ANNUAL REPORT

OF THE

COCHITUATE WATER BOARD

FOR

1864.

City Document. — *No.* 20.

CITY OF BOSTON.

REPORT

OF THE

COCHITUATE WATER BOARD

TO THE

CITY COUNCIL OF BOSTON,

FOR THE YEAR 1864.

CITY OF BOSTON.

In Common Council, January 5, 1865.

ORDERED: That the Cochituate Water Board be authorized to make their Annual Report in print.

Sent up for concurrence.

WM. B. FOWLE, JR., *President.*

In Board of Aldermen, January 9, 1865.

Concurred.

G. W. MESSINGER, *Chairman.*

Approved January 10, 1865.

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

REPORT.

OFFICE OF THE COCHITUATE WATER BOARD,
Boston, January 15, 1865.

TO THE CITY COUNCIL: —

The Cochituate Water Board respectfully submit their Annual Report for the year 1864, together with those of the Clerk of the Board, the Superintendents, City Engineer, and Water Registrar, to which they would refer you for the more minute details of the several departments.

The Works are divided into two divisions, the Western and Eastern; the former embracing that portion of the line from the Lake to the Brookline Reservoir, and is under the superintendence of Mr. E. F. Knowlton, who resides at the Lake; and the latter embracing that portion of the line East of the Brookline Reservoir, including all the works in the city, and is under the superintendence of Mr. E. R. Jones.

WESTERN DIVISION.

During the last year there have been sold several tracts of land near the Lake, and distributed along the line of the conduit, which were of no use to the city, while the taxes on the same were a burden, without any equivalent; these lots embraced about 43 acres, and were sold at prices varying from $40 to $200 per acre, the sum total received being $3,596.24.

At the Lake, there has been laid during the year some fifteen hundred feet of slope wall to protect the banks from washing away, and above this wall the banks have been sloped and sodded; there has also been erected a filtering dam, which has proved very satisfactory to filter the water of Pegan Brook, which passes through the village of Natick and empties its waters into the Lake.

During the year the water has been shut off from the conduit four times, in order that it might be examined, cleaned, and repaired. During such time it was visited by members of the Board, and we regret that we cannot report favorably as to its present condition; several cracks were discovered and repaired as well as could be during the short time the water could remain shut off, but the entire conduit requires a thorough examination, cleaning, and repairing, which cannot be done effectually until a new reservoir is completed; as we have at present no means of supplying the city during such repair, which would take several days if not weeks to complete.

We cannot but feel gratified that such active steps have already been taken by the city in regard to the construction of a new reservoir, covering an area of 100 acres, the land for which the sum of $50,000 has been already appropriated, and application made to the Legislature for an Act to enable the same to be constructed; and we feel that we cannot press the importance of the undertaking too forcibly upon the City Council; for in our opinion it is of vital consequence, for the safety of the entire line of the conduit from the Lake to the Brookline Reservoir, that it should be completed in the shortest possible time, and we earnestly request that you will give the subject your early attention.

The water at the Lake was at its highest point on June 3, when it reached fourteen feet above the bottom of the conduit, but from that time it gradually fell off until December 26, when it was but four feet ten inches above the bottom and one foot six inches below the top of the conduit. During the latter part

of November and the first of December the water in the Lake was falling so rapidly that the Board had under consideration, and was making investigations, as to the best artificial means to be adopted for raising the water to a sufficient height to flow into the conduit; but before any method was decided upon, the water began to rise and has continued to gain, and they were relieved from this serious subject.

It gives us great pleasure to be able to report that all outstanding claims of every description, which the Board have any knowledge of, have been satisfactorily adjusted.*

EASTERN DIVISION.

Ever since 1859, when the new 40-inch main was laid over the Milldam, there has been an unsettled question as to the right of the city to maintain this pipe; for several years petitions have been made to the Legislature for an Act to enable the city to hold the same, but parties adverse to our interest have been able to defeat us or postpone the subject until this year, and we are now able to report that the matter has been settled and the right given for the city to maintain the same forever; there will now be no question about our being able to supply the Back Bay lands, which might have arisen, had we been compelled to remove this pipe.

The fender, which protects the main pipe that supplies East Boston as it passes under the Warren Bridge, having been broken away, has been thoroughly repaired, in such a manner that we believe it will last for many years.

All the pipes and works in the city are in good condition, and there have been fewer leaks than usual, the only one of any

* Dug Pond.—In our last Annual Report we stated that we had been unable to effect a settlement for a perpetual right to divert the waters of Broad Brook on the east side of this Pond, since which time we have accomplished the object, and secured the right forever, by the payment of the sum of five hundred dollars.

consequence being the breakage of one of the large gates on Tremont Street near Dover; this was so well managed by the Superintendent, that no one was interrupted in their supply of water, although the old gate was removed and a new one substituted. During the past year 6,634 feet of new pipe have been laid, making a total to January 1, 1865, of 136 miles 3,497 feet.

WASTE OF WATER.

This subject, which has been brought to the notice of the City Council in the Annual Reports of this Board for many years, has been and will continue to be a source of great anxiety, and one that will require active measures to prevent. The last two months the Lake was at such a low point that the Board believed it to be their imperative duty to use every means in their power to put a stop to the enormous waste which they felt sure was taking place, and they commenced by issuing a Circular to the citizens, calling their attention to the fact; this had a very good and marked effect, but still a great waste continued, and as the Lake was still falling a second notice was issued, and persons having hand hose were requested to discontinue its use, and it was also decided to employ a suitable number of persons to examine all the water fixtures throughout the city and to report each day at the office any waste that might be discovered, and also all leaks; this was immediately carried out by the Water Registrar, and the result has proved, that nearly one half of the water that has been brought into the city has been wasted; for the first ten days, which included about one third of the city, there were reported 531 cases where water was running to waste, and 1,353 cases where the fixtures were out of order and water was leaking on that account.

We have no doubts whatever but that the supply of water is ample for years to come if used in a liberal but proper manner.

The active measures which the Board has adopted have already greatly reduced the consumption, or we should say waste

of water, and our reservoirs are now nearly full. According to the estimate of the Engineer, the average amount of water brought into the city daily is 16,681,000 gallons; to bring this enormous quantity we have been obliged to run our conduit to its utmost capacity, and thereby endangering the Works; and as we know that a large part of this is wasted, we shall continue to use every means in our power to find out and prevent the same.

METERS.

Each year we are adding to the number of meters; at the present time we have 312 in use, and 35 are ordered but not yet received; nothing but their great cost prevents our applying them to all consumers, as it is the only sure way to prevent a continual waste, as consumers give their fixtures more attention when they are paying for any leakage.

COST OF THE WORKS.

Amount paid by the Commissioners, and by the Water Board from the time the Works came under the control of the latter		$6,005,676 68
Sundry payments by the city,	$73,025 82	
Interest on loans,	4,472,453 31	
		4,545,479 13
		$10,551,155 81
Amount paid the City Treasurer by the Commissioners and Water Board,	$184,513 98	
Sundry credits by the city,	66,384 36	
Amount received for Water Rates,	4,279,067 25	
		$4,529,965 59
Total cost of the Works, January 1, 1865,		$6,021,190 22

Making the cost of the Works $112,617.59 more than it was on January 1, 1864.

RECEIPTS AND EXPENDITURES.

There has been received from the Treasury during the year, ...	$85,817 66
Of this amount there is charged to the extension of the Works, ...	48,000 59
Amount of current expenses,	$37,817 07

It will thus be seen that the amount drawn from the Treasury is $12,727.98 less than last year, although the current expenses are $4,884.76 more than last year, the difference being more than made up by the falling off in the expense of the extension of the Works.

The total number of water-takers entered for 1865 is 27,046, being an increase over last year of 465.

The total amount received for the year 1864 for water-rates was $431,986.76, being an increase over the previous year of $36,204.51. The estimated amount of receipts for the year 1865 is $450,000.

All of which is respectfully submitted.

EBENEZER JOHNSON, *President.*
GEORGE DENNIE,
L. MILES STANDISH,
NATHANIEL J. BRADLEE,
ALEXANDER WADSWORTH,
JONAS FITCH,
JOHN H. THORNDIKE.

RECEIPTS AND EXPENDITURES.

Statement of Expenditures made by the Cochituate Water Board, from December 31, 1863, *to January* 1, 1865.

Wages laying service pipe	$3,544 50
" " main "	4,007 98
" Blacksmith shop	1,085 79
" Plumbing "	719 93
" Proving yard	2,625 02
Repairing hydrants	1,717 02
" streets	2,365 32
" service pipe	3,190 94
" stop-cocks	460 79
" main pipe	1,433 22
Main pipe	11,179 26
Service pipe	10,855 69
Lake	4,001 14
Aqueduct repairs	1,069 67
Stable	986 45
Brookline Reservoir	648 29
East Boston Reservoir	415 12
South " "	464 15
Beacon Hill "	596 80
Miscellaneous expense, annual visit of the City Government to the Lake, expenses of the Board, binding Reports, &c.	2,071 04
Amount carried forward,	$53,438 12

Amount brought forward,	$53,438 12
Stop-cocks	1,778 05
Proving yard, for stock, &c.	1,479 76
Hydrant and stop-cock boxes	2,600 31
Off and on water	3,636 75
Hydrants	1,540 26
Taxes	1,051 37
Salaries, (including Clerks and Inspectors in the Water Registrar's Office,)	8,981 22
Meters	6,412 75
Travelling expenses	217 50
Carting	147 49
Fountains	124 18
Office expense	96 00
Printing, (including Water Registrar's and Superintendent's)	740 02
Maintaining meters	811 29
Tolls and ferriages	147 03
Blacksmith shop, for stock, &c.	414 08
Postage and express	20 87
Tools	278 09
Laying main pipe, (for stock, &c.)	790 12
Oil	138 10
Stationery, (including stationery for Water Registrar and Superintendents,)	323 67
Plumbing shop, for stock, &c.	15 00
Laying service pipe	4 10
Damage	15 99
Watching Water Works	615 54
	$85,817 66

Amount brought forward,		$85,817 66

CASH PAID CITY TREASURER.

