The most important work of the year, in this division, was the completion of the work connecting Dudley Pond with the lake. The City Engineer was requested to make a survey of this pond, which has been completed. The area of the pond is 81 acres, and the amount of water it will contain, which is available to the City, is about 250,000,000 gallons. The entire capacity of the pond is much greater, as the water in the deepest part measures thirty feet, but as the pipe connecting with the

lake is laid twelve and one half feet below high-water mark, the pond can only be drawn down to that depth. The distance round the pond, measuring at the verge at high-water mark, is three miles. The waters of the pond were let into the lake on January 31, 1862; being less than two months from the commencement of the undertaking.

The abutters, and all others in any way damaged by the drawing down of this pond, have been amicably settled with, excepting two or three, (some of them being absent,) and these, no doubt, will be adjusted in a short time.

The successful completion of this work is highly gratifying to the Board, more than realizing our expectations, and is regarded by us as a matter of congratulation, having thus secured for the use of the City a valuable reservoir.

Improvements have been made during the year on the borders of the lake. The bank on the north side of the road, east of the Superintendent's house, has been cut down nearly level with the road, graded, and a slope wall laid, which has made a great improvement in the appearance of this part of the lake. Slope wall has also been laid on the borders of the lake in other places, which was rendered necessary by the washing of the banks; some of the banks have been sodded, and other improvements made.

The condition of the meadow opposite the Superintendent's house has long been unsatisfactory to the Board, and, during the year, a portion of it has been filled up, thereby strengthening the dam, and presenting a much more creditable appearance.

The interior of the aqueduct has been examined and thoroughly cleansed by the Superintendent during the year. No new cracks were discovered. Some of the old ones were pointed, so that any further settling would be discovered.

Those portions of the aqueduct built upon quicksands will need particular attention, when the frost leaves the ground in the spring.

The rods in some of the waste weirs have been repaired, and

the iron screws replaced by composition ; the remainder of them will be repaired and changed as soon as circumstances will admit.

The Selectmen of the town of Brookline notified the Board of their intention to grade Boylston Street, in front of the reservoir, in doing which it was necessary to alter somewhat the grade of the bank of the reservoir, and to relay a portion of the drain wall outside of it. Also on the opposite side of the reservoir, they laid out a highway, and, in grading, they filled in some portion of it, and excavated others, which caused the banks to cave, and the fence to be continually getting out of repair, and the Board concluded to have the land adjoining graded, and the fence rebuilt where it will be much more likely to stand. This work has much improved the appearance of the reservoir and the street, and the Selectmen appear to be well pleased with it. It is hoped, at some future time, an iron fence will be placed round this reservoir.

The Superintendent of this Division notified the Board that the iron rod attached to the gate of the 40-inch main pipe in this reservoir, was out of order, and that the gate could not be raised. Upon considering the matter, it was found that either the water must be drawn from the reservoir, (which would be a serious loss to the city at this season of the year,) or that the services of a diver, with submarine armor, be procured to go down and find out, if possible, what the trouble was ; this last course was deemed the most advisable, and, upon descending to the depth of twenty-five feet, he found the nut was off of the bottom of the rod, after considerable time spent in searching for it, in different parts of the pipe-chamber, the nut was found, screwed on, and the gate hoisted up and taken out, and is now being repaired. The Board are entirely satisfied with the result of the undertaking.

By the Report of the City Engineer, hereto annexed, it appears that the average daily consumption of water during the year has been sixteen million six hundred thousand gallons,

which daily consumption is one million five hundred and eighty-nine thousand three hundred and four gallons less than in the year 1861. This is very gratifying to the Board, for not only has the consumption decreased over one million gallons per day, but the receipts for water used during the year have considerably increased. This saving, or non-use of water, is mainly owing, no doubt, to the number of water-meters placed in establishments where large quantities of water is used, and the Board would recommend a more general use of them in all such cases.

There was no need of, neither would there have been any, water wasted from the lake, had not some evil-disposed person taken out the stop-plank in the dam of the brook, on the east side of Dug Pond, thereby turning the waters into the lake, which prevented the filling of Dug Pond as usual. By the Superintendent's Report this pond, or reservoir, lacked four feet of being full; the contents of this four feet would be about fifty-seven million gallons; if this quantity had run into the pond we should now have it stored, rather than loosing thirty-two million two hundred thousand gallons of it by running into the lake, and wasting over the outlet dam. There is some question about the right of the City to divert the waters of this brook to fill the pond, but negotiations have been commenced to acquire a perpetual right, which it is expected will be satisfactorily consummated.

Through the liberality of S. T. Tisdale, Esq., of East Wareham, the Board have been enabled to procure some black bass, to stock the lake and Brookline Reservoir, for the purpose of destroying the eels and other small fish which get into our pipes, and cause much trouble and expense. The experiment has been successfully tried by Mr. Tisdale in some of his ponds.

It is the opinion of this Board that it will be for the interest of the City, at some future time when the affairs of our country are in a more prosperous condition, to build a new reservoir, somewhere near this end of the aqueduct, for the storage of all

the surplus water which the lake can furnish ; it would also be of great importance in case of any accident to the aqueduct, for we should then be better able to furnish the city with water while repairing.

All which is respectfully submitted.

EBENEZER JOHNSON, *President.*
GEORGE P. FRENCH,
GEORGE DENNIE,
JABEZ FREDERICK,
JOHN F. PRAY,
GEORGE HINMAN,
J. C. J. BROWN.

RECEIPTS AND EXPENDITURES.

*Statement of Expenditures made by the Cochituate Water Board,
from December 31, 1861, to January 1, 1863.*

Main pipe	\$ 14,287 85
Service pipe	6,014 77
Wages laying main pipe	3,280 02
Wages laying service pipe	2,447 33
Wages blacksmith shop	640 72
Wages plumbing shop	403 30
Wages proving yard	2,765 14
Off and on water	2,706 79
Salaries	8,383 08
Lake. Paid on account of Dudley Pond, grading and other repairs around the lake	13,616 78
Aqueduct repairs	1,453 04
Brookline Reservoir, for labor, &c.	1,752 43
Beacon Hill " " "	1,420 40
South Boston " " "	222 69
East Boston " " "	162 24
Laying main pipe, for stock, &c.	1,764 49
Laying service pipe	5 50
Plumbing shop, for stock	27 00
Blacksmith shop, "	315 45
Office expense	1,003 25
Fountains	297 79
<i>Amount carried forward,</i>	\$ 62,970 06

<i>Amount brought forward,</i>	\$ 62,970 06
Miscellaneous expense, flowing skating grounds, pond on the Public Garden, expense of the Board, &c.	695 82
Meters	5,679 34
Stop-cocks	2,156 77
Proving yard, for stock, &c.	1,023 85
Hydrants	1,654 92
Hydrant and stop-cock boxes	1,193 50
Stable	1,035 04
Travelling expenses	78 92
Tolls and ferriages	120 35
Damage in streets, and to land caused by raising the lake, &c.	752 00
Stationery (including stationery for Water Reg- istrar and Superintendents)	110 06
Pipe yard, repairing buildings, &c.	93 38
Oil	89 63
Printing (including Water Registrar's and Super- intendents')	464 81
Postage and express	22 29
Tools	449 76
Rents, for tool chest	13 00
Carting	182 63
Taxes	375 18
Repairing main pipe	1,125 01
Repairing service pipe	2,520 77
Repairing hydrants	1,319 46
Repairing streets	1,570 35
Repairing stop-cocks	567 32
<i>Amount carried forward,</i>	<u>\$ 86,264 22</u>

Amount brought forward, \$ 86,264 22

CASH PAID CITY TREASURER.

