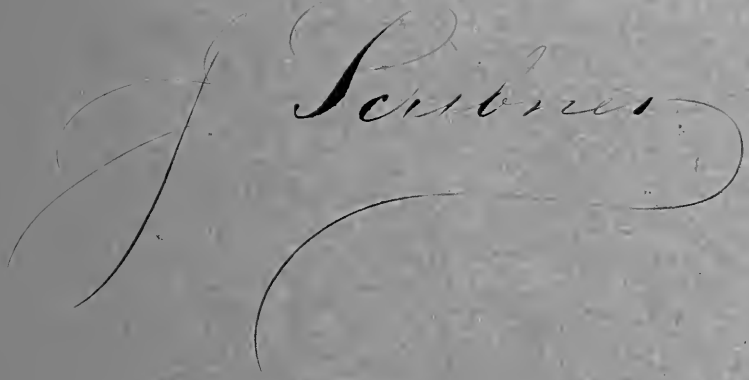
Ninth Annual Report

OF THE

BOSTON WATER BOARD.

1885.



NINTH ANNUAL REPORT

OF THE

BOSTON WATER BOARD,

FOR THE

YEAR ENDING APRIL 30, 1885.

BOSTON:
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CITY OF BOSTON.

NINTH ANNUAL REPORT

OF THE

BOSTON WATER BOARD,

FOR THE YEAR ENDING APRIL 30, 1885.

Boston Water Board Office,
May 1, 1885.

The Boston Water Board herewith presents its ninth annual report, together with the reports of the Engineer of the Board, the Water Registrars, and the different Superintendents.

Condition of Reservoirs and Aqueducts.

Special attention is directed to the reports of Engineer Jackson and Superintendent FitzGerald. They contain much valuable information with reference to the conditions of the storage-basins, the method of cleansing the same, and, generally, the work performed, during the past year, in order to insure a pure and abundant supply of water.

The new basin at Ashland (No. 4) is fast approaching completion, and will be finished by November 1st. It will be in condition to be used next season, and will furnish an additional supply of about 5,000,000 gallons per day. Its storage capacity is about 1,100,000,000 gallons. The work will be completed within the appropriation made by the City Council, and the reservoir will be the largest and best in the water service. Total cost in round numbers, $800,000.

Pollution of the Supply.

Attention is also directed to that part of the report of Superintendent FitzGerald relating to the test case before the Supreme Judicial Court, with reference to the "Pollution of Boston's Water Supply." We regard this decision as one of the most inportant, not alone for the city, but for the whole State, that has been rendered in many years. It was generally regarded as a test case, and since the promulgation of the decision, we have notified all parties engaged in polluting the supply, that immediate steps must be taken to stop such pollution, or the city will be obliged to seek a remedy in the courts. The decision is being accepted by all parties in good faith, and the persons and corporations polluting our supply in Natick, Framingham, and elsewhere, have either ceased such pollution, or are making preparations to cease the same at an early day. Under these circumstances there is every reason to believe that the time is not far distant when the sources of our water supply will be practically free from the pollutions which have so long prevailed.

The importance of the legislation which led up to the decision of the court, and the great benefits which must inevitably result to the citizens of Boston, and to all other communities in the State having a water supply, can hardly be overestimated. The struggle to reach it has been very protracted, and the efforts of the Board have been bitterly opposed by the various town authorities, corporations, and individuals who have been polluting our water supply. The final decision of the court, establishing the principle that polluters of water sources used as supplies for communities may be estopped from a continuance of such pollution, is of incalculable benefit, and may be justly considered as a great sanitary triumph.

Prevention of Waste.

This important subject is one to which the Board has given a great deal of attention. The Deacon waste detection system, and the house to house inspection system, were organized in 1883 for the purpose of reducing the enormous consumption of water in our city, and the results justify, in our judgment, the expenditures made in this direction. The daily average consumption in 1883, in the Cochituate Department, was, in round numbers, 32,000,000 gallons, and the daily per capita consumption, 91 gallons. In 1885 (the first six months), notwithstanding the increase of manu-

factures and population, the daily average consumption had been reduced to 26,000,000 gallons, and the daily *per capita* consumption to 70 gallons. The reduction in the Mystic Department was not so large, in consequence of the defective system of pipes in Somerville and Chelsea.

The accompanying report of Superintendent Cashman, of the Waste Division, indicates, in detail, the methods adopted to effect such results, and these show the effectiveness and benefits of the system. The examinations of the Inspection Corps are also calculated to materially add to the water revenue, for the reason that the rates are based in part upon the number and style of fixtures attached to the premises, and these are inspected regularly by the officials. There is no other method of preventing the enormous waste which prevails, except by the universal adoption of a measurement system, and this is impossible, at present, in Boston. If the consumption cannot be kept substantially within its present limits, the necessity for obtaining new sources of supply will become imperative. This would necessarily involve an expenditure of several millions of dollars. The existing inspection and waste detection systems present the only practicable method of avoiding the large expense for a new supply; and the Board is of the opinion that it should be continued until the people have become educated up to the standard of a more economic use of water. It may be said with some degree of force that the inspection system is somewhat expensive, but there is absolutely no other way to stop the enormous waste save by the universal use of meters; and this, as we have already stated, is, at present, impracticable.

The force is somewhat larger at present than it will need to be after the people have become thoroughly possessed with the idea that fixtures must be kept in repair, and wilful waste prevented. The Board has the reorganization and reduction of this force in contemplation, but does not deem it advisable to enter upon this until the early fall.

In the report of the Water Board for 1882 it was stated that, "During the past year an investigation of this subject has been made by the Joint Standing Committee on Water, and from their report (City Document 78, 1882) it will be seen that, if the present consumption could be reduced to sixty gallons per head, the capacity of the works would be sufficient for many years." The systems since established have accomplished two-thirds of this result, and it is hoped and believed that the *per capita* consumption may be reduced to sixty gallons in the near future.

We especially commend the tabulated statements of Super-

intendent Cashman's report to the attention of your honorable body.

SUDBURY AND COCHITUATE WORKS.

	1882.		1883.		1884.		1885.	
	Daily Average Consumption.	Gallons per Head, per Day.	Daily Average Consumption.	Gallons per Head, per Day.	Daily Average Consumption.	Gallons per Head, per Day.	Daily Average Consumption.	Gallons per Head, per Day.
January . .	32,151,100	92.9	34,715,500	97.8	32,162,300	88.4	26,711,900	71.4
February . .	34,662,300	102.2	32,690,700	92.0	24,598,000	67.5	31,847,400	84.9
March . . .	32,656,300	94.1	34,110,700	95.8	23,711,900	65.0	27,697,200	73,7
April	30,827,000	88.6	30,617,600	85.8	21,505,700	58.8	22,720,450	60.3
May	28,738,000	82.3	32,169,500	89.8	23,708,500	64.6	22,168,400	58.6
June	33,178,400	94.8	33,419,200	93.3	26,184,600	71.2	27,214,800	71.8
July	30,992,600	88.5	36,774,000	102.4	25,409,000	68.9	. . . . .	. . . .
August . . .	34,149,300	97.3	37,141,000	103.2	25,065,200	67.7	. . . . .	. . . .
September .	31,691,600	90.0	33,645,600	93.2	26,389,500	71.1	. . . . .	. . . .
October . . .	31,563,800	89.4	29,575,800	81.9	25,022,900	67.2	. . . . .	. . . .
November .	31,138,700	88.7	28,839,300	79.6	22,954,200	61.5	. . . . .	. . . .
December .	32,352,300	91.4	30,174,200	83.0	24,234,800	64.9	. . . . .	. . . .

MYSTIC WORKS.

	1883.		1884.		1885.	
	Daily Average Consumption.	Gallons per Head, per Day.	Daily Average Consumption.	Gallons per Head, per Day.	Daily Average Consumption.	Gallons per Head, per Day.
January	8,369,600	97.3	8,019,100	92.2	7,855,400	89.2
February	7,714,650	89.6	6,349,500	72.9	10,019,500	113.6
March	7,737,300	89.8	6,337,100	72.7	8,487,500	96.1
April	6,171,150	71.5	5,242,100	60.1	6,042,600	68.3
May	6,319,100	73.1	5,800,000	66.4	5,605,700	63.3
June	6,912,550	80.0	6,245,600	71.5	6,594,200	74.4
July	7,307,550	84.5	6,312,300	72.1	. . . . .	. . . . .
August	7,261,500	83.9	6,088,400	69.5	. . . . .	. . . . .
September	5,846,300	67.4	6,411,200	73.1	. . . . .	. . . . .
October	5,497,250	63.4	5,834,200	66.4	. . . . .	. . . . .
November	5,930,600	68.3	5,119,700	58.2	. . . . .	. . . . .
December	6,771,500	77.9	6,330,800	71.9	. . . . .	. . . . .

Quality of the Water.

The quality of the water during the past year has been excellent. Regular examinations and analysis have been made by Professor E. S. Wood, of Harvard University, and the results justify the conclusion that our city is receiving water of as good quality as any large community in the country. The Board has every reason to believe that the efforts which have been made for the past two years, and the work now in progress, will guarantee an abundant and pure supply of water for some years to come.

Current Expenses.

Cochituate Water-Works.

Year.	Maintenance.	Extension.	Interest.
1883–84	$300,851 34	$96,389 69	$639,213 41
1884–85	336,578 36	115,013 02	668,658 07

The increase in the cost of maintenance for the year ending April 30, 1885, was $35,727.02, and this was very largely caused by the transfer of the expenses of the inspection and waste Division, from a special appropriation, to the maintenance account, and in main-pipe repairing, and service-pipe relaying and repairing. These several amounts were as follows: —

Inspection and Waste Division . . .	$25,019 82
Main and Service Pipe	9,769 87
	$34,789 69

The same reasons governed with reference to the increase in "Extension" and "Interest" accounts as in the previous year. It may properly be added in this connection that no extensions of main-pipes are authorized by the Board until 6 per cent. income on the cost of the extension is guaranteed by the petitioners for a period of five years.

Mystic Water-Works.

Year.	Maintenance.	Extension.	Interest.
1883–84	$116,572 94	$556 53	$538 60
1884–85	128,126 40	446 03	489 60

The increase in the cost of maintenance for the year ending April 30, 1885, over the preceding year was $11,553.46,

and this was caused entirely by the additional cost for inspection and waste, the repairs of pipes, and the work required upon the Mystic sewer.

WATER-RATES.

The estimate of the Water Registrar, Mr. W. F. Davis, for the year ending April 30, 1885, anticipated a deficit of about $80,000. The actual deficit, as ascertained after the year expired, was found to be $75,495.88. To provide, in part, for this deficit, and to relieve the overburdened manufacturing industries from the onerous, and, in the judgment of the Board, inequitable water-taxes, it was decided to make such changes in the annual rates as would properly and equitably meet these exigencies. These changes were ordered by the Board, but the vote was subsequently rescinded, in consequence of the action of your honorable body, and in deference to a very unusual exhibition of public clamor, but which the Board thought at the time was simply the natural complaints of the persons immediately affected by the increase of rates. We see no reason to change the views expressed in our communication to your honorable body under date of February 24, 1885.

It is estimated that the surplus for the year ending April 30, 1886, will amount to $121,745.50. We had hoped to be able to apply this surplus, in large part, to a reduction of the water-tax upon the manufacturing interests of the city; but the opinion of the Corporation Counsel against the principle of discriminating rates, and the failure of the Legislature to authorize such discrimination, will prevent any present action in this direction. It should be stated that this large surplus is the result of the action of your honorable body in providing that the cost of the extension in main-pipes and appurtenances shall not be charged to the annual revenue hereafter.

There is no question but that a revision of the rates is demanded in the near future, and that when such revision is entered upon, it should be pursued wholly with regard to an equitable and just apportionment upon all water-takers, and with particular reference to a readjustment of present inequitable rates.

HIGH-SERVICE.

The appropriation for the extension of the high-service was passed December 24, 1884. The amount appropriated was $766,000, in accordance with the estimates of the Engineer of the Board. The latter was at once consulted, and, following his recommendations, the Board, early in

January, made contracts for the pipe required, and effected a saving, by reason of the speedy action of about $24,000. Subsequently contracts were made for the pumping-engines and machinery with the firm of R. Worthington, of the city of New York.

Permission to exchange the engines at the Elmwood-street Station was obtained from the City Council under an order approved April 20th, and the exchange formed a part of the consideration in the Worthington contract.

The land for the principal reservoir was purchased of Mr. George A. Wilson, on April 9th, for the sum of $91,934. The location of this new reservoir is upon Fisher Hill, Brookline, being the site originally selected by ex-City Engineers Joseph P. Davis and Henry M. Wightman, and approved by the acting engineer at the time of the purchase, Mr. Dexter Brackett. The price paid was five cents per foot beyond the estimates made by Mr. Wightman, but within the general estimate. The work of the high-service extension will be pushed forward as vigorously as possible, and, it is expected, will be completed in about two years.

Henry M. Wightman.

Mr. Henry M. Wightman, the Engineer of the Board and General Superintendent of the Water-Works, died quite suddenly on the 3d of April. At the time of his death the Board was awaiting his report upon the location of reservoir sites for the high-service extension, and the best method of prosecuting the work.

The Board regarded Mr. Wightman, both officially and personally, as a man of great executive force and ability; of unquestioned integrity, and of almost invaluable service to the city. It will be difficult to replace him. The members of the Board, both individually and collectively, offer a tribute to his ability as an official and to his genial and generous qualities as a man.

Meters.

The report of Superintendent Cutts presents an exhibit of the present condition of the meter service. The purchase of new meters has been temporarily suspended, to enable the company to repair and return to the service a number of meters which had failed to come up to the requirements of the bond originally given by the company. It will be remembered that under the conditions of this bond the Tremont Company is required to guarantee each meter to do accurate duty for a period of twelve consecutive months.

Whenever a meter has failed to reach this standard it has been removed at the expense of the Tremont Company, and either repaired or replaced by an accurate machine. The city is thus practically secured by a good and sufficient twelve-months' guarantee.

The Results.

In conclusion, we summarize the labors of the past two years with the statement that the Board has endeavored to secure —

1st. An efficient and economic organization of the department, the business being conducted systematically and upon business principles.

2d. The reservoirs and aqueducts have been thoroughly cleansed, shallow flowage largely eliminated, with the exception of Basin No. 3, which cannot be done until next year, and a general system of watchfulness observed as to the removal of all impurities, and the causes thereof, from the different sources of supply.

3d. Legislation and decisions of the highest law authorities have been obtained, of paramount importance to the water-takers of the city and elsewhere, and which place the power of protecting the purity of our water supplies securely in our hands.

4th. The establishment of waste-prevention systems, under which the daily consumption has already been reduced 6,000,000 gallons, and the *per capita* consumption from 91 to 70 gallons per day, with a possibility of better results later on.

We present the above results and the accompanying reports as evidences of the faithfulness with which we have endeavored to discharge our duties.

General Statistics.

SUDBURY AND COCHITUATE WORKS.	1882.	1883.	1884.
Daily average consumption in gallons	31,970,800	32,836,900	25,090,500
Daily average consumption in gallons per inhabitant	91	91	68
Daily average amount used through meters, gallons	4,387,530	5,085,600	5,171,120
Percentage of total consumption metered	13.7	15.5	20.6
Number of services	48,160	49,290	50,632
Number of meters and motors	2,463	2,919	4,666
Length of supply and distributing mains, in miles	367.2	378.0	388.5
Number of fire-hydrants in use	4,320	4,446	4,573
Yearly revenue from water-rates	$1,127,982 32	$1,167,704 17	$1,203,192 55
Yearly revenue from metered water	$319,785 42	$371,074 61	$378,484 75
Percentage of total revenue from metered water,	28.4	31.8	31.5
Cost of works on May 1, 1883, 1884, and 1885	$17,184,751 14	$17,775,955 68	$18,173,644 45
Yearly expense of maintenance	$249,064 71	$300,851 34	$336,578 36
MYSTIC WORKS.			
Daily average consumption in gallons	6,574,400	7,093,500	6,209,700
Daily average consumption in gallons per inhabitant	77.0	82.5	71.0
Daily average amount used through meters, gallons	800,830	933,150	869,246
Percentage of total consumption metered	12.2	13.1	14.0
Number of services	13,992	14,453	14,939
Number of meters and motors	405	501	571
Length of supply and distributing mains, in miles	146.0	147.2	[1]129.2
Number of fire-hydrants in use	748	770	794
Yearly revenue from water-rates	$245,981 85	$259,791 28	$262,243 50
Yearly revenue from metered water	$58,459 80	$68,116 91	$63,627 39
Percentage of total revenue from metered water,	23.8	26.2	24.3
Cost of works on May 1, 1883, 1884, and 1885	$1,641,762 22	$1,648,452 35	$1,656,266 70
Yearly expense of maintenance	$84,483 87	$116,572 94	$128,126 40

[1] Reduction caused by correction of errors in previous reports.

EARNINGS OF THE WORKS.

The total receipts of the Cochituate Water-Works from all sources, for the year ending April 30, 1885, are as follows, viz. : —

Income from sales of water		$1,195,946 03
Income from shutting off and letting on water, and fees		2,413 75
Service-pipes, sale of old material, etc.		17,613 94
Sundry receipts by Water Board		4,394 27
Stock on hand May 1, 1884		79,628 36
Increase in valuation of stock, March 15, 1884	$6,315 18	
Profits in manufacturing hydrants, etc., etc., for the year ending March 15, 1884,	4,302 52	
		10,617 70
		$1,310,614 05

The total amount charged to Cochituate Water-Works for the year ending April 30, 1885, is as follows, viz. : —

Current expenses	$336,578 36	
Extension of works paid for out of income	115,013 02	
Interest on funded debt	668,658 07	
		1,120,249 45
Balance, April 30, 1885		$190,364 60
Stock on hand, April 30, 1885,	$70,235 48	
On hand to be paid to Cochituate Water Sinking-Fund	120,129 12	
		$190,364 60
Amount required for Sinking-Fund for 1884–85	$195,625 00	
Excess of income over expenditures for 1884–85	120,129 12	
Excess of requirements over income		$75,495 88

The outstanding Cochituate Water Loans at this date, *exclusive* of the Additional Supply, are as follows: —

5 per cent. Sterling Loan (£399,500)	$1,947,273 98		Due Oct.	1, 1902
5 per cent. Loans	100,000 00	$100,000	Due April	1, 1906
5 per cent. Loan	1,000 00	1,000	Due Oct.	1, 1907
6 per cent. Loans	4,253,000 00	500,000	Due Dec.	12, 1897
		450,000	Due June	16, 1898
		540,000	Due Oct.	3, 1898
		250,000	Due April	27, 1899
		625,000	Due Jan.	1, 1901
		688,000	Due April	1, 1901
		330,000	Due July	1, 1901
		413,000	Due April	1, 1903
		38,000	Due April	1, 1904
		161,000	Due Jan.	1, 1905
		142,700	Due April	1, 1905
		6,000	Due Oct.	1, 1905
		82,550	Due Jan.	1, 1906
		8,750	Due April	1, 1906
		4,000	Due Oct.	1, 1906
		8,000	Due Jan.	1, 1907
		5,000	Due April	1, 1907
		1,000	Due July	1, 1907
4 per cent. Loan	743,200 00	280,000	Due April	1, 1910
		120,000	Due Jan.	1, 1913
		257,000	Due Jan.	1, 1914
3½ per cent. Loan	50,000 00	50,000	Due Jan.	1, 1915
		36,200	Due April	1, 1915
		50,000	Due April	1, 1915
	$7,094,473 98			

The total receipts of the Mystic Water-Works, from all sources, for the year ending April 30, 1885, are as follows, viz.: —

Stock on hand, May 1, 1884	$16,708 74
Income from sales of water	267,670 59
Income from shutting off and letting on water, and fees	416 50
Sundry receipts by Water Board	2,330 42
Receipts by Mystic Water Registrar, for service-pipes, etc.	3,367 33
	$290,493 58

The total amount charged to Mystic Water-Works for the year ending April 30, 1885, is as follows, viz.: —

Amount carried forward,	$290,493 58

Amount brought forward,		$290,493 58
Current expenses . . .	$128,126 40	
Extension of works paid for out of income	446 03	
Interest on funded debt . .	48,960 00	
Amount paid Chelsea, Somerville, and Everett, under contracts	37,622 32	
		215,154 75
Balance, April 30, 1885		$75,338 83
Stock on hand, April 30, 1885 .	$10,145 84	
On hand to be paid to Mystic Water Sinking-Fund . .	65,192 99	
		$75,338 83
Amount required for Sinking-Fund for year 1884–85 .	$66,568 00	
Excess of income over expenditures for year 1884-85 . .	65,192 99	
Excess of requirements over income . .		$1,375 01

The outstanding Mystic Water Loans at this date are as follows: —

6 per cent. currency Mystic Water Loans .	$586,000 00	$35,000	Due April 1, 1886
		60,000	Due Oct. 1, 1886
		50,000	Due Oct. 1, 1887
		3,000	Due April 1, 1888
		100,000	Due July 1, 1890
		51,000	Due Jan. 1, 1891
		139,000	Due July 1, 1891
		67,000	Due Jan. 1, 1892
		42,000	Due July 1, 1892
		39,000	Due July 1, 1893
5 per cent. currency Mystic Water Loans .	108,000 00	6,000	Due Oct. 1, 1893
		102,000	Due April 1, 1894
6 per cent. currency Mystic Sewer Loans .	130,000 00	130,000	Due April 1, 1886
4 per cent. Loan .	15,000 00	15,000	Due Oct. 1, 1913
	$839,000 00		

The following statement shows the appropriations by the City Council for an additional supply of water, with the loans issued to meet them, and the amount of expenditures to this date: —

ADDITIONAL SUPPLY OF WATER.

APPROPRIATIONS.

Oct. 21, 1871.	— Transfer from Reserved Fund . .	$10,000 00
Apr. 12, 1872.	— Order for Treasurer to borrow . .	100,000 00
Apr. 11, 1873.	— " " " . .	500,000 00
Feb. 26, 1875.	— " " " . .	1,500,000 00
July 1, 1876.	— " " " . .	2,000,000 00
Apr. 20, 1878.	— " " " . .	600,000 00
Apr. 11, 1879.	— " " " . .	350,000 00
Aug. 17, 1881.	— " " " . .	324,000 00
June 2, 1883.	— " " " . .	621,000 00
[1]Oct. 14, 1884.	— " " " . .	150,000 00
	Total appropriations to April 30, 1885 . . .	$6,155,000 00
Oct. 1, 1875.	— Premium on $1,000,000 bonds, under order of Feb. 26, 1875 . $83,700 00	
April 1, 1876.	— Premium on $452,000 bonds, under order of Feb. 26, 1875 . . 47,786 80	
Oct. 1, 1876.	— Premium on $2,000,000 bonds, under order of July 1, 1876 . . . 221,400 00	
		352,886 80
		$6,507,886 80

EXPENDED.