Received for rent of Arches under Beacon Hill Reservoir		$300 00	
Received for land sold		3,596 24	
" " pipe, laying, &c.		5,838 41	
" " mortgages sold		4,461 60	
" " pasture and grass		47 00	
Received for off and on water for non-payment	$1,276 00		
Received for fines and waste	1,601 00		
" " repairs	1,185 75		
	4,062 75		
Less this amount paid City Treasurer	1,276 00		
		2,786 75	
			17,030 00
Balance			$68,787 66
Amount of expenditures			$85,817 66

EXTENSION OF THE WORKS.

Wages laying main pipe	$4,007 98	
" " service pipe	3,544 50	
" " blacksmith shop	600 00	
" " plumbing	500 00	
" " proving yard	1,400 00	
Main pipe	11,179 25	
Service pipe	10,855 69	
Laying main pipe	790 12	
Laying service pipe	4 10	
Blacksmith shop	250 00	
Amounts carried forward,	$33,131 64	85,817 66

Amounts brought forward,	$33,131 64	85,817 66
Plumbing shop	15 00	
Hydrant and stop-cock boxes	1,900 00	
Stable	380 00	
Oil	85 00	
Hydrants	1,540 26	
Stop-cocks	1,778 05	
Carting	75 00	
Tolls and ferriage	75 00	
Tools	200 00	
Proving yard	700 00	
Meters	6,412 75	
Lake	1,707 89	
		48,000 59
Amount of annual expense		$37,817 07

Expenditures and Receipts on Account of the Water Works, to January 1, 1865.

Amount drawn by Commissioners	$4,043,718 21
" " Water Board, 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
" " " " 1863,	98,545 64
" " " " 1864,	85,817 66
	$6,005,676 68

Amount brought forward,		$6,005,676 68
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	
" " " " 1863,	10,000 46	
" " " " 1864,	17,030 00	
		184,513 98
		$5,821,162 70
Sundry payments by the city,	$73,025 82	
Interest on loans,	4,472,453 31	
		4,545,479 13
		10,366,641 83
Sundry credits by the city .	66,384 36	
Amount received for water-rates (as per City Treasurer's account) . . .	4,279,067 25	
		4,345,451 61
		$6,021,190 22

SAMUEL N. DYER,
Clerk Cochituate Water Board.

REPORT OF THE SUPERINTENDENT OF THE EASTERN DIVISION.

Boston, *January* 4, 1865.

Ebenezer Johnson, Esq., *Pres. Cochituate Water Board*: —

Sir: I beg leave to submit this, my Annual Report. I believe the works under my charge to be in as good condition as in any year heretofore. The whole number of feet of main pipe laid the past year is 6,634, being but about one half that of the year previous. This small amount, as you are aware, is owing to the fact of so few buildings having been erected on new lands. The number of men employed in this part of our work during the year, has been less than one half; yet the cost of all material has been more than double that of former years. In addition to the main pipe laid, I have raised, to correspond with the present grade of the streets, six hundred and twelve feet of pipe on Brookline Street, one hundred and fifty-six feet on Fifth Street, six hundred and seventy feet on Pembroke Street, and two hundred and five feet on Paris Street. I would here observe that there are eighteen other streets, or parts thereof, where the mains are in the same condition as these were before they were raised, and I recommend that they should be raised. The mains were originally laid at a proper depth, but the grade of the streets have been altered by the city so much, that, in some cases, they are six feet below our usual grade. The expense of raising has been borne by this Department, and it is a question with me, which I leave for your consideration, which Department it should be charged to.

The whole number of service pipes put in during the year is four hundred and twenty-four; length, fourteen thousand and one hundred and forty-two, being seventy-one in number, and about six thousand in feet, less than last year.

There has been no leak in the forty-inch main the past year, and the most in large pipes have been in the thirty-inch and thirty-six inch on Tremont Street. The large mains have been shut off only three times during the year; twice on Tremont Street and once on Washington Street. On the sixteenth of November a leak was reported at the corner of Dover and Tremont streets, which proved to arise from the breaking of the flange from the body of one of the thirty-six inch gates. This was temporarily repaired at the time, and on the Saturday night following the gate was taken out and replaced by another. The injured gate was taken to the yard for inspection, and a crack, three feet in length, was found in the body, held together only by the clamps. It was deemed advisable to break it up. By direction of the Board, I have ordered drawings to be made for one of an improved pattern, which will soon be ready for inspection.

All the hydrants are now made in the workshop of the Department, and of a size to correspond with the requirements of the steam engines of the Fire Department. A good part of the original hydrants were so defective in their construction that I have not considered it economy to repair them, and when taken out are replaced by new ones and are condemned. This makes this part of my Department more expensive that that of former years. Those hydrants that will admit of repairs, I propose, this year, to insert nipples sufficiently large to make them equal in size to the new ones. I think that all that are now in can be increased this way to nearly the requisite size, but the cost will be so great that I cannot do it without the sanction of the Board.

The reservoirs have had the usual attention this year. The Beacon Hill is tight, the South Boston shows no sign of leakage, and the East Boston shows about the same as formerly.

The subject of accretions in the iron mains has been under consideration many years. In 1858, a line of twenty-inch pipes, coated with bitumen as an experiment, was laid under Dover Street Bridge. As soon as the height of water in South Boston Reservoir will admit, I propose to open these pipes for the inspection of the Board.

Statement of Location, Size, and Number of Feet of Pipe laid in 1864.

In what Street.	Between what Streets.	Diameter of pipe in inches.	Feet of pipe.
	BOSTON PROPER.		
Berkley	Appleton and Lawrence	12	19
Albany	Sharon and Plympton	12	921
	Total 12 inches in Boston		940
Newton	West of Tremont	6	52
Canton	" "	6	171
Clarendon	Appleton Street and Columbus Avenue	6	572
St. James	Berkley and Clarendon	6	178
Rutland Square	West of Tremont	6	72
Montgomery	Canton and Dedham	6	368
Chestnut	Messenger and Otter	6	261
Warren Avenue	Dedham and Canton	6	120
Brookline	West of Tremont	6	325
	Total 6 inches in Boston		2,119
Harrison Avenue	For Hinckley, Williams, & Co	4	288
Concord Square	West of Tremont	4	306
Unknown street	Messenger and Otter	4	400
Lawrence	Berkley and Clarendon	4	582
Albany	For City Swill House	4	206
Various streets	Connections with Fire Reservoirs	4	135
	Total 4 inches in Boston		1,917
	SOUTH BOSTON.		
Broadway	M and O	6	570
Dorchester Avenue	For Norway Iron Works	4	142
Dove	Dorchester and F	4	264
Quincy	C and D	4	90
	Total 4 inches in South Boston		496
	EAST BOSTON.		
Maverick	McKay & Aldus's Shipyard	4	547
Condor	Brooks and Putnam	6	20
	CHELSEA.		
Marginal	North of Meridian Street Bridge	4	25

RECAPITULATION.

Section.	1864.	Diameter in inches.				
		36	12	8	6	4
Boston Proper...	Total number of feet laid		940		2,119	1,917
	Stop-cocks in same		1	1	8	19
South Boston....	Total number of feet laid				570	496
	Stop-cocks in same					
East Boston.....	Total number of feet laid				20	547
	Stop-cocks in same					
Chelsea.....	Total number of feet laid					25
	Stop-cocks in same					1
	Sums of pipes		940		2,709	2,985
	Sums of stop-cocks		1	1	8	20

Statement of the Length of different Sizes of Pipes laid, and Number of Stop-cocks put in, to January 1, 1865.

	Diameter of Pipe in inches.										Aggregate.
	40	36	30	24	20	16	12	8	6	4	
Ft. of Pipe laid in Brookline, Roxb'y & Boston proper	23,082	19,991	29,696	5,773	.....	6,096	60,001	1,114	238,834	80,347	
Number of Stop-cocks in the same	4	6	8	10	1	19	115	2	490	276	
Feet of Pipe laid in South Boston	.....	.....	.....	.....	8,155	.....	18,938	2,871	90,055	25,695	
Number of Stop-cocks in the same	.....	.....	.....	.....	4	.....	31	2	128	61	
Feet of Pipe laid in East Boston	.....	.....	.....	.....	15,972	1,523	16,150	.....	69,493	4,418	
Number of Stop-cocks in the same	.....	.....	.....	.....	6	3	23	.....	91	29	
Feet of Pipe laid in Newton and Needham	.....	1,074	2,140	.....	.....	.....	159	.....	.....	.....	
Number of Stop-cocks in the same	.....	.....	.....	.....	.....	.....	2	.....	1	.....	
TOTALS. — Length of Pipe laid	23,082	21,065	31,836	5,773	24,127	7,619	95,248	3,985	398,382	110,460	721,577 feet, equal to 136 mls. 3,497 ft.
Number of Stop-cocks put in	4	6	8	10	11	22	171	4	710	366	1,312

Statement of Service Pipes laid in 1864.

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.
1¼	1	22	1	19	..	....	2	41
1	8	308	2	86	3	85	13	479
¾	6	670	2	92	..	....	8	762
⅝	149	5,547	60	2,613	46	1,320	255	9,480
½	59	1,392	67	1,361	20	627	146	3,380
Aggregate.....							424	14,142
Making the total number up to January 1, 1865.....								25,259

Repairs of Pipes during the Year 1864.