Received rent of arches under Beacon Hill Reservoir	\$ 300 00	
Received for land sold	279 53	
Received for wood, grass, pasture, and old material	311 84	
Received for pipe laying, repairing, &c.,	687 63	
Received for off and on water, for repairs	\$ 1,242 00	
Received for off and on water, waste, and fines,	474 00	
Received for off and on water, for non-payment,	1,548 00	
	<u>3,264 00</u>	
Less this amount paid to the City Treasurer	1,548 00	
	<u>1,716 00</u>	3,295 00
		<u>\$ 82,969 22</u>
<i>Balance</i>		\$ 86,264 22
<i>Amount of expenditures</i>		\$ 86,264 22

EXTENSION OF THE WORKS.

Wages laying main pipe	\$ 3,280 02	
Wages laying service pipe	2,447 33	
Wages proving yard	2,765 14	
Wages plumbing shop	202 00	
Wages blacksmith shop	430 72	
Main pipe	14,287 85	
Service pipe	6,014 77	
Laying main pipe, &c.	1,769 99	
<i>Amounts carried forward,</i>	<u>\$ 31,197 82</u>	<u>\$ 86,264 22</u>

<i>Amounts brought forward,</i>	\$ 31,197 82	\$ 86,264 22
Blacksmith shop	315 45	
Plumbing shop	27 00	
Hydrant and stop-cock boxes	800 00	
Stable	518 00	
Oil	89 63	
Hydrants	1,654 92	
Stop-cocks	2,156 77	
Carting	100 00	
Tolls and ferriage	60 35	
Tools	150 00	
Proving yard, for stock, &c.	723 85	
Meters	5,163 37	
Lake and Dudley Pond	12,881 56	
	<hr/>	55,838 72
Amount of annual expense		\$ 30,425 50

*Expenditures and Receipts on account of the Water Works, to
January 1, 1863.*

Am't drawn by Commissioners, \$4,043,718 21	
“ “ Wat'r B'rd, 1850, 366,163 89	
“ “ “ 1851, 141,309 23	
“ “ “ 1852, 89,654 20	
“ “ “ 1853, 89,854 03	
“ “ “ 1854, 80,182 35	
“ “ “ 1855, 63,866 33	
“ “ “ 1856, 81,429 35	
“ “ “ 1857, 96,931 25	
“ “ “ 1858, 76,006 01	
“ “ “ 1859, 385,652 47	
“ “ “ 1860, 146,304 55	
“ “ “ 1861, 73,977 29	
“ “ “ 1862, 86,264 22	
<i>Amount carried forward,</i>	<hr/> \$ 5,821,313 38

<i>Amount brought forward,</i>		\$5,821,313 38
Amount paid the City Treasurer by the Commissioners,	\$47,648 38	
Am't paid by Water Board, 1850,	8,153 52	
“ “ “ 1851,	5,232 38	
“ “ “ 1852,	15,869 12	
“ “ “ 1853,	4,621 40	
“ “ “ 1854,	12,423 29	
“ “ “ 1855,	9,990 38	
“ “ “ 1856,	7,840 43	
“ “ “ 1857,	13,750 00	
“ “ “ 1858,	9,200 00	
“ “ “ 1859,	5,554 00	
“ “ “ 1860,	3,287 51	
“ “ “ 1861,	10,618 11	
“ “ “ 1862,	3,295 00	
	<hr/>	157,483 52
		<hr/>
		5,663,829 86
Sundry payments by the City,	\$68,194 57	
Discount and interest on loans,	3,794,096 86	
	<hr/>	3,862,291 43
		<hr/>
		9,526,121 29
Sundry credits by the City,	\$61,453 04	
Am't rec'd for water rates, (as per the City Treasurer's account,)	3,453,850 19	
	<hr/>	3,515,303 23
		<hr/>
		\$6,010,818 06

SAMUEL N. DYER,

Clerk Cochituate Water Board.

REPORT OF THE SUPERINTENDENT OF THE EASTERN DIVISION.

BOSTON, *January 8, 1863.*

EBENEZER JOHNSON, ESQ., *Pres. Cochituate Water Board :*

SIR: The usual annual report of matters connected with the Eastern Division of the Cochituate Water Works, is herewith submitted. The amount of work done during the past year does not vary materially from that done in the year 1861. The aggregate number of feet of main pipe laid the past year, is one hundred and forty less than that laid in the previous year. The number of service pipes laid is one hundred and nineteen less than during the previous year. The total number of leaks is eighteen less than the number in the year 1861, showing a slight improvement.

The cost of laying new pipes and of repairs has increased in consequence of the introduction of so many horse railroad tracks in the public streets; and the prices of all the materials used in this department have advanced so much that it is impossible to show the reduction in the expense anticipated at the commencement of the year. I beg leave to call your attention to the 12-inch pipe in Chelsea Street, between Decatur and Marion Streets. This pipe was laid previous to the establishment of the present grade; it is now covered to the depth of nine feet, and as it lays on soft ground, it is constantly settling, thus starting the joints and causing them to leak. I would recommend raising the pipe to the proper grade; or that a new line be laid, and the use of the old pipe discontinued.

There are two short bends in the 24-inch line of pipe in Char-don Street, — I would recommend that these be taken out and the line straightened.

The iron box on the Tremont Street Bridge is so constructed that it is impossible to get at the pipes contained therein, to drive the joints; and as one or more of the joints are now leaking slightly, I would urge the necessity of reconstructing the box upon some plan which will allow repairs to be easily made.

Reservoirs.

The repairs on the Beacon Hill Reservoir have been completed during the past year, and the reservoir is now comparatively tight. No changes have been made at the South Boston or East Boston Reservoirs, during the past year. It will be necessary, however, early in the present year to repair or replace the wooden fence around the East Boston Reservoir.

Statement of Location, Size, and Number of Pipes laid in 1862.

IN WHAT STREETS.	BETWEEN WHAT STREETS.	Diameter of pipe in inches.	Feet of pipe.	REMARKS.
BOSTON PROPER.				
Boylston.....	West of Arlington.....	12	335	The 6-inch pipe is taken up.
Boylston.....	Pleasant and Arlington....	12	876	
Albany.....	Sharon and Newton.....	12	228	
Berkley.....	Appleton and W. Railroad.....	12	122	
	Total 12 inches in Boston.....	....	1,561	
Albany.....	Newton and Worcester.....	8	608	
Marlborough.....	West of Berkley.....	8	350	
	Total 8 inches in Boston.....	....	958	
Appleton.....	Berkley and Clarendon.....	6	23	
Clarendon.....	Appleton and Tremont.....	6	472	
Marlborough.....	Arlington and Berkley.....	6	205	
Worcester.....	West of Tremont.....	6	122	
Newton.....	West of Tremont.....	6	100	
Third Avenue.....	South of Clarendon.....	6	518	
Third Avenue.....	Berkley and Clarendon.....	6	195	
Sharon.....	Harrison Avenue and Albany.....	6	116	
Albany.....	South of Worcester.....	6	155	
Pembroke.....	West of Tremont.....	6	148	
Canton.....	West of Tremont.....	6	43	
Marlborough.....	Arlington and Berkley.....	6	431	
	Total 6 inches in Boston.....	....	2,528	

Statement of Pipes, continued.