1871–72	$2,302 81	
1872–73	61,278 83	
1873–74 including $20,897.50, discount on bonds sold, January, 1874	114,102 77	
1874–75	224,956 68	
1875–76	783,613 49	
1876–77	1,924,060 24	
1877–78	1,257,715 26	
1878–79	635,658 08	
1879–80	213,350 97	
1880–81	97,406 78	
1881–82	35,677 98	
1882–83	167,621 43	
1883–84	423,625 79	
1884–85	276,292 13	
		6,217,663 24
Balance of appropriations unexpended, April 30, 1885,		$290,223 56

Balance of loans, April 30, 1884,	$389,515 69	
Loans issued in 1884–5 . .	27,000 00	
		$416,515 69
Payments during year 1884–5 . . .		276,292 13
Balance unexpended, April 30, 1885 .		$140,223 56

[1] Not yet issued.

The outstanding loans which were made on account of Additional Supply of Water are as follows: —

4 per cent. Loans	$1,575,000	$324,000	Due April 1, 1912
		82,000	Due July 1, 1908
		588,000	Due April 1, 1908
		336,000	Due Oct. 1, 1913
		209,000	Due Jan. 1, 1914
		18,500	Due April 1, 1914
		16,000	Due Oct. 1, 1914
		1,500	Due April 1, 1915
5 per cent. Loans	3,452,000	1,000,000	Due Oct. 1, 1905
		452,000	Due April 1, 1906
		2,000,000	Due Oct. 1, 1906
5 per cent. Loan	12,000		Due April 1, 1908
6 per cent. Loans	644,000	100,000	Due July 1, 1902
		492,000	Due April 1, 1903
		8,000	Due Jan, 1, 1904
		44,000	Due July 1, 1905
4½ per cent. Loan	268,000		Due Oct. 1, 1908
	$5,951,000		

WM. A. SIMMONS, *Chairman.*
JOHN G. BLAKE,
GEO. M. HOBBS.

REPORT OF THE CLERK.

OFFICE OF THE BOSTON WATER BOARD.

BOSTON, MAY 1, 1885.

HON. WM. A. SIMMONS,

Chairman of the Boston Water Board: —

SIR, — The following is a statement of the receipts and expenditures of the Boston Water Board for the financial year ending April 30, 1885: —

RECEIPTS.

On account of Cochituate Water-Works			$1,220,367 99
" " Mystic Water-Works			273,784 84
			$1,494,152 83
Balance of loans unexpended April 30, 1884, Additional Supply of Water,	$389,515 69		
Loans issued in 1884–5	27,000 00		
		$416,515 69	
Mystic Sewer	$1,122 42		
From Transfer Fund under order of City Council, June 7, 1884	6,245 70		
		7,368 12	
Balance appropriation, New Main, Cochituate Water-Works		8,297 72	
Appropriation, Chestnut-Hill Driveway, 1884–5		3,000 00	
Appropriation Introduction of meters and Inspection, Cochituate Water-Works		279,831 86	
Amounts carried forward,		$715,013 39	$1,494,152 83

Amounts brought forward,		$715,013 39	$1,494,152 83
Appropriation Introduction of meters and Inspection, Mystic Water-Works . .		11,541 27	
Appropriation High Service .		86,200 00	
Appropriation Extension of mains, etc. . . .		50,000 00	
Stock purchased in previous years, Cochituate Water-Works		90,246 06	
Mystic Water-Works . .		16,708 74	
Introduction of Meters and Inspection, Cochituate Water-Works .	$5,177 50		
Purchased during year 1884–5, but not used .	7,835 95		
		13,013 45	
			$982,722 91
			$2,476,875 74

EXPENDITURES.

Current expenses, Cochituate Water-Works . . .	$336,578 36	
Current expenses, Mystic Water-Works . . .	128,126 40	
Extension of Cochituate Water-Works . . .	115,013 02	
Extension of Mystic Water-Works	446 03	
Interest on Cochituate Water Loans	668,658 07	
Interest on Mystic Water-Loans	48,960 00	
Chelsea, Somerville, and Everett contracts, account Mystic Water-Works .	37,622 32	
Balance Appropriation New Main, Cochituate Water-Works, paid to Sinking-Fund Commissioners by order City Council, April 28, 1885	8,297 72	
Amounts carried forward,	$1,343,701 92	$2,476,875 74

Amounts brought forward,	$1,343,701 92	$2,476,875 74
Construction, Additional Supply of Water	276,292 13	
Construction, Mystic Sewer	7,368 12	
Introduction of Meters and Inspection, Cochituate Water-Works	106,873 92	
Introduction of Meters and Inspection, Mystic Water-Works	6,044 00	
High-service	5,332 72	
Extension of Mains, etc.	1,050 90	
Surplus Income of Cochituate Water-Works to be paid to Cochituate Water Sinking-Fund	120,129 12	
Surplus Income of Mystic Water-Works to be paid to Mystic Water Sinking-Fund	65,192 99	
Chestnut-Hill Driveway	2,997 48	
Balance of Appropriation Chestnut-Hill Driveway, carried into the Treasury, April 30, 1885	2 52	
		$1,934,985 82
		$541,889 92

April 30, 1885, Balance of loans unexpended, Additional Supply of Water	$140,223 56	
Introduction of Meters and Inspection, Cochituate Water-Works	172,957 94	
Introduction of Meters and Inspection, Mystic Water-Works	5,497 27	
High-service	80,867 28	
Extension of Mains, etc.	48,949 10	
Stock on hand, April 30, 1885, Cochituate Water-Works	70,235 48	
Mystic Water-Works	10,145 84	
Introduction of Meters and Inspection, Cochituate Water-Works	13,013 45	
		$541,889 92

Total Water Debt of the City of Boston.

Cochituate, outstanding April 30, 1885	$13,045,473 98	
Mystic, outstanding, April 30, 1885	839,000 00	
		$13,984,473 98

Cochituate Water Debt.

Outstanding April 30, 1884	$12,882,273 98	
Issued in 1884–85	163,200 00	
		$13,045,473 98

Mystic Water Debt.

Outstanding April 30, 1884	$840,000 00	
Paid in 1884–5	1,000 00	
		$839,000 00

Total Water Sinking-Funds, April 30, 1885.

Cochituate Water Sinking-Fund	$3,106,323 82	
Mystic Water Sinking-Fund	444,453 69	
		$3,550,777 51

Trial Balance, Cochituate Water-Works, April 30, 1885.

	Dr.	*Cr.*
Construction Account	$18,173,644 45	
Cochituate Water-Works		$18,173,644 45
City Treasurer, Loan Account	835,667 77	
Appropriation, Additional Supply of Water		140,223 56
Appropriation, High-service		80,867 28
Amounts carried forward,	$19,009,312 22	$18,394,735 29

Amounts brought forward,	$19,009,312 22	$18,394,735 29
Appropriation, Extension of Mains, etc.		48,949 10
Appropriation, Introduction of Meters and Inspection		172,957 94
Income of Cochituate Water-Works		1,310,614 05
Maintenance of Cochituate Water-Works	336,578 36	
Extension of Cochituate Water-Works	115,013 02	
Interest on Cochituate Water Loans	668,658 07	
Stock Account	70,235 48	
Stock, Introduction of Meters and Inspection	13,013 45	
City Treasurer, Revenue Account	1,220,367 99	
Appropriation, Chestnut-Hill Driveway		2 52
City Treasurer, Appropriation Account	3,000 00	
City Treasurer		1,508,919 69
Funded Debt	13,045,473 98	
Cochituate Water 6% Currency Loan		4,897,000 00
Cochituate Water 5% Currency Loan		13,000 00
Cochituate Water 5% Gold Loan		3,552,000 00
Cochituate Water 5% Sterling Loan		1,947,273 98
Cochituate Water 4% Currency Loan		588,000 00
Cochituate Water 4% Loan		1,730,200 00
Cochituate Water 4½% Loan		268,000 00
Cochituate Water 3½% Loan		50,000 00
Commissioners on the Sinking-Funds	3,106,323 82	
Cochituate Water Sinking-Fund		3,106,323 82
	$37,587,976 39	$37,587,976 39

Trial Balance, Mystic Water-Works, April 30, 1885.

	Dr.	*Cr.*
Construction	$1,656,266 50	
Mystic Water-Works		$1,656,266 50
City Treasurer, Revenue Account	273,784 84	
Income of Mystic Water Works		290,493 58
Maintenance of Mystic Water-Works	128,126 40	
Extension of Mystic Water-Works	446 03	
Interest on Mystic Water Loans	48,960 00	
Chelsea, Somerville, and Everett contracts	37,622 32	
Stock Account	10,145 84	
Stock, Introduction of Meters and Inspection	829 80	
City Treasurer, Loan Account	12,663 69	
Introduction of Meters, and Inspection		5,497 27
City Treasurer		216,588 07
Funded Mystic Water Debt	839,000 00	
Mystic Water 6% Currency Loan		586,000 00
Mystic Water 5% Currency Loan		108,000 00
Mystic Water 4% Loan		15,000 00
Mystic Sewer 6% Currency Loan		130,000 00
Commissioners on the Sinking-Funds	444,453 69	
Mystic Water Sinking-Fund		444,453 69
	$3,452,299 11	$3,452,299 11

Cost of Construction of the Cochituate Water-Works to May 1, 1885.

Cost of Water-Works to January 1, 1850, as per final report of Water Commissioners	$3,998,051 83
Extension to East Boston	281,065 44
Amount carried forward,	$4,279,117 27

Amount brought forward,	$4,279,117 27
Jamaica-pond aqueduct	13,237 50
New dam at Lake Cochituate	10,940 08
Raising lake two feet, including damages	28,002 18
Dudley pond, lower dam, and making connections with lake	18,982 23
New main from Brookline reservoir	304,991 83
Land and water rights and land damages since January 1, 1850	49,486 17
New pipe-yard and repair-shop	25,666 51
Upper yard, buildings, etc.	9,165 63
New water-pipes, East Boston	20,999 43
New main, East Boston	24,878 08
Pumping-works at Lake Cochituate	23,577 69
High-service, stand-pipe, engine-house and engines	103,829 53
High-service, South Boston	27,860 29
Chestnut-Hill reservoir, including land	2,461,232 07
Parker-Hill reservoir	228,246 17
Charles-river siphon	26,532 35
Keeper's house, Parker Hill	2,764 90
Temporary high-service, Brighton	7,865 86
New stable at Chestnut-Hill reservoir	8,103 55
Pegan dam, Natick	1,394 06
Willow dam, Natick	1,567 29
High-service, East Boston	22,960 07
New main from Chestnut-Hill reservoir	341,702 28
New high-service works	5,332 72
Cost of laying main pipe for extension in Roxbury, Dorchester, Brighton, and West Roxbury Districts	1,758,512 22
Additional supply of water, including land damages and all expenses	6,217,663 24
Cost of laying main pipe since January 1, 1850	2,147,982 35
Extension of mains, etc. (from loans)	1,050 90
	$18,173,644 45

Cost of Construction of the Mystic Water-Works to May 1, 1885.

Salaries	$17,644 61
Engineering	33,746 87
Land damages	91,855 38
Amount carried forward,	$143,246 86

Amount brought forward,	$143,246 86
Reservoir	141,856 26
Dam	17,167 26
Conduit	129,714 30
Engine-house, coal-shed, and chimney	36,112 99
Engines	150,096 70
Grubbing pond	9,393 26
Iron pipes	108,437 10
Iron pipes, trenching	61,029 59
City distribution	162,335 23
Hydrants	19,976 21
Stopcocks	19,262 52
Miscellaneous items	14,012 51
Roadway and bridge	3,529 22
Lowering Mystic river	3,012 06
Inspections	1,824 79
Service-pipes and meters	133,858 70
Hydrants for Somerville and Medford	2,653 08
Somerville distribution	2,492 10
Dwelling-house for engineer and fireman (pumping-station)	4,871 02
Chelsea extension	37,347 86
Medford extension	3,997 41
Drinking-fountains	1,415 05
New line of supply main	203,050 09
Stable and pipe-yard	8,964 64
Extension of engine-house and boiler	33,727 43
New force main	9,875 17
Mystic sewer	136,245 70
New stable, engine-house	1,767 39
Additional force main	24,882 96
Temporary pumping-works	6,905 15
New work-shop	3,000 00
Cost of laying main pipe since 1873	20,205 89
	$1,656,266 50

Respectfully submitted,

W. E. SWAN,

Clerk of the Boston Water Board.

REPORT OF THE CITY ENGINEER.

OFFICE OF CITY ENGINEER,
CITY HALL, BOSTON, May 1, 1885.

HON. WILLIAM A. SIMMONS,
Chairman Boston Water Board: —

SIR, — In accordance with the requirements of the ordinance establishing the Boston Water Board, I respectfully transmit the following report on the condition of the Water-Works: —

SUDBURY RIVER RESERVOIRS AND LAKE COCHITUATE.

The supply from these reservoirs, both in quantity and quality, has been better during the last year than for a number of previous years. During the greater portion of the year the storage reservoirs have been full; and, with the exception of Reservoir No. 2, none of them have fallen more than 4.5 feet below high-water mark.

Reservoir No. 1. — This reservoir has been practically full during the entire year, the lowest point reached being 156.04, or 3.25 feet below the top of the flash-boards, on Jan. 6, 1885.

Water was wasted at Dam No. 1 for the greater portion of the time from May 1 until Sept. 2, when the water fell below the level of the flash-boards; and, with the exception of the $1\frac{1}{2}$ million gallons per day which is always allowed to pass into the river, no water was wasted until Dec. 13, when the waste-gates were opened for a few days.

On Dec. 22 the water reached the level of the crest of the dam, and has been wasting since that date.

Reservoir No. 2. — On May 1, 1884, water was wasting over the crest of the outlet dam, and the waste was continued, except for a few days, until July 8. During the following month the reservoir was falling, and on Aug. 7 the surface was 3.14 feet below the top of the flash-boards. A heavy rain on this date replenished the supply, and the reservoir filled nearly to high-water mark.

The months of September and October were very dry, and

the reservoir being drawn upon for the city's supply fell rapidly until Oct. 14, when it was practically empty. In the latter part of November the reservoir began to fill, and on Dec. 23 waste began over the stone crest of the dam. On April 25 flash-boards were placed on the dam, and since that time the reservoir has remained at ordinary high-water mark.

Considerable work has been done in completing the work on shallow flowage, such as riprapping the shores, grading, loaming, etc.

Reservoir No. 3. — This reservoir was full and overflowing on May 1, 1884, and its surface remained near the level of the crest of the dam until September, when it began to fall; and on Oct. 14 it was 174.44 above tide-marsh level.

From Oct. 14 to 30 it was drawn upon for the supply of the city, and its surface fell about two feet. In November the reservoir was again drawn upon, and on Nov. 23 the water surface reached its lowest point for the year, 3.88 feet below the crest of the dam. On Dec. 19 the reservoir was again full, and waste was commenced over the dam. The reservoir is now full.

Reservoir No. 4. — The quantity of gravel filled on to the dam during the past year was 119,300 cubic yards, and the quantity of concrete added to the core, or centre wall, was 5,100 cubic yards, — thereby increasing the height of the dam twenty-five feet.

The slope of the dam below the berme has been covered with riprap to the depth of eighteen inches, and about 7,000 cubic yards of loam, for covering the outside slope and top of dam, have been deposited along the upper portion of the slope, ready for spreading.

All the broken stone used in concrete and riprap has been crushed from stones collected in the basin; the quantity aggregating 7,850 cubic yards.

All the valves and iron-work required for the gate-chamber have been set, and now control the water flowing out of the basin. The valves were closed on the 4th day of February, 1885, and water allowed to accumulate in the basin to the amount of 253,000,000 gallons, or to the depth of fifteen feet at the gate-house, — at which depth the water has been maintained to date.

During the past year there have been removed from the basin 68,000 cubic yards of muck and soil, and two acres of shallow flowage have been formed.

The old wooden bridge on the road at the extreme southerly end of the basin has been removed and a new bridge built with granite abutments and wing-walls.

The work remaining to complete the reservoir consists of about 20,000 cubic yards of material, to be placed in the embankment, 1,750 cubic yards of slope paving on the inner slope of the dam, soiling of embankment, superstructure of the gate-chamber, etc. This work will be completed during the present season.

Farm Pond. — To accommodate the work of building the aqueduct across this pond the water-surface has been kept below its usual height for the greater portion of the year.

It was kept nearly full until July 13, when it was lowered about 2.5 feet to 146.50, where it remained until December. It was then raised to 147., and kept at that height for four months, then lowered to 145, where it now remains.

Lake Cochituate. — On May 1, 1884, the surface of the lake was 134.30 above tide marsh level. During June and July 320,000,000 gallons were run into the lake from the Sudbury river and the lake surface was kept near high water-mark until August. It then gradually fell until December 6, when it stood at 129.90, or 4.46 feet below high water-mark.

During December and January the lake was rising, and on February 6 waste was commenced. The surface is now at high-water mark.

No water has been drawn from Dudley pond during the year.

By the decision of the Supreme Judicial Court, rendered in February last, the authority of your Board to prevent the discharge of sewage into Lake Cochituate has been established, and the sources of pollution are now being removed from the brooks entering the lake.

The temporary pumping machinery has not been required during the past year, and as the completion of Reservoir No. 4, during the present season, will probably render its use unnecessary for a number of years, I would advise its removal to a more secure situation.

The diagram annexed to this report shows graphically the varying heights of the different reservoirs during the year, the rainfall on the Sudbury river, and the daily amounts drawn from the Sudbury-river reservoirs during the year.

The following table shows the heights of water in the reservoirs and in Lake Cochituate on the first of each month: —

	Res. No. 1. Top of flash-boards, 159.29.	Res. No. 2. Top of flash-boards, 167.12.	Res. No. 3. Crest of Dam, 175.24.	Farm Pond.	Lake Cochituate Top of flash-boards, 134.36.
May 1, 1884	158.00	166.18	175.58	149.27	134.30
June 1, "	157.86	166.09	175.49	148.83	134.28
July 1, "	159.45	167.17	175.40	149.22	134.30
Aug. 1, "	159.30	164.80	175.27	146.51	133.86
Sept. 1, "	159.30	164.50	175.14	146.50	133.19
Oct. 1, "	158.97	155.64	174.65	146.49	131.85
Nov. 1, "	158.71	150.25	172.35	146.54	130.70
Dec. 1, "	157.67	152.95	171.81	146.79	130.08
Jan. 1, 1885	158.01	166.15	175.56	146.83	131.43
Feb. 1, "	157.73	165.95	175.41	146.90	132.74
Mar. 1, "	157.83	166.13	175.07	146.97	132.47
Apr. 1, "	158.15	166.34	175.69	145.75	132.62
May 1, "	159.40	167.46	175.50	145.04	134.36

Water has been drawn from the Sudbury-river reservoirs as follows: —

May 1 to June 17,	from	Reservoir	No. 1.
June 17 to June 25,	"	"	No. 2.
June 25 to June 30,	"	"	Nos. 1 and 2.
June 30 to Oct. 14,	"	"	No. 2.
Oct. 14 to Oct. 30,	"	"	Nos. 2 and 3.
Oct. 30 to Nov. 8,	"	"	No. 2.
Nov. 8 to Nov. 30,	"	"	Nos. 2 and 3.
Nov. 30 to Feb. 11, '85,	"	"	No. 2.
Feb. 11 to May 1,	"	"	No. 3.

FARM-POND CONDUIT.

At the date of the last annual report Messrs. Parker & Sylvester were filling across the pond on the line of the conduit.

Their contract was completed on August 29, 59,010 cubic yards of material having been deposited at a cost of $27,672.70.

On August 4 proposals were received for the construction of the conduit, 3,760 feet in length, between the upper and lower gate-houses; and on August 20 a contract was made for the work with G. M. Cushing, of New York.

Work under this contract is now progressing, the trench has been excavated for a length of 1,200 feet, and 700 feet of the conduit completed.

Aqueducts and Distributing Reservoirs.

The Sudbury-river aqueduct has been in constant use, with the exception of a few days in December, when it was being cleaned.

During the summer, portions of the masonry of the Charles-river bridge were pointed in a thorough manner, at a cost of $584.

The Cochituate aqueduct has been in constant use except from December 29 to January 4, when the water was drawn off for cleaning.

From May 1 to June 10 the water in this aqueduct was kept six feet above the conduit invert; it was then reduced to five feet, and maintained at that height throughout the year.

The line of the Circuit Railroad, which is now being constructed, crosses both aqueducts in Newton. At the crossing of the Sudbury aqueduct the arch has been strengthened by an additional ring of bricks, and the work of strengthening the Cochituate aqueduct will soon be done. The Chestnut Hill, Brookline, Parker Hill, and East Boston reservoirs have been in constant use, and are in good condition. At the Parker-Hill reservoir an iron fence has been erected on the coping surrounding the reservoir, at a cost of $2,094, and a stone and gravel walk constructed on the top of the reservoir bank at a cost of $1,064.25.

High-Service Works.

The work done at the Highland station is shown in detail by the table on page 44.

All of the water has been pumped by the Worthington engine. The total quantity of water pumped during the year was 884,988,000 gallons, — a decrease of 16.5 per cent. from the amount pumped in 1883.

Total coal consumed, 1,551,900 lbs., of which 13.3 per cent. were ashes and clinkers.

Average lift, 108.49 feet.

Quantity pumped per lb. of coal, 570.3 gallons.

Average daily quantity pumped, 2,418,000 gallons.

Average duty (no deductions), 51,597,600 foot lbs., per 100 lbs. of coal.

COST OF PUMPING.

Salaries	$3,943 11
Fuel	3,784 00
Repairs	185 69
Oil, waste, and packing	243 96
Sundry small supplies, gas, etc.	221 71
	$8,378 47
Cost per million gallons, raised one foot high	$0.087

The construction of new high-service works which has been constantly advocated for the past ten years was authorized by a vote of the City Government, in December.

On January 20 proposals were received for 2,920 tons of pipes, and special castings required for the force and supply mains, and on January 24 a contract was made with A. H. McNeal, of Burlington, N.J., for furnishing the same.

The contract price is $26.45 per gross ton for the pipe, and $53.20 for the specials.

During the month of January surveys and investigations were made with reference to determining the most advantageous site for a reservoir.

At the East Boston station the daily average amount pumped has been 226,900 gallons, a decrease of 36% from the corresponding amount for the previous year.

At the Brighton station the amount pumped has varied from 100,000 to 250,000 gallons per day.

MYSTIC LAKE.

Mystic Lake was full and overflowing on May 1, 1884, and waste was continued until June 8. The lake remained full until September 1, after which date its surface fell, and during the month of November stood about 3.50 feet below high water. In December the lake filled, and on December 23 waste began, and has been continued to the present time.

MYSTIC–VALLEY SEWER.

The treatment of the sewage from the tanneries in the Mystic Valley has been continued under the same system as for the two previous years.