WHERE.	DIAMETER OF PIPES IN INCHES.																	Total.
	40	36	30	24	20	16	12	8	6	4	2	1½	1¼	1	¾	⅝	½	
Boston	..	9	3	1	..	..	6	..	23	36	9	29	5	21	..	246	3	391
South Boston.....	..	..	..	..	3	..	..	..	3	2	1	..	..	5	..	43	7	64
East Boston	..	..	..	..	4	..	..	..	5	..	1	..	..	1	1	21	1	34
Totals.....	..	9	3	1	7	..	6	..	31	38	11	29	5	27	1	310	11	489

Of the leaks that have occurred in pipes of 4 inches and upwards, 79 were on the joints, 8 by settling of the earth, 3 by defective cocks, 2 by frost, 3 by defective pipes; total, 95. Of the leaks of 2 inches and in service pipes, 132 were caused by settling of earth, 29 stopped by rust, 1 eaten by rust, 44

stopped by fish, 57 by defective pipes, 16 stiff connections, 5 defective cocks, 1 by drain digger, 1 stopped by nails, 12 by defective joints, 22 by defective couplings, 27 by frost, 5 by boxing, 13 by being struck with picks, 3 by cocks blowing out, 7 by cocks being pulled out, 10 knawed by rats, 3 stopped by gravel, 3 by gasket, 2 by pile driving, 1 by drawbridge. Total, 394.

Statement of the number of Leaks, 1850–1864.

YEAR.	DIAMETER OF		Total.
	Four inches and upwards.	Less than four inches.	
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
1863	97	397	494
1864	95	394	489

Hydrants.

During the year twenty-eight new Hydrants have been established, as follows: Nineteen in the City proper, five in South Boston, three in East Boston, and one in Chelsea.

Total number of Hydrants established up to January, 1865:

In Boston proper	983
South Boston	322
East Boston	191
Brookline	3
Roxbury	12
Charlestown	11
Chelsea	8
Total	1,530

Thirty-five Hydrants have been taken out and replaced by new or repaired ones, and fifty-nine boxes have been renewed. The Hydrants have had all the attention of former years paid them.

FIRE RESERVOIRS.

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

Derne Street, corner of Temple Street.
Somerset Street, opposite Allston Street.
Walnut " " Chestnut "
Chestnut " " West Cedar Street.
Irving " corner of Cambridge "
Chambers " " Poplar "
Green " " Leverett, "
Hancock " " Cambridge "
Blossom " opposite McLean "

Auburn	Street,	corner of	Livingston	Street.
Leverett	"	opposite	Spring	"
Causeway	"	"	Merrimac	"
Hawkins	"	"	the Schoolhouse.	
Friend	"	corner of	Traverse	Street.
Cooper	"	"	Salem	"

The stock and labor for the above connections, amounting to $1,855, is charged to the Fire Department.

Stop-Cocks.

Thirty new stop-cocks have been established this year, and fifty-one boxes over old ones have been renewed. All the cocks have been oiled and the usual attention paid them.

Statement of Pipes and other Stock on hand, exclusive of Tools, January 1, 1865.

NUMBER OF	DIAMETER IN INCHES.											
	40	36	30	24	20	16	12	8	6	4	3	2
Pipes	17	18	91	8	62	38	29	81	52	60	....	3
Blow-off Branches	1	....	1	....	....	....	....	....	....	....	....	....
Y. Branches	....	....	1	....	....	1	1	....	6	....	....	....
3 Way Branches	7	4	3	....	3	6	14	9	26	7	1	4
4 Way Branches	....	....	2	1	....	2	....	7	2	....	....	....
Flange Pipes	2	4	4	5	2	....	....	....	....	4	....	....
Sleeves	5	1	6	8	5	3	11	8	40	14	....	10
Clamp Sleeves	....	4	5	....	....	2	3	....	6	9	2	....
Caps	2	2	5	1	1	....	6	2	8	21	....	....
Reducers	3	2	1	2	....	3	6	6	8	11	....	....
Bevel Hubs	....	....	....	....	2	....	....	....	3	3	....	....
Curved Pipes	....	3	9	....	2	2	3	....	....	....	....	....
Quarter Turns	....	....	....	....	2	1	4	....	5	7	....	7
Double Hubs	....	....	....	....	4	9	....	....	....	....	....	....
Offset Pipes	....	....	....	....	....	....	....	....	8	5	....	....
Yoke Pipes	....	....	....	....	....	....	3	....	2	....	....	....
Man-Hole Pipes	2	....	4	....	....	....	....	....	....	....	....	....
One eighth Turns	1	....	....	....	1	....	1	1	11	....	....	....
Pieces of Pipes	4	7	4	3	16	3	7	1	3	1	2	....
Stop-Cocks	1	1	1	2	2	2	7	6	5	8	2	....

Hydrants. 7 new Lowell, 2 Wilmarth (old), 1 Lowell (old).

For Hydrants. 25 bends, 36 lengtheners, 3 frames, 11 covers, 65 plungers, 55 screws, 50 wastes, 73 nipples, 33 valve seats, 56 stuffing boxes, 2 goose-neck couplings, 4 hose couplings, 212 lbs. composition castings, 2,611 lbs. iron castings, 32 lbs. iron castings for wharf hydrants, 24 comp. couplings for ditto, 4 wharf hydrants.

For Stop-Cocks. 3 36-inch screws, 1 30-inch ditto, 2 24-inch ditto, 1 16-inch ditto, 3 12-inch ditto, 17 6-inch ditto, 11 4-inch ditto, 6 4-inch unfinished ditto, 1 ditto for waste weir, 1 ditto for Brookline Reservoir, 3 12-inch plungers, 6 6-inch ditto, 6 4-inch ditto, 4 6-inch rings, 23 4-inch ditto, 2,447 lbs. Iron castings for 6-inch, 1,125 lbs. ditto for 4-inch.

Meters. In the shop, 1 2-inch, 4 1-inch, 7 $\frac{5}{8}$-inch composition, 6 1-inch iron, 6 $\frac{5}{8}$-inch ditto, and 6 $\frac{5}{8}$-inch Scotch, in use, 1 4-inch, 4 3-inch, 15 2-inch, 120 1-inch, 159 $\frac{5}{8}$-inch. Besides the above there are 8 $\frac{5}{8}$-inch, 1 1-inch, 1 2-inch, and 2 4-inch meters belonging to private individuals, under the care of this department.

Stock for Meters. 249 lbs. composition castings, 3 2-inch male couplings, 48 $\frac{5}{8}$-inch ditto, 23 1-inch female ditto, 30 1-inch nipples, 51 $\frac{5}{8}$-inch ditto, 13 $\frac{5}{8}$-inch connecting pieces, 6 1-inch ditto, 5 2-inch ditto, 4 2-inch nipples, 5 1-inch stop-cocks, 4 $\frac{5}{8}$-inch ditto, 16 clocks, 20 glasses, 77 rubber nipples, 11 brass spindles, 10 feet leather hose, 10 iron bolts, 4 sheets straw board, 2 lbs. rubber packing, 8 platforms, 18 covers, 8 frames.

For Service pipes. 9 1-inch union cocks, 28 $\frac{3}{4}$-inch ditto, 79 $\frac{5}{8}$-inch ditto, 35 $\frac{1}{2}$-inch ditto, 9 1-inch T cocks, 10 $\frac{3}{4}$-inch ditto, 4 $\frac{5}{8}$-inch ditto, 6 Y cocks, 5 air cocks, 31 straight $\frac{5}{8}$-inch cocks, 6 2$\frac{1}{4}$-inch connection couplings, 12 1$\frac{1}{4}$-inch ditto, 43 1-inch ditto, 50 $\frac{3}{4}$-inch ditto, 110 $\frac{5}{8}$-inch ditto, 18 $\frac{1}{2}$-inch ditto, 173 $\frac{5}{8}$-inch female couplings, 150 $\frac{1}{2}$-inch ditto, 8 2-inch flanges, 8 1-inch ditto, 25 $\frac{5}{8}$-inch ditto, 8 $\frac{3}{4}$-inch unfinished union cocks, 102 $\frac{1}{2}$-inch ditto, 13 unfinished T cocks, 10 ditto Y cocks, 34 lbs. $\frac{1}{4}$-inch coupling castings, 23 lbs. $\frac{3}{4}$-inch ditto, 101 tubes, 11 ditto and flanges for 1-inch cocks, 35 long boxes, 13 T boxes, 6 Y ditto.

Lead Pipe. 511 lbs. 2-inch, 616 lbs. 2$\frac{1}{2}$-inch, 545 lbs. 1 $\frac{1}{4}$-inch, 535 lbs. 1-inch, 1,036 lbs. $\frac{3}{4}$-inch, 1,037 lbs. $\frac{5}{8}$-inch, 662 lbs. $\frac{1}{2}$-inch, 36 lbs. $\frac{3}{4}$-inch block tin, 48 lbs. $\frac{5}{8}$ ditto, 600 lbs. sheet lead 3,191 lbs. pig lead, 63 lbs. solder.

Blacksmith's Shop. 695 lbs. square iron, 1,400 lbs. round

ditto, 675 lbs. flat ditto, 211 lbs. cast steel, 977 lbs. working pieces iron, 1,040 lbs. scrap iron.

Carpenter's Shop. 5,000 feet of pine plank, 200 feet of oak ditto, 300 feet of spruce boards, 4 hydrant boxes, 5 stop-cock boxes, 1 large meter box, 1 small ditto, 2 wharf hydrant ditto, 38 top pieces, 50 unfinished hydrant boxes, 3 unfinished meter ditto, 50 lbs. spikes.