IN WHAT STREETS.	BETWEEN WHAT STREETS.	Diameter of pipe in inches.		REMARKS.
		Diameter of pipe in inches.	Feet of pipe.	
Gloucester Place....	From Harrison Avenue.....	4	220	
Albany	For City Stable.....	4	100	
	For 9 Fire Reservoirs.....	4	130	
			450	
SOUTH BOSTON.				
H.....	Eighth and Ninth.....	8	300	
	Total 8 inches in South Boston..		300	
Third.....	East of P	6	139	
Ninth.....	H and K.....	6	243	
Second.....	O and P.....	6	291	
O	Fifth and Sixth.....	6	144	
Sixth	O and P.....	6	160	
Fourth.....	Foundry and the Bridge	6	400	
	Total 6 inches in South Boston..		1,377	
Bolton.....	C and D.....	4	284	
Athens.....	B and C.....	4	208	
Fourth.....	For Alger's Foundry.....	4	83	
	For 13 Fire Reservoirs.....	4	198	
			773	
EAST BOSTON.				
Putnam.....	Princeton and Lexington.....	6	256	
Paris.....	Decatur and Porter	6	700	
Marginal.....	Cottage and Jeffries.....	6	570	
Breman.....	Bennington and Prescott	6	463	
London.....	Bennington and Porter.....	6	430	
	Total 6 inches in East Boston...		2,419	
	For 9 Fire Reservoirs.....	4	63	
	Total 4 inches in East Boston...		63	

RECAPITULATION.

SECTION.	1862.	Diameter in inches.			
		12	8	6	4
Boston Proper.....	Total number of feet laid	1,561	958	2,528	450
	Stop-cocks in the same.....	4	1	4	10
South Boston.....	Total number of feet laid		300	1,377	773
	Stop-cocks in the same.....		1	1	16
East Boston	Total number of feet laid.....			2,419	63
	Stop-cocks in the same.....			2	9
	Sums of Pipes.....	1,561	1,258	6,324	1,286
	Sums of Stop-cocks.....	4	2	7	35

Statement of the Length of different Sizes of Pipes laid, and the Number of Stop-cocks put in, to January 1, 1863.

DIAMETER OF PIPES IN INCHES.

	40	36	30	24	20	16	12	8	6	4	AGG'TE.
Ft. of Pipe laid in Brookline, Roxby & Boston proper	23,082	19,991	29,606	5,773	.....	6,096	57,183	958	232,055	77,804	
Number of Stop-cocks in the same.....	4	5	8	10	1	19	113	1	473	235	
Fect of Pipe laid in and for South Boston.....	.....	.....	.....	.....	8,155	.....	18,730	300	88,033	24,292	
Number of Stop-cocks in the same.....	.....	.....	.....	.....	4	.....	31	1	125	55	
Fect of Pipe laid in and for East Boston.....	.....	.....	.....	.....	15,972	1,523	16,114	.....	68,940	3,823	
Number of Stop-cocks in the same.....	.....	.....	.....	.....	6	3	21	.....	90	28	
Fect of Pipe laid in Newton and Needham.....	.....	1,074	2,140	.....	.....	.....	159	.....	.....	.....
Number of Stop-cocks in the same.....	.....	.....	.....	.....	.....	.....	2	.....	1	.....
TOTALS. — Length of Pipes laid.....	23,082	21,065	31,836	5,773	24,127	7,619	92,186	1,258	359,928	105,919	702,793 feet, equal to 133 miles, 553 ft.
Number of Stop-cocks put in.....	4	5	8	10	11	22	167	2	689	318	1,236

Statement of Service Pipes laid in 1862.

Diam. in inches.	Boston Proper.		South Boston.		East Boston.		Total.	
	Number of Pipes.	Length in Feet.	Number of Pipes.	Length in Feet.	Number of Pipes.	Length in Feet.	Number of Pipes.	Length in Feet.
1	5	372	3	83	.....	.....	8	455
$\frac{3}{4}$	1	195	2	147	.....	.....	3	342
$\frac{1}{2}$	275	11,220	81	2,619	37	1,031	393	14,870
$\frac{3}{8}$	20	633	34	1,093	30	899	84	2,625
Aggregate.....							488	18,292
Making the total number up to January 1, 1863.....							24,340	

Repairs of Pipes during the Year 1862.

DIAMETER OF PIPES IN INCHES.

Where.	40	36	30	24	20	16	12	8	6	4	2	$1\frac{1}{2}$	1	$\frac{3}{4}$	$\frac{5}{8}$	$\frac{1}{2}$	Total.
Boston.....	1	4	1	1	2	....	12	....	23	47	6	43	14	2	220	1	377
So. Boston..	....	....	....	....	3	....	2	....	5	1	....	....	6	....	45	5	67
East Boston.	....	....	....	....	4	1	6	....	2	2	1	....	1	....	29	....	46
Totals...	1	4	1	1	9	1	20	....	30	50	7	43	21	2	294	6	490

Of the leaks that have occurred in pipes of four inches and upwards, eighty-three was on the joints, six by defective pipes, eleven by frost, thirteen by settling of earth, two by caps blowing off, two by defective stop-cocks. Total, one hundred and seventeen. Of the leaks in service and two-inch pipes, one hundred and thirteen were caused by settling of earth, forty-two stopped by fish, thirty-eight by stiff connections, sixty-two by defective pipes, thirty-five by frost, six by turning off water, twelve by defective joints, nine stopped by rust, four by tenants,

six gnawed by rats, twenty-three by defective couplings, one stopped by a sponge, four by digging drains, seven by defective cocks, one stopped by a stone, nine struck by picks, one by cock blowing out. Total, three hundred and seventy-three, showing a decrease of eighteen, for the past year; it will be seen that the most of the leaks are occasioned by the settling of earth caused by the digging of sewers and drains, and as that is a matter which we have no control of, I cannot see any way to prevent it.

Statement of the Number of Leaks, 1850 – 1862.

YEAR.	LEAKS IN PIPES OF A DIAMETER OF		
	Four inches and upwards.	Less than four inches.	Total.
1850.....	32	72	104
1851.....	64	173	237
1852.....	82	241	323
1853.....	85	260	345
1854.....	74	280	354
1855.....	75	219	294
1856.....	75	232	307
1857.....	85	278	363
1858.....	77	324	401
1859.....	82	449	531
1860.....	134	458	592
1861.....	109	399	508
1862.....	117	373	490

Hydrants.

During the year twenty-two new hydrants have been established, as follows: eleven in the city proper, six in South Boston, five in East Boston.

Total number of hydrants established up to January 1, 1863 :

In Boston proper	949
“ South Boston	307
“ East Boston	184
“ Brookline	3
“ Roxbury	12
“ Charlestown	11
“ Chelsea	7
Total	<u>1,473</u>

Sixty-three hydrants have been taken out and replaced by new or repaired ones. Sixty-eight hydrant boxes have been renewed the past year. The hydrants are all in good working order, and have been kept free from frost, although it was reported at the fire that occurred in Pearl Street on the night of December 23, 1862, that the delay was on account of the hydrants being frozen ; such was not the fact, as I was informed by the engineers. During the extreme cold weather, two men are put upon each fire district, whose duty it is to make a daily examination of each hydrant, and I am well satisfied that the duty is faithfully performed.

FIRE RESERVOIRS.

The following list of Fire Reservoirs have been connected with the main pipes during the year :

Boston proper.

Court Square, opposite City Hall.	
Washington Street, corner Northampton Street.	
Washington “ corner Union Park.	
Washington “ at Engine House No. 3.	
Washington “ at Castle Street.	
Summer “ at the junction of Bedford Street.	

Channing Street corner of Federal Street.
 Union “ opposite North Street.
 Brattle “ opposite Brattle Square.

South Boston.