The Farquhar low-pressure filter has been placed in position, and trials have been made to determine the practicability of filtering the sewage; but the experiments have not thus far been successful.

Experiments made during the past year show that the sludge removed from the settling-tanks has some value for manurial purposes. All of the land available has been graded, and the experiment will be continued during the present season.

The quantity of sewage is constantly increasing, and, if the works are to be maintained at their present location, they should be placed upon a more permanent basis. The machinery and buildings are of a temporary character, and already in need of repairs.

Authority for the removal of the works to the shore of the lower Mystic pond was asked by the Legislature, but has not been granted. I would recommend that the subject be carefully considered, in order that some definite plan may be decided upon before the next session of the Legislature.

MYSTIC CONDUIT AND RESERVOIRS.

The conduit has been cleaned twice during the year, and is in good condition. The east basin of the reservoir was drawn off and cleaned in May, 1884, The stone-work was repointed, and the wrought-iron pipe leading to the west basin re-covered with cement.

MYSTIC PUMPING-STATION.

The work done at this station is shown by the table on page 43.

Engine No. 1 was used	151	hours	30	min.,	pumping	25,005,600	gallons.
" " 2 " "	1343	"	30	"	"	258,542,200	"
" " 3 " "	7155	"	45	"	"	2,027,161,600	"
Total amount pumped						2,310,709,400	"
Total coal consumed						5,843,400	lbs.

Of which 8.6% were ashes and clinkers.
Average lift 150.04 feet.
Quantity pumped per lb. of coal, 395.4 gallons.
Average duty of engines (no deductions), 49,482,700 feet per 100 lbs. coal.
Daily average amount pumped 6,313,400 gallons, a decrease of 7.4 per cent. from that of the previous year.

Cost of Pumping.

Salaries	$7,318 20
Fuel	13,957 07
Oil, waste, and packing	544 87
Repairs	1,299 52
Small supplies	58 87
	$23,178 53

Cost per million gallons lifted one foot high $0.067.

The new boilers which were being erected at the date of the last report were completed and placed in service in June last. The boiler-room has been greatly improved by raising the ceiling so as to make the boilers and piping more accessible, and also to reduce the danger from fire.

In order to determine the efficiency of the boilers a careful trial was made on February 9 and 10, with the following results.

The test was conducted in the following manner: —

On the morning of the 9th boilers Nos. 2 and 3 were supplying steam for engine No. 3, which was pumping the city's supply. At 10.18 A.M. the engine was stopped, the fires under the boilers drawn, and the ash-pits cleaned. At 10.30 A.M. new fires were started under both boilers, the steam pressure at the time (as shown by the gauges) being 27 lbs. in boiler No. 2, and 29 lbs. in boiler No. 3. At 10.50 A.M. the engine was started, and run continuously until 11.12 A.M. February 10, when it was stopped, the boiler-pressures at that time being the same as when the fires were lighted, viz., 27 and 29 lbs.

All of the wood and coal used during the trial was carefully weighed on tested scales. The water fed to the boilers was carefully weighed, and also measured by a 2-inch Worthington meter placed upon the boiler feed-pipe. Half-hourly observations were taken of the height of the water in boilers, steam pressure in boilers, temperatures of steam, feed-water and gases in flue.

The height of the water in the boilers at the beginning of the trial was carefully noted, and the water left at the same elevation when the trial ended.

The boilers are of the horizontal, return tubular type, with external furnaces. They are 78 inches in diameter, 17 feet in length, and each boiler contains 151 tubes of 3 inches outside diameter. The boiler shells are of $\frac{7}{16}$-inch steel, tube sheets $\frac{1}{2}$-inch steel.

Grate surface each 7 feet by 6 feet, for both boilers	84 sq. ft.
Heating surface in both boilers	4102.8 "
Ratio of grate surface to heating surface	1 to 48.8 "
Duration of trial	24 hours 22 min.
Average steam pressure	44 lbs.
" temperature of steam	286.6° Fah.
" " " gases in flue	344.2° "
" " " feed water	115.6° "
Total amount of wood used	633 lbs.

Fuel equivalent at 40%	253 lbs.
Total coal used	19,235 "
" fuel used	19,488 "
" ashes drawn from grates	1,463 "
Unburnt coal in ashes	0 "
Total combustible	18,025 "
Total weight of water fed to boilers	190,986 "
Water evaporated per lb. of coal at observed temperature and pressure	9.8 "
Equivalent evaporation from and at 212°,	11,035 "
Water evaporated per lb. of combustible at observed temperature and pressure	10,596 "
Equivalent evaporation from and at 212°,	11,931 "
Fuel burnt per hour	800 "
Fuel burnt per hour per sq. ft. of grate surface	9.52 "
Water evaporated per hour per sq. ft. of grate surface	7,837 "
Water evaporated per hour per sq. ft. of grate surface	93.33 "
Water evaporated per hour per sq. ft. of heating surface	1.91 "

CONSUMPTION.

The daily average consumption during the year was as follows: —

	Gallons.	Gallons per head per day.	Percentage of reduction from year 1883.
Sudbury and Cochituate supply	25,090,500	68	23.6
Mystic supply	6,209,700	71	9.0
Total	31,300,200	68.6	21.6

The daily average consumption from the combined works has been 8,630,200 gallons less than during the year 1883, and less than that of any year since 1877.

The table on page 36, and the diagram facing page 36, show the daily average consumption for each month.

WASTE.

The above figures show that the efforts which have been made to prevent the waste of water have been very successful.

By request of your Board, Mr. Dexter Brackett has been especially detailed from this office to take charge of the Waste Detector Service, and I transmit herewith his report which gives more in detail the work accomplished:—

"Boston, May 1, 1885.

"William Jackson, Esq., *City Engineer:* —

"Dear Sir, — The following report of the work done in the detection of waste is respectfully submitted:—

"During the months of May and June, 1884, the Deacon meters, which had been received from England, were located throughout the city and were immediately placed in service to determine the amount of waste in the different sections. The localities found to be using large quantities of water were reported to Mr. D. B. Cashman, the superintendent of the Inspection and Waste Department, in order that a house to house inspection might be made by the inspectors under his charge.

"After the house to house inspection had been made the sections were again tested, to determine the saving effected by the inspection.

"Nearly all of the residential portions of the city are now controlled by this system.

"Sixty-nine meters are in use, supplying a population of about 360,000 people in 137 districts.

"The saving which has been effected is shown by the following table, which gives the daily average consumption per inhabitant during the past two years: —

Month.	SUDBURY AND COCHITUATE.				MYSTIC.			
	Consumption.		Amount saved.		Consumption.		Amount saved.	
	Galls. per head per day.		Galls. per head per day.	Percentage.	Galls. per head per day.		Galls. per head per day.	Percentage.
	1883	1884			1883	1884		
January . .	97.8	88.4	9.4	9.6	97.3	92.2	5.1	5.2
February .	92.0	67.5	24.5	26.6	89.6	73.0	16.6	18.5
March . . .	95.8	65.0	30.8	32.1	89.8	72.8	17.0	18.9
April . . .	85.8	58.8	27.0	31.5	71.5	60.1	11.4	15.9
May	89.8	64.6	25.2	28.1	73.1	66.4	6.7	9.2
June	93.3	71.2	22.1	23.7	80.0	71.5	8.5	10.6
July	102.4	68.9	33.5	32.7	84.5	72.1	12.4	14.7
August . .	103.2	67.7	35.5	34.4	83.9	69.5	14.4	17.2
September .	93.2	71.1	22.1	23.7	67.4	73.1	. . .	(8.5 inc.)
October . .	81.9	67.3	14.6	17.8	63.4	66.4	. . .	(4.7 inc.)
November .	79.6	61.5	18.1	22.7	68.3	58.2	10.1	14.8
December .	83.0	64.9	18.1	21.8	77.9	71.9	6.0	7.7
Averages .	91.5	68.0	23.5	25.6	82.0	71.0	11.0	13.4

"It will be noticed that the saving effected on the Sudbury and Cochituate works has been greater than on the Mystic works. This I attribute to the fact that the distribution systems of Somerville and Chelsea are in a very poor condition, and that the Deacon system has not yet been extended to those cities.

"There yet remains in some of the sections a considerable amount of waste, but whether this is taking place from the water-fixtures or from the street mains and services cannot be definitely ascertained until we have sidewalk stopcocks on the services.

"The Board having adopted the Church stopcock to be placed on the services throughout the city, ordered 5,000 of them in September, 1884.

"About 2,500 of these have been delivered and are now being tested for acceptance. Within a few weeks the work of setting them will be commenced, and it is intended to forward the work as rapidly as possible in order that they may be used to reduce the waste during the present season.

"Further experiments have been made with the Bell Waterphone; but I do not think it advisable to adopt it for permanent use.

"Respectfully submitted,

"DEXTER BRACKETT,

"*Assistant Engineer.*"

Quality.

The quality of the water from the different sources of supply has been generally good throughout the year. The cucumber taste has not been noticed. *Algæ* made their appearance in Farm Pond and Reservoirs Nos. 1 and 3 during the summer and fall; but less trouble was experienced from their presence than in past years. Owing to the work going on at Farm Pond the water of that pond has not been very good during most of the year.

The water of Lake Cochituate has been of good quality throughout the year.

Distribution.

The distributing mains of the Sudbury and Cochituate works have been extended about eleven miles, and one mile of pipe relaid with pipe of larger diameter. The total length of supply and distributing mains now connected with the works is 388.5 miles.

On the Mystic works the distributing mains have been extended 11,291 feet, and 5,232 feet of wrought-iron and cement pipe replaced by cast-iron pipes. The total length of supply and distribution mains connected with the Mystic system is 129.2 miles. This amount is less than that given in former reports, as a careful examination of reports and plans shows that many errors had crept into the figures, and the revised length is thought to be practically correct.

The raising of the grade of Brookline avenue, between Beacon street and Burlington avenue, necessitated the raising of about 1,200 feet of the 40-inch supply main. For a

length of 1,000 feet the pipe was raised and supported by a pile trestle. This trestle was also used by the railroad company in filling the street. The water passes over the bridge in two wrought-iron pipes 28 inches in diameter.

Appended to this report will be found the usual statistical tables showing the rainfall, consumption of water, yield of the different water-sheds, etc.

Respectfully submitted,

WILLIAM JACKSON,

City Engineer, and Engineer Boston Water Board.

Daily Average Consumption of Water in Gallons, from the Cochituate and Mystic Works.

	COCHITUATE WORKS.							MYSTIC WORKS.						
MONTHS.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1878.	1879.	1880.	1881.	1882.	1883.	1884.
January	24,210,600	28,190,200	25,817,600	32,121,900	32,151,100	34,715,500	32,162,300	10,325,705	11,111,972	10,511,279	8,756,500	7,816,200	8,369,600	8,019,100
February . . .	23,848,700	27,446,300	27,625,800	31,607,900	34,662,300	32,690,700	24,598,000	9,944,140	12,253,090	11,616,248	9,428,700	7,937,300	7,714,700	6,349,500
March	21,019,500	24,163,800	23,095,700	27,531,700	32,256,300	34,110,700	23,711,900	8,192,825	9,851,219	10,324,323	7,042,800	6,573,700	7,737,300	6,337,100
April	20,628,300	20,421,800	22,670,700	28,146,200	30,827,000	30,617,600	21,505,700	7,365,951	8,311,620	9,400,931	6,420,700	5,946,100	6,171,100	5,242,100
May	22,023,800	22,953,800	25,238,200	29,307,600	28,738,000	32,169,500	23,708,500	7,717,476	8,523,744	9,962,213	6,502,900	5,793,600	6,319,100	5,800,000
June	23,360,600	24,101,200	27,795,400	30,059,200	33,178,400	33,419,200	26,184,600	8,383,667	9,054,267	10,891,057	6,556,700	6,664,400	6,912,500	6,245,600
July	25,620,000	26,156,900	26,951,800	33,885,300	30,992,600	36,774,000	25,409,000	9,087,658	9,150,025	10,051,544	6,906,400	6,881,400	7,307,600	6,312,300
August	24,679,600	27,075,100	28,175,100	34,472,200	34,149,300	37,141,000	25,065,200	8,751,038	8,027,325	9,754,149	7,011,700	6,912,200	7,261,500	6,088,400
September . .	24,469,700	28,017,800	28,734,400	34,801,500	31,691,600	33,645,600	26,389,500	8,767,490	7,614,951	9,591,891	6,587,100	5,964,100	5,846,300	6,411,150
October	24,100,700	27,702,600	27,487,900	32,871,200	31,563,800	29,575,800	25,022,900	7,900,000	7,771,578	7,634,888	6,195,400	6,011,300	5,497,200	5,834,200
November . .	22,200,600	25,299,200	26,458,400	27,519,800	31,318,700	28,839,300	22,954,200	7,525,957	7,372,892	6,245,891	7,870,400	5,577,400	5,930,600	5,119,700
December . . .	22,298,500	26,831,900	28,010,500	29,860,400	32,352,800	30,174,200	24,234,800	8,227,314	8,585,799	6,778,046	7,056,900	6,877,600	6,771,500	6,330,800
Yearly average,	23,205,700	25,695,900	26,500,000	31,020,200	31,970,800	32,836,900	25,090,500	8,515,768	8,883,470	9,387,879	7,194,700	6,574,400	6,819,200	6,209,700

Month.	1879.		1880.		1881.		1882.	1883.		1884.	
	To Lake Cochituate.	To Chestnut Hill Res'r.	To Lake Cochituate.	To Chestnut-Hill Res'r.	To Lake Cochituate.	To Chestnut-Hill Res'r.	To Chestnut-Hill Res'r.	To Lake Cochituate.	To Chestnut-Hill Res'r.	To Lake Cochituate.	To Chestnut-Hill Res'r.
	Gallons.	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*
January	.....	204,600,000	228,400,000	673,600,000	.....	814,800,000	595,000,000	.....	733,400,000	.....	697,000,000
February	.....	272,300,000	11,300,000	604,100,000	.....	680,300,000	975,700,000	.....	597,800,000	1,094,300,000	265,400,000
March	.....	295,100,000	8,200,000	268,400,000	.....	853,600,000	1,002,300,000	17,200,000	634,700,000	.....	312,500,000
April	.....	117,700,000	161,300,000	348,000,000	.....	810,700,000	781,200,000	967,900,000	535,700,000	.....	228,800,000
May	.....	245,900,000	280,800,000	460,000,000	.....	960,100,000	502,800,000	260,000,000	613,800,000	.....	268,400,000
June	.....	180,800,000	136,700,000	398,600,000	.....	941,700,000	491,800,000	.....	631,600,000	168,400,000	414,500,000
July	333,100,000	322,500,000	.....	378,400,000	.....	911,200,000	646,900,000	.....	754,300,000	152,000,000	430,100,000
August	45,500,000	322,100,000	.....	592,000,000	.....	730,700,000	655,800,000	.....	640,900,000	1,600,000	406,100,000
September	9,300,000	294,600,000	.....	445,500,000	.....	731,500,000	308,900,000	.....	467,100,000	.....	442,200,000
October	.....	234,800,000	.....	434,600,000	.....	429,300,000	570,300,000	.....	483,300,000	.....	432,900,000
November	21,400,000	339,300,000	.....	398,200,000	.....	321,700,000	572,300,000	.....	580,800,000	.....	363,900,000
December	2,000,000	508,200,000	.....	402,100,000	187,600,000	472,100,000	632,200,000	.....	536,800,000	.....	432,500,000
Totals	411,300,000	3,337,900,000	826,700,000	5,403,500,000	187,600,000	8,657,700,000	7,735,200,000	1,245,100,000	7,209,900,000	1,416,300,000	4,694,300,000
Total diversion from Sudbury River	3,749,200,000		6,230,200,000		8,845,300,000		7,735,200,000	8,455,000,000		6,110,600,000	
Average daily diversion for whole year	10,272,000		17,022,400		24,233,700		21,192,300	23,164,400		16,695,600	

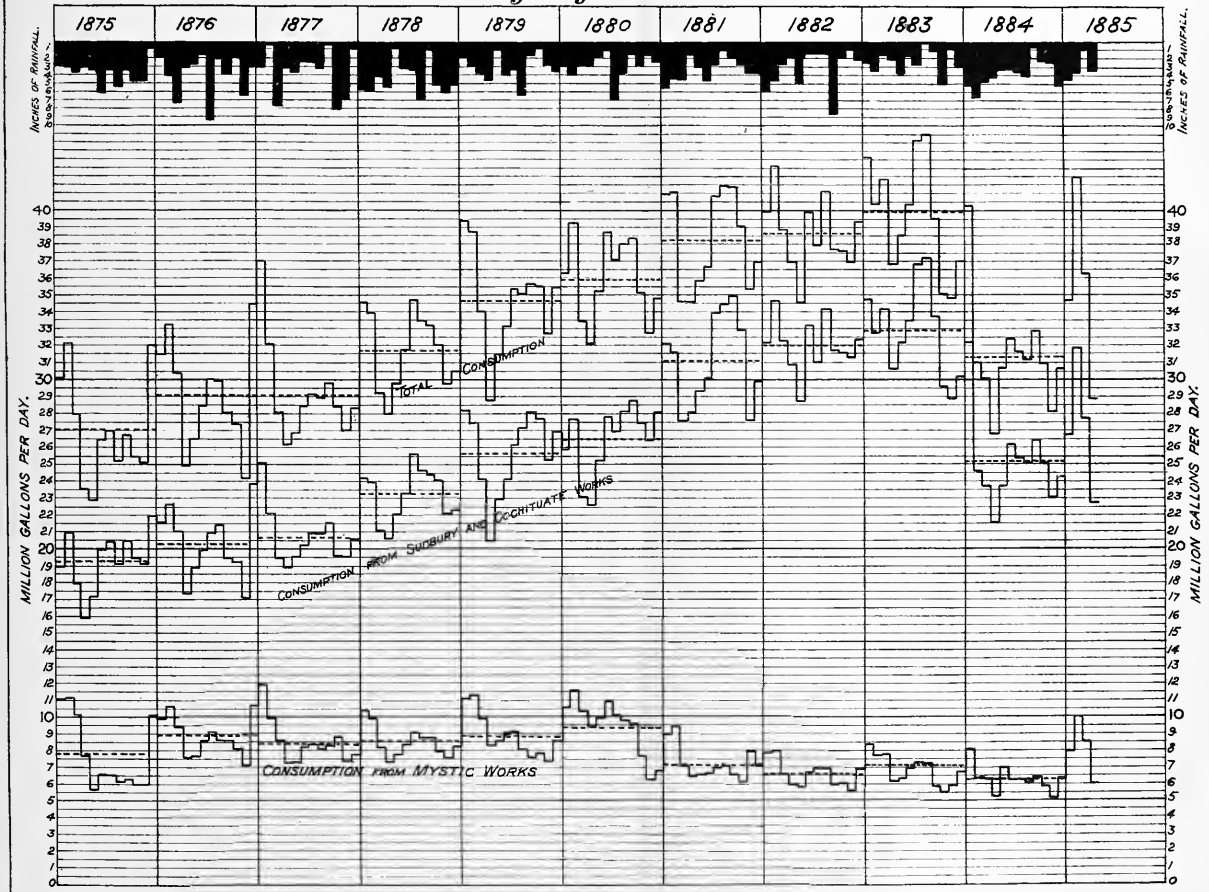
Table showing the average Monthly and Yearly Heights above the tide marsh level of the Water in the Lakes and Reservoirs of the Boston Water-Works.

Months.	Reservoir No. 1. Flash-boards 159.29		Reservoir No. 2. Flash-boards 167.12		Reservoir No. 3. Stone-crest 175.24.		Farm Pond. High water 149.25.		Lake Cochituate. High water 134.36.		Chestnut-Hill Reservoir. High water 124.00.		Brookline Reservoir. High water. 124.00.		Parker-Hill Reservoir. High-water 219.00.		Mystic Lake. High water 7.00.		Mystic Reservoir. High water 147.00.	
	1883.	1884.	1883.	1884.	1883.	1884.	1883.	1884.	1883.	1884.	1883.	1884.	1883.	1884.	1883.	1884.	1883.	1884.	1883.	1884.
January . . .	154.42	155.33	162.28	160.43	169.55	164.05	149.24	148.41	126.09	124.98	123.78	123.42	123.10	122.90	217.28	217.66	5.96	3.51	146.87	146.87
February . .	153.23	157.83	161.93	166.36	173.96	174.92	149.29	148.94	126.34	130.57	123.93	123.69	123.59	123.50	217.84	218.33	6.17	6.21	146.98	146.94
March . . .	157.97	158.41	166.09	166.47	175.56	175.52	149.24	148.77	127.82	133.60	123.60	123.88	123.27	123.69	217.05	218.14	5.78	5.92	146.86	146.81
April	157.82	158.29	166.13	166.40	175.53	175.63	149.19	148.55	131.93	134.06	123.63	123.93	123.35	123.76	217.72	218.35	6.53	6.53	146.73	146.77
May	158.58	157.93	166.56	166.14	175.42	175.53	149.21	148.71	134.07	134.33	123.98	123.73	123.67	123.54	217.40	217.79	6.73	6.79	146.72	147.07
June	159.37	159.17	165.86	166.85	175.35	175.39	149.24	148.39	133.61	133.90	123.91	123.58	123.44	123.38	217.81	217.73	6.63	6.75	146.72	146.70
July	159.16	159.31	156.82	166.27	174.84	175.27	149.24	148.27	131.97	134.08	123.82	123.82	123.46	123.62	217.48	217.80	5.33	6.78	146.82	146.77
August . . .	158.44	159.33	150.28	165.45	170.25	175.27	148.59	146.60	130.08	133.63	123.80	123.62	123.48	123.45	217.54	218.17	3.28	6.77	146.83	146.78
September . .	157.17	159.12	148.99	160.46	165.40	174.91	147.63	146.55	127.92	132.54	123.28	123.69	123.01	123.50	217.82	217.19	0.83	5.89	146.46	145.89
October . . .	156.32	158.79	149.42	151.06	161.88	173.81	147.63	146.53	126.30	131.21	122.98	123.69	122.73	123.52	217.35	217.61	—0.36	4.01	146.81	146.66
November . .	155.66	157.78	149.86	149.90	159.59	171.89	147.96	146.39	125.16	130.26	123.16	123.93	122.93	123.75	217.65	217.73	—0.29	3.51	146.74	146.80
December . .	154.81	157.67	149.48	161.08	156.00	174.18	147.35	146.73	124.47	130.51	123.07	123.86	122.84	123.55	218.18	217.68	—0.38	5.09	146.53	146.87
Yearly ave. .	156.91	158.25	157.81	162.24	169.44	173.86	148.65	147.74	128.81	131.97	123.58	123.74	123.24	123.51	217.59	217.85	3.85	5.65	146.76	146.74

BOSTON WATER WORKS.

Diagram showing the rainfall and daily average consumption for each month.

Yearly Averages shown thus .....