Stable. 3 horses, 3 wagons, 1 buggy, 1 chaise, 4 sets harness, 1 pung, 2 sleighs, 800 lbs. English hay, 1,000 lbs. salt hay, 26 bushels grain, stable utensils.

Tools. 1 steam-engine, 1 large hoisting crane, 1 boom derrick, 4 geared hand derricks, 2 sets of shears, and all the rigging for the same, tools for lying main and service pipes, and for repairs of the same, 1 steam-engine, 2 engine lathes, 1 fox ditto, 1 hand ditto, 1 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, 1 40-inch proving press, 1 36-inch ditto, 2 small ditto, also office furniture.

At Beacon Hill Reservoir. 5 swivel pipe patterns, 1 swing stage, capstan frame and levers, 1 composition cylinder, 1 6-inch ditto, 4 jets, 1 reducer, and 2 sets of 12-inch plates, and 2 4-inch plates, 3 composition reel jets, 6 cast-iron jets, 1 drinking fountain, also a large lot of patterns stored at the pipe yard and at the founderies where we obtain castings.

Miscellaneous. 100 tons paving gravel, 500 bricks, 325 lbs. gasket, 5 keg-bolts, 375 feet of hose, 1½ cords wood, 35 gallons oil, 200 lbs. old composition, 1 load sand, 17 reservoir gate covers, 5 man holes, 6 plates, lot of old lumber, lot of machinery from Marlboro.

Respectfully submitted,

E. R. JONES,

Superintendent Eastern Division B. W. W.

REPORT OF THE SUPERINTENDENT OF THE WESTERN DIVISION.

NATICK, January 5, 1865.

EBENEZER JOHNSON, ESQ., *President Cochituate Water Board.*

SIR: In compliance with the Rules of the Water Board the Superintendent respectfully submits a statement of the work done on the Western Division.

LAKE COCHITUATE.

All necessary repairs at the gate house, dams, bridges, roads, walks, fences, and grounds, around the Lake, have been made. Agreeably to your order I have laid five hundred and fifteen yards of slope wall to protect the banks of the Lake from washing. The banks have been sloped and sodded down to the top of the wall, which has much improved the appearance of the borders of the Lake.

A dam has been built as ordered by the Board to filter the water of Pegan Brook, which passes through the village of Natick, and empties its waters into the Lake.

From January 1, 1864, to June 1, water was wasted from the Lake at the outlet dam eighty-one days; the quantity wasted will be given you by the City Engineer, Mr. Crafts. The gates at the outlet dam were closed June 1, the Lake being at that time 14 feet above the bottom of the conduit, from that time to the 1st of August it was drawn down 4 feet to supply the city, the

gates of the outlet of Dug Pond were then opened, which kept the water in the Lake from falling any lower, until the 13th of August, at which time Dug Pond was all drawn off except what it afforded by springs and rain fall, which by careful measurement amounted to nearly a million of gallons per day. Since the 13th of August it gradually fell till on the 24th of December it was but 4 feet 10 inches above the bottom of the conduit, lower than it has ever been since the water was introduced into the city.

In accordance with your order, on the 24th of December the waters of Dudley's Pond were let into the Lake, and have been kept running from that time; this by the aid of the late rain storms, has caused the waters of the Lake to rise, and to day it is six feet three inches above the bottom of the conduit.

BRICK CONDUIT AND LINE OF AQUEDUCT.

All the bridges, waste-weirs, pipe chambers and culverts are in good condition; the banks of the aqueduct have been repaired in a number of places and sodded to prevent them from being washed by the heavy rains. The water has has been drawn off from the conduit four times during the past year for examination, repairs, and cleaning, by order of the Board. First, it was shut off above Charles River on the 8th day of April, at 6 o'clock P. M. and let into the conduit again on the 9th at 12 M. the water being off eighteen hours; during this time it was cleaned and examined from the Lake to Charles River. There are a number of places on this section which need repairs, but in the limited time which the water could be kept off it was impossible to make them, and they were temporarily repaired for the season. The water was again shut off the 13th of June at 6 o'clock P. M. and let on again at 12 M. on the 14th eighteen hours; during this time the pipe chamber on the east side of Charles River was repaired, and swing gates placed in the chamber to prevent the water from wasting from the Brookline Reservoir and conduit east of Charles River, in case of a break in

the aqueduct west of Charles River; and also to examine the conduit from the River to the Brookline Reservoir, which it has been impossible to do farther than the waste-weirs at Newton Centre, owing to the great quantity of water in the conduit. On arriving at the reservoir, I found the gate at the upper gate house, which shuts the water from the conduit at the reservoir, broken. It had been repaired and a set of stop plank made and placed in the gate house to guard against another accident of the kind. The third time the water was shut off was on the 7th of September, and the water was drawn off to examine a leak. A large crack was discovered in the conduit near the waste-weir in the 13th Section, and the water had forced its way through the bank of the aqueduct. After the reservoir had been filled with water the gates at the Lake were again closed for the 4th time September 16, at 4 o'clock P. M. the conduit emptied and the leak repaired. The conduit was also examined from the reservoir to Newton Centre; the water was let on the 17th at 12 M. having been off twenty hours and causing the water in the reservoir to fall two feet nine inches, equal to twenty million gallons. There are other places in the conduit this side of Charles River which need repairs, but it would require more time than could be given, as the conduit contains when full fifteen million gallons; and to do the necessary repairs would require the conduit to be emptied at least six times, causing a waste of ninety million gallons, which could not be spared when the Lake is low.

Nothing of importance has been done to Brookline Reservoir during the year except to keep the banks and walks in order.

You will find annexed a schedule of tools, &c. belonging to the city and used in this Department.

Respectfully submitted,

E. F. KNOWLTON,

Superintendent 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 Wagon.
1 Express Harness.
2 Boats and 4 Oars.
19 Wheelbarrows and 1 Handcart.
49 Shovels and 10 Picks.
4 Crowbars, 4 Rammers.
2 Grindstones 4 Water Pails.
4 Pairs Rubber Boots.
6 Lanterns, 2 Hammers.
1 Level, 2 Handsaws.
2 Grass Hooks.
2 Iron Wrenches at Gate House.
2 " " at Brookline Reservoir.
4 Trowels, 2 Hoes, 2 Axes.
1 Fluid Can and Oil Filler.
1 Pair of Hedge Shears.
1 Stove, 1 Desk.
1 Gravel Scow, and Screen.
1 Rain Gauge.
½ Cask Nails.

WATER REGISTRAR'S REPORT.

WATER REGISTRAR'S OFFICE,
BOSTON, Dec. 31, 1864.

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

SIR: In conformity with the 16th section of the Ordinance, the following Report is herewith submitted: —

The total number of water-takers now entered for the year 1865, is 27,046, being an increase since January 1, 1864, of 465. During the year there has been 745 cases where the water has been turned off for non-payment of water-rates. Of this number 630 have been turned on, leaving a balance of 115 still remaining off.

The total number of cases where the water has been turned on for the first time, is 472.

The total amount received from December 31, 1863, to January 1, 1865, is		$430,710 76
Of the above, there was received for water used in previous years, the sum of	$17,807 98	
Leaving the receipts for water used during the year 1864, the sum of . . .	$412,902 78	
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		1,276 00
Total		$431,986 76

The increased amount of income in 1864 over the previous year, is	$36,204 51
The total amount of assessments now made for the present year, is	309,627 58
The estimated amount of income from the sales of water during the year 1865, is . . .	450,000 00
The expenditures of my office during the year 1864, has been	4,200 34

The items of this expenditure have been as follows, viz: —

Chas. L. Bancroft for services	$975 83
Stephen Badlam " "	975 83
Edwin Jennings " "	849 81
Chas. C. Badlam " "	849 81
William Souther " distributing bills . .	24 00
A. D. Child " " " . .	24 00
G. E. Richardson " " " . .	24 00
Chas. W. Little " " " . .	10 00
J. E. Farwell & Co. " printing	283 52
J. L. Fairbanks " stationery . . .	183 54
	$4,200 34

The order which passed your Board December 21, 1864, directing the Water Registrar to employ twenty men to examine and report all places where the water fixtures were out of order, and the water found running to waste, has been complied with, and the result shows the necessity of the order. The total number of cases reported during the past ten days, is 1,808. Of these 1,353 were cases of fixtures out of repair, and 531 were reported for wasting water.

METERS.

The meter system continues to grow in favor, and with few exceptions gives general satisfaction. The total number of meters now in use is 312, being an increase since January 1, 1864, of 58. During the past 60 days a series of experiments have been commenced by attaching meters to the premises of a variety of establishments, embracing Club Houses, Restaurants, Confectioners, Oyster Saloons, and buildings occupied by several tenants, and the result proves the benefit of their application; and I am convinced that with the aid of meters similar results would follow with almost every class of consumers.

STATEMENT

Showing the Number and Sizes of Water Meters now in Use, and where applied, to January 1, 1865.