D Street, corner Broadway.
 Broadway, near corner C Street.
 A Street, near corner Broadway.
 Broadway, near corner B Street.
 Broadway, near corner Dorchester Avenue.
 Dorchester Avenue, at Fourth Street.
 Dorchester Avenue, at Fifth Street.
 E Street, between Broadway and Athens Street.
 Broadway, opposite Hawes School House.
 Broadway, corner Dorchester Street.
 Broadway, opposite car house of B. R. R. Co.
 Old Road, half way between Broadway and K Street.
 Second Street, corner Dorchester Street.

East Boston.

Chelsea Street, near Decatur Street.
 Meridian “ opposite Lyman School House.
 Sumner “ “ Primary School House.
 Webster “ “ Mr. Lamson's house.
 Saratoga “ “ No. 29
 Meridian “ “ Old Engine House.
 Trenton “ “ No. 67.
 Monmouth “ corner Marion Street.
 Cottage “ “ Sumner Street.

The stock and labor for the above reservoirs, amounting to \$2,757.54, is charged to the Fire Department.

Stop Cocks.

In April the water was shut off from the 40-inch line, in order to ascertain the trouble with the 40-inch gate, on the Common. It was found that the valve was fitted too close; that was easily repaired, and the water was off of the line about fifteen hours. That has been the only occasion that required the water to be shut off from either of the main lines the past year. Forty-eight new stop-cocks have been put in, and covered by new boxes, and eighty-eight stop-cock boxes have been renewed. Four 6-inch stop-cocks have been taken out and condemned, and others put in their places. All of the stop-cocks have been cleaned and oiled during the year.

Everything connected with the shop has been kept up this season, as there has been power enough at all times to do the work.

*Statement of Pipes and other Stock on hand, exclusive of Tools,
January 1, 1863.*

NUMBER OF	DIAMETER IN INCHES.											
	40	36	30	24	20	16	12	8	6	4	2	1½
Pipes.....	18	25	93	8	64	43	107	160	23	150	5	28
Blow-off Branches.....	1	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....
Y Branches.....	.....	.....	1	.....	.....	1	1	.....	5	.....	.....	.....
3-Way Branches.....	8	4	4	.....	3	6	10	.....	13	10	13	.....
4-Way Branches.....	.....	.....	2	1	.....	1	5	.....	2	.....	.....	.....
Flange Pipes.....	2	6	5	1	4	.....	3	.....	8	2	.....	.....
Sleeves.....	6	1	9	8	2	5	9	2	3	14	12	.....
Clamp Sleeves.....	.....	4	7	2	.....	2	3	.....	9	27	.....	.....
Caps.....	2	2	5	.....	1	2	4	2	9	18	.....	.....
Reducers.....	3	3	1	2	.....	2	5	1	3	.....	.....	.....
Bevel Hubs.....	.....	.....	.....	.....	3	.....	.....	.....	6	4	.....	.....
Curved Pipes.....	1	2	7	.....	3	3	.....	.....	12	12	.....	.....
Quarter Turns.....	.....	.....	.....	.....	2	.....	5	.....	1	.....	9	.....
Double Hubs.....	.....	.....	.....	.....	4	9	.....	.....	.....	.....	.....	.....
Offset Pipes.....	.....	.....	.....	.....	.....	.....	.....	.....	7	3	.....	.....
Stop Cocks.....	1	3	1	2	2	3	4	2	1	1	.....	.....
Yoke Pipes.....	.....	.....	.....	.....	.....	.....	3	.....	3	.....	.....	.....
Man-hole Pipes.....	2	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pieces of Pipes.....	4	6	9	5	17	2	10	3	20	5	10	.....

Hydrants. 37 Lowell, new, 13 ditto, old; 11 Wilmarth, old; 1 sample; 3 New York Pattern.

For Hydrants. 17 screws, 10 plungers, 46 nipples, 17 valve seats, 38 packing boxes, 9 bends, 59 lengtheners, 9 frames, 9 covers, 24 nipples for wharf hydrants, 90 lbs. castings for wharf hydrants.

For Stop Cocks. 3 36-inch screws, 2 30-inch ditto, 1 16-inch ditto, 6 12-inch ditto, 11 6-inch ditto, 3 12-inch plungers, 9 6-inch ditto, 12 4-inch screws, 5 screws for waste-gates, 8 6-inch rings, 11 4-inch ditto, 308 lbs. composition castings for

4-inch, 6 4-inch plungers, 6 6-inch iron screws, 4 4-inch iron ditto, 9 frames, 3 covers.

Meters. 2 3-inch Worthington, 1 3-inch composition ditto, 8 2-inch ditto, 100 1-inch ditto, 54 $\frac{5}{8}$ -inch ditto, 6 1-inch iron ditto, 6 $\frac{5}{8}$ -inch ditto, 1 1-inch Scotch, 6 $\frac{5}{8}$ -inch ditto.

Stock for Meters. 24 male 1-inch couplings, 11 female ditto, 97 female $\frac{5}{8}$ -inch ditto, 22 male $\frac{5}{8}$ -inch ditto, 52 1-inch connection nipples, 24 $\frac{5}{8}$ -inch ditto, 4 2-inch ditto, 52 lbs. unfinished composition castings, 4 2-inch composition pieces, 4 1-inch ditto, 3 $\frac{5}{8}$ -inch ditto, 3 2-inch female couplings, 3 2-inch male ditto, 56 meter glasses, 1 gross screws, 13 meter clocks, 4 1-inch stop-cocks, 10 feet hose, 21 frames and covers.

For Service Pipes. 13 1-inch union cocks, 51 $\frac{3}{4}$ -inch ditto, 25 $\frac{5}{8}$ -inch ditto, 58 $\frac{1}{2}$ -inch ditto, 8 1-inch T cocks, 21 $\frac{3}{4}$ -inch ditto, 20 $\frac{5}{8}$ -inch ditto, 69 $\frac{5}{8}$ -inch straight ditto, 70 $\frac{3}{4}$ -inch cock couplings, 400 $\frac{5}{8}$ -inch ditto, 94 $\frac{1}{2}$ -inch ditto, 220 tubes for $\frac{1}{2}$ -inch ditto, 6 $2\frac{1}{4}$ -inch connection couplings, 44 $1\frac{1}{4}$ -inch ditto, 43 $\frac{1}{2}$ -inch ditto, 15 1-inch air-cocks, 638 $\frac{5}{8}$ -inch unfinished cocks, 335 lbs. castings for various sizes cocks, 30 upright tubes, 41 extension ditto, 7 flanges, caps, and tubes for 1-inch cocks, 37 caps, 29 straight boxes, 25 T ditto, 1 Y ditto.

Lead Pipe. 148 lbs. 2-inch, 4164 lbs. $1\frac{1}{4}$ -inch, 160 lbs. 1-inch, 375 lbs. $\frac{3}{4}$ -inch, 3408 lbs. $\frac{5}{8}$ -inch, 337 lbs. pieces, 106 lbs. $\frac{5}{8}$ -inch block tin, 633 lbs. sheet lead, 2080 lbs. pig lead.

Blacksmith's Shop. 2857 lbs. bar iron, 2288 lbs. working pieces, 274 lbs. cast steel, 3200 lbs. scrap iron.

Carpenter's Shop. 1500 feet of pine plank, 100 feet of spruce boards, 100 feet pine ditto, 200 lbs. spikes, 100 lbs. nails, 3 hydrant boxes, 40 unfinished ditto, 3 stop-cock ditto, 3 meter ditto, 14 tops for ditto.

Stable. 3 sets of harness, 3 horses, 1 buggy, 1 chaise, 3 wagons, 2 pungs, 2200 lbs. English hay, 1000 lbs. salt hay, 12 bushels corn and oats, stable utensils.