HELIOTYPE PRINTING CO BOSTON

Statement showing Amount of Water diverted from Sudbury to Lake Cochituate and Chestnut-Hill Reservoir; Amount wasted; Amount of flow in River; Percentage of Rainfall Collected, etc., 1875 to 1884.

(Water-shed from 1875 to 1878, inclusive, = 77,764 sq. miles; in 1879, = 78,238 sq. miles, and in 1880, 1881, 1882, 1883, and 1884, = 76,305 sq. miles.)

YEAR.	Amount of Water diverted to Lake Cochituate and Chestnut-Hill Reservoir.	Amount of Water wasted from River.	STORAGE.		Total amount of flow in River.	Daily average amount of flow in River.	Rainfall.	Rainfall collected.	Percentage of collected Rainfall.
			Gain.	Loss.					
	Gallons.	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*	*Inches.*	*Inches.*	*Per cent.*
1875	2,555,800,000	24,971,600,000	66,300,000	. . . . .	27,593,700,000	75,599,200	45.490	20.418	44.88
1876	2,528,300,000	29,942,300,000	. . . . .	160,700,000	32,309,900.000	88,278,400	49.563	23.908	48.24
1877	1,894,350,000	32,438,300,000	112,100,000	. . . . .	34,444,750,000	94,369,200	44.018	25.487	57.90
1878	3,422,100,000	37,125,200,000	654,700,000	. . . . .	41,202,000,000	112,882,200	57.931	30.487	52.63
1879	3,749,200,000	20,817,500,000	962,200,000	. . . . .	25,528,900,000	69,942,200	41.419	18.755	45.33
1880	6,230,200,000	11,290,000,000	. . . . .	958,600,000	16,561,600,000	42,250,300	38.177	12.487	32.71
1881	8,845,300,000	17,279,000,000	751,700,000	. . . . .	26,876,000,000	73,633,900	44.169	20.257	45.88
1882	7,735,200,000	16,273,900,000	. . . . .	352,600,000	23,656,500,000	64,812,300	39.394	17.841	45.29
1883	8,455,000,000	7,251,900,000	. . . . .	1,086,400,000	14,620,500,000	40,056,200	32.780	11.023	33.63
1884	6,110,600,000	23,228,900,000	1,744,600,000	. . . . .	31,084,100,000	84,929,200	47.135	23.440	49.73
Averages	5,152,600,000	22,061,860,000	. . . . .	. . . . .	27,387,795,000	74,973,400	44.008	20.410	46.38

Statement showing Amount of Watar drawn from Lake Cochituate; Amount wasted; Amount of Rainfall collected in Lake; Amount received into Lake from Sudbury River; Percentage of Rainfall collected, etc., 1852 to 1884. Water-shed of Lake = 12,077 acres.

YEAR.	Amount of Water drawn from Lake.	Amount of Water wasted from Lake.	Amount received into Lake from Sudbury River.	STORAGE.		Total amount of Rainfall collected in Lake.	Daily average amount of Rainfall collected in Lake.	Rainfall.	Rainfall collected.	Percentage of Rainfall collected.
				Gain.	Lost.					
	Gallons.	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*	*Inches.*	*Inches.*	*Per cent.*
1852[1]	2,974,042,800	4,020,566,900	.....	.....	261,300,000	6,733,249,700	18,396,900	47.93	20.61	43.
1853	3,117,839,500	3,166,417,500	.....	239,580,000	.....	6,523,937,000	17,873,800	55.73	19.51	35.
1854	3,614,230,000	4,187,733,000	.....	.....	217,800,000	7,584,163,000	20,778,500	43.15	22.87	53.
1855	3,776,399,500	No account kept	.....	.....	326,700,000	.....	.....	34.96	.....	.....
1856	4,409,787,600	"	.....	598,950,000	.....	.....	.....	40.80	.....	.....
1857	4,644,990,000	10,625,900,000	.....	32,670,000	.....	15,303,560,000	41,927,600	63.10	46.69	74.
1858	4,689,155,000	1,934,500,000	.....	.....	141,570,000	6,482,085,000	17,759,000	48.66	19.46	40.
1859[2]	4,808,875,000	7,569,000,000	.....	283,140,000	.....	12,661,015,000	34,687,700	49.02	38.24	78.
1860	6,309,108,000	None.	.....	174,240,000	.....	6,483,348,000	17,714,100	55.44	19.40	35.
1861	6,639,095,900	3,377,559,000	.....	.....	1,459,260,000	8,557,394,900	23,444,900	45.44	25.45	56.
1862	6,059,000,000	33,200,000	.....	1,306,800,000	.....	7,399,000,000	20,271,200	49.69	22.36	45.
1863	5,927,052,500	2,165,696,500	.....	762,300,000	.....	8,855,049,000	24,260,400	69.30	27.03	39.
1864	6,105,306,700	1,368,746,000	.....	.....	1,848,577,000	5,625,475,700	15,370,200	42.60	17.04	40.
1865	4,621,630,000	1,688,120,700	.....	743,242,500	.....	7,052,993,200	19,323,300	49.46	21.27	43.
1866	4,463,585,000	None.	.....	742,242,500	.....	5,206,827,500	14,265,300	62.32	15.58	25.

BOSTON WATER WORKS.

Diagram showing the heights of the Sudbury River Reservoirs, Farm Pond and Lake Cochituate, the daily amount drawn from the Sudbury River, and the Rainfall on the Sudbury River Water Shed during the year 1884.

HELIOTYPE PRINTING CO BOSTON

1867	4,951,225,000	2,482,041,000	. . . . .	. . . . .	698,811,000	6,734,455,000	18,450,600	56.25	20.25	36.
1868	5,405,515,000	2,507,684,000	. . . . .	346,371,000	. . . . .	8,259,570,000	22,567,200	49.71	24.86	50.
1869	5,500,696,000	1,635,570,000	. . . . .	480,882,000	. . . . .	7,620,203,000	20,877,300	64.34	23.16	36.
1870	5,477,810,000	4,818,971,000	. . . . .	. . . . .	1,736,085,000	8,560,696,000	23,453,900	55.89	26.27	47.
1871	5,223,500,000	None.	. . . . .	. . . . .	250,933,000	4,972,567,000	13,623,500	45.39	14.98	33.
1872	5,775,151,200	None.	1,676,666,400	1,543,995,500	. . . . .	5,642,480,300	15,416,600	48.47	16.96	35.
1873	6,511,826,900	2,917,977,000	. . . . .	. . . . .	515,132,000	8,914,671,900	24,423,800	45.43	27.26	60.
1874	6,623,972,900	1,145,851,700	. . . . .	. . . . .	1,367,715,000	6,402,109,600	17,540,000	35.93	19.40	54.
1875	7,092,955,500	None.	2,555,800,000	1,222,885,000	. . . . .	5,760,040,500	15,780,900	45.49	17.74	39.
1876	7,277,175,200	1,619,243,800	2,528,300,000	43,438,000	. . . . .	6,411,557,000	17,517,900	48.49	19.40	40.
1877	7,626,889,200	1,484,978,600	1,894,350,000	378,727,000	. . . . .	7,596,244,800	20,811,600	43.80	23.21	53.
1878	7,743,904,700	3,341,875,000	2,668,300,000	219,788,000	. . . . .	8,637,267,700	23,663,700	53.58	26.25	49.
1879	6,051,838,900	1,523,361,400	411,300,000	. . . . .	1,322,697,300	5,841,203,000	16,003,300	38.01	17.86	47.
1880	4,284,147,100	65,577,700	826,700,000	. . . . .	146,265,000	3,376,759,800	9,226,100	35.83	10.30	29.
1881	2,846,459,700	2,231,016,700	187,600,000	468,089,400	. . . . .	5,357,965,800	14,679,400	41.09	16.34	40.
1882	3,935,490,600	1,358,543,700	. . . . .	. . . . .	357,334,700	4,936,699,600	13,525,200	40.29	15.05	37.
1883	4,731,227,700	162,381,800	1,245,100,000	. . . . .	334,400,000	3,314,089,500	9,079,700	31.20	10.11	32.
1884	4,533,156,450	1,842,837,100	1,416,300,000	1,340,436,700	. . . . .	6,300,120,050	17,213,450	45.57	19.21	42.
Averages . .	5,265,246,500	2,234,688,100	. . . . .	. . . . .	. . . . .	7,067,961,200	19,352,500	47.95	21.42	44.1

[1] Observation of Rainfall at Lake Cochituate commenced 1852, and these observations are assumed as correct for the whole district.
[2] Lake raised two feet.

Statement showing Amount of Water drawn from Mystic Lake; Amount wasted; Amount of Rainfall collected in Lake; Percentage of Rainfall collected, etc., 1876 to 1884; Water-shed of Lake, 17,200 acres.

YEAR.	Amount of Water drawn from Lake.	Amount of Water wasted from Lake.	STORAGE.		Total amount of Rainfall collected in Lake.	Daily average amount of Rainfall collected in Lake.	Rainfall.	Rainfall collected.	Percentage of Rainfall collected.
			Gain.	Loss.					
	Gallons.	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*	*Inches.*	*Inches.*	*Per cent.*
1876	3,230,101,300	6,369,774,700	.....	32,583,000	9,567,293,000	26,140,100	47.00	20.49	43.6
1877	3,069,554,800	7,250,223,500	.....	16,291,400	10,303,486,900	28,228,700	43.095	22.06	51.2
1878	3,354,371,200	8,714,479,600	.....	28,672,900	12,040,177,900	32,986,800	54.065	25.79	47.7
1879	3,736,107,800	4,625,691,800	.....	233,944,900	8,127,854,700	22,268,000	35.30	17.61	49.9
1880	3,692,195,700	2,158,761,200	.....	113,500,000	5,737,456,900	15,676,100	34.42	12.28	35.7
1881	2,815,579,900	5,395,200,000	371,200,000	.....	8,582,000,000	23,512,300	41.91	18.37	43.8
1882	2,570,896,700	4,444,668,000	15,000,000	.....	7,030,564,700	19,261,800	39.165	15.05	38.4
1883	2,664,514,000	2,034,685,000	.....	347,600,000	4,351,600,000	11,922,300	31.22	9.34	29.91
1884	2,469,761,000	6,574,003,800	380,600,000	.....	9,424,364,800	25,749,600	44.39	20.18	45.46
Average	3,067,009,200	5,285,276,400	.....	.....	8,351,644,300	22,860,600	41.17	17.91	42.85

Statement of Operations at the Mystic Pumping-Station for the year 1884.

1884.	Engine No. 1.			Engine No. 2.			Engine No. 3.			Total amount pumped.	Daily average amount pumped.	Daily average am't of coal consumed.	Per cent. ashes and clinkers.	Quantity pumped per lb. of coal.	Average lift in ft.	Duty in ft. lbs. per 100 lbs. of total coal.
	Pumping time.		Amount pumped.	Pumping time.		Amount pumped.	Pumping time.		Amount pumped.							
	Hrs.	*Min.*	*Gallons.*	*Hrs.*	*Min.*	*Gallons.*	*Hrs.*	*Min.*	*Gallons.*	*Gallons.*	*Gallons.*	*Lbs.*		*Gals.*	*Ft.*	*Ft.-lbs.*
January	13	...	2,038,500	182	30	32,857,600	744	...	216,038,400	250,934,500	8,094,661	22,226	8.1	364.2	151.01	45,868,300
February	94	45	15,975,800	229	45	45,919,100	438	45	122,009,600	183,904,500	6,341,500	17,259	8.3	367.4	149.33	45,761,600
March	43	45	6,991,300	...	...	.....	660	45	189,388,800	196,380,100	6,334,850	16,581	8.2	382.1	149.59	47,665,400
April	...	...	.....	75	15	14,465,800	508	15	142,899,200	157,365,000	5,245,500	14,017	8.2	374.2	149.38	46,623,100
May	...	...	.....	254	30	48,350,200	635	30	178,611,200	226,961,400	7,321,340	18,806	8.2	389.3	152.91	49,646,100
June	...	...	.....	94	30	18,482,400	595	...	168,755,200	187,237,600	6,241,250	15,883	8.7	392.9	150.36	49,275,200
July	...	...	.....	202	00	40,135,800	551	30	155,545,600	195,681,400	6,312,300	15,677	8.8	402.6	149.42	50,175,100
August	...	...	.....	145	45	28,357,800	578	...	160,076,800	188,434,600	6,078,500	14,823	8.6	410.1	149.40	51,096,600
September	...	...	.....	35	45	6,583,600	657	45	185,011,200	191,594,800	6,386,500	15,067	9.1	423.9	149.74	52,935,800
October	...	...	.....	37	...	6,991,300	598	30	174,796,800	181,788,100	5,864,100	13,306	9.6	440.7	149.83	55,068,900
November	...	...	.....	...	...	.....	557	45	153,881,600	153,881,600	5,129,400	12,323	9.0	416.2	149.82	52,008,300
December	...	...	.....	86	30	16,398,600	630	...	180,147,200	196,545,800	6,340,200	15,490	8.5	409.3	149.69	51,097,600
Totals & averages,	151	30	25,005,600	1,343	30	258,542,200	7,155	45	2,027,161,600	2,310,709,400	6,313,400	15,966	8.6	395.4	150.04	49,482,700

Statement of Operations at the Highland Pumping-Station for the year 1884.

1884.	WORTHINGTON ENGINE.										
	Total pumping time.		Amount pumped.	Daily average amount pumped.	Total amount of coal consumed.	Daily average amount of coal consumed.	Amount ashes and clinkers.	Per cent. ashes and clinkers.	Quantity pumped per lb. of coal.	Average lift in feet.	Duty in ft.-lbs. per 100 lbs. of total coal.
	Hrs.	*Min.*	*Gallons.*	*Gallons.*	*Lbs.*	*Lbs.*	*Lbs.*		*Gals.*	*Feet.*	*Ft.-Lbs.*
January	651	....	76,942,000	2,482,000	138,500	4,468	15,035	10.9	555.5	109.73	50,837,600
February	609	....	68,231,000	2,352,800	123,200	4,248	14,645	11.9	553.8	108.11	49,933,900
March	646	....	73,485,500	2,370,500	132,700	4,281	16,140	12.2	553.8	108.34	50,035,900
April	614	30	65,751,000	2,191,700	112,500	3,750	14,830	13.2	584.5	106.95	52,132,600
May	634	30	72,199,000	2,329,000	124,500	4,016	18,025	14.5	579.9	107.65	52,062,600
June	629	30	79,468,500	2,648,950	141,100	4,703	20,295	14.4	563.2	109.26	51,322,400
July	634	45	74,865,000	2,415,000	130,900	4,223	19,850	15.2	571.9	108.04	51,532,900
August	617	15	71,486,000	2,306,000	127,400	4,110	19,660	15.4	561.1	107.88	50,483,200
September	629	....	77,686,000	2,589,500	129,400	4,313	16,405	12.7	600.4	108.34	54,245,000
October	637	45	76,043,000	2,453,000	126,800	4,090	16,828	13.3	599.7	108.11	54,070,900
November	622	....	71,005,500	2,366,850	123,500	4,117	15,945	12.9	574.9	108.11	51,838,100
December	651	....	77,825,500	2,510,500	141,400	4,561	18,250	12.9	550.4	111.34	51,109,000
Totals and averages	7,576	15	884,988,000	2,418,000	1,551,900	4,240	205,908	13.3	570.3	108.49	51,597,600

Rainfall in inches and hundredths on the Sudbury-River Water-shed, for the year 1884.

1884.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1	. . .	0.065	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
2	1.405	. . .	. . .	. . .	. . .	. . .	0.015	. . .	. . .	. . .	. . .	. . .
3	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	0.08	. . .	. . .
4	. . .	. . .	. . .	1.35	. . .	. . .	. . .	. . .	. . .	0.43	0.08	. . .
5	. . .	0.60	. . .	. . .	0.015	. . .	0.735	0.425	. . .	. . .	. . .	. . .
6	. . . .	. . .	0.12	. . .	0.055	. . .	0.25	0.01	. . .	0.035	. . .	1.74
7	. . .	0.16	. . .	. . .	. . .	. . .	. . .	2.425	. . .	. . .	. . .	. . .
8	. . .	. . .	. . .	. . .	0.54	. . .	0.08	. . .	0.03	0.02	. . .	. . .
9	1.695	0.175	1.755	. . .	0.01	. . .	0.265	. . .	. . .	. . .	. . .	. . .
10	. . .	. . .	. . .	0.82	. . .	. . .	. . .	0.05	. . .	. . .	. . .	. . .
11	0.03	. . .	0.03	. . .	. . .	. . .	. . .	0.055	0.22	. . .	. . .	0.06
12	. . .	. . .	. . .	. . .	. . .	0.355	0.05	. . .	. . .	0.135	. . .	. . .
13	. . .	. . .	. . .	. . .	. . .	. . .	0.39	0.015	. . .	. . .	. . .	0.125
14	. . .	0.90	0.255	. . .	0.52	. . .	. . .	. . .	. . .	. . .	. . .	. . .
15	. . .	. . .	. . .	0.77	0.08	. . .	. . .	0.18	. . .	. . .	. . .	0.95
16	. . .	. . .	. . .	. . .	0.02	. . .	0.025	. . .	. . .	. . .	. . .	. . .
17	. . .	. . .	. . .	. . .	0.015	. . .	0.01	. . .	. . .	. . .	. . .	0.18
18	. . .	. . .	. . .	0.94	. . .	. . .	. . .	. . .	0.145	0.25	. . .	. . .
19	. . .	. . .	. . .	. . .	. . .	0.575	0.225	. . .	. . .	. . .	0.52	. . .
20	0.43	1.44	1.335	. . .	1.27	. . .	. . .	0.415	0.09	. . .	. . .	. . .
21	. . .	. . .	. . .	0.095	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
22	. . .	. . .	. . .	. . .	. . .	. . .	. . .	0.35	0.075	0.425	. . .	1.635
23	. . .	1.065	. . .	. . .	0.025	. . .	0.105	. . .	. . .	. . .	1.145	. . .
24	1.145	. . .	0.215	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	0.425
25	. . .	. . .	. . .	. . .	. . .	. . .	0.055	. . .	0.095	. . .	0.015	0.045
26	. . .	. . .	0.985	0.43	. . .	2.515	. . .	0.265	. . .	. . .	. . .	. . .
27	. . .	1.085	. . .	. . .	. . .	. . .	0.49	. . .	. . .	. . .	0.885	. . .
28	. . .	1.055	. . .	. . .	0.92	. . .	. . .	. . .	0.20	0.045	. . .	0.01
29	0.01	. . .	. . .	. . .	. . .	. . .	. . .	0.375	. . .	. . .	. . .	. . .
30	0.37	. . .	0.025	. . .	. . .	. . .	0.66	0.065	. . .	. . .	. . .	. . .
31	. . .	. . .	. . .	. . .	. . .	. . .	0.31	0.02	. . .	1.285	. . .	. . .
Total .	5.085	6.545	4.72	4.405	3.47	3.445	3.665	4.65	0.855	2.48	2.645	5.17

Total rainfall during year . . . . . 47.135 inches.
Being an average of two gauges, located at Framingham and Westboro'.

Rainfall in inches and hundredths on Lake Cochituate Water-shed for the Year 1884.

1884.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
1	. . .	0.12	. . .	. .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
2	1.13	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
3	. . .	. . .	. . .	. .	. .	. . .	. . .	. . .	. . .	0.03	. . .	. . .
4	. . .	0.21	. . .	1.05	. . .	. . .	. . .	. . .	. . .	0.38	0.13	. . .
5	. . .	0.39	. . .	0.10	0.06	. . .	1.03	0.14	. . .	. . .	. . .	. . .
6	. . .	. . .	0.12	. . .	. . .	. . .	0.17	0.43	. . .	0.02	. . .	1.85
7	. . .	0.18	. . .	. . .	0.05	. . .	. . .	2.20	. . .	. . .	. . .	. . .
8	. . .	. . .	. . .	. . .	0.48	. . .	0.45	. . .	0.06	0.05	. . .	. . .
9	1.64	. . .	. . .	. . .	. . .	. . .	0.29	. . .	. . .	. . .	. . .	. . .
10	. . .	. . .	1.52	0.82	. . .	. . .	. . .	. . .	0.23	. . .	. . .	. . .
11	0.04	. . .	. . .	0.03	. . .	. . .	. . .	0.08	0.10	. . .	. . .	0.11
12	. . .	0.24	0.07	0.02	. . .	0.16	0.31	. . .	. . .	0.14	. . .	. . .
13	. . .	0.55	. . .	. . .	. . .	0.20	. . .	0.11	. . .	. . .	. . .	0.09
14	0.02	. . .	. . .	. . .	0.58	. . .	. . .	0.06	. . .	. . .	. . .	. . .
15	. . .	. . .	0.25	0.73	0.07	. . .	. . .	. . .	. . .	. . .	. . .	0.93
16	. . .	. . .	. . .	0.14	0.04	. . .	0.10	. . .	. . .	. . .	. . .	. . .
17	. . .	. . .	. . .	0.38	. . .	. . .	. . .	. . .	. . .	. . .	. . .	0.18
18	. . .	0.82	. . .	. . .	. . .	. . .	0.04	. . .	0.07	0.16	. . .	. . .
19	. . .	. . .	. . .	. . .	. . .	0.40	0.13	. . .	. . .	. . .	0.33	. . .
20	0.12	0.68	1.24	. . .	0.73	. . .	. . .	. . .	0.09	. . .	. . .	. . .
21	. . .	. . .	. . .	. . .	. . .	. . .	. . .	0.10	. . .	. . .	. . .	1.52
22	. . .	. . .	. . .	. . .	. . .	. . .	. . .	0.52	0.06	0.39	. . .	0.10
23	. . .	1.20	. . .	. . .	0.03	. . .	0.07	. . .	. . .	. . .	0.88	. . .
24	1.04	. . .	0.24	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
25	. . .	. . .	. . .	. . .	. . .	. . .	0.07	. . .	0.11	. . .	0.02	0.29
26	. . .	. . .	1.06	0.53	. . .	3.12	. . .	0.22	. . .	. . .	. . .	0.24
27	. . .	0.70	. . .	. . .	. . .	. . .	0.60	. . .	0.04	. . .	0.02	. . .
28	. . .	0.95	. . .	. . .	0.88	. . .	. . .	. . .	0.14	0.03	0.95	. . .
29	. . .	. . .	. . .	. . .	. . .	. . .	0.84	0.63	. . .	. . .	. . .	. . .
30	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
31	0.40	. . .	. . .	. . .	. . .	. . .	0.32	. . .	. . .	1.39	. . .	. . .
Total.	4.39	6.04	4.50	3.80	2.92	3.88	4.42	4.49	0.90	2.59	2.33	5.31

Total rainfall during year . . . . . 45.57 inches.

Rainfall in inches and hundredths on the Mystic-Lake Water-shed for the Year 1884.