	SIZE OF METERS.				
	⅝ inch.	1 inch.	2 inch.	3 inch.	4 inch.
Revere House		3			
Parker House		4			
American House		2			
Marlboro House		1			
Adams House	2	1			
Coolidge House		4			
Tremont House		4			
United States Hotel		3			
Bromfield House	2				
Hotel Pelham	2	1			
Sailors' Home	1				
City Hotel	2				
Mariners' House	1				
Boston Hotel	1				
Young's Hotel		2			
New England House		1			
Merrimac House	1				
Wilde's Hotel	1				
Massachusetts House	1				
J. Adams's Boarding House	1				
Quincy House	2	2			
Elm Street House		1			
National House	1				
Central House	2				
Webster House		2			
Hancock House		2			
Evans House	1	2			
Dooley's Hotel	1				
Berkley House	1				
Trimountain House	2				
Appleton's Hotel	2				
Merchants' Hotel	1				
Boston Sugar Refinery				1	
Worcester Railroad Company	5	2			
Maine Railroad Company	2	1	1		
Old Colony Railroad Company	4	3			
Fitchburg Railroad Company		2			
Providence Railroad Company	2		2		
Eastern Railroad Company	1	5	1		
Midland Southern Railroad Company			1		
Navy Yard					2
Amounts carried forward	42	48	5	1	2

	⅝ inch.	1 inch.	2 inch.	3 inch.	4 inch.
Amounts brought forward	42	48	5	1	2
United States Marine Hospital			1		
Massachusetts General Hospital	1	4			
McLean Asylum			1		
Massachusetts State Prison					1
Bay State Rolling Mill		1	1		
Norway Iron Company		3			
Pembroke Forge Company		1			
D. Dyer (Rice Mill)		1			
Farrar, Follett, & Co	1				
Boston Gas Light Company		1			
South Boston Gas Light Company	1				
East Boston Gas Light Company		1			
Cunard Steamship Company				1	
East Boston Ferry Company			2		
Chelsea Ferry Company				1	
Torreys & Co	2	1			
Bowker, Torrey, & Co	3				
E. L. Gowan	1				
A. Wentworth	4				
J. Trull & Co		1			
J. M. Barnard		1			
S. Bowman		2			
Felton & Waters	1	1			
F. H. Jenny	1	1			
W. E. French		2			
John Felton & Son		1			
Graves & Hoyt		1			
J. Foote	1				
Cushing & Beach	1				
" "	1				
S. H. L. Pierce	1				
Chauncy Page		1			
Benjamin Pope & Co		1			
J. A. Robertson	1				
Bennett & Co	1				
Manson, Peterson, & Co	1				
J. J. McNutt	1				
J. R. Coolidge		1			
J. F. Paul	2	1			
Henry N. Hooper & Co		1			
William Carleton	3				
South Boston Iron Company	1		2		
C. Alger (Powder Mill)	1				
Hinckley, Williams, & Co	2				
Downer's Kerosene Oil Company	1		1		
Shawmut Oil Company	1				
Oriental Oil Company		1			
H. Richardson	1				
Lee, Crocker, & Co	1	1			
Hodges & Silsbee	1				
Philbrick & Parsons		1			
Loring, Bangs, & Co	1				
Henry Souther (Brewery)		1			
Amounts carried forward	80	80	13	3	3

	⅝ inch.	1 inch.	2 inch.	3 inch.	4 inch
Amount brought forward	80	80	13	3	3
William T. Van Nostrand		1			
George W. Smith	1				
S. H. Litchfield		1			
Fairbanks & Beard		1			
Howard Theatre	1				
Mount Washington Glass Company		1			
Boston Crystal Glass Company	2				
W. K. Lewis	1				
W. H. Davis	1				
J. G. Hamblen	1				
H. M. Richards	1				
Chickering & Sons		3			
J. L. Ross	1	1			
Dexter, Lambert, & Co		1			
Sanborn, Richardson, & Co	1				
Grover, Baker, & Co		2			
G. E. Evans		1			
Thomas Oxnard		1			
Hazleton & Bailey	1				
Globe Locomotive Company		1			
Boston Milling Manf. Company	1				
Hill, Dwinell, & Co		1			
S. C. Taylor	1				
Warren Color Company	1				
Aerated Bread Company	1				
J. B. Fowle & Co	1				
Kittridge & Co		1			
Aquilla Adams		1			
William Evans		1			
Atlantic Works		2			
R. Hoe & Co		1			
George McLauthlin	2				
J. J. Walworth & Co		1			
Edwards & Kershaw	1				
Briggs & Robinson	1				
Schenkl & Dana	1				
Banker, Carpenter, & Co	1				
Stimpson, Valentine, & Co	1				
Jarvis & Hall	1				
Albion Building		1			
Hart, Baldwin, & Bothume		1			
Aquilla Adams		1			
Donald McKay	2	1			
T. R. Burnham	1				
Suffolk Salt Works	1				
Boston Music Hall				1	
Second Church Society		1			
R. B. Brigham	1				
Carter, Mann, & Co	1				
Fulton Iron Company		1			
Pavilion		1			
Denio & Roberts		1			
J. Hobart	1				
Amount carried forward	111	110	13	4	3

	⅝ inch.	1 inch.	2 inch.	3 inch.	4 inch.
Amount brought forward	111	110	13	4	3
E. S. Wright & Co.	2				
Charles Copeland	3				
Peter Brigham		1			
E. W. Johnson	2				
Atlantic Works		1			
Leavitt & Co.	1				
G. H. Dickerman	1				
H. Atwood	1				
Globe Works		1			
Eagle Sugar Company		1			
Fowler & Co		1			
Bay State Sugar Company		1			
Campbell & Coverly	1				
Underhill & Brother	1				
Stebbins & Anderson	1	1			
Mason & Hamlin	2				
Sanborn & Parker	1				
Watson & Bisbee	1				
Freeman & Sears	1				
G. H. Fox & Co		1			
Simpson Dry Dock Company		1			
Paul Curtis	1				
Richard Price	1				
Commercial Wharf Company	1				
St. Mary's College	1	1			
Union Club House	1				
McKay & Aldus			1		
P. Doane	1				
Vinton & Copeland	1				
Medical College	1				
W. D. Parks	1				
Suffolk Lead Works	1				
George W. Vinton	2				
S. D. & H. W. Smith	1				
Union Building	4				
Somersett Club House	2				
E. F. Porter	1				
Merchants' Exchange	1	1			
New England Life Insurance Company		1			
Haley, Morse, & Co.	1				
Jonathan Cottle		1			
R. S. Higgins	2				
J. Higgins	1				
E. Perkins	1				
J. M. Learned	1				
Thomas Jameson	2				
Curtis & Tilden	1				
Studio Building	1	2			
Monks Building	1				
Phœnix Building	2				
City Exchange		1			
Niles Building		2			
Total	163	128	14	4	3

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
" " 1757,	"	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
" " 1863,	"	1864,	394,506	25
" " 1864,	"	1865,	430,710	76
	Total		$ 4,279,067	25

Statement showing the number of houses, stores, steam engines, &c. in the City of Boston, supplied with Cochituate water to the 1st of January, 1865, with the amount of water-rates paid for 1864: —

19,309	Dwelling-houses	$232,384 04
27	Boarding "	1,544 00
101	Model "	4,345 00
9	Lodging "	233 00
17	Hotels	1,142 00
4,315	Stores and shops	38,673 62
217	Buildings	9,325 78
368	Offices	2,832 58
46	Printing offices	685 50
24	Banks	292 50
35	Halls	515 50
2	Theatres	44 50
22	Private schools	197 00
9	Asylums	361 13
4	Greenhouses	30 00
67	Churches	657 33
7	Markets	804 50
110	Cellars	706 00
379	Restaurants and saloons	4,609 05
9	Club houses	240 50
3	Bath houses	220 00
14	Packing houses	232 34
957	Stables	10,914 86
16	Factories	513 37
1	Brewery	6 66
1	Beer manufactory	50 00
6	Bleacheries	76 00
1	Laundry	25 00
	Amount carried forward,	$311,661 76

Amount brought forward,		$311,661 76
1	Dyehouse	54 00
63	Bakeries	520 00
4	Shipyards	51 67
2	Dry docks and engines	34 00
56	Shops and do.	3,328 50
15	Stores and do.	1,103 80
1	Mill and do.	169 20
7	Foundries and do.	287 43
4	Factories and do.	403 26
11	Printing and do.	803 79
1	Bakery and do.	33 00
3	Shipyards and do.	264 06
1	Bindery and do.	93 50
4	Buildings and do.	746 94
1	Pottery and do.	35 00
36	Stationery engines	1,492 64
6	Armories	60 00
3	Gymnasiums	56 50
941	Hand-hose	2,831 00
19	Fountains	124 00
2	Gaslight companies	801 15
1	Milldam company	122 00
1	Postoffice	67 00
1	Statehouse	134 50
28	Steamboats	5,395 18
3	Offices, Niles Block	36 00
1	Office, Harbor Master	6 00
1	Office, City Scales	9 00
1	Old State House	27 00
6	Fire-alarm meters	65 00
22	Fire engine, hose, and hook and ladder houses	350 00
Amount carried forward,		$331,166 88

Amount brought forward,		$331,166 88
278	Public schools	1,888 00
8	Police stations	719 00
2	City stables	135 00
1	Offal station	200 00
1	Steamer, Henry Morrison	192 56
1	Court-house	262 50
1	Probate building	47 50
1	House of reception	10 00
1	House of correction	462 00
1	Jail for Suffolk County	243 00
1	Lunatic Hospital	225 00
1	Public Library	250 00
1	Free City Hospital	50 00
1	Faneuil Hall	40 00
1	City Hall	51 00
1	City building	37 50
	Common Sewer Department, making mortar	50 00
	Public urinals	145 00
	Contractors for supplying shipping	2,618 35
	Street sprinkling	400 00
1	Deer park	10 00
	Hydrants, Boston Common	50 00
	Building purposes	1,217 98
1	Custom-house	153 00
1	U. S. Court-house	102 00
	Measured water	72,176 51
		$412,902 78

Statement showing the Number and kind of Water Fixtures contained within the Premises of Water-takers in the City of Boston to January 10, 1865, *as compared with previous years.*

1862	1863	1864	REMARKS.
4,766	4,789	4,831	Taps. These have no connection with any drain or sewer.
36,255	37,289	38,844	Sinks.
13,127	14,100	15,488	Wash-hand basins.
4,660	4,921	5,262	Bathing-tubs.
5,216	5,788	6,286	Pan water-closets.
6,252	6,529	7,117	Hopper water-closets.
816	846	935	Self-acting water-closets.
1,408	1,548	1,644	Urinals.
4,390	4,967	5,535	Wash-tubs. These are permanently attached to the building.
16	17	12	Shower-baths. These are in houses where there are no tubs.
12	12	12	Hydraulic rams.
714	729	708	Private hydrants.
211	216	275	Slop-hoppers.
77,843	81,751	86,949	Total.