Tools. 1 steam engine, 1 large hoisting crane, 1 boom derrick, 4 geered hand derricks, 2 sets of shears and all the rigging

for the same, tools for laying main and service pipes and for repairs of same, 2 engines, 1 fox and 1 hand lathe, upright drilling machine, 3 grindstones, and the necessary tools for carrying on the machine, blacksmith's, carpenter's, and plumber's shops, 3 large tool houses, 2 small ditto, also office furniture.

At Beacon Hill Reservoir. 1 large proving press for 40-inch pipes, 5 swivel pipe patterns, 1 swing stage, capstan frame and levers, 1 large copper ball, 1 composition cylinder, 2 jets, 1 6-inch cylinder, 2 6-inch jets, 1 reducer and 2 sets of 12-inch plates, 2 4-inch ditto, 3 composition reel jets, 6 cast-iron jets, 1 drinking fountain, also all the patterns belonging to this department, some of which are stored at the foundries where we obtain the castings.

Miscellaneous. 5 man-holes, 6 plates, large lot of old lumber, 7 large flagging stones, lot of machinery from Marlboro', 70 tons paving gravel, 900 bricks, $\frac{1}{2}$ bbl. rosin, 8 bundles gasket, 5 kegs old bolts of various sizes, 4 tons of old cast-iron, 30 lbs. rubber packing, 14 proving heads, lot of old hose, 1 large proving press for 36-inch pipes, 1 small press.

Respectfully submitted.

ALBERT STANWOOD,

Superintendent Eastern Division B. W. W.

REPORT OF THE SUPERINTENDENT OF THE WESTERN DIVISION.

NATICK, *January 5, 1863.*

EBENEZER JOHNSON, ESQ., *President of the Cochituate Water Board :*

SIR : In compliance with the Rules and Regulations of the Board, the following Report of matters connected with the Western Division of the Water Works is respectfully submitted :

The gate house, outlet dams, and other structures, together with the roads and grounds around the lake, are all in good order.

During the year the borders of the lake have been improved by laying about fourteen hundred feet of slope wall, and sodding the banks. This work had been rendered necessary by the washing away of the banks, and in this connection I would state that there are many places around the lake where the banks are being washed away to such an extent that a few years will bring the borders of the lake to the five rod line, and render necessary the purchase of more land. This action of the water in these places could be stopped at a comparatively small expense, and I recommend the subject to the attention of the Board.

By order of the Board the meadow in front of the house occupied by me has been much improved by filling up portions of it, (which, during the warm weather contained stagnated water,) and thereby strengthening the dam between this meadow and the lake.

In April I commenced filling up the cut between Dudley Pond and the lake to the level of the adjoining land, and it was left in as good, if not better condition, than before the cut was made. The owners of the land were satisfied, and the residents of the town much pleased, at the improvements made in the highway.

The survey of Dudley Pond, ordered by the Board, has been completed by Henry M. Wightman, from the City Engineer's office, and the surveys for the re-location of old bounds are progressing satisfactorily. When the proper locations for the bounds are fixed, stone monuments are put down instead of stakes, and in future there will be no difficulty in finding them.

Dug Pond, last spring, lacked four feet of being full. This deficiency was caused by some person or persons destroying the dam across a brook leading into the lake. Mr. Knight acquired the right to divert the water from this brook, through an artificial channel, into Dug Pond, to insure the filling of the pond by spring; this right Mr. Knight conveyed to the City, but it is disputed by the owners of land on the brook, both above and below the dam, and although the City, during the life of Mr. Knight, has undoubtedly the right to divert the water of this brook, still I would recommend to the Board a settlement with these owners to avoid difficulty in future, and secure to the City the perpetual right to divert the brook.

The bridges, culverts, waste-weirs, and embankments on the line of the aqueduct, are all in good condition. The iron screws and rods connected with the gates in the waste-weirs, having become insecure by rust, were replaced by composition screws and new iron rods.

The interior of the aqueduct during the year has been examined a number of times, and thoroughly cleansed. No new cracks have been discovered, and no alteration is perceptible in the old ones, with the exception of the one at Bennet's land in Brighton, mentioned in my report of last year. At this place one side of the top arch had settled an inch or more below the

other; I shored it to prevent its settling any more, and upon examination this year, the other side was found to be even with it, and the crack seemed to be in better condition than it was a year ago. I removed the shores, and pointed the crack, so that any further settling would be discovered. This portion of the conduit should be thoroughly repaired, but it is impossible to do it, as the Brookline Reservoir is not large enough to keep the city supplied while the work is being done. If any accident to the conduit should occur at this place, great inconvenience would ensue before the damage could be repaired.

Everything connected with Brookline Reservoir is in good condition, with the exception of the gate to the 40-inch main in the gate house, which will be repaired as soon as circumstances will permit. The town of Brookline having laid out a new road back of the reservoir, and altered the grade of the road in front of it, a number of alterations were rendered necessary, which by order of the Board have been satisfactorily completed, and the reservoir has again resumed its usual neat and orderly appearance, which during the progress of the work, it was impossible to maintain.

Annexed is a schedule of tools, &c., belonging to the City, and used on this Division.

Respectfully submitted.

E. F. KNOWLTON,
Superintendent of Western Division.

The following property is in charge of, and used by the Superintendent of the Western Division: —

- 1 Horse Cart and Harness.
- 1 Express Harness.
- 2 Boats and 2 oars.
- 39 Wheelbarrows and 1 Handcart.
- 73 Shovels and 18 Picks.

- 4 Crowbars, 4 Rammers.
- 2 Grindstones, 6 Water Pails.
- 1 Pair Rubber Boots.
- 6 Lanterns, 2 Aqueduct Lamps.
- 2 Hammers, 1 Level.
- 2 Handsaws, 2 Grass Hooks.
- 2 Iron Wrenches at Gate House.
- 2 “ “ “ Brookline Reservoir.
- 4 Trowels, 2 Hoes, 4 Axes.
- 1 Fluid Can and Oil Filler.
- 1 Pair Hedge Shears.
- 2 Scythes and 1 Scythe Snaith.
- 1 Stove, 1 Desk.
- 2 Whitewash Brushes.
- 1 Gravel Scow.
- 1 Rain Guage.

WATER REGISTRAR'S REPORT.

OFFICE OF WATER REGISTRAR, CITY HALL,
BOSTON, *January 1, 1863.*

E. JOHNSON, ESQ., *President of the Cochituate Water Board:*

SIR: The undersigned respectfully presents to the Cochituate Water Board his Annual Report for the year 1862, in compliance with the sixteenth section of the Ordinance passed October 31, 1850.

The total number of water-takers now entered for the year 1863, is 26,289, being an increase since Jan. 1, 1862, of 803.

During the year there has been 1,204 cases where the water has been shut off, all of which were for non-payment of water rates.

The total number of cases where the water has been turned on is 1,248; of these 774 were cases which had been shut off for non-payment of water rates, and 474 were turned on for the first time.