1884.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1	. . .	0.14	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
2	1.385	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
3	. . .	0.06	. . .	0.67	. . .	. . .	. . .	. . .	. . .	0.025	. . .	. . .
4	. . .	0.235	. . .	0.38	. . .	. . .	. . .	. . .	. . .	0.36	0.26	. . .
5	. . .	0.20	. . .	0.07	. . .	0.17	0.99	0.84	. . .	. . .	. . .	. . .
6	. . .	0.16	0.15	. . .	0.05	. . .	0.225	. . .	. . .	0.02	. . .	1.435
7	. . .	0.08	. . .	. . .	0.065	0.095	. . .	2.29	. . .	. . .	. . .	. . .
8	. . .	0.04	0.405	0.03	0.09	. . .	0.665	. . .	0.01	0.14	. . .	. . .
9	1.71	0.06	0.66	0.015	0.415	. . .	. . .	. . .	. . .	. . .	. . .	. . .
10	. . .	. . .	0.25	. . .	0.24	. . .	. . .	. . .	. . .	. . .	. . .	. . .
11	0.045	0.19	. . .	0.59	. . .	. . .	. . .	. . .	0.46	. . .	. . .	0.16
12	. . .	0.09	0.05	. . .	. . .	0.315	0.06	0.135	. . .	0.16	. . .	. . .
13	. . .	0.415	. . .	. . .	. . .	. . .	0.10	0.14	. . .	. . .	. . .	0.08
14	. . .	. . .	. . .	. . .	0.32	. . .	. . .	. . .	. . .	. . .	. . .	. . .
15	. . .	. . .	0.095	. . .	0.20	. . .	. . .	. . .	. . .	. . .	. . .	0.925
16	. . .	. . .	0.025	0.91	0.02	. . .	0.025	. . .	. . .	. . .	. . .	. . .
17	. . .	. . .	. . .	0.025	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .
18	. . .	0.625	. . .	0.13	0.01	. . .	0.035	. . .	. . .	. . .	. . .	0.20
19	. . .	0.11	. . .	0.035	. . .	0.45	0.14	. . .	. . .	. . .	0.265	. . .
20	0.23	0.05	1.52	0.01	0.62	. . .	. . .	. . .	0.07	. . .	. . .	. . .
21	. . .	0.57	. . .	0.035	. . .	. . .	. . .	. . .	. . .	. . .	. . .	1.20
22	. . .	. . .	. . .	. . .	. . .	. . .	. . .	0.315	. . .	0.485	. . .	0.10
23	. . .	1.16	. . .	. . .	0.03	. . .	0.01	. . .	. . .	. . .	0.525	. . .
24	0.935	. . .	0.30	. . .	. . .	. . .	0.01	. . .	. . .	. . .	. . .	0.345
25	. . .	. . .	. . .	0.035	. . .	. . .	0.01	0.04	. . .	. . .	. . .	. . .
26	. . .	0.095	. . .	0.215	. . .	3.605	. . .	0.225	. . .	. . .	. . .	0.07
27	. . .	0.63	0.735	0.03	. . .	. . .	0.335	. . .	0.05	. . .	0.055	. . .
28	. . .	1.175	. . .	. . .	0.89	. . .	. . .	. . .	0.11	0.04	0.90	0.045
29	0.025	. . .	. . .	. . .	. . .	. . .	0.92	0.87	. . .	0.15	. . .	. . .
30	. . .	. . .	0.065	. . .	. . .	. . .	0.01	. . .	. . .	1.01	. . .	. . .
31	0.415	. . .	. . .	. . .	. . .	. . .	0.185	. . .	. . .	0.31	. . .	. . .
Totals .	4.745	6.085	4.255	3.18	2.95	4.635	3.72	4.855	0.70	2.70	2.005	4.56

Total rainfall during year . . . . . 44.39 inches.

Being an average of two gauges, located at Mystic Lake and Mystic Station.

Monthly Rainfall in Inches for 1884 at various places.

Place.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
	Inches.	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*
Lake Cochituate	4.39	6.04	4.50	3.80	2.92	3.88	4.42	4.49	0.90	2.59	2.33	5.31	45.57
Framingham	5.29	6.47	4.69	4.52	3.28	3.14	3.75	5.14	0.58	2.58	2.55	5.22	47.21
Westboro'	4.88	6.62	4.75	4.29	3.66	3.75	3.58	4.16	1.13	2.38	2.74	5.12	47.06
Chestnut-Hill Reservoir	4.84	6.38	4.23	4.46	2.89	4.73	5.47	4.78	0.42	3.41	3.02	4.92	49.55
Mystic Lake	4.60	6.45	4.22	3.29	2.87	4.52	3.73	4.68	0.73	2.59	2.03	4.43	44.14
Mystic Station	4.89	5.72	4.29	3.07	3.03	4.75	3.71	5.03	0.67	2.81	1.98	4.69	44.64
Mystic Engine-House	4.70	6.24	4.35	3.51	2.83	4.37	3.89	4.79	0.79	2.66	2.49	4.37	44.99
Cambridge Observatory	5.20	6.39	4.89	4.36	3.08	3.83	4.06	4.68	0.66	2.54	2.85	4.88	47.42
Waltham (Boston Manufacturing Co.)	4.44	6.16	4.24	3.52	2.44	3.16	4.84	4.12	0.60	2.96	1.92	4.40	42.80
Lowell (Locks & Canals Co.)	4.944	5.703	5.013	4.110	3.684	3.064	3.198	3.977	0.924	1.945	2.328	5.149	44.039
Lowell (Merrimac Manufacturing Co.)	4.82	5.58	4.68	3.78	4.44	3.60	3.98	4.24	1.32	2.42	2.60	5.32	46.78
Boston (Superintendent of Sewers)	5.71	7.19	6.25	4.88	3.32	4.21	5.33	5.30	0.23	3.34	3.19	4.91	53.86
Boston (U. S. Signal Service)	6.27	5.74	4.86	4.76	3.31	4.01	4.25	5.01	0.31	3.17	3.03	4.46	49.18
Boston Pipe-Yard	5.45	7.11	5.18	4.75	3.07	3.94	5.05	4.64	0.37	3.15	2.90	4.60	50.21
Averages	5.03	6.27	4.73	4.08	3.20	3.93	4.23	4.64	0.69	2.75	2.57	4.84	46.96

Table showing the Temperature of Air and Water at different Stations on the Water-Works.

1884.	TEMPERATURE OF AIR.									TEMPERATURE OF WATER.	
	Mystic Pumping-Station.			Chestnut-Hill Reservoir.			Parker-Hill Reservoir.			Brookline Reser'r.	Mystic Eng. Ho.
	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Mean.	Mean.
January .	46.0	—4.	22.5	47.	—6.	21.7	48.	—3.	23.1	36.	35.1
February .	57.	2.	30.9	56.	5.	31.6	56.	0.	32.1	36.	35.
March . .	58.	0.	32.	55.	—2.	32.	57.	2.	32.8	37.	35.6
April . . .	66.5	25.	41.8	67.	25.	43.	66.	24.	41.6	43.5	41.8
May . . .	85.	33.5	53.7	83.	35.	55.3	84.	33.	55.	55.1	55.7
June . . .	93.	37.	65.2	92.	37.	66.9	94.	34.	66.5	65.9	66.8
July . . .	88.	50.	67.9	90.	51.	69.2	90.	51.	68.7	72.1	72.3
August . .	90.	46.	68.3	93.	51.	70.1	88.	48.	67.9	72.	71.8
September	91.	37.	64.2	92.	37.	65.8	90.	39.	65.7	69.7	69.1
October .	82.	27.5	50.8	80.	28.	51.8	80.	28.	52.4	59.	58.3
November	62.5	19.	38.2	63.	19.	39.2	65.	20.	40.	44.	44.9
December	57.5	—13.	30.5	59.	—9.	31.1	58.	—10.	31.4	37.5	37.5

REPORT OF THE WATER REGISTRAR

OF THE

SUDBURY AND COCHITUATE DEPARTMENT.

OFFICE OF THE WATER REGISTRAR,
CITY HALL, BOSTON, May 1, 1885.

HON. WM. A. SIMMONS, *Chairman of the Boston Water Board:* —

SIR, — In compliance with the requirements of the ordinance, the Water Registrar herewith submits his annual report for the year ending April 30, 1885: —

The total number of water-takers now entered for the present year is 56,361, — being an increase of 2,193 over the previous year.

The total revenue from the sale of water during the financial year 1884–5 is . .	$1,089,124 23
Revenue from the sale of water furnished in previous years	106,821 80
	$1,195,946 03

The total receipts from all other sources are as follows: —

Revenue for off and on water for non-payment,	$1,016 00
" " off and on water for repairs .	2,645 45
" " service-pipes and repairs . .	3,017 24
" " elevator and motor pipes . .	3,983 60
" " old material	6,583 12
" " merchandise	993 53
" " summonses	1,397 75
" " fines and penalties . . .	290 00
" " sundries	101 00
	$20,027 69

The estimated income from the sale of water during the year 1885–6 is . . .	$1,256,871 00
From all other sources	21,500 00
	$1,278,371 00

The expenditures of my department for the year 1884 have been	$39,307 27
The items of this expenditure are as follows: —	
Salaries	$24,473 34
Labor in service division	12,176 42
Printing	1,658 21
Travelling expenses	711 92
Postage, etc.	287 38
	$39,307 27

The total number of meters now applied to the premises of water-takers is 4,439.

Of this number 1,332 are $\frac{5}{8}$-inch in size 2,325 $\frac{3}{4}$-inch, 614 1-inch, 84 2-inch, 24 3-inch, 14 4-inch, and 1 6-inch in size. There are also 235 elevators and 69 motors, with indicators attached to register the quantity of water consumed.

There are 53 drinking-fountains established within the city limits. Those marked * are arranged for continuous flow of water. The balance have automatic fixtures, operating the flow of water when required.

City Proper.

* Boston Common (6).
North square.
Washington street, opposite Blackstone square.
Atlantic avenue, junction Commercial street.
" " head of Rowe's wharf.
Atlantic avenue, near N.Y. & N.E. R.R. freight-house.
Haymarket square.
Causeway street, at Boston and Lowell R.R. depot.
" " junction Merrimac street.
Charles street, opposite the Jail.
" " near Boylston street.
Beacon street, near Charles street.
Tremont street, near Clarendon street.
Albany street, opposite water-works, pipe-yard.
Mt. Washington avenue, near the drawbridge.

East Boston.

Maverick square.
Central square.
Bennington street, junction Chelsea street.

South Boston.

Foundry street, opposite First street.
Fourth street, near Foundry street.
" " junction Emerson street.
" " corner Q street.
Telegraph Hill.
Sixth street, near P street.
Washington Village, junction Dorchester avenue and Dorchester street.

Roxbury.

Albany street, junction Dearborn street.
* Eliot square.
Eustis street, near Washington street.
Heath street, near Tremont street.
Pynchon street, near Roxbury street.
Tremont street, junction Cabot street.
Blue Hill ave., opposite Oakland Garden.

West Roxbury.

Centre street, junction Day and Perkins streets.
Centre and LaGrange streets, West Roxbury village.
Morton street, junction South street.
Roslindale, Taft's hotel.
Washington street, near Williams street.

Dorchester.

Commercial street, opposite Beach street.
Neponset avenue, cor. Walnut street.
Upham's Corner.
Glover's Corner.
Grove Hall.

Brighton.

Barry's Corner.
Market street, Cattle-fair Hotel.
Union square.
Western avenue, Charles-river Hotel.
Washington street, Oak square.

There are 23 stand-pipes now located for street-sprinkling purposes, as follows: —

Tremont street and Hammond park.
Clay street, corner Tremont street.
Eliot square.
Brookline avenue, corner Longwood avenue.
St. James street, corner Warren street.
Blue Hill avenue, between Waverley and Clifford streets.
Warren street, corner Gaston street.
Egleston square, corner Walnut ave.
Upham's Corner.
Field's Corner.
Dorchester avenue, near Savin Hill avenue.
Dorchester avenue, at Old Boston line.
Beach street, Harrison square.
Union square, Brighton.
Washington street, corner Winship street, Brighton.
Chestnut Hill avenue, corner of South street.
Dudley street, opposite Howard avenue.
Paris street, corner of Meridian street.
Corner Munroe, Walnut avenue.
Near Francis, Tremont street.
Centre street, Jamaica Plain.
Emerson street, Junction Third street.
Beacon street, corner Brookline avenue.

Statement showing the number of houses, stores, steam-engines, etc., in the city of Boston, supplied with water to the 1st of January, 1885, with the amount of water-rates received for 1884: —

35,396	Dwelling-houses (54,299 families)	$520,076 23
2,232	Model-houses (8,725 tenements)	52,499 19
17	Boarding-houses	925 00
5	Lodging-houses	114 00
12	Hotels	464 17
283	Buildings	12,873 14
5,740	Stores, shops, and offices	55,554 61
395	Shops and engines	7,272 49
148	Restaurants	1,253 97
1,065	Saloons and bars	15,380 98
6	Club-houses	380 13
112	Laundries	2,156 00
134	Bakeries	2,527 50
	Amount carried forward,	$671,477 41

Amount brought forward,		$671,477 41
2	Markets	371 00
33	Cellars	195 00
2,017	Stables	14,681 60
153	Churches	2,524 94
72	Greenhouses	1,038 25
21	Photographers	513 17
34	Public halls and theatres	580 67
29	Private schools	580 00
27	Asylums and hospitals	1,480 00
5	Armories	107 00
17	Bottling-houses	317 50
1	Laboratory	50 00
28	Railroad stations	374 42
8	Freight-houses	133 50
1	Stationary engine	116 00
35	Pile-driving and discharging engines	426 00
3	Pumping-engines	45 00
1	Dry-dock and engine	12 00
2	Ship-yards	60 00
4	Boat-houses	43 33
2	Ice Cos. (washing ice)	25 00
2,279	Hand-hose	11,395 00
11	Fountains	186 25
15	Tumbler-washers	230 00
4	Binderies	80 33
59	Beer water-pressures	295 00
6	Aquariums	50 00
7	Motors	35 00
1	Library	17 50
4	Smoke-houses	95 00
2	Lobster-boilers	16 00
	Steam and tug boats	6,436 87
	Steamer "Flanders"	170 00
	" "Protector"	150 00
	" "Samuel Little"	100 00
	" "J. P. Bradlee"	200 00
	Engine, Hose, and Hook and Ladder Cos.	1,090 00
	Fire hydrants, 4,180	83,600 00
	Reservoirs, 129	2,580 00
	Fire Department, Repair-shop	35 00
	Lamp Department	20 00
	School Department	1,205 00
	Sewer Department	256 00
Amount carried forward,		$803,394 74

Amount brought forward,	$803,394 74
Health Department	917 50
Paving Department	99 75
Police Department	110 00
Surveyor's Department	12 50
Committee on Common and Squares	390 00
Committee on Bridges	80 00
Committee on Public Buildings	136 00
Committee on Armories	35 00
Board of Health	792 25
Directors of Public Institutions	201 00
Public and Branch Libraries	236 00
City Hospital (shop and stable)	25 00
Quincy Market (public urinals and closets)	67 50
Building purposes	3,890 48
Street sprinkling	1,287 22
Jamaica Pond Aqueduct Co.	1,344 00
Filling Gas-holder	75 00
Metered water (9 months)	282,671 95
Miscellaneous	35 78
	$1,095,801 67

The following table exhibits the classes of premises to which meters are attached, the amount of water consumed, and the revenue received for the years 1883 and 1884.

CLASS OF PREMISES.	1883.		1884.	
	Quantity used. Cubic feet.	Revenue received.	Quantity used. Cubic feet.	Revenue received.
Hotels	27,593,573	$41,390 36	19,446,104	$29,169 13
Apartment Hotels	6,567,065	9,850 60	17,058,166	25,587 20
Business premises	52,614,059	78,921 08	51,641,069	77,461 53
Steam Railroads	26,489,786	39,734 68	26,592,829	39,889 22
Sugar Refineries	23,386,000	35,079 00	29,522,760	44,284 14
Factories and Machinists	19,760,772	29,641 15	22,087,052	33,130 51
Iron Works and Foundries	8,380,042	12,570 06	5,489,472	8,234 19
Mills and Engines	7,900,982	11,851 47	4,562,819	6,844 19
Marble and Stone Works	2,561,763	3,842 64	2,493,423	3,740 13
Gas Companies	8,328,522	12,492 78	7,252,200	10,878 30
Breweries	8,969,227	13,453 84	9,061,887	13,592 82
Oil Works	1,844,000	2,766 00	1,532,898	2,299 47
Chemical Works	3,386,531	5,079 80	2,128,750	3,193 12
Laundries	318,667	478 00	424,000	636 00
Restaurants	3,914,041	5,871 06	3,401,990	5,102 98
Stables	9,820,665	14,731 00	9,767,765	14,651 61
Theatres and Halls	706,000	1,059 00	1,390,000	2,085 00
Hospitals	2,065,928	3,098 89	1,643,000	2,464 50
Schools	1,891,075	2,836 61	1,656,006	2,484 01
City, State, and Government Buildings	10,401,903	15,602 85	8,001,702	12,002 55
Steamers and Shipping	4,963,444	7,565 44	7,537,190	11,428 30
Elevators and Motors	13,859,038	20,788 56	13,929,396	20,894 08
Electric Light Companies	.....	.....	2,662,000	3,993 00
Miscellaneous	1,776,174	2,370 34	3,068,187	4,438 77
Totals	247,499,257	$371,075 21	252,350,665	$378,484 75

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

Received by Water Commissioners, as per Auditor's report, in 1848						$972 81
From January 1,	1849,	to January 1,	1850			71,657 79
" "	1850,	"	1851			99,025 45
" "	1851,	"	1852			161,052 85
" "	1852,	"	1853			179,567 39
" "	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 96
" "	1862,	"	1863			373,922 33
" "	1863,	"	1864			394,506 25
" "	1864,	"	1865			430,710 76
" "	1865,	"	1866			450,341 48
" "	1866,	"	1867			486,538 25
" "	1867,	"	1868			522,130 93
" "	1868,	"	1869			553,744 88
" "	1869,	"	1870			597,328 55
" "	1870,	"	1871			708,783 68
" "	1871,	"	1872			774,445 70
" "	1872,	"	1873			862,704 08
" "	1873,	"	1874			917,415 92
" "	1874,	"	1875			977,020 48
" "	1875,	"	1876			1,005,120 94
" "	1876,	"	1877			1,029,643 70
" "	1877,	"	1878			1,015,562 89
" "	1878,	"	1879			1,010,584 30
" "	1879,	"	1880			1,025,803 14
" "	1880,	"	1881			1,039,896 17
" "	1881,	"	1882			1,087,528 49
" "	1882,	"	1883			1,127,982 32
" "	1883,	"	1884			1,167,704 17
" "	1884,	"	1885			1,203,192 55
" "	1885,	to May 1,	1885			870,967 96

The following table exhibits the yearly increase of water-takers since January 1, 1850: —

					Takers.	Increase.
From January 1,	1850,	to January 1,	1851,		13,463	
"	"	1851,	"	1852,	16,076	2,613
"	"	1852,	"	1853,	16,862	786
"	"	1853,	"	1854,	18,110	1,308
"	"	1854,	"	1855,	19,193	1,023
"	"	1855,	"	1856,	19,998	805
"	"	1856,	"	1857,	20,806	808
"	"	1857,	"	1858,	21,602	796
"	"	1858,	"	1859,	22,414	812
"	"	1859,	"	1860,	23,271	857
"	"	1860,	"	1861,	24,316	1,045
"	"	1861,	"	1862,	25,486	1,170
"	"	1862,	"	1863,	26,289	803
"	"	1863,	"	1864,	26,851	562
"	"	1864,	"	1865,	27,046	195
"	"	1865,	"	1866,	27,489	443
"	"	1866,	"	1867,	27,754	265
"	"	1867,	"	1868,	28,104	350
"	"	1868,	"	1869,	29,738	1,634
"	"	1869,	"	1870,	31,500	1,762
"	"	1870,	"	1871,	36,132	4,632
"	"	1871,	"	1872,	38,716	2,584
"	"	1872,	"	1873,	40,688	1,972
"	"	1873,	"	1874,	42,345	1,657
"	"	1874,	"	1875,	44,676	2,331
"	"	1875,	"	1876,	46,885	2,209
"	"	1876,	"	1877,	48,328	1,443
"	"	1877,	"	1878,	49,970	1,642
"	"	1878,	"	1879,	51,523	1,553
"	"	1879,	"	1880,	52,268	745
"	"	1880,	"	1881,	53,254	986
"	"	1881,	"	1882,	53,655	401
"	"	1882,	"	1883,	52,817	
"	"	1883,	"	1884,	54,168	1,351
"	"	1884,	"	1885,	56,361	2,193

The Service Department, under the direction of the Water Registrar, is in charge of Mr. C. F. Doherty, to whom all applications are made for service-pipes, shutting off and letting on water, repairs in service-pipes, and remedying stoppages in the water supply.

Mr. Doherty fully meets the requirements of the department and the demands of the public, and has therefore proved himself a capable and faithful officer.

The total number of applications received during the year is as follows: —

For service-pipes	1,343
" repairs on pipes	1,987
" off and on water for repairs	3,679
" " " " non-payment	1,248
" turning on water for first time	1,338
" off and on for waste	193

Table showing the Number and Kind of Water-Fixtures contained within the Premises of Water-takers to May 1, 1885.

	Taps.	Sinks.	Bowls.	Bath-Tubs.	Water-Closets.				Wash-Tubs.	Automatic Urinals.	Plain Urinals.
					Pan.	Automatic.	Plain Hopper.	Waste.			
City Proper	6,728	48,330	38,944	12,599	20,641	15,978	921	478	15,531	3,283	1,123
East Boston	636	8,561	1,201	561	760	2,274	86	40	413	36	23
South Boston	1,169	15,903	2,666	1,285	1,580	4,335	174	219	1,370	92	103
Dorchester	1,693	5,512	3,075	1,802	2,049	1,316	72	76	2,421	23	16
Boston Highlands	2,097	12,437	6,255	3,466	4,300	4,012	43	108	4,370	73	41
West Roxbury	726	3,074	1,446	918	1,092	869	23	43	1,177	24	19
Brighton	450	1,403	628	333	471	232	.....	45	419	10	14
Total	13,499	95,220	54,215	20,964	30,893	29,016	1,319	1,009	25,701	3,541	1,339

Respectfully submitted,

WM. F. DAVIS, *Water Registrar.*

REPORT OF THE WATER REGISTRAR OF THE MYSTIC DEPARTMENT.

Office of the Mystic Water Registrar, City Hall Building,
Charlestown District, Boston, May 1, 1885.

Hon. Wm. A. Simmons, *Chairman Boston Water Board:*—

Sir, — The annual report of this department for the year ending April 30, 1885, is herewith submitted: —

The total number of water-takers now entered for the year 1885, is 18,269, distributed as follows: Charlestown District, 6,302; Somerville, 5,624; Chelsea, 5,161; Everett, 1,182.