Respectfully submitted,

WILLIAM F. DAVIS,

Water Registrar.

REPORT OF THE CITY ENGINEER.

Office of City Engineer, Boston, January, 1864.

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.

The condition of the structures and grounds at the Lake and the improvements made during the past year, being fully set forth in the Report of the Superintendent of the Western Division, it is only necessary to refer to his Report for information upon this subject.

The water in the Lake, at the beginning of the year was, according to the reports of the Superintendent, 13 feet 11 inches above the bottom of the conduit, and remained at about this height — rising at one time to 14 feet — until June 3.

On the first of July it had fallen to 12 feet 7 inches. During the month of July it fell from 12 feet 7 inches to 10 feet, or at the rate of one inch per day. It then continued to lower, with slight fluctuations, until the 26th of December, when it had reached a level of only 4 feet 10 inches above the bottom of the aqueduct, — a fall since July 3, when the Lake was full, of 9 feet 2 inches. Since December 26, it has been gradually

rising, and on the 1st of January stood at 5 feet 8 inches, a gain in five days of 10 inches, or at the rate of 2 inches per day with every prospect of a steady increase. It would now seem that the danger which has been apprehended of being obliged to resort to artificial means of raising the water from the Lake into the aqueduct, in order to supply the usual great consumption incident to the winter months, has now passed.

A Table of the average monthly and yearly heights of water in the Lake above the bottom of the aqueduct for the past fourteen years has been prepared and is herewith submitted; from which it appears that the yearly average height of the Lake for the past year has been $10,\frac{84}{100}$ feet, being a trifle lower than for years 1860, 61, 62. It will also be seen, that the monthly average height for December last, — the lowest since the works were constructed, varies only $\frac{68}{100}$ of a foot from the average for January, 1862, and, in fact, that the present low stage of the water is almost exactly paralleled in the winter of 1861, 2.

We should be admonished by the experience of the past year, when, — with a rain-fall of $42\frac{6}{10}$ inches, our supply ran so low, — of the danger that we should incur, if the rain-fall should happen to be as small as in 1822, which was only $27\frac{2}{10}$ inches. The want of adequate storage room has probably been more forcibly exemplified in this year's experience than ever before. We began the year with the Lake full, and during the first five months there was wasted at the outlet dam 1,368,746,000 gallons or enough to supply the city for 82 days at the rate of consumption for the past year. All this amount, however, could not have been retained even if the dam had been two feet higher, as was recommended in the Report of the former engineer, as the capacity of the additional two feet would have been not over one-half the amount wasted. Although the proposed new Reservoir will furnish storage room for an amount equal to the capacity of an additional two feet at the Lake; nevertheless, it must be apparent that the storage capacity of the Lake itself should be increased unless the obstacles in the

form of damages should be found to be insuperable. We must either make the total capacity of the Lake, as a receptacle of the rain-fall on its water shed, available by increasing its storage capacity, or, in a few years, seek an additional source of supply.

By reference to the statement herewith submitted of the rain-fall on the water shed of the Lake, the amount consumed and wasted, the available amount received into the Lake, and the available percentage, it will be seen that the daily average amount received into the Lake for a term of eleven years was about 23,000,000 gallons, while the capacity of the aqueduct to deliver, even if thoroughly strengthened, cannot safely exceed 20,000,000 gallons per day, an amount, which, if storage room could be provided, would adequately supply, even at the prsent rates of consumption, a population of 235,000.

Water has been wasted from the Lake, during the past year as follows, viz: —

In January, for	22 days,	266,420,604	gallons.
" February, "	6 "	7,120,452	"
" March, "	10¼ "	582,656,370	"
" April, "	10¼ "	373,482,932	"
" May, "	25 "	139,065,713	"
5 months,	73½	1,368,746,071	"

PEGAN BROOK.

The water of the stream known as Pegan Brook, which passes through the centre of the village of Natick and empties into the Lake at its southeast corner, receives in its flow a great deal of offensive matter, so much, in fact, as to render its diversion or purification a matter of great desirability if not of necessity.

A personal examination of the premises, in company with your Board was made last summer, when it was determined to make a survey of the most practicable route for an aqueduct or

drain to divert this water to Bannister's Brook, and thence into Sudbury River, and to estimate the cost thereof. In view of the known great cost of such a work, especially at the present high rates of labor and materials, an expedient was suggested which it was thought might serve to mitigate temporarily at least, the nuisance. This plan was to build across the meadow, which is from 80 to 100 feet wide at the mouth of the brook, a dam of such materials that the waters of the brook, under a slight head, should filter through, thus arresting much of the filth which would otherwise pass into the Lake. A plan was proposed for a dam to be built of common field-stone, except a space three feet in width in the centre of the embankment extending its whole length, to be filled with fine pebbles or screened gravel, which may be replaced whenever the filter becomes foul or clogged, without disturbing the rest of the dam. To provide for unusual flows of water, as in case of spring freshets, a flume, five feet in width, provided with stop-plank was to be built through the dam.

This plan was adopted by the Board and has been executed in a thorough manner under the direction of the Superintendent, Mr. Knowlton. Its cost was only about $500, and, thus far, has worked admirably. A very recent examination showed the water issuing in a perfectly clear state along the whole outer line of the dam under a head of only one foot three inches, thus showing that the filter was working quite as satisfactorily as was expected.

Several routes for an aqueduct to divert this brook have been reconnoitred, and the one deemed the most feasible has been surveyed. The length of brick aqueduct to be built on this route would be about 2½ miles, with cuttings for nearly one mile, averaging 22 feet, and fillings for the rest of the distance, varying from one to twelve feet. By this route the aqueduct would commence about 1,000 feet east of the present filter dam, at a point on the brook which is about 7 feet above high-water mark in the Lake; thence, following the course of the brook

to near the border of the southeastern part of the Lake, about 1,000 feet; thence along the southern border of the Lake and by the northerly side of the Worcester railroad, about 3,000 feet; thence in a northwesterly and northerly direction, along the shore of the Lake about 3,600 feet, crossing land of Mrs. Sally Walker and land of Willard Morse; thence in a northerly direction, leaving the edge of the Lake, through land of said Morse, of Martin Badger, and of Caroline Morse about 2,400, to a road known as Speen Street; thence, following this road, about 2,000 feet; thence leaving the road on the easterly side thereof and passing through land of Aaron Train and others, about 1,000 feet, and thence by an open ditch about 700 feet to the present ditch, which leads from the meadow opposite the Superintendent's house to Bannister's Brook.

The size of aqueduct required has not been determined, as no opportunity has yet occurred for gauging the maximum flow of the brook.* It is probable, however, that a diameter of three feet, which, with a fall of three feet per mile would discharge over 8,000,000 gallons in twenty-four hours, would be sufficient to carry off the large quantities which the brook brings down in spring freshets.

An aqueduct of this size, built on the route above described, would cost, at present prices, not less than $ 70,000, a sum which nothing less than absolute necessity should justify the expenditure of. At all events, before incurring such an expense, it would be well to exhaust all other expedients for preventing the filth from entering the brook, and for the purification of its waters before entering the Lake. The Board should control, by purchase or otherwise, the borders of the brook as far as possible, say from its mouth to the culvert under Walcott's Block; then, if the sewage from Fay's Factory, which appears to be the chief source of impurity, could be diverted,

* Since this was written, and during the recent rain, the flow of the brook has been gauged, and though not a maximum flow, was found to be 1,060,000 gallons in twenty-four hours.

and the present filter dam maintained in its present efficiency, it is quite certain that the evil would be effectually cured, and at a moderate cost compared with the expense of an aqueduct.

We should also save the water, which, although not very great in amount, helps to make up the total supply, which, even at the present rate of consumption, is not over abundant. I would also suggest that an analysis of the water of this brook, taken at several points above the dam in its present condition, and compared with the same water after it has passed the filter, also with the water at the gate-house, which is about three miles distant, would determine whether the impurities, gross as they appear, are of that nature to deleteriously affect the quality of the water.

CONSUMPTION OF WATER.

The usual statement of the daily average amount of water consumed, for the past and previous years since 1849, is herewith presented, and it appears that the average for the year is 16,681,000 gallons per day, being an increase over last year of 442,500 gallons per day. It will be seen that the average daily consumption for the months of November and December is about 2,000,000 gallons less than for the corresponding month of last year, — a fact that is gratifying, and is undoubtedly owing to increased vigilance and care on the part of our citizens, inspired by fears of a short supply, and by the extra exertions of the Board and its officers in tracing out sources of waste.

The estimates of consumption for the past year have been made according to the method employed the year previous. Some comparisons have been made of this method with various formulas for obtaining the discharge of canals and pipes under similar conditions, and all the investigations I have made this year confirm the opinion expressed in my last Report, that the estimates for a number of years past have been too large.