The total amount received from December 31, 1861, to January 1, 1863, is	\$ 373,922 88
Of the above, there was received for water used in previous years the sum of \$ 9,886.51; leav- ing the receipts for water used during the year 1862, the sum of \$ 364,036.37. In addition to the above there has been received for letting on water, in cases where it had been turned off for non-payment of rates, the sum of	1,548 00
Total amount	<u>\$ 375,470 88</u>

The increased amount of income in 1862, over the previous year, is	\$ 8,599 42
The amount of assessments now made for the present year, is	298,775 89
The estimated amount of income from the sales of water during the year 1863, is	385,000 00
The expenditures of my department during the year 1862, have been	3,615 51

The items of this expenditure have been as follows :—

Paid Charles L. Bancroft, for services as clerk	\$ 900 00
“ Stephen Badlam, “ “	900 00
“ Edwin Jennings, for services as inspector	782 50
“ Charles C. Badlam, “ “	782 50
“ J. L. Fairbanks, for books and stationery	158 51
“ R. D. Child, for distributing bills	32 00
“ William Souther, for distributing bills	30 00
“ Stephen Russell, for “ “	30 00
Amount	<u>\$ 3,615 51</u>

Statement showing the number of houses, stores, steam engines, &c., in the city of Boston, supplied with Cochituate water to the 1st of January, 1863, with the amount of water rates paid for 1862 :—

18,523 Dwelling-houses	\$ 218,559 55
15 Boarding “	856 00
105 Model “	4,314 75
5 Lodging “	124 50
25 Hotels	2,741 00
3,791 Stores and shops	32,075 47
187 Buildings	7,617 09
<i>Amount carried forward,</i>	<u>\$ 266,288 36</u>

	<i>Amount brought forward,</i>	\$ 266,288 36
296	Offices	2,204 88
53	Printing offices	721 17
22	Banks	255 50
20	Halls	299 50
3	Theatres	146 50
22	Private schools	203 50
8	Asylums	391 63
5	Green houses	39 00
1	Catholic College	197 00
1	Medical College	50 00
60	Churches	554 37
8	Markets	879 00
121	Cellars	746 34
404	Restaurants and saloons	5,045 26
11	Club houses	234 50
7	Bath houses	310 00
13	Packing houses	203 00
958	Stables	10,462 93
15	Factories	355 83
3	Breweries	67 50
5	Beer factories	159 25
7	Bleacheries	73 50
60	Bakeries	475 00
5	Ship yards	54 25
1	Dry dock	15 00
3	Dry docks and engines	113 75
61	Shops and engines	4,306 93
9	Stores and engines	748 39
6	Mills and engines	697 53
7	Foundries and engines	283 80
9	Factories and engines	522 87
9	Printing offices and engines	759 67
	<i>Amount carried forward,</i>	\$ 297,865 71

<i>Amount brought forward,</i>	\$ 297,865 71
2 Bakeries and engines	117 40
5 Ship yards and engines	120 83
1 Bindery and engine	67 91
7 Buildings and engines	940 17
42 Stationary engines	1,515 90
1 Pottery	35 00
5 Armories	57 25
3 Gymnasiums	61 50
712 Hose	2,159 00
27 Fountains	163 00
2 Gas light companies	1,028 91
1 Milldam company	300 00
1 Post office	61 50
1 State House	134 50
1 Massachusetts State Prison	817 74
27 Steamboats	4,153 69
3 Railroad companies	850 00
1 House, First Street (city)	6 00
2 Offices (Niles Block)	42 00
1 Office (City Scales)	9 00
1 Office (Harbor Master)	6 00
6 Fire-alarm motors	65 00
22 Engines, hose, and hook and ladder houses,	397 00
271 Public schools	1,847 00
8 Police stations	625 00
2 City stables	112 50
1 Offal station	150 00
1 Steamer Henry Morrison	192 56
1 Court House	262 50
1 Probate Building	47 50
1 Dead House	10 00
1 House of Correction	462 00
<i>Amount carried forward,</i>	<u>\$ 314,684 07</u>

<i>Amount brought forward,</i>	\$ 314,684 07
1 Jail for Suffolk County	243 00
1 Lunatic Hospital	225 00
1 Public Library	50 00
1 Faneuil Hall	40 00
1 City Hall	50 00
1 City Building	37 50
Common Sewer Depart., (making mortar),	75 00
Urinals, &c., F. H. Market	70 00
Contractors for supplying shipping	4,376 93
Street sprinkling	410 00
Building purposes	1,609 70
Navy Yard (Charlestown)	634 98
Custom House	156 00
Measured water	41,374 19
Total	<u>\$ 364,036 37</u>

Statement showing the number and sizes of Water Meters now in use, and where applied, to January 1, 1863.

	SIZE OF METERS.			
	½ inch.	1 inch.	2 inch.	3 inch.
Revere House		3		
Parker House		4		
American House		2		
Marlboro' Hotel		1		
Adams House	2	1		
Coolidge House		4		
Tremont House		4		
United States Hotel		3		
Winthrop House		2		
Bromfield House	1			
Hotel Pelham	2	1		
Sailors' Home	1			
City Hotel	2			
Mariners' House	1			
Pearl Street House	1			
Boston Hotel	1			
Young's Hotel		2		
New England House	1			
Merrimac House	1			
Wildes' Hotel	1			
Massachusetts Hotel	1			
J. Adams (Boarding House)	1			
Boston Sugar Refinery				1
Boston and Worcester Railroad Company	4	2		
Boston and Maine Railroad Company	1	1	1	
Old Colony Railroad Company	4	3		
Fitchburg Railroad Company		1		
Eastern Railroad Company		4	2	
South Boston Gas Company	1			
East Boston Gas Company		1		
Norway Iron Company		2		
Bay State Rolling Mill		2		
Boston Gas Light Company		1		
J. Trull & Co. (Distillery)		1		
J. M. Barnard "		1		
S. Bowman, "		2		
Felton & Waters "	1	1		
Stephen Jenney "	1			
Stephen Jenney (Oil Mill)		1		
W. E. French (Distillery)		2		
John Felton, "		1		
Hodges & Silsbee (Chemicals)	1			
W. D. Philbrick, "	1			
Downer's Kerosene Oil Company			2	
Shawmut Oil Company	1			
<i>Amounts carried forward,</i>	31	53	5	1

	§ inch.	1 inch.	2 inch.	3 inch.
<i>Amounts brought forward,</i>	31	53	5	1
Oriental Oil Company		1		
Lee, Woodman, & Co. (Oil Mill)	1	1		
Pembroke Forge Company		1		
G. & W. Smith (Brewery)		1		
Henry N. Hooper & Co. (Foundry)		1		
William Carleton (Foundry)	3			
Ambrose Louis (Chemicals)	2			
W. K. Lewis (Pickle Manufactory)	1			
W. H. Davis, " "	1			
J. B. Hamblen & Co. (Pickle Manufactory)	1			
American Grist Mill		1		
Mount Washington Glass Company		1		
Chickering & Sons (Piano Manufactory)		3		
Boston Crystal Glass Company	1			
Dexter, Lambert, & Co. (Tassel Manufactory),		1		
Sanborn, Richardson, & Co. (Iron Pipe Manf.),	1			
Grover, Baker, & Co. (Sewing Machine Manf.),		2		
Cunard Steamship Company				1
East Boston Ferry Company				1
Chelsea Ferry Company				1
People's Ferry Company			1	
Hazleton & Locke (Paper Manufactory)	1			
Henry Souther (Brewery)		1		
Evans & Hoyt (Distillery)		1		
G. S. Evans (Sugar Manufactory)		1		
Albion Building		1		
McLean Asylum			2	
Massachusetts General Hospital	1	4		
Globe Locomotive Works		1		
Aquila Adams (Machine Shop)		1		
William Evans, " "		1		
Torreys & Co. (Marble Works)	1	1		
Hill, Dwinell, & Co. (Spice Mill)		1		
Hinckley, Williams, & Co. (Foundry)	1			
Aquarial Gardens	2			
M. Grant (Marble Works)	1			
Briggs & Robinson (Steam Engine)	1			
Banker & Carpenter (Paint Mill)	1			
F. Alger (Powder Mill)	1			
United States Marine Hospital			2	
Loring, Bangs, & Co. (Chemicals)	1			
Bowker, Torrey, & Co. (Marble Works)	2			
Houston & Pierce (Planing Mill)	1			
E. H. Maxwell (Brewery)		1		
Atlantic Works (Machine Shop)		1		
A. Wentworth & Co. (Marble Works)	4			
Cutting's Aquarial Garden	2			
Kittredge & Co. (Turpentine Works)		1		
William Rutledge (Brewery)		1		
Hart, Baldwin, & Co. (Packing House)		1		
E. L. Gowen (Marble Works)	1			
Total	63	84	10	4