The total revenue received from all sources during the financial year of 1884–5 is $271,454.42, in detail as folows: —

Charlestown District Water-rates	$114,792 80	
Somerville Water-rates	77,012 85	
Chelsea "	64,652 88	
Everett "	11,212 06	
		$267,670 59
Labor and material furnished for additional work on service-pipes, etc.	$2,449 58	
Sale of old material	467 16	
Off and on water for repairs	294 00	
Fees, summons	208 50	
Fines, non-payment	208 00	
Maintaining meters	106 59	
Fines, wasting water	34 00	
Sale of potatoes	16 00	
		3,783 83
Total		$271,454 42

There has been paid the cities of Somerville, Chelsea, and town of Everett, as per contract, $37,622.32, as follows: —

Somerville	$19,594 81	
Chelsea	16,327 92	
Everett	1,699 59	
		$37,622 32

The expenses of the office during the year ending April 30, 1885, including all charges for collection in Chelsea, Somerville, and Everett, were $7,888.70.

Table showing the Number of Places turned off for Non-payment of Rates during the Year 1884, the Number turned on again, and the Number still remaining off.

	Number turned off.	Number turned on.	Number remaining off.
Charlestown District	41	36	5
Chelsea	66	56	10
Somerville	44	41	3
Everett	16	13	3
Totals	167	146	21

STAND-PIPES FOR STREET-WATERING.

The whole number in use in this department is 36, distributed as follows: —

Charlestown District.

Cambridge street, near Stickney & Poor's factory.
" " Railroad.
Rutherford avenue, " City stables.
" " Allen street.
South Eden street, " Main street.
Prescott, " Harvard school building.
Monument square, " Laurel street.

Chelsea.

Cary square, corner Forsyth street.
Broadway, near Stockton street.
" " Cary avenue.

Somerville.

Washington street,	corner	Boston street.
" "	"	Myrtle street.
" "	near	Union square.
Summer street,	"	Elm street.
" "	"	Laurel street.
Somerville avenue,	"	Poplar street.
" "	"	Cambridge line.
" "	"	Merriam street.
" "	"	Mossland street.
Broadway,	"	Franklin street.
"	opposite	Public park.
"	near	Clarendon avenue.
Somerville avenue,	"	439 Somerville avenue.
Spring street,	near	Somerville avenue,
Beacon street,	"	Cooney street.
Pinckney street,	"	Pearl street.
Pearl street,	"	Cross street.
Highland avenue,	corner	Medford street.
Main street,	junction	Broadway.
Medford street,	near	Sycamore street.

Everett.

Broadway,	near	Engine-house.
"	"	Pleasant street.
"	"	Chandler's.
Main street,	"	Chelsea street.
Chelsea "	"	Winter street.
Ferry "	"	Nichols street.

DRINKING–FOUNTAINS.

The whole number in use in this department is 19, distributed as follows: —

Charlestown District.

Bunker Hill street,	corner	Tufts street.	Automatic.
Canal street,	"	South Eden street.	"
Main street,	"	Hancock square.	"
"	near	Tufts wharf.	"
Austin street,	opposite	Front street.	"

Chelsea.

Broadway square.	
" near bridge.	Automatic.
Winnisimmet street, near Ferry.	
Pearl street, corner Marginal street.	
Eastern avenue, corner Crescent avenue.	

Somerville.

Union square.	Automatic.
Broadway, corner Walnut street.	
Highland avenue, corner Walnut street.	
Medford street, " Central street.	
Davis square.	
" "	Automatic.
Broadway, opposite public park.	
Somerville avenue, junction Washington street.	

Everett.

Main street, junction Broadway.	Automatic.

The following Table exhibits the Classes of Premises to which Meters are applied, the amount of Water consumed, and the Revenue received for the Year 1884.

CLASS OF PREMISES.	Quantity used. Cubic feet.	Revenue received.
Steam Railroads	15,704,172	$23,556 19
Horse Railroads	936,199	1,404 29
Hoosac Tunnel Dock and Elevator Co.	1,415,420	2,123 13
City and government buildings	3,038,112	4,557 07
Schools	860,528	1,290 69
Stables	1,928,298	2,892 21
Factories	4,749,162	7,123 50
Chemical works	774,160	1,161 23
Foundries	815,244	1,222 83
Breweries	869,004	1,303 49
Gas companies	161,769	242 63
Oil-works	337,148	505 71
Mills and engines	870,305	1,305 44
Hotels	465,994	698 98
Model houses	714,007	1,070 93
McLean Insane Asylum	1,628,621	2,442 90
Slaughter-houses	1,367,951	2,051 91
Business purposes	567,174	850 74
Wharves	778,669	1,167 94
Laundries	484,169	726 21
Elevators and motors	236,930	355 37
Bakeries	275,080	412 59
Restaurants	232,506	348 71
Miscellaneous	2,134,192	3,201 21
Tanneries	1,074,366	1,611 49
Total	42,419,180	$63,627 39

The quantity used through meters in the different districts was as follows: —

	Cubic feet.	Revenue.
Charlestown	28,345,934	$42,518 15
Somerville	7,180,866	10,770 99
Chelsea	5,962,421	8,943 33
Everett	929,959	1,394 92
Total	42,419,180	$63,627 39

The following Table exhibits the Class of Premises supplied with Mystic-pond Water, together with the Amount of Revenue received.

CLASS OF PREMISES.	DISTRICTS SUPPLIED.							
	From January 1, 1884, to January 1, 1885.				*From July 1, 1883, to July 1, 1884.*			
	CHARLESTOWN.		SOMERVILLE.		CHELSEA.		EVERETT.	
	Number Supplied.	Revenue Received.	Number Supplied.	Revenue Received.	Number Supplied.	Revenue Received.	Number Supplied.	Revenue Received.
Dwelling-houses	4,169	$51,527 94	4,127	$50,752 54	3,692	$44,025 50	706	$6,669 71
Families in same	6,208		5,778		4,920		870	
Model houses	573	8,562 67	47	598 00	138	2,004 00	6	101 34
Tenements in same	1,753		162		460		22	
Stores and shops	333	2,440 66	121	867 34	209	1,653 64	10	77 67
Stables	243	1,417 23	594	2,631 13	283	1,347 72	146	606 25
Saloons	86	922 70	1	5 00	28	328 76	. . . . .	. . . . .
Offices	22	151 67	4	35 00	24	182 50	2	20 00
Manufactories	17	149 75	8	102 16	21	180 33	3	17 50
Churches	9	155 00	15	182 33	11	172 50	1	3 75
Laundries	11	185 00	2	35 00	7	116 67	. . . . .	. . . . .
Bakeries	13	122 50	5	70 33	12	137 00	1	17 67
Clubs	12	117 83	2	18 00	13	99 87	. . . . .	. . . . .
Halls	5	94 00	5	41 67	5	80 83	2	22 50
Hoisting-engines	3	33 00	. . . . .	. . . . .	2	24 00	. . . . .	. . . . .
Banks	4	55 50	. . . . .	. . . . .	2	25 00	. . . . .	. . . . .
Hand-hose	104	543 50	493	2,466 00	247	1,215 00	104	520 00
Printing-offices	4	42 50	. . . . .	. . . . .	2	30 00	. . . . .	. . . . .
Photographers	1	22 50	1	17 50	2	32 50	. . . . .	. . . . .
Masons' cellars	6	32 09	2	7 00	2	8 50	. . . . .	. . . . .
Greenhouses, gardens, and fountains	5	50 00	12	141 00	11	100 00	5	62 50
Miscellaneous	25	245 00	11	132 42	18	251 25	4	85 00
Building purposes	. . . . .	133 71	. . . . .	372 27	. . . . .	106 61	. . . . .	43 10
Street-watering	. . . . .	201 04	. . . . .	2,190 82	. . . . .	45 30	. . . . .	112 72
Metered water for the year	. . . . .	42,518 15	. . . . .	10,770 99	. . . . .	8,943 33	. . . . .	1,394 92
Public schools, not metered	. . . . .	210 00	. . . . .	96 00	. . . . .	111 72	. . . . .	62 38
Rock-crusher	. . . . .	. . . . .	. . . . .	22 50	. . . . .	. . . . .	. . . . .	. . . . .

Board of Public Institutions	Metered					56 50		10 00
Steamer, hose, and ladder houses		110 00		110 00		85 00		16 00
Fire hydrants		4,460 00		1,428 00		1,736 00		235 53
Committee on Commons		15 00				40 00		
Health Department, sprinkling streets		50 00						
Sewer Department		50 00		27 00				
Street Department		220 42						
Paving Department		12 50						
Police Department, including court-room		53 50				31 00		
City Hall building, including Public Library		37 50				62 50		
Committee of Armories		87 50				17 50		
Committee on Bridges		18 00						
Commissioners West Boston Bridge		11 00						
Water-Works Department						12 50		
Public Schools, 1883		722 07						
Total		$115,781 43		$73,120 00		$63,263 53		$10,078 54

Referring to the above table, it will be observed that the water-rates are assessed in Charlestown and Somerville from January to January, and in Chelsea and Everett from July to July.

Table showing the Number and Kind of Water-Fixtures contained within the Premises of Water-takers.

	Taps.	Sinks.	Wash-hand Basins.	Bath-Tubs	Water-Closets.					Shower Baths.	Urinals.	Wash-Tubs.	Private Hydrants.	Fire Hydrants.
					Pan.	Selfacting.	Hoppers,	Waste.	Slop Hoppers.					
Charlestown District	1,506	10,393	1,972	1,000	1,440	3,278	38	25	21	....	119	969	24	227
Chelsea	1,031	7,278	1,808	1,109	1,578	2,054	12	15	8	29	87	869	2	154
Somerville	1,548	7,511	2,066	1,510	1,800	2,337	15	38	23	....	58	1,171	13	302
Everett	317	1,143	236	216	169	97	....	2	....	1	5	111	1	71
Totals	4,402	26,325	6,082	3,835	4,987	7,766	65	80	52	30	269	3,120	40	754

Statement showing the amount of water-rates received since the introduction of Mystic-pond water, November 29, 1865; also the amount paid by the several districts supplied under existing contracts: —

	Amount received.	Paid under contract.	Net amount.	Total amount received.	Total amount paid under contract.	Net amount to Mystic Water Works.
Charlestown, 1865	$27,045 10		$27,055 10			
" 1866	47,247 16		47,247 16			
" 1867	60,188 83		60,188 83			
" 1868	68,815 32		68,815 32			
" 1869	74,369 81		74,369 81			
" 1870	82,230 79		82,230 79			
" 1871	87,259 70		87,259 70			
" 1872	97,727 36		97,727 36			
" 1873	99,455 66		99,455 66			
" 1874	111,420 30		111,420 30			
" 1875	118,568 00		118,568 00			
" 1876	116,271 17		116,271 17			
" 1877	109,963 25		109,963 25			
" 1878	104,174 76		104,174 76			
" 1879	98,313 88		98,313 88			
" 1880	102,590 50		102,590 50			
" 1881	106,927 90		106,927 90			
" 1882	109,921 18		109,921 18			
" 1883	115,462 25		115,462 25			
" 1884	115,781 43		115,781 43			
" May 1, 1885	77,205 93		77,205 93			
				$1,930,940 28		$1,930,940 28
East Boston, 1870	$54,885 28	$15,015 06	$39,870 22			
" 1871	63,371 71	18,348 73	45,022 98			
" 1872	70,957 40	21,383 02	49,574 38			
" 1873	77,480 79	23,992 38	53,488 41			
" 1874	77,776 91	24,122 83	53,654 08			
" 1875	70,256 26	21,102 53	49,153 73			
" 1876	72,046 78	21,818 74	50,228 04			
" 1877	66,637 43	19,655 03	46,982 40			
" 1878	65,088 96	16,535 63	48,553 33			
" 1879	56,165 94	32,139 10	24,026 84			
" 1880	50,973 39	10,889 36	40,084 03			
				725,640 85	225,002 41	500,638 44
Amounts carried forward	. . . . .	. . . . .	. . . . .	$2,656,581 13	$225,002 41	$2,431,578 72

	Amount received.	Paid under contract.	Net amount.	Total amount received.	Total amount paid under contract.	Net amount to Mystic Water-Works.
Amounts brought forward	. . . . .	. . . . .	. . . . .	$2,656,581 13	$225,002 41	$2,431,578 72
Chelsea, 1868 (6 mos.)	$3,632 80	$544 92	$3,087 88			
" 1868–69	19,548 14	2,932 22	16,615 92			
" 1869–70	26,474 26	4,294 85	22,179 41			
" 1870–71	31,161 56	5,290 39	25,871 17			
" 1871–72	38,714 16	7,178 54	31,535 62			
" 1872–73	42,239 50	8,171 85	34,067 65			
" 1873–74	45,169 46	9,050 85	36,118 61			
" 1874–75	50,644 51	10,757 90	39,886 61			
" 1875–76	50,934 20	10,873 66	40,060 54			
" 1876–77	49,893 35	10,468 02	39,425 33			
" 1877–78	49,496 59	10,348 99	39,147 60			
" 1878–79	50,368 45	10,647 79	39,720 66			
" 1879–80	51,785 24	11,214 09	40,571 15			
" 1880–81	54,990 65	12,496 26	42,494 39			
" 1881–82	57,535 56	13,514 23	44,021 33			
" 1882–83	61,510 34	15,104 14	46,406 20			
" 1883–84	63,263 53	15,805 42	47,458 11			
" May 1, 1885	61,956 09	15,282 44	46,673 65			
				809,318 39	173,976 56	635,341 83
Somerville, 1869 (6 mos.)	$6,572 62	$985 89	$5,586 73			
" 1870	13,189 89	1,978 49	11,211 40			
" 1871	20,029 68	3,005 94	17,023 74			
" 1872	25,275 13	4,055 02	21,220 11			
" 1873	30,930 81	5,232 70	25,698 11			
" 1874	37,325 96	6,831 48	30,494 48			
" 1875	47,912 43	9,873 73	38,038 70			
" 1876	49,743 55	10,423 08	39,320 47			
" 1877	49,873 19	10,461 97	39,411 22			
" 1878	53,581 31	11,932 52	41,648 79			
" 1879	54,329 13	12,231 65	42,097 48			
" 1880	56,988 65	13,295 45	43,693 20			
" 1881	65,394 32	16,657 73	48,736 59			
" 1882	69,656 63	18,362 65	51,293 98			
" 1883	73,872 23	20,048 89	53,823 34			
" 1884	73,120 00	19,748 00	53,372 00			
" May 1, 1885	64,411 00	16,264 40	48,146 60			
				792,206 53	181,389 59	610,816 94
Amounts carried forward	. . . . .	. . . . .	. . . . .	$4,258,106 05	$580,368 56	$3,677,737 49

	Amount received.	Paid under contract.	Net amount.	Total amount received.	Total amount paid under contract.	Net amount to Mystic Water-Works.
Amounts brought forward	. . . . .	. . . . .		$4,258,106 05	$580,368 56	$3,677,737 49
Everett, 1872-73	$3,603 34	$540 51	$3,062 83			
" 1873-74	4,365 84	654 88	3,710 96			
" 1874-75	4,677 58	701 63	3,975 95			
" 1875-76	5,861 80	879 28	4,982 52			
" 1876-77	6,548 38	982 26	5,566 12			
" 1877-78	7,401 99	1,110 29	6,291 70			
" 1878-79	7,429 06	1,114 36	6,314 70			
" 1879-80	7,642 05	1,146 33	6,495 72			
" 1880-81	8,329 87	1,249 47	7,080 40			
" 1881-82	8,868 48	1,330 29	7,538 19			
" 1882-83	9,946 46	1,491 98	8,454 48			
" 1883-84	10,078 54	1,511 79	8,566 75			
" May 1, 1885	10,812 32	1,621 85	9,190 47	95,565 71	14,334 92	81,230 79
Total to May 1, '85	. . . . .	. . . . .	. . . . .	$4,353,671 76	$594,703 48	$3,758,968 28

Respectfully,

JOSEPH H. CALDWELL,

Mystic Water Registrar.

REPORT OF THE SUPERINTENDENT OF THE WESTERN DIVISION.

CHESTNUT-HILL RESERVOIR, May 1, 1885.

HON. W. A. SIMMONS, *Chairman Boston Water Board:* —

SIR, — In compliance with a rule of the Board I submit herewith my annual report for the year May 1, 1884, to May 1, 1885.

SUDBURY-RIVER BASINS.

All of the basins at the present time are full, and water is wasting over the dams. The quality of the water has, as a rule, been better during the past year than usual. Although *algæ* have appeared in Basin 3, less trouble has been experienced from their presence than ever before. Very little water has been drawn for the use of the city from Basin 1.

Until early in 1885 Basin 2 supplied the bulk of the water used from the Sudbury system. No *algæ* have appeared at this point. Considerable additional work in the way of riprapping around the margin of Basin 2 has been accomplished. These are the principal facts in regard to the Sudbury supply. A more detailed account will be found under each basin.

BASIN 1.

On May 1, 1884, water in this basin stood at elevation 158.00 above tide marsh, with water wasting over the crest of the dam. On June 2, a double set of flash-boards was put on the overflow. On July 19, waste ceased, but on August 1 waste was resumed.

With the exception of a few days, water was running over the flash-boards until September 2. On December 18, the flash-boards were removed, at which time the water stood at elevation 157.00. On December 22 water was wasting over the stone crest, and so continued until April 25, 1885, when both sets of flash-boards were put on the dam, owing to the dryness of the season.

The highest point reached by the water during the year was 159.60, on April 30. The lowest elevation was 156.04,

on June 6. Not less than 1,500,000 gallons daily have been allowed to pass into the river from this basin during the whole year, in accordance with the law. *Algæ* were noticed from June 4, until December 27.

The usual amount of care has been given to the maintenance of the works in connection with the dam. There is one point which will require considerable work at the earliest moment. The 48-in. main laid in the bottom of the basin has shown signs of leaking in many places. Once it has given away entirely, and it is probable that there are many bad joints, which will require re-leading when the water can be drawn off without risk to the city's supply.

Basin 2.

On May 1, 1884, this basin stood at grade 166.18, and water was wasting over the dam. On June 4 a double set of stop-planks was put in place. On June 8 water was flowing over the stop-planks and continued to waste, with the exception of a few days, until July 8, when it ceased, and the surface gradually fell until October 14, at which time it was at elevation 150.90. Water was drawn from this source for the supply of the city from June 18 to June 24, from June 26 to February 11, 1885. On account of some work which was in progress in the bottom of Basin 2 the water was kept at about 149 until late in the autumn. During the greater part of this time the water was confined to the old channel of the river. During the early part of the winter, on account of numerous rains, the surface rose rapidly, and water was wasting over the stone crest on December 23. This flow continued until April 25, when flash-boards were placed on the dam, and the surface of the basin carried up to ordinary high-water mark. The highest point reached during the year was 167.47, on April 30; the lowest, 148.75, on November 17. During the first part of May, 1884, the color of the water was very clear, the taste good, and very little matter in suspension. In October and November the water was not of so good a quality. It had more color and taste. Early in February, owing to the dark color, the supply was taken from other sources. No *algæ* have appeared in Basin 2 during the year. The road to the dam was gravelled, and the banks sodded last summer. During the winter a substantial stone wall was built on the border of the city property on Union street. For three months a small force was employed completing odd jobs about the margin of the basin in connection with the work on shallow flowage ordered by the Board. The work consisted generally in trimming the

borders of the original slopes, filling up considerable areas to high-water line, distributing loam, sowing grass-seed, etc. At one time 40 men, 9 double and 4 single teams, were employed on this work. All of the riprap left uncompleted between Fountain-street bridge and the wooden dam was completed to grade. Around Nevin's point, and facing Dam 2, where the basin is exposed to a long reach of wind and waves, about 2,200 square yards of riprap were placed. The gate-house, dam and other structures connected with this basin are in excellent order, and require no immediate repairs.

BASIN 3.

On May 1, 1884, the water in this basin stood at grade 175.58, and water was flowing over the crest of the dam. On July 16 waste ceased, and the basin was kept at about 175.00 until September, when the surface gradually lowered to 174.44, on October 14. On this date a portion of the supply for the city was taken from this source, Basin 2 having been exhausted. By the last of October something like 2 feet of water had been drawn off. On November 8 the gates were opened again for the supply of the city, and on November 29 the surface had fallen to 171.62. When the gates were shut the surface rose rapidly, and on December 19 water commenced to flow over the dam and has continued to do so ever since, with the exception of about a week's time. The highest point reached by the water was 175.89, on December 23, and the lowest, 171.36, on November 23. The quality of the water in Basin 3 has been somewhat better than usual. On June 4 *algæ* made their appearance and remained until the last of December. During the hottest weather, when the *algæ* was thickest, the surface had a peculiar taste, and in its later stages, when the *algæ* had lost its green tint, and was almost white, they seemed to give the water a musty taste. Very little work has been done during the year on Basin 3. The gate-house and dam are in excellent order.

FARM POND.

On account of the building of the Farm-pond aqueduct the surface of the water has been kept at a low level during a good part of the year. On May 1, the water was at elevation 149.27, but was soon lowered, and kept at about 148.75 until June 27, when, in order to store some of the water wasting in the river, it was raised to high-water mark, and kept there until July 13. The pond was then lowered

to 146.50 until the middle of December. It was then raised a little and kept at about 147.00 until March 28, when it was gradually lowered to about 145.00 where it has been kept to date. The highest point reached during the year was 149.39, on July 5; the lowest, 144.98, on August 3. *Algæ* appeared in the waters of Farm pond on June 3, but disappeared in a few days after the water from Basin 1 was shut off.

On Aug. 8 *algæ* reappeared, and remained until the last of November.

The quality of water in Farm pond has not been very good during most of the year, owing to the construction of the embankment for the new aqueduct which has made the water somewhat roily.

Lake Cochituate.

The quality of the water in Lake Cochituate has been excellent throughout the year. Persistent efforts have been maintained by your Board to abolish the evil from which the city has suffered for so many years, in the shape of sewage discharged into the brooks feeding the lake. At last these efforts have been crowned with success. In February a decision favorable to the city was rendered by the Supreme Judicial Court.

My first report on the matter of sewage pollution, as affecting the waters of the lake, was made in 1879. Since that date several cases have been tried before different courts, but the city has always been beaten. We are now in a position to maintain the purity of Pegan and other brooks entering the lake, and, under directions from your Board, I am at present engaged in the work of causing all the drainage, of whatever description, whether from water-closets or sinks, to be removed. Notices to polluters have also been served on the Sudbury-river system.

The following is the decision of the Supreme Court: —

Decision of the Supreme Judicial Court in the Case of Augustus P. Martin, Mayor of Boston,

vs.

Luther Ellis Gleason.

PRELIMINARY STATEMENT.

(from city of boston's brief.)