The greatest amount consumed on any one day during the

winter months of 1864, was about 23,700,000 gallons on the nineteenth of February, and greatest amount for any one day in the summer, was 20,300,000 on the 24th of June.

CONDUIT.

A statement of the condition of the conduit and the repairs made during the year, will be found in the Report of Superintendent of the Western Division.

The importance of a thorough strengthening of the conduit in its weak places, especially on embankments, is, I doubt not, fully appreciated by the Board; and I have nothing further to add to the suggestions in my last Report upon this topic, except it be to urge the importance of putting the conduit in condition to deliver the water for the new Reservoir when completed. In its present condition it is hardly safe to exceed the daily requirements of the city, whereas if it were thoroughly strengthened it could be made to deliver at least 20,000,000 gallons daily.

PROPOSED NEW RESERVOIR.

Some additional surveys and rough estimates have been made during the past year in connection with this project; but, as yet, the surveys have been too imperfect to form a reliable estimate of its cost. If it should be decided to go on with this work, a complete and minute survey must be made, which will require some months to finish. I would therefore suggest the expediency of commencing the survey as soon as possible. The importance of this work has been so fully set forth in former reports, and the Board is so well satisfied of its necessity, that any arguments in its favor would be entirely superfluous at this time.

EASTERN DIVISION.

The Board is referred to the detailed Report of the Superintendent of this Division for a statement of the general conditions of the works in his Department.

I have prepared, and herewith submit, the usual tabular statement of the average monthly heights of water in the reservoirs at Brookline, Beacon Hill, South and East Boston, above tide-marsh level, for the past five years.

By this Table it will be seen that, notwithstanding the low state of the water at the Lake, the average height of the water in Brookline Reservoir for the whole year has been well maintained, being only $\frac{22}{100}$ of a foot less than last year, and only $\frac{69}{100}$ of a foot less than in 1862 — the highest average of the five years. It also appears that the height of water in the several City Reservoirs has been well maintained, — at Beacon Hill being only $\frac{15}{100}$ of a foot less than last year; at South Boston 1.09 feet less; while at East Boston there has been a gain of 1.88 feet.

The yearly average loss of head from Brookline to the City Reservoirs for the past five years is shown by the following table, in feet and hundredths: —

	1860.	1861.	1862.	1863.	1864.
Loss from Brookline to Beacon Hill.....	6.16	6.54	6.35	6.27	6.10
" " " " S. Boston.....	11.43	9.66	8.93	11.05	11.82
" " " " E. Boston.....	27.28	27.47	28.27	30.24	28.04

It will thus be seen that the loss of head to Beacon Hill has been less the past year than for the four previous years; to South Boston it has been greater, while at East Boston it has been less than for the two previous years.

CONSUMPTION OF WATER.

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

MONTH.	1849	1850	1851	1852	1853	1854	1855	1856
January.....	1,700,000	5,181,700	7,233,700	8,280,900	8,050,500	10,695,200	9,702,700	12,669,000
February.....	.....	5,214,000	7,221,100	8,790,300	8,643,600	10,654,200	10,349,800	12,791,000
March.....	1,550,009	4,841,200	6,137,900	8,521,100	8,202,200	9,582,100	10,125,600	12,504,000
April.....	.....	4,961,000	5,365,200	8,048,700	7,903,600	8,738,500	8,540,000	10,800,000
May.....	3,600,000	5,346,100	6,238,400	8,350,000	8,123,400	9,685,300	9,103,800	10,378,000
June.....	4,300,000	6,906,500	7,925,000	8,033,100	8,945,900	11,745,200	9,984,400	11,223,000
July.....	4,800,000	8,514,200	7,180,200	9,608,000	8,809,200	10,613,800	11,056,600	13,167,000
August.....	4,100,000	8,004,600	7,235,000	9,709,300	8,461,900	10,028,100	11,120,800	12,664,000
September.....	4,800,000	6,585,500	7,230,600	7,920,000	8,640,700	9,712,400	11,710,800	11,522,000
October.....	4,550,000	4,504,300	6,716,600	6,930,000	8,871,100	8,769,800	10,771,200	11,891,000
November.....	3,800,000	4,960,500	6,473,500	6,637,900	8,624,700	8,030,200	10,383,200	11,691,000
December.....	3,600,000	5,037,000	7,663,400	7,195,800	9,228,400	10,597,600	11,307,200	13,284,000
Average for year,	3,680,000	5,837,900	6,883,800	8,125,800	8,542,300	9,902,000	10,346,300	12,048,600

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

MONTHS.	1857	1858	1859	1860	1861	1862	1863	1864
January.....	15,089,000	12,160,000	14,512,000	17,862,000	21,106,769	17,000,000	16,112,000	18,954,000
February.....	14,175,000	14,399,000	14,769,000	18,901,000	20,804,131	17,000,000	17,328,000	18,846,000
March.....	13,941,000	14,154,000	14,480,000	15,409,000	19,453,344	17,300,000	16,681,000	16,841,000
April.....	12,454,000	13,465,000	13,760,000	14,621,000	17,151,593	15,300,000	15,125,000	16,506,000
May.....	12,414,000	11,423,000	11,302,000	14,790,000	16,687,832	14,300,000	15,407,000	16,094,000
June.....	12,504,000	10,867,000	11,639,000	17,838,000	17,231,984	16,600,000	16,138,000	17,730,000
July.....	13,551,000	13,621,000	13,219,000	17,239,000	18,897,809	16,400,000	15,954,000	18,112,000
August.....	13,077,000	13,141,000	12,704,000	19,297,000	18,272,365	17,000,000	16,980,000	16,188,000
September.....	12,030,000	12,745,000	12,389,000	17,957,000	18,098,259	17,000,000	17,035,000	16,798,000
October.....	10,864,000	12,969,000	12,026,000	16,938,000	17,987,128	17,300,000	15,779,000	15,479,000
November.....	11,372,000	12,143,000	12,715,000	16,862,000	16,604,076	17,100,000	16,028,000	14,079,000
December.....	11,241,000	13,075,000	14,586,000	19,151,000	15,976,362	17,000,000	16,295,000	14,547,000
Average for year,	12,726,000	12,847,000	13,175,000	17,238,000	18,189,304	16,600,000	16,238,500	16,681,000

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.

Months.	Heights in feet and inches.																										These heights show a head on the Conduit.											
	0.0	4.10	4.11	5.0	5.0½	5.1	5.2	5.3	5.3½	5.4	5.4½	5.5	5.5½	5.6	5.6½	5.7	5.7½	5.8	5.9	5.10	5.11	6.0	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	6.10	6.11	7.0	7.6	7.8	8.0	8.4
	Number of days in each month.																																					
January	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	30	..
February	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	26	3
March	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	31	..
April	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	6	..	18	..
May	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	31	..	..	..	..
June	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	7	..	18	..
July	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13	..	..	18	..
August	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	31	..	..	..	..
September	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	27	..	..	..	..
October	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	1	1	1	2	2	2	9	2	1	1	1	5	..	..	..	..	..
November	..	..	..	..	..	..	..	..	1	1	3	8	3	5	1	4	2	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
December	..	2	2	1	2	3	3	1	..	3	..	1	..	3	..	3	1	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	4	2	2	1	2	3	3	1	1	4	3	9	3	8	1	7	3	7	1	2	1	1	1	1	2	2	2	9	2	1	1	1	6	111	13	1	141	3

From the foregoing statement it will be seen that the conduit has been empty only four days during the past year; partly full, with a depth of water varying from four feet ten inches to six feet three inches, for sixty-nine days; just full, (six feet four inches in depth,) two days; and for the remainder of the year, (two hundred and ninety-one days,) it has worked under a head of from one inch to two feet.

Table of the average monthly and yearly heights of water in the Lake above the bottom of the Aqueduct.

Months.	1850.	1851.	1852.	1853.	1854.	1855.	1856.	1857.	1858.	1859.*	1860.	1861.	1862.	1863.	1864.
January	10.87	9.50	10.63	9.51	10.54	10.16	8.06	9.53	10.75	10.80	10.83	11.93	6.09	11.33	13.88
February	10.68	10.21	10.20	10.78	10.95	10.65	7.59	10.28	10.05	12.17	11.36	12.77	6.57	12.85	13.71
March	11.03	10.43	10.49	10.44	10.93	10.68	6.96	10.67	9.35	12.45	12.67	13.21	8.65	13.95	14.33
April	11.46	11.17	11.23	10.68	10.66	11.57	10.24	12.30	9.36	12.06	12.72	14.14	12.40	14.59	14.32
May	11.38	11.02	10.94	10.98	10.87	11.35	12.05	12.05	10.67	12.06	11.52	13.88	14.45	14.01	14.26
June	11.36	10.40	10.28	10.62	10.33	10.69	11.78	12.14	11.72	11.96	10.83	12.99	14.43	13.29	13.51
July	11.09	9.76	9.44	9.45	9.00	9.86	10.67	11.41	11.74	10.22	10.42	11.50	14.05	12.82	11.33
August	10.92	9.01	8.40	8.64	6.67	9.01	11.59	11.70	11.30	10.24	9.42	10.27	12.97	13.73	9.65
September	11.00	8.00	5.68	7.78	6.64	7.52	10.82	11.72	10.40	9.84	9.42	8.71	11.33	13.43	7.91
October	9.39	7.55	6.55	7.34	5.90	6.42	10.10	11.10	8.72	10.15	10.35	7.79	10.30	12.94	6.46
November	9.18	8.07	7.74	9.58	6 09	6.28	10.80	11.16	9.01	9.98	10.44	7.22	10.24	13.26	5.48
December	9.57	9.67	8.49	10.57	8.38	7.29	10.97	11.02	9.85	10.54	11.17	6.88	11.70	14.06	5.41
Yearly Averages	10.66	9.57	9.17	9.70	9.00	9.29	10.14	11.26	10.24	11.04	10.93	10.94	11.10	13.52	10.84

*High-water mark raised two feet.