The following table exhibits the yearly revenue received from the sales of Cochituate water, since its introduction into the city, October 25, 1848 : —

From October 25, 1848, to January 1, 1850,		\$72,043 20
“ January 1, 1850,	“ 1851,	98,367 90
“ “ 1851,	“ 1852,	161,299 72
“ “ 1852,	“ 1853,	179,486 25
“ “ 1853,	“ 1854,	196,352 32
“ “ 1854,	“ 1855,	217,007 51
“ “ 1855,	“ 1856,	266,302 77
“ “ 1856,	“ 1857,	282,651 84
“ “ 1857,	“ 1858,	289,328 83
“ “ 1858,	“ 1859,	302,409 73
“ “ 1859,	“ 1860,	314,808 97
“ “ 1860,	“ 1861,	334,544 86
“ “ 1861,	“ 1862,	365,323 46
“ “ 1862,	“ 1863,	373,922 88
	Total,	<u>\$3,453,850 24</u>

Statement showing the number and kind of Water Fixtures contained within the premises of Water-takers in the City of Boston, to January 1, 1863, as compared with 1861.

1861.	1862.	REMARKS.
4,680	4,766	Taps ; these have no connection with any drain or sewer.
34,503	36,255	Sinks.
12,046	13,127	Wash-hand basins.
4,331	4,660	Bathing-tubs.
4,831	5,216	Pan water-closets.
4,298	6,252	Hopper water-closets.
256	816	Self-acting water-closets.
1,383	1,408	Urinals.
3,868	4,390	Wash-tubs ; these are permanently attached to the building.
13	16	Shower-baths ; these are in houses where there is no tubs.
10	12	Hydraulic rams.
709	714	Private hydrants.
171	211	Slop-hoppers.
71,099	77,843	Total.

Respectfully submitted.

WILLIAM F. DAVIS, *Water Registrar.*

REPORT OF THE CITY ENGINEER.

OFFICE OF CITY ENGINEER, BOSTON, *January, 1863.*

EBENEZER JOHNSON, ESQ., *President of the Cochituate Water Board :*

SIR: The following report of matters connected with the Water Works is respectfully submitted.

LAKE COCHITUATE.

During the past year the water in the lake has fluctuated in the following manner : —

On the 1st of January, 1862, the water stood at the depth of six feet and one inch above the bottom of the conduit, this being three inches too low to fill the conduit, — its height being six feet and four inches, — and being seven feet and eleven inches below high-water mark. The water kept gradually falling until January 25, when it stood at a depth of five feet above the bottom of the conduit. It then commenced rising, and continued to rise until the 7th of February, when it had again risen to six feet above the bottom of the conduit, at which height it stood one week. It afterwards fell only a few inches below this height, and again, on the 5th of March, it stood at six feet above the bottom of the conduit. From this time it gradually rose until the 4th of May, when it reached high-water mark, equal fourteen feet above the bottom of the conduit. It kept full ten days and again commenced falling, and fluctuated between the heights of thirteen and fourteen feet, until the 1st of August. It afterwards fluctuated, but gradually fell down to eight feet ten inches, on the 27th of October. It then com-

menced rising again, and on the 18th of December it had risen to eleven feet and two inches. On the 1st of January, 1863, it stood at eleven feet one inch above the bottom of the conduit.

During three days and a half in the month of May, water was wasted from the lake into Sudbury River, amounting in all to 33,200,000 gallons, equal to about two days' supply for the city. This was the total amount of waste for the whole year.

During the year it will be seen that we have gained a depth of five feet of water in the lake, equal to about sixty days' supply,—nearly one fifth of the number of days in the year,—but we have also had about one fifth more than the average annual rain fall, showing that we used an amount equal to the average annual rain fall, and also showing that we are now using all that the lake can be relied on to furnish us annually.

We need more storage room with the present means of supply, as well as a new source of supply.

Consumption of Water. Daily Average Number of Wine Gallons drawn from the Brookline Reservoir.

MONTHS.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.
January.....	9,702,700	12,669,000	15,089,000	12,160,000	14,512,000	17,862,000	21,106,769	17,000,000
February.....	10,349,800	12,791,000	14,175,000	14,399,000	14,769,000	18,901,000	20,804,131	17,000,000
March.....	10,125,600	12,504,000	13,941,000	14,154,000	14,480,000	15,409,000	19,453,344	17,300,000
April.....	8,540,000	10,800,000	12,454,000	13,465,000	13,760,000	14,621,000	17,151,593	15,300,000
May.....	9,103,800	10,378,000	12,414,000	11,423,000	11,302,000	14,790,000	16,687,832	14,300,000
June.....	9,984,400	11,223,000	12,504,000	10,867,000	11,639,000	17,838,000	17,231,984	16,600,000
July.....	11,056,600	13,167,000	13,551,000	13,621,000	13,219,000	17,239,000	18,897,809	16,400,000
August.....	11,120,800	12,664,000	13,077,000	13,141,000	12,704,000	19,297,000	18,272,365	17,000,000
September.....	11,710,800	11,522,000	12,030,000	12,745,000	12,389,000	17,957,000	18,098,259	17,000,000
October.....	10,771,200	11,891,000	10,864,000	12,969,000	12,026,000	16,938,000	17,987,128	17,300,000
November.....	10,383,200	11,691,000	11,372,000	12,143,000	12,715,000	16,862,000	16,604,076	17,100,000
December.....	11,307,200	13,284,000	11,241,000	13,075,000	14,586,000	19,151,000	15,976,362	17,000,000
Average.....	10,346,300	12,048,600	12,726,000	12,847,000	13,175,000	17,238,000	18,189,304	16,600,000

Average Monthly Heights of Water in Reservoirs at Brookline, Beacon Hill, South and East Boston, 1858 - 62 inclusive.

MONTH.	BROOKLINE.					BEACON HILL.					SOUTH BOSTON.					EAST BOSTON.				
	1858	1859	1860	1861	1862	1858	1859	1860	1861	1862	1858	1859	1860	1861	1862	1858	1859	1860	1861	1862
January.....	124.55	124.48	123.27	122.81	122.46	116.33	114.02	118.25	116.61	117.48	116.33	114.11	107.48	115.03	113.66	95.77	93.51	93.26	95.37	96.26
February.....	124.56	124.68	122.95	122.68	122.85	113.81	115.36	117.94	118.93	119.46	113.28	114.33	109.30	115.07	114.08	93.80	93.47	95.29	93.05	94.94
March.....	124.37	124.48	123.88	123.32	123.52	114.27	116.61	119.89	119.05	119.18	113.28	114.60	109.40	115.12	114.12	93.75	93.88	94.80	94.60	95.75
April.....	124.66	122.52	123.77	124.01	124.18	117.10	116.99	119.83	118.91	117.91	113.05	114.69	109.34	115.32	114.93	95.99	98.97	93.84	98.07	96.71
May.....	124.49	124.43	123.13	124.04	124.00	117.70	117.01	117.70	119.09	117.59	112.67	114.35	111.90	113.83	115.74	94.85	94.79	96.66	97.85	96.99
June.....	124.54	124.22	123.26	123.68	123.25	116.40	115.65	116.69	117.32	116.39	86.70	113.88	113.47	112.58	114.22	93.60	93.98	96.29	96.22	95.99
July.....	125.65	124.05	122.99	122.68	123.73	115.39	115.30	116.13	116.48	116.46	114.12	113.62	113.26	110.91	114.23	92.91	93.48	95.53	95.00	96.13
August.....	124.56	124.13	122.78	123.71	123.70	114.81	114.82	115.70	114.18	116.22	113.85	112.38	110.97	112.92	114.03	96.88	93.41	96.99	97.34	93.96
September....	124.60	124.37	123.33	123.76	123.64	116.45	113.82	117.15	113.14	116.22	110.90	111.88	114.66	112.96	114.04	93.45	93.61	95.97	95.76	95.57
October.....	124.41	124.29	123.59	123.79	123.85	116.59	114.76	115.34	115.91	115.91	111.46	114.38	113.49	114.68	114.24	94.05	93.97	96.97	95.56	91.80
November.....	124.62	123.55	123.02	123.80	124.07	116.73	114.90	116.23	116.74	117.20	114.22	110.85	114.48	114.14	115.94	94.34	93.79	97.60	96.40	93.57
December.....	124.60	123.60	122.98	124.00	123.46	116.44	113.61	114.67	117.45	115.23	114.16	109.75	114.91	113.79	116.35	93.70	91.77	98.89	97.37	95.77
Average.....	124.63	124.07	123.29	123.52	123.56	116.00	115.24	117.13	116.98	117.21	110.91	112.98	111.86	113.86	114.63	94.42	94.05	96.01	96.05	95.29