In 1846 the Legislature, by an act entitled "An act for supplying the City of Boston with pure water," authorized the City of Boston "to take, hold, and convey to, into and through said city the water of Long pond, so called (now Lake Cochituate), in the towns of Natick, Wayland, and Framingham, and the waters which may flow into and from the same, and any other ponds and streams within the distance of four miles from said Long pond, and any water-rights connected therewith." Acts of 1846, Ch. 167, § 1.

Pursuant to this authority, and in part execution thereof, the city, in August, 1846, took certain water and water-rights, described as, "all the waters of Long pond, so called, and other brooks and streams, whether permanent or temporary, entering into the same, and of all the bays, coves, and inlets thereof, and of the outlet of the same, and all the water-rights thereunto belonging, or in any wise appertaining."

August 19, 1846, the city filed in the office of the registry of deeds for the county of Middlesex, the foregoing description of the taking, and a statement of the purpose for which taken, as required by said act of the Legislature (see copy, page 4 of the report); and, as soon as the necessary works could be constructed, proceeded actually to use, and has ever since used, said waters for the supply of its inhabitants. Pegan brook is, and has always been, one of the streams entering into Long pond. (Report, page 1.)

The defendant is the proprietor of a hotel in Natick, and all the human excrement discharged from the water-closets, and all the sewage of his hotel are discharged directly into said brook in sufficient quantity to contaminate its waters. (Report, page 1.)

The City of Boston, by petition of its Mayor (St. 1884, c. 154), prays for an injunction to restrain the defendant from polluting this water-supply.

DECISION OF THE SUPREME JUDICIAL COURT.

Martin *vs.* Gleason.

C. Allen, *J.* Disregarding punctuation, as may properly be done in construing a statute (Cushing *vs.* Worrick, 9 Gray, 385), and looking at the purpose and contemplated scope of Stat. 1846, c. 167, the City of Boston was authorized by Section 1 of that statute to take the water of Long pond, and the waters which may flow into and from the same, and any other ponds and streams within the distance of four miles from said Long pond, and any water-rights connected therewith, so far as may be necessary for the preservation and purity of the same, for the purpose of furnishing a supply of pure water for the said City of Boston. This declared purpose relates back, and illustrates the extent of the authority conferred. Water-rights may be taken so far as may be necessary for the preservation and purity of the water. The words "and any water-rights connected therewith" are not limited to the immediate antecedent, namely, the "other ponds and streams" there referred to, but they also include Long pond itself, and the waters which may flow into and from the same. It was designed to give a broad and comprehensive authority, for the purpose of furnishing a supply of pure water for the city, and to confer the power to take everything included within the meaning of the antecedent words, so far as might be necessary for the preservation and purity of the water. Section 15, imposing a penalty for wantonly or maliciously diverting the water, or any part thereof, of any of the ponds, streams or water-sources which shall be taken by the city, or corrupting the same, or rendering it impure, confirms this view. Under this authority, the city might lawfully take any water-rights connected with the waters flowing into Long pond, including the prescriptive rights which the plaintiff contends that he then had to discharge sewage into Pegan brook. It appears that this brook is and always has been a feeder of Long pond; and that the whole of it is within four miles of the pond. A prescriptive right to foul the waters of a stream is included under the term "water-rights." This, indeed, is asserted by the defendant in his answer. It is a right in respect to the water of the stream; and the statute conferred power to take all water-rights which might interfere with the purity of the waters taken. It is contended for the defendant that, if it was necessary to preserve the brook or the purity of the water, power was granted to the city to take the land on each

side of the brook, and thus cut off any use either of it or of its waters; and, indeed, that the water-rights could not be taken separately from the land. But it does not appear to us to be necessary, even if it was competent, for the city to take the land on the sides of the brook in order to extinguish any prescriptive right to foul the water of it.

Assuming that the defendant had such prescriptive right, it is further contended that the city did not take it; but that the taking of the waters of the brooks and streams entering into Long pond only appropriated the water as it flowed into the pond at the time of the taking, and subject to all legal burdens and uses then existing. This, however, is too narrow a construction of the description of what was taken. The city, after reciting the whole of the first section of the statutes, took all the waters of Long pond, "and other brooks and streams, whether permanent or temporary, entering into the same," "and all the water-rights thereunto belonging or in any wise appertaining, for the sole use and benefit of said city." This language does not exactly follow the language of the statute; but we cannot doubt that it is broad enough to include Pegan brook, and the taking of "all the water-rights thereunto belonging or in any wise appertaining," includes any right then existing to foul its waters. It is urged, by way of illustration, that, if a mill existed on the brook, the right to use the mill was not taken. But it is not necessary to consider that question here. It does not appear that there was any mill on the brook. If there was, the use of the water for turning its wheels might not foul the water, and might therefore be consistent with the purposes and rights of the city. But the right to use the brook as a discharge for sewage in large quantities, as practised by the defendant, is inconsistent with such purpose. If, therefore, the defendant had any such prescriptive right to foul the water of Pegan brook, as he claimed, such right was taken and extinguished by the act of the city under the Statute of 1846; and by Section 6 of that act the city was liable to pay all damages sustained thereby. The defendant, if he sustained damage, might have applied by petition for the assessment thereof at any time within three years from such taking. This remedy was the exclusive one.

It was not seriously contended in the argument that the defendant has acquired a prescriptive right to foul the waters since the taking by the city in 1846. Such prescriptive right could not be acquired, because the fouling of the water, since the right to foul it ceased, would be a public nuisance. Morton *vs.* Moore, 15 Gray, 576. Brookline *vs.* Mackintosh, 133 Mass., 125, 226.

Finally, it was contended for the defendant that, by reason of constructions erected by the city at the mouth of the brook, since the taking in 1846, the waters of Pegan brook do not, in fact, contaminate the water of the pond; and that, therefore, the city is not injured. It appears, however, as a fact, that the water of the brook is contaminated by the acts of the defendant. The city has a right to be protected against the necessity of maintaining works for the preservation of the purity of the water from such a cause. If the acts of the defendant in fouling the stream have made it necessary for the city to resort to extraordinary means for preserving the purity of the water of the pond, he cannot justify the continuance of such illegal fouling by showing that the city has thus far been able, by the maintenance of special works, to prevent the natural result of his acts.

The result is that the petition for an injunction is maintained.

Injunction to issue.

On May 1, 1884, the surface of Lake Cochituate stood at elevation 134.30, and on the 16th at 134.36, exactly high-water mark. It was maintained at this height until May 29, when the surface began to fall. Between June 18 and July 1 a flow of 168,000,000 gallons was poured into the lake from Sudbury river, and at different times in July 152,000,000 gallons more, which maintained the surface very nearly at high-water mark until quite late in the season. The lowest point reached during the year was 129.90, on December 6. On February 12, the water having risen as high as was considered safe, the stop-planks were taken out at the dam, and about 6 inches allowed to flow over the crest. This continued during the remainder of the month. On March 22 the water was stopped and the lake was filled. The surface is now at high-water mark.

The ice all disappeared from the lake on April 12.

The engines, boilers, and pumps used last year, are still in position at the gate-house, but I should recommend their removal to a more secure situation.

During the past year the old rotten stable, in connection with the keeper's house, has been pulled down, and a substantial stable built in a better location.

The attention of the Board is called to the importance of providing, at some convenient time, for the building of a new dam at the outlet of Lake Cochituate. A few years since, at the request of the City Engineer, I made a study of the

present structures, their capacities under different circumstances, and the portfolio of accompanying plans was filed with the City Engineer.

During the past year, samples of the lake water have been analyzed every three months by Professor E. S. Wood.

Dudley Pond.

This pond is now full. No water was drawn from this source during the year.

Sudbury-river Aqueduct.

This aqueduct has been in daily service during the entire year, with the exception of a few days when undergoing cleaning. It has brought to the city a total of over 5,000,000,000 of gallons, or an average of 13,894,000 gallons daily. The greatest amount in any one day was 31,900,000 gallons, on December 29, and the smallest 7,100,000 gallons, on May 1, 1884.

On December 15, 16, and 17, the whole of the interior was cleaned from Farm pond to Chestnut-Hill reservoir. The brick-work has never appeared so dirty before. Large quantities of black patches with thick muddy deposits were removed. Spots of *spongilla* were found at occasional intervals. At station 124 + 50, some bricks had started on the bottom from the pressure of a spring. The practice of applying loam to the embankment, in some places a foot in thickness, has been continued. Without this treatment it is impossible to maintain some of the embankments. All of the loam from the location of the new Circuit R.R. has been removed. The arch of the aqueduct has also been strengthened at the crossing of the tracks by an additional ring of bricks.

The waste-weir houses have been kept in good repair.

Between July 11 and September 18 the following portions of the Charles-river bridge were pointed in a thorough manner. All of the brick-work, the two projecting belt courses, the joints under the belts, the ring of the large arch, the platforms, abutments and steps at each end of the bridge. The total cost of this work was $584. It was found that the cement-mortar was lacking in some of the joints from 1 inch to 7 inches in depth. This admitted water to the interior and was damaging the masonry. As a general rule, oil cement, with $\frac{1}{8}$ part fine sand, was liberally used in all, except vertical joints. The Waban arches need the same treatment, and will be taken in hand during the coming season.

The Cochituate Aqueduct.

On May 1, 1884, a height of six feet of water was kept in this structure, and so maintained until June 10. On this day the head was reduced to 126.00 or five feet above the invert, which height was unchanged during the remainder of the year. Between December 29 and January 4 the water was drawn off for cleaning. For a distance of nearly a quarter of a mile or from Sta. 193 + 02 to Sta. 204 + 60 a considerable amount of offensive sewage weeps through the Brookline tunnel and of course finds its way immediately into the water. This sewage comes from the leaky cesspools of the residents in the vicinity and is a nuisance which should be remedied without delay.

The upper six miles of the aqueduct were entirely cleared of *spongilla* on January 1 and 2, by a special gang of men after the regular cleaning had been accomplished. This substance clings so closely to the brick-work that it is found more economical to remove it in this manner.

Preparations for the crossing of the Circuit R.R. have been made, and work on the strengthening of the arch at this point will be begun in a few days.

During the past year the town of Wellesley has put in a system of water-works, and their pipes have crossed the aqueduct in at least a dozen places. This has required the greatest watchfulness to see that no damage was done to the Boston works. The force main of their supply is located under the Newton Lower Falls arch, and is at a level with the bottom of the foundation of that structure. A break at this point might endanger the Cochituate aqueduct.

The whole line has been kept clear of bushes by the usual annual mowing.

No repairs of any importance have been made on the interior during the year.

Chestnut-Hill Reservoir.

This reservoir has been in constant use during the year. The water has been good in quality. Very little work has been done on the drive-ways on account of the crusher being in use at Basin 4. Considerable work will have to be done on these roads when the crusher can be spared for this purpose.

The usual meteorological and other observations have been made.

All of the gate-houses and other structures are in a state of good repair.

A table of rainfall, showing the time of beginning and ending of each storm is appended.

BROOKLINE RESERVOIR.

The grounds and structures connected with this reservoir are in good order.

No new work has been done at this point during the year.

Very respectfully,

DESMOND FITZGERALD,

Superintendent.

Table of Rainfall at Chestnut-Hill Reservoir for year ending Dec. 31, 1884.

Date.	Inches.	Snow or Rain.	Duration.	Date.	Inches.	Snow or Rain.	Duration.
Jan. 1	.13	Rain & Snow	5.15 a.m. to 4 p.m.	Feb. 12	.53	Snow and Rain	4.30 a.m. to 4.15 p.m.
" 2	1.28	"	12.15 a.m. to 5.30 p.m.	" 13			
" 8	1.80	"	8.30 p.m. to 8.40 a.m.	" 17	.74	Rain	2.45 p.m. to 11.00 p.m.
" 9				" 18			
" 11	.03	Rain	1.19 p.m. to 4.15 p.m.	" 19	.62	Snow and Rain	9.30 p.m. to 2.30 p.m.
" 12	.02	Snow	1.10 p.m. to 10.15 p.m.	" 20			
" 13	.03	"	7.45 p.m. to 10.00 p.m.	" 23	1.37	Snow and Rain	6.00 a.m. to 9.30 p.m.
" 19	.28	"	3.30 a.m. to 7.30 p.m.				
" 20				" 25	1.05	Snow	9.40 p.m. to 11.45 a.m.
" 24	.84	Rain	9.30 a.m. to 11.30 p.m.	" 26			
" 30	.43	"	7.45 p.m. to 12.30 a.m.	" 27			
" 31				" 28	1.17	"	6.00 a.m. to 9.30 p.m.
Total .	4.84			Total .	6.38		
Feb. 1	.07	Rain	3.30 a.m. to 8.00 a.m.				
" 4	.19	Snow	4.00 a.m. to 2.30 p.m.	March 5	.13	Snow	7.00 p.m. to 6.30 a.m.
" 5	.34	Snow and Rain	12.30 a.m. to 3.30 p.m.	" 6			
" 6	.19	Rain	7.15 p.m. to 9.30 a.m.	" 7	1.17	Rain and Snow	11.00 a.m. to 5.30 a.m.
" 7				" 8			
" 8	.06	Snow and Rain	3.00 a.m. to 9.30 p.m.	" 9	.41	Rain and Snow	3.15 p.m. to 8.15 a.m.
" 9	.05	Rain	11.40 a.m. to 3.30 p.m.	" 10			
				" 11	.03	Rain	9.30 p.m. to 11.15 p.m.

Table of Rainfall of Chestnut-Hill Reservoir. — Continued.

Date.	Inches.	Snow or Rain.	Duration.
Mar. 14	.24	Rain and Snow	7.15 p.m. to 1.30 p.m.
" 15			
" 19	1.14	Snow and Rain	3.30 p.m. to 6.30 p.m.
" 20			
" 23	.22	Rain	7.30 p.m. to 4.00 a.m.
" 24			
" 26	.83	Rain	1.15 p.m. to 5.30 a.m.
" 27			
" 27	.02	Showers.	1.15 p.m. to 8.00 p.m.
" 30	.03	Snow	1.00 a.m. to 11.30 a.m.
" 30	.01	"	5.45 p.m. to 9.30 p.m.
Total .	4.23		
April 2	1.54	Snow and Rain	12.30 p.m. to 1.30 p.m.
" 3			
" 4			
" 9	.78	Rain and Snow	1.30 p.m. to 7.15 p.m.
" 10			
" 15	.86	Rain	1.45 p.m. to 5.00 a.m.
" 16			
" 16	.06	"	6.05 p.m. to 9.00 p.m.
" 17	.10	Showers.	7.20 p.m. to 1.15 p.m.
" 18			
" 18	.13	"	9.00 p.m. to 7.15 a.m.
" 19			
" 20	.13	Rain	2.00 p.m. to 7.00 a.m.
" 21			
" 24	.06	"	4.30 p.m. to 6.30 p.m.
" 25	.80	"	1 p.m. to 10.45 a.m.
" 26			
Total .	4.46		
May 5	.04	Showers	7.35 a.m. to 12.30 p.m.
" 6	.07	Rain	5.45 to 11 p.m.
May 7	.47	Rain	4.40 p.m. to 2.00 a.m.
" 8			
" 9			
" 10	.03	Shower	11.50 a.m. to 12.10 p.m.
" 10	.01	"	4.30 to 5.00 p.m.
" 14	.61	Rain	12.05 to 10.15 a.m.
" 15	.08	"	5.35 to 6.45 p.m.
" 20	.73	"	1.35 to 5.45 p.m.
" 24	.02	Shower	6.00 to 6.15 a.m.
" 28	.83	Rain	7.40 a.m. to 9.00 p.m.
Total .	2.89		
June 12	.31	Showers	12.15 p.m. to 2.30 a.m.
" 13			
" 19	1.66	Rain	2.05 to 6.05 p.m.
" 25	2.76	"	12.15 p.m. to 6.45 a.m.
" 26			
Total .	4.73		
July 4	1.13	Rain	9.10 p.m. to 7.40 a.m.
" 5			
" 5	.26	"	10.20 p.m. to 6.00 a.m.
" 6			
" 8	.81	"	10.45 a.m. to 11.00 p.m.
" 9	.03	"	5.40 p.m. to 6.05 p.m.
" 12	.24	Showers	8.40 p.m. to 4.20 p.m.
" 13			
" 14	.02	Showers	5.00 p.m. to 5.10 p.m.
" 16	.05	"	6.25 p.m. to 7.10 p.m.
" 18	1.27	Showers	2.15 p.m. to 9.20 p.m.
" 19	.02	Shower	10.30 p.m. to 11.30 p.m.
" 23	.02	"	7.35 p.m. to 9.15 p.m.
" 25	.04	Showers	5.00 a.m. to 7.45 a.m.

Table of Rainfall at Chestnut-Hill Reservoir. — Concluded.

Date.	Inches.	Snow or Rain.	Duration.
July 27	.30	Rain	5.30 p.m. to 2.30 a.m.
" 28			
" 29	.95	"	6.10 a.m. to 10.a.m.
" 30			
" 31	.33	"	4.45 p.m. to 9.15 p.m.
Total .	5.47		
Aug. 5	.08	Rain	4.45 to 11.55 a.m.
" 5	1.06	"	9.10 p.m. to 2.00 a.m.
" 6			
" 6	.10	"	2.40 to 3.20 p.m.
" 7	2.14	"	11.15 a.m. to 12.10 a.m.
" 8			
" 12	.24	"	11.30 p.m. to 3.00 a.m.
" 13			
" 14			
" 22	.30	"	7.15 to 9.15 p.m.
" 26	.23	"	4.40 a.m. to 3.30 p.m.
" 29	.63	"	9.10 a.m. to 5.40 a.m.
" 30			
" 31	.06	"	2.00 to 2.20 p.m.
Total .	4.78		
Sept. 11	.12	Rain	5.00 to 7.15 p.m.
" 20	.06	"	3.30 to 4.45 p.m.
" 25	.10	Showers.	2.45 to 4.30 p.m.
" 28	.14	Rain	1.00 to 3.30 a.m.
Total .	.42		
Oct. 3	.02	Rain	8.00 to 8.30 p.m.
" 4	.34	"	7.00 to 11.50 p.m.
" 6	.11	"	10.00 to 11.00 a.m.
Oct. 8	.08	Rain	6.15 to 11.30 p.m.
" 12	.18	"	12.15 to 10.00 p.m.
" 18	.15	"	4.45 to 7.00 p.m.
" 22	.75	"	8.20 p.m. to 5 a.m.
" 23			
" 28	.07	"	9.30 a.m. to 4.15 p.m.
" 30	1.71	Rain and Snow	5.00 a.m. to 5.00 a.m.
" 31			
Nov. 1			
Total .	3.41		
Nov. 5	.30	Rain	12.05 to 1.30 a.m.
" 19	.49	Snow	4.40 to 11.50 p.m.
" 23	.99	Rain	12.20 p.m. to 5.00 a.m.
" 24			
" 28	1.24	"	1.30 p.m. to 9.45 a.m.
" 29			
Total	3.02		
Dec. 6	1.45	Rain	3.45 p.m. to 3.30 p.m.
" 7			
" 11	.16	Snow	5.00 a.m. to 11.45 p.m.
" 12	.05	"	8.00 a.m. to 1.30 p.m.
" 13	.09	"	6.45 a.m. to 4.30 p.m.
" 15	.85	Rain	2.00 to 9.40 a.m.
" 17	.22	Snow	6.00 a.m. to 6.30 p.m.
" 21	1.42	Snow and Rain	5.30 a.m. to 3.00 a.m.
" 22			
" 22	.14	Showers	2.45 to 11.50 p.m.
" 24	.54	Snow	6.10 a.m. to 9.30 p.m.
Total .	4.92		

Total for year . . . . . 49.55.

REPORT OF THE SUPERINTENDENT OF THE EASTERN DIVISION.

Boston, May 1, 1885.

Wm. A. Simmons, *Chairman Boston Water Board:* —

Sir, — I herewith present my report for the year ending with April 30. The works under my charge are, in my judgment, in good condition. In the large sizes of main-pipes only one break has occurred. On the 4th of October last one of the 48-inch pipes on Beacon street, beyond Brookline avenue, was broken by the falling of a large stone during the construction of one of the abutment-walls of the new bridge over the Boston and Albany railroad. The damage was soon repaired. Last season the 40-inch main on Brookline avenue was raised to conform to the new grade; two wrought-iron pipes were laid on the new bridge, and connections with the opening of the 40-inch line were made this spring, and water let on. Up to now the evidences are the whole line is in a good condition.

Beyond the laying of new mains, introduction of service-pipes, and the general maintenance of the works, nothing of note, except the above-mentioned items, has occurred.

Main-Pipe.

The whole length of main-pipe of the different sizes laid since the commencement of the works to the present time is 437½ miles. The whole length of pipe laid during last year is 61,849 feet, or about 12 miles.

Whole length now in service, 388.52 miles.

Service-Pipes.

Whole number put in last season	1,342
Length in feet	35,475
Total number to date	50,632

Hydrants and Stopcocks.

118 hydrants and 173 stopcocks established during the year.

Relaying of Enlarged Sizes.

Street.	Between what Streets.	Size now.	No. of Feet.	Size formerly.
Tremont	Hollis and Boylston	8	789	6
Boylston	Across Tremont	12	30	6
Eliot	Pleasant and Tremont	8	744	6
W. Dedham . . .	Shawmut ave. and Tremont .	8	686	6
Crawford	Humboldt ave. and Tower . .	12	92	6

TAKEN UP AND ABANDONED.

40-inch	112 feet..
12-inch	808 "
8-inch	145 "
6-inch	3,564 ".
4-inch	932 "
1½-inch	820 "

CHANGED.

One ⅝-inch out, one 2-inch put in.
One ⅝-inch out, one 1½-inch put in.
One ⅝-inch out, one 1¼-inch put in.
Eight ⅝-inch out, eight 1-inch put in.
Seven ⅝-inch out, seven ¾-inch put in.
Three ½-inch out, three ⅝-inch put in.

Statement of Location, Size, and Number of Feet of Pipe laid in 1884.

NOTE. — B. indicates Boston; S.B. South Boston; E.B. East Boston; B.H. Boston Highlands; D. Dorchester; W.R. West Roxbury; Bri. Brighton.