Statement showing Amount of Rain-Fall on Water-shed of Lake Cochituate, Amount of Water consumed and wasted, available Amount received into Lake, available percentage of Rain-Fall, &c. from 1852 *to* 1864, *inclusive.*

YEAR.	Rain-Fall.	Amount of Rain-Fall on Water-shed of Lake Cochituate.	Amount of water consumed.	Amount of water wasted from Lake.	Total amount consumed and wasted.	Rise of Lake during the year.	Fall of Lake during the year.	Total available amount of Rain-Fall received into Lake.	Available daily average amount of Rain-Fall received into Lake.	Available percentage of Rain-Fall received into Lake.
	INCHES.	GALLONS.	GALLONS.	GALLONS.	GALLONS.	GALLONS.	GALLONS.	GALLONS.	GALLONS.	
1852 *	47.93	15,759,207,000	2,974,042,800	4,020,566,885	6,994,609,685	.....	261,360,000	6,733,249,685	18,396,857	43 per cent.
1853	55.86	18,366,561,000	3,117,939,500	3,166,417,500	6,284,357,000	239,580,000	.....	6,523,937,000	17,873,800	35 per cent.
1854	43.15	14,187,562,000	3,614,230,000	4,187,733,020	7,801,963,020	.....	217,800,000	7,584,163,020	20,778,529	53 per cent.
1855	34.96	11,494,719,000	3,776,399,500	No acct. kept.	.....	.....	326,700,000	.....	.....	....
1856	40.80	13,414,892,000	4,409,787,600	" "	.....	598,950,000	.....	.....	.....	....
1857	63.10	20,747,052,000	4,644,990,000	10,625,900,000	15,270,890,000	32,670,000	.....	15,303,560,000	41,927,562	74 per cent.
1858	48.66	15,999,232,000	4,689,155,000	1,934,500,000	6,623,655,000	.....	141,570,000	6,482,085,000	17,759,013	40 per cent.
1859 †	49.02	16,117,602,000	4,808,875,000	7,569,000,000	12,377,875,000	283,140,000	.....	12,661,015,000	34,687,712	78 per cent.
1860	55.44	18,228,471,000	6,309,108,000	None.	6,309,108,000	174,240,000	.....	6,483,348,000	17,714,065	35 per cent.
1861	46.44	15,269,303,000	6,639,095,900	3,377,558,966	10,016,654,866	.....	1,459,260,000	8,557,394,866	23,444,917	56 per cent.
1862	49.69	16,337,890,000	6,059,000,000	33,200,000	6,092,200,000	1,306,800,000	.....	7,399,000,000	20,271,233	45 per cent.
1863	69.30	22,785,586,000	5,927,052,500	2,165,696,470	8,092,748,970	762,300,000	.....	8,855,048,970	24,260,408	39 per cent.
1864	42.60	14,006,726,000	6,105,306,700	1,368,746,000	7,474,052,700	.....	1,848,577,000	5,625,475,700	15,370,152	40 per cent.
Aver.	49.76	Aver. daily waste for 11 years,		9,569,268	Av'age daily capacity of Lake as a source of supply for 11 years,			22,953,113		49 per cent aver.
		" " " 6 " '52–'59,		14,378,900						
		" " " last 5 " '60–'64,		3,801,424						

* Observations of Rain-Fall at Lake Cochituate commenced 1852, and these observations are assumed as correct for the whole district. † Lake raised 2 feet.

Monthly Fall of Rain in Inches, in 1864.

MONTHS.	PLACES AND OBSERVERS.							
	Lake Cochituate, by E. F. Knowlton.	Boston, by J. P. Hall.	Boston, by W. H. Bradley, Sup't of Sewers.	Lowell, by Merrimac Manufacturing Company.	Lowell, by Locks and Canals Company.	Cambridge, by G. P. Bond.	Waltham, by Boston Manufacturing Company, J. R. Scott, Agent.	Providence, by A. Caswell.
January	3.37	3.87	2.79	2.44	2.64	3.34	3.00	4.66
February	0.98	1.43	1.13	0.89	0.98	0.89	0.90	1.53
March	8.44	11.75	9.86	8.03	8.42	5.59	6.84	4.74
April	4.02	4.72	3.65	2.56	3.59	7.81	4.44	2.46
May	2.84	3.31	2.70	2.56	2.81	2.91	2.20	3.15
June	0.58	1.47	1.64	1.25	1.07	0.78	0.70	1.22
July	1.06	1.90	1.46	1.62	1.82	1.20	1.16	1.46
August	3.56	4.17	3.09	3.22	3.54	2.55	2.51	4.05
September	1.52	2.60	2.51	2.91	2.90	1.68	2.30	2.36
October	6.50	4.80	4.37	3.79	3.84	4.60	4.97	2.85
November	5.45	4.00	4.36	3.93	4.09	3.52	4.04	3.42
December	4.28	5.28	4.69	4.91	4 94	4.59	3.50	4.93
Totals	42.60	49.30	42.25	38.11	40.64	39.46	36.56	36.83

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, 1849 *to* 1864, *inclusive.*

YEAR.	PLACES AND OBSERVERS.						
	Lake Cochituate, by E. F. Knowlton.	Boston, by J. P. Hall.	Cambridge, by W. C. Bond and George P. Bond.	Waltham, by E. Hobbs and J. R. Scott, Agent, Boston Manufacturing Company.	Lowell, by Merrimac Manufacturing Company, J. B. Francis.	Lowell, by Locks and Canals Co., J. B. Francis.	Providence, by A. Caswell.
1849	....	40.30	40.97	40.74	41.90	....	34.69
1850	....	53.98	54.07	62.13	51.09	....	51.48
1851	....	44.31	41.97	41.00	45.68	....	43.30
1852	* 47.93	47.94	40.51	42.24	42.78	....	38.58
1853	* 55.86	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	44.25
1862	49.69	61.06	57.21	....	44.26	44.61	50.09
1863	69.30	67.72	56.42	53.66	52.37	57.81	54.17
1864	42.60	49.30	....	36.56	38.11	40.64	36.83

* By J. Vanneyar.

It appears from the foregoing Table that in only one year since the works were completed (1855) has the annual rain-fall at the Lake been so small as for the past year.

Average Monthly Heights of Water in Reservoirs at Brookline, Beacon Hill, South and East Boston, 1860 – 64 *inclusive.*

	BROOKLINE.					BEACON HILL.					SOUTH BOSTON.					EAST BOSTON.				
MONTH.	1860	1861	1862	1863	1864	1860	1861	1862	1863	1864	1860	1861	1862	1863	1864	1860	1861	1862	1863	1864
January	123.27	122.81	122.46	123.64	122.37	118.25	116.61	117.48	118.36	117.72	107.48	115.03	113.66	115.73	110.63	93.26	95.37	96.26	95.64	90.22
February	122.95	122.68	122.85	123.23	122.61	117.94	118.93	119.46	118.18	117.54	109.30	115.07	114.08	115.54	110.94	95.29	93.05	94.94	93.86	92.98
March	123.88	123.32	123.52	123.23	123.62	119.89	119.05	119.18	118.03	116.38	109.40	115.12	114.12	115.36	111.13	94.80	94.60	95.75	94.29	93.50
April	123.77	124.01	124.18	123.85	123.82	119.83	118.91	117.91	117.27	117.21	109.34	115.32	114.93	114.73	112.07	93.84	98.07	96.71	95.65	96.16
May	123.13	124.94	124.00	123.52	123.62	117.70	119.06	117.59	116.33	116.53	111.90	113.83	115.74	112.71	111.64	96.66	97.85	96.99	93.07	97.68
June	123.26	123.68	123.25	123.17	122.66	116.69	117.32	116.39	115.40	115.31	113.17	112.58	114.22	111.39	109.06	96.29	96.22	95.99	91.10	94.22
July	122.99	122.68	123.73	122.76	122.87	116.13	116.48	116.46	116.34	115.32	113.26	110.91	114.23	109.75	108.57	95.53	95.09	96.13	90.43	92.34
August	122.78	123.71	123.70	123.11	122.64	115.70	114.18	116.22	116.05	115.19	110.97	112.92	114.03	109.80	109.53	96.99	97.34	93.96	91.23	92.84
September	123.33	123.76	123.64	123.36	122.03	117.15	113.14	116.22	116.12	115.91	114.66	112.96	114.04	109.64	110.21	95.97	95.76	95.57	91.96	95.00
October	123.59	123.79	123.85	122.26	123.19	115.34	115.91	..*..	115.87	118.17	113.49	114.68	114.24	109.90	112.49	96.97	95.56	91.80	95.02	97.55
November	123.62	123.80	124.07	123.63	122.78	116.23	116.74	117.20	116.85	118.55	114.48	114.14	115.94	111.25	112.49	97.60	96.40	93.57	93.36	98.14
December	122.98	124.00	123.46	122.53	122.29	114.67	117.45	115.23	118.30	117.35	114.91	113.79	116.35	109.90	113.89	98.89	97.37	95.77	89.79	97.27
Average	123.29	123.52	123.56	123.19	122.87	117.13	116.98	117.21	116.92	116.77	111.86	113.86	114.63	112.14	111.05	96.01	96.05	95.29	92.95	94.83

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.

I desire to return my thanks to the several gentlemen who have so kindly furnished me with their annual records of the rain-fall for the past year.

Respectfully submitted,

N. HENRY CRAFTS,

City Engineer.

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