NOTE.— The above average heights are given in feet and parts, above marsh level. Maximum high water in the Brookline Reservoir is 124.6 feet above marsh level. By deducting the heights in the City Reservoirs from the heights in the Brookline Reservoir, in each month, we find the LOSS OF HEAD in the different sections of the city at that time.
 * Beacon Hill Reservoir was shut off for repairs two days in September, and twenty-nine days in October, 1862. Its average height of water is, therefore, the average for eleven months only.

Loss of Head from the Brookline Reservoir to Beacon Hill and East Boston Reservoirs.

The effect of increased consumption of water in the city may be seen, by reference to the table in this and previous reports of *average annual heights of water in the reservoirs.*

A synopsis is given in the following table.

YEAR.	Average Annual Heights of Water above Marsh Level, in			Loss of Head from Brookline to Bea- con Hill Reserv'r.	Loss of Head from Brookline to East Boston Reserv'r.
	Brookline Reservoir.	Beacon Hill Reservoir.	East Boston Reservoir.		
1850.....	123.16	119.04	.....	4.12	.....
1851.....	123.36	119.39	105.06	3.97	18.30
1852.....	123.67	116.60	104.07	7.07	19.60
1853.....	122.86	114.89	104.91	7.97	17.95
1854.....	123.65	115.69	99.84	7.96	23.81
1855.....	123.82	117.79	97.49	6.03	26.33
1856.....	123.66	116.15	94.11	7.51	29.55
1857.....	124.11	114.77	94.18	9.34	29.93
1858.....	124.63	116.00	94.42	8.63	30.21
1859.....	124.07	115.24	94.05	8.83	30.02
1860.....	123.29	117.13	96.01	6.16	27.28
1861.....	123.52	116.98	96.05	6.54	27.47
1862.....	123.56	117.21	95.29	6.35	28.27

Conduit.

The following table shows the different heights at which the water has been running, and the number of days in each month at the different heights.

The height of the conduit is six feet four inches.

	HEIGHTS IN FEET AND INCHES.													
												These heights show a head on the Conduit.		
	0.0	5.0	5.2	5.3	5.6	5.9	5.11	6.0	6.4	6.6	6.9	7.0	7.6	8.0
	NUMBER OF DAYS IN EACH MONTH.													
January	1	9	7	6	5	1	2							
February						9	9	10						
March						4		2	17	1	3		4	
April	1								29					
May									24	7				
June	2										5	23		
July	2											27	2	
August	1											30		
September	1											29		
October												31		
November	1								1		13	15		
December									17			7	5	2
Total	8	1	9	7	6	18	10	14	88	8	21	162	11	2

It will be seen by this table that the conduit has been empty only eight days during the year. It has been just full eighty-eight days; less than full sixty-five days; and for two hundred and four days it has been running with a head on it, varying from two inches to one foot and eight inches.

Monthly Fall of Rain in Inches, in 1862.

MONTH.	PLACES AND OBSERVERS.				
	Lake Cochituate, by E. F. Knowlton.	Boston, by J. P. Hall.	Lowell, by Merrimac Manufac. Co. J. B. Francis.	Lowell, by Locks and Canals Co. J. B. Francis.	Cambridge, by G. P. Bond.
January	7.82	8.30	6.86	6.02	7.70
February	1.08	3.29	3.27	2.68	2.79
March	4.18	4.70	4.85	5.20	6.21
April	1.85	1.97	1.75	2.22	1.73
May.....	2.71	2.70	1.99	1.90	2.32
June	6.58	6.78	6.04	5.77	6.29
July.....	6.54	7.33	5.20	5.20	5.05
August	1.43	4.20	2.29	2.55	6.29
September	2.62	5.61	1.87	2.18	4.66
October.....	4.83	4.85	3.92	3.52	5.24
November	7.69	8.32	4.60	5.08	6.73
December.....	2.36	3.01	1.62	2.29	2.20
Totals	49.69	61.06	44.26	44.61	57.21

NOTE. — Melted snow is, as usual, included in the above amounts of rain-fall.

Annual Amount of Rain-Fall, in Inches, in Lake Cochituate, Boston, and vicinity, 1852 to 1862, inclusive.

YEAR.	PLACES AND OBSERVERS.						
	Lake Cochituate, by E. F. Knowlton.	Boston, by J. P. Hall.	Cambridge, by W. C. Bond.	Waltham, by E. Hobbs.	Lowell, by Merrimac Manufac. Co. J. B. Francis.	Lowell, by Locks and Canals Co. J. B. Francis.	Providence, by A. Caswell.
1852..	.....	47.94	40.51	42.24	42.78	.....	38.58
1853..	.....	48.86	53.83	45.04	43.92	.....	53.27
1854..	43.15	45.71	45.17	41.29	42.08	.....	46.25
1855..	34.96	44.19	47.59	40.63	44.89	48.41	39.05
1856..	40.80	52.16	53.79	42.33	42.49	45.97	40.97
1857..	63.10	56.87	57.92	44.04	49.38	52.02	44.74
1858..	48.66	52.67	45.46	37.40	37.73	35.80	44.51
1859..	49.02	56.70	.....	48.49	47.51	48.41	45.29
1860..	55.44	51.46	46.95	.....	46.91	46.67	38.24
1861..	46.44	50.07	50.14	.....	43.32	42.95	.....
1862..	49.69	61.06	.....	.....	44.26	44.61	.....

According to Mr. J. P. Hall's measurements of rain-fall in Boston, the average annual amount for twenty-nine years previous to 1852 was 42.24 inches; and for one third of that time the annual amount was less than the average of 41 inches. In 1828 it was only 32.41 inches.

The above table gives the average annual amount in Boston, for the past eleven years, — 1852 to 1862, inclusive, — as

51.61 inches, or an increase over the average for the previous twenty-nine years of 22 per cent. A similar increase has taken place, to a greater or less extent, at all the places mentioned in the above table; showing that since the construction of the Water Works the annual rain-fall has been much larger than we have a right to expect or calculate on for any series of years.

In Providence, R. I., Prof. Caswell makes the average annual rain-fall, for twenty-nine years previous to 1861, equal 40.7 inches.

Respectfully submitted.

JAMES SLADE, *City Engineer.*



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