In what Street.	Between what Streets.	District.	Size.	Length.
Brookline ave.	Over B. and A. R.R.	B.	28	244
	Total 28-inch			244
Huntington ave.	Tremont and Wigglesworth	B.H.	16	259
Chestnut Hill ave.	South and Englewood ave.	Bri.	"	1,403
	Total 16-inch			1,662
West Chester park	Westland ave. and Boylston	B.	12	135
Westland ave.	Parker and West Chester park	"	"	973
West Newton	Washington and Shawmut ave.	"	"	297
Boylston	Across Tremont	"	"	30
Tremont	Boylston and Head place	"	"	67
Gloucester	Boylston and Newbury	"	"	57
Boylston	Fairfield and Gloucester	"	"	552
Prescott	Bremen and New	E.B.	"	1,731
Crawford	Elm Hill ave. and Tower	B.H.	"	1,337
Amory	School and Centre	"	"	1,071
Holborn	Blue Hill ave. and Warren	"	"	333
Lawrence ave.	Blue Hill ave. and Cedar	D.	"	293
Blue Hill ave.	Columbia and Elmo	"	"	14
Nelson	Norfolk and Evans	"	"	262
Prospect	Milton ave. and Norfolk	"	"	260
Forest Hill ave.	Norfolk and N.Y. and N.E. R.R.	"	"	175
Erie ave.	Washington and Merrill	"	"	40
Pond	May and Brookline line	W.R.	"	2,021
Canterbury	Walk Hill and Ashland	"	"	3,662
Florence	Hancock and Brown ave.	"	"	146
Clarence	Spring and Prospect	"	"	24
South	From Walk Hill	"	"	142
Everett	Pearl and Vernon	Bri.	"	185
Roxbury ave.	Englewood ave. and Beacon	"	"	291
	Carried forward	...	...	14,098

Statement of Location, Size, etc. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	Brought forward	. . .	. . .	14,098
Nonantum	Washington and Newton line	Bri.	12	602
Warren	Cambridge and Massachusetts ave.	"	"	1,528
Lake	Washington and South	"	"	1,770
	Total 12-inch	. . .	. . .	17,998
West Dedham	Shawmut ave. and Tremont	B.	8	686
Eliot	Tremont and Pleasant	"	"	744
Tremont	Hollls and Boylston	"	"	789
West Chester park . . .	Huntington ave. and B. & P. R.R. bridge . .	"	"	521
Moore	Saratoga and Milton	E.B.	"	612
Curtis	Chelsea and Bremen	"	"	100
Atwood ave.	From Day	B.H.	"	74
Gilbert	Wyman and Hoffman	"	"	485
Milbourne	Welles ave. and Centre	Dor.	"	62
Back	Austin and Madison	"	"	687
Quincy	Magnolia and Ceylon	"	"	93
Bowdoin ave.	Eldon and Washington	"	"	194
Torrey	Withington and Washington	"	"	173
South	From Washington	W. R.	"	504
Kittredge	Albano and Washington	"	"	1,148
St. John	Centre and Rockview	"	"	60
Centre	Louder lane and Walter	"	,,	3,379
Brown ave.	Gardner and Florence	"	"	301
Bourne	Canterbury and Walk Hill	"	"	442
Ashland	Brown ave. and B. & P. R.R. bridge	"	"	440
Fairview	South and Proctor	"	"	797
Albano	Washington and Salem	"	"	274
Allandale	From Centre	"	"	750
Braintree	Wilton and Everett	Bri.	"	359
Bennett	From Parson	"	"	184
	Total 8-inch			13,858
West Chester park . . .	Columbus ave. and B. & P. R.R.	B.	6	95
St. Botolph	Cumberland and Durham	"	"	273
Eastern ave.	Atlantic ave. and the Ferry	"	"	18
	Carried forward	. . .	. . .	386

Statement of Location, Size, etc. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	Brought forward	. . .	. . .	386
Boylston	Fairfield and Hereford	B.	6	139
Waterford	Shawmut ave. and Washington	"	"	372
La Grange	Tremont and Farnsworth	"	"	51
Falmouth	West Chester Park and Camden	"	"	590
Commonwealth ave. . .	West Chester Park and Beacon	"	"	53
Cumberland	Huntington ave. and St. Botolph	"	"	302
Parker	Westland ave. and Boylston	"	"	110
Marlborough	West Chester Park and Hereford	"	"	58
Claremont	Columbus ave. and Carlton	"	"	85
Carlton	Claremont and Greenwich park	"	"	115
Mayo	From Castle	"	"	60
Baxter	C and D	S.B.	"	231
Boston place	Dorchester ave. and Old Colony R.R. . . .	"	"	222
C	Seventh and Baxter	"	"	14
Bowen	C and D	"	"	399
East Fifth	G and H	"	"	142
New	From Prescott	E.B.	"	172
Moore	Saratoga and Pope	"	"	515
Nickerson's wharf . . .	From New	"	"	184
Putnam	Condor and Falcon	"	"	214
Bennington	Moore and Wordsworth	"	"	769
Maverick wharf	From North Ferry	"	"	240
Kensington	Bainbridge and Elmore	B.H.	"	259
Tower	Crawford and Oriole	"	"	12
Waumbeck	Warren and Wabon	"	"	153
Wyman	Gilbert and Danforth	"	"	81
Bromley	New and Old Heath	"	"	376
Winthrop	Blue Hill ave. and Dennis	"	"	24
Savin	Warren and Tupelo	"	"	227
Winthrop	From Dennis	"	"	157
Townsend	Walnut ave. and Warren	"	"	771
Simmons	Vernon and Clay	"	"	368
Pierpont	Station and Prentiss	"	"	196
Sunderland	Blue Hill ave. and Warren	"	"	152
Wise	Centre and Roys	"	"	111
	Carried forward	. . .	. . .	8,310

Statement of Location, Size, etc. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	Brought forward	. . .	. . .	8,310
Goldsmith	From Ruggles	B.H.	6	148
Fenwick	Circuit and Hulbert	"	"	261
Oregon	Smith and Conant	"	"	98
Phillips	Longwood ave. and Conant	"	"	120
Shirley	Dudley and George	"	"	161
Irving ave.	From Blue Hill ave.	"	"	303
Clapp	East Chester park and Boston	Dor.	"	608
Carruth	Fairfax and Codman	"	"	173
Folsom	Dudley and Harlow	"	"	152
Longmeadow	Clifton and Batchelder	"	"	103
New	From Boston	"	"	452
Maxwell	Milton ave. and Capen	"	"	211
Selden	" " "	"	"	95
Holbrook ave.	From Neponset ave.	"	"	314
Newhall	Pierce ave. and Ashmont	"	"	253
Crescent ave.	Newport and O.C. & N.R.R.	"	"	163
Milton ave.	Norfolk and Lauriat ave.	"	"	165
Baker court	From Washington	"	"	359
Pierce ave.	Plain and Newhall	"	"	72
Plain	Pierce ave. and Chickatawbut	"	"	76
Swan court	From Olney	"	"	274
Fuller	Milton ave. and Washington	"	"	187
New	From Magnolia	"	"	181
Tremlett	Washington and Hooper	"	"	675
Chickatawbut	Plain and Minot	"	"	262
Bodwell park	Columbia and Bird	"	"	79
Spring Garden	Crescent ave. and Harbor View	"	"	14
Wales	Harvard and Blue Hill ave.	"	"	120
Leeds	Savin Hill ave. and Bay	"	"	132
Humphrey sq.	From Dudley	"	"	78
New	From Savin Hill ave.	"	"	126
Grampian Way	Savin Hill and Savin Hill ave.	"	"	331
Harbor View	Dorchester ave. and Newport	"	"	481
Clifton	Hudson and Shirley	"	"	202
Elmo	Erie and Blue Hill ave.	"	"	194
	Carried forward	. . .	. . .	15,933

Statement of Location, Size, etc. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	Brought forward	. . .	. . .	15,933
Fairfax	From Carruth	Dor.	6	151
Whitfield	Wheatland ave. and park	"	"	258
Elmo	Erie and Erie ave.	"	"	485
Rockwell	Milton ave. and Washington	"	"	821
Sigourney	Glenroad and Walnut	W.R.	"	168
Allen	Brown ave. and Rowe	"	"	175
C	Spring Park and Boylston	"	"	217
Pratt ave.	From Centre	"	"	142
Woodman	Centre and Jamaica	"	"	81
Ballard	Centre and Custer	"	"	213
School	Amory and Copley	"	"	263
Bismarck	Boylston and Germania	"	"	392
Spring Vale	Spring and Marshall	"	"	207
Corinth	Washington and Birch	"	"	356
Hancock	Prospect ave. and Ashland	"	"	356
Maple	Centre and Weld	"	"	237
Sharon	Brown ave. and Rowe	"	"	469
Hancock	Prospect ave. and Pine	"	"	335
Pine	Brown ave. and Hancock	"	"	123
Hawthorne	Florence and Sycamore	"	"	60
Atherton ave.	Washington and Albano	"	"	164
Baker	Spring and Garden	"	"	452
Meehan	Williams and Keyes	"	"	107
Keyes	Washington and Meehan	"	"	252
Rockview	Green and Hazel	"	"	314
Hazel	Rockview and Enfield	"	"	88
Sheldon	Ashland and Prospect ave.	"	"	120
Salem	Albano and Corinth	"	"	348
Farrington ave.	Oak and B. & P. R.R.	"	"	301
Danforth	Wyman and Boylston	"	"	274
John A. Andrew	Sedgwick and Newburne	"	"	78
Union ave.	Green and Washington	"	"	153
Hobart	From Brooks	Bri.	"	329
Wilton	Cambridge and Braintree	"	"	117
Pratt	From Linden	"	"	186
	Carried forward	. . .	. . .	24,675

Statement of Location, Size, etc. — *Concluded.*

In what Street.	Between what Streets.	District.	Size.	Length.
	Brought forward			24,675
Peaceable	Winship and Rockland	Bri.	6	213
Englewood ave.	Chestnut Hill and Roxbury aves.	"	"	677
Foster	Washington and Surrey	"	"	116
Surrey	Parsons and Foster	"	"	458
Appian Way	Franklin and Vernon	"	"	122
Hichborn	From North Beacon	"	"	713
Sinclair court	" " "	"	"	240
Oakland	Washington and Faneuil	"	"	158
Gardner	Chester and Malvern	"	"	200
La Rose place	From Union	"	"	185
Linden	Garden and Brighton ave.	"	"	176
	Total 6-inch			27,933
Lindall ave.	Lindall park and Vernon	B.H.	4	54
Fenton court	Greenwich pl. and Greenwich	Dor.	"	100
	Total 4-inch			154

Statement of Location, Size, and Number of Feet of Pipe Relaid and Abandoned in 1884.

In what Street.	Between what Streets.	District.	Size.	Length.	Size of Pipe as relaid.
Brookline ave.	Under Boston and Albany R.R.	B.	40	112	
	Total 40 inch			112	
West Newton	Shawmut ave. and Washington	B.	12	297	12
Brookline ave.	Burlington and Boston and Albany RR.	B.H.	12	511	
				808	
Central place	Harrison ave. and Washington	B.	8	17	
Montana	From Georgia	B.H.	"	128	
				145	
T. Wharf	Atlantic ave. and the Water	B.	6	615	
Tremont	Hollis and Boylston	"	"	789	8
Boylston	Across Tremont	"	"	30	12
Eliot	Tremont and Pleasant	"	"	744	8
West Dedham	Shawmut ave. and Tremont	"	"	686	8
Crawford	Humboldt ave. and Tower	B.H.	"	92	12
Clapp	East Chester park and Boston	D.	"	608	6
				3,564	
T wharf	Atlantic ave. and the Water	B.	4	134	
Waterford	Shawmut ave. and Washington	"	"	372	6
Parker	Boston and Albany R.R. and Westland ave.	"	"	415	
			"	11	6
Eastern ave.	Atlantic ave. and the Ferry	"		932	
	RAISED.				
Brookline ave.	Burlington ave. and Beacon	B.H.	40	1,161	
Beacon	Brookline and Commonwealth ave.	B.	"	100	
Brookline ave.	Burlington ave. and Boston and Albany R.R.	B.H.	12	250	
Clapp	East Chester park and Boston	Dor.	6	304	
	LOWERED.				
D	Eight and Ninth	S.B.	12	100	
Ninth	D and E	"	6	175	
Sheridan ave.	Chestnut and Terrace	B.H.	"	550	
Bell court	From D	S.B.	4	50	

Table Showing the Length of Supply and Distributing Mains laid during the Year 1884-5, and the Length Connected with the Sudbury and Cochituate Works, May 1, 1885.

	DIAMETER OF PIPE IN INCHES.														Totals.
	60	48	40	36	30	28	24	20	16	12	10	8	6	4	
EASTERN DIVISION.															
Length in use, May 1, 1884	....	25,721	23,166	20,255	32,127	....	30,976	44,846	49,719	552,146	16,200	180,928	855,021	140,535	1,971,640
Stopcocks in same	....	1	7	12	15	....	30	30	87	795	6	328	2,025	596	3,932
Length laid or relaid during the year	....	....	....	....	....	244	....	....	1,662	17,998	....	13,858	27,933	154	61,849
Stopcocks in same	....	....	....	....	....	....	....	....	....	34	....	22	108	9	173
Length abandoned during the year	....	....	112	....	....	....	....	....	....	808	....	145	3,564	932	5,561
Stopcocks in same	....	....	....	....	....	....	....	....	3	1	....	....	5	4	13
Length in use May 1, 1885	....	25,721	23,054	20,255	32,127	244	30,976	44,846	51,381	569,336	16,200	194,641	879,390	139,757	2,027,928
Stopcocks in same	....	1	7	12	15	....	30	30	84	828	6	350	2,128	601	4,092
WESTERN DIVISION.															
Length in use May 1, 1885	266	16,051	1,435	1,166	2,140	....	....	....	20	2,043	....	....	360	....	23,481
Stopcocks in same	....	5	....	3	....	....	....	....	2	4	....	....	2	....	16
Total length connected with works May 1, 1885	266	41,772	24,489	21,421	34,267	244	30,976	44,846	51,401	571,379	16,200	194,641	879,750	139,757	2,051,409 ft. equal to 388.52 miles.

Length of Hydrant, Blow-off, and Fire Reservoir Pipe, May 1, 1885.

	16 inches.	12 inches.	9 inches.	8 inches.	6 inches.	4 inches.	Totals.
Length in use May 1, 1884	128	4,830	3,213	.....	6,924	14,078	29,173
Length laid or relaid during the year	.....	138	.....	28	773	43	982
Length abandoned during the year	65	43	13	.....	10	294	425
Total length in use May 1, 1885	63	4,925	3,200	28	7,687	13,827	29,730

Statement of Service-Pipes laid in 1884.

Diameter in Inches.	Boston.		South Boston.		East Boston.		Boston Highlands.		Dorchester.		West Roxbury.		Brighton.		Totals.	
	Number of Pipe.	Length in Feet.	Number of Pipe.	Length in Feet.	Number of Pipe.	Length in Feet.	Number of Pipe.	Length in Feet.	Number of Pipe.	Length in Feet.	Number of Pipe.	Length in Feet.	Number of Pipe.	Length in Feet.	Number of Pipe.	Length in Feet.
3	....	....	1	155	....	....	....	....	....	....	....	....	....	....	1	155
2	1	34	....	....	....	....	....	....	....	....	....	....	....	....	1	34
1½	4	118	....	....	....	....	1	23	1	28	....	....	....	....	6	169
1¼	1	25	....	....	1	3	....	....	....	....	1	14	....	....	3	42
1	19	610	....	....	2	11	21	538	6	267	1	17	....	....	49	1,443
¾	23	889	....	....	1	50	17	535	3	74	3	140	....	....	47	1,688
⅝	178	5,748	143	4,033	89	2,345	236	6,073	247	6,182	195	3,969	147	3,594	1,235	31,944
Aggregate															1,342	35,475
Making total number up to May 1, 1885																50,632

Repairs of Pipes during the Year 1884.

WHERE.	Diameter of Pipes in Inches.																	Total.
	48	40	36	30	20	16	12	10	8	6	4	3	2	1½	1¼	1	¾	⅝	½	
Boston	.	.	1	3	13	2	14	.	1	46	61	7	9	47	5	14	12	401	6	642
South Boston	.	.	.	.	5	.	5	1	1	14	7	1	2	.	.	3	1	116	13	169
East Boston	.	.	.	.	12	.	2	.	.	1	1	.	.	.	.	.	.	109	14	139
Boston Highlands	1	1	.	1	.	.	8	.	.	10	1	4	.	.	.	3	1	209	1	240
Dorchester	.	.	.	.	.	.	5	.	.	1	3	1	.	.	.	.	.	76	.	86
West Roxbury	.	.	.	.	.	.	3	.	2	1	1	.	1	.	.	.	.	56	.	64
Brighton	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	39	1	40
Totals	1	1	1	4	30	2	37	1	4	73	74	13	12	47	5	20	14	1,006	35	1,380

Of the leaks that have occurred on pipes of 4 inches and upwards: joints, 146; settling of earth, 18; defective packing, 26; defective stopcock, 17; defective pipe, 17; broken by B. & A. R.R. bridge-builders, 1; by wharf-builders, 1; struck by pick, 3; by frost, 2. Total	231
Stoppages by frost	22
Of 3-inch and on service-pipes: joints, 12; settling of earth, 159; settling of wall, 3; settling of drain, 2; defective pipe, 265; defective faucet, 23; defective packing, 13; defective coupling, 13; struck by pick, 34; by frost, 3; stiff connections, 45; by sewer diggers, 15; faucet pulled out, 3; gnawed by rats, 9. Total . .	606
Stoppages by fish, 33; rust, 306; dirt, 8; solder 1; paper, 1; gasket, 2; frost outside, 99; frost inside, 71. Total	521
Total	1,380

Statement of Leaks and Stoppages 1850–1884.

YEAR.	DIAMETER OF.		Totals.
	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	594	489
1865	111	496	607
1866	139	536	675
1867	122	487	609
1868	82	449	531
1869	82	407	489
1870	157	767	926
1871	185	1,380	1,565
1872	188	1,459	1,647
1873	153	1,076	1,229
1874	434	2,120	2,554
1875	203	725	928
1876	214	734	948
1877	109	801	910
1878	213	1,024	1,237
1879	211	995	1,206
1880	135	929	1,064
1881	145	833	1,028
1882	170	1,248	1,248
1883	171	782	953
1884	253	1,127	1,380

HYDRANTS.

During the year 171 hydrants have been established, and 53 abandoned.

	ESTABLISHED.					ABANDONED.					Total Difference.
	Boston Lowry.	Post.	Lowry.	Boston.	Total.	Boston Lowry.	Post.	Lowry.	Boston.	Total.	
Boston	3	23	13	3	42	1	..	2	23	26	16
South Boston	3	..	..	2	5	...	..	..	2	2	3
East Boston	3	2	..	1	6	...	..	..	..	..	6
Boston Highlands	11	5	2	2	20	3	2	3	2	10	10
Dorchester	6	9	2	11	28	2	..	6	4	12	16
West Roxbury	31	7	3	6	47	...	..	..	1	1	46
Brighton	9	8	3	3	23	...	..	..	2	2	21
	66	54	23	28	171	6	2	11	34	53	118

Total Number up to May 1, 1885.

	Boston Lowry.	Boston Y.	Post.	Lowry.	Boston.	Total.
Boston	47	....	100	486	753	1,386
South Boston	17	1	33	143	327	521
East Boston	8	...	33	112	171	324
Boston Highlands	26	....	43	650	125	844
Dorchester	57	....	98	560	86	801
West Roxbury	61	....	208	94	56	419
Brighton	18	....	153	62	39	272
Deer Island	....	....	16	....	....	16
Brookline	....	....	....	5	3	8
Chelsea	....	....	....	....	7	7
	234	1	684	2,112	1,567	4,598

104 hydrants have been taken out and replaced by new or repaired ones, and 164 boxes have been taken out and replaced by new ones. The hydrants have had the usual attention paid them.

STOPCOCKS.

173 new stopcocks have been established this year. 117 boxes have been taken out and replaced by new ones. The stopcocks have had the proper attention paid them.

Respectfully,

E. R. JONES,

Superintendent Eastern Division.

REPORT OF THE SUPERINTENDENT OF THE MYSTIC DEPARTMENT.

Mystic Department Boston Water-Works,
Charlestown District, May 1, 1885.

Hon. William A. Simmons, *Chairman Boston Water Board:* —

Sir, — The annual report of this department for the year ending April 30 is herewith submitted: —

Mystic Lake.

During the past year the water has been abundant and unusually good.

The cleaning mentioned in my last report was continued the past season on Wedge pond and that part of the Abajonah river between the tracks of the Boston & Lowell R.R. The depth of water was a hindrance, and on that account we were unable to do all that was intended. Considerable work was done on that part of the lake above the old canal, and on the land owned by Mr. Bacon, in blowing out the old stumps that were left when the works were built. If the state of the water will permit we shall continue the work of cleaning this season.

Mystic-valley Sewer.

The sewer is in good condition, but is now taxed to its capacity, and, if the tanneries continue to increase their business, will have to be enlarged.

The engine and pump are badly worn, and will need extensive repairs this summer. The boiler has been repaired twice the past year, and is liable to give out at any time.

When the works were built the plant was sufficiently large to take care of the sewage; but, as there is six times the amount running now, the plant should be increased in proportion.

The land at the sewer-pump has been graded, using the sewage refuse as a fertilizer. We raised a good crop of Hungarian grass and yellow corn the last year, and, as the

land was clear gravel, it showed conclusively that the refuse taken out by our settling-tanks is of value as a fertilizer.

Conduit.

The conduit is in good condition. It has been cleaned twice the past year, and thoroughly inspected each time. At the fall cleaning some small patches of sponge were found, which were scraped off and thoroughly scoured. This spring there were no traces of vegetable growth discovered.

Reservoir.

The east basin was drawn off and cleaned last spring; the brick lining to the slope, with the exception of a small piece, was found in good condition. The necessary repairs were made to that portion, and the stone-work pointed. We found the covering to the cement-pipe, leading to the west basin, in bad condition. The old covering was cleaned off, the iron thoroughly scraped, and newly covered with cement well worked on.

The banks were thoroughly top-dressed last fall, and now show the benefit of the work done. The concrete walk around the reservoir will have to be resurfaced this season, and it will be economy to concrete the gutters around the first slope.

This work can be done after the west basin has been cleaned and pointed. The gate-house has been painted inside, and a new set of screens for the outlet pipes have been made and put in.

I again call the attention of the Board to the great need of a telephone at this gate-house, and recommend that it be put in immediately.

Roads and Grounds.

This part of the works has received the usual attention. The grass shows the effect of top-dressing.

The roads around the works are in poor condition, having been made with clay and loose gravel. In wet weather they are mud; in dry, dust. I would recommend that a stone-crusher be purchased for this department, and the roads be re-built. The railroad track has been straightened, and the wall built on the east side. A foundation has been built for a new shed for the storage of carts and tools which should be built this season.

I would also recommend that the house at the lake be clapboarded this season.

Pumping Service.

This department is in good condition, though, like all works of the kind, it needs constant care and repairs to keep it in working order.

No. 3 pump will have to be thoroughly overhauled this season. Since my last report the new boilers have been finished, and are now in use, showing a saving in fuel over the old ones. The partial repairs on the engine-house, mentioned in my last report, have been done, and the work should be continued this year.

I would recommend the purchase of a gas-machine to light the engine-house. At present it is poorly lighted, and hardly safe.

Distribution–Pipes.

These pipes have been extended by the addition of 211 feet 6-inch and 90 feet 4-inch pipe. There have been 5,455 feet of cement pipe replaced with cast-iron. There have been 78 leaks the past year. The annexed tables show the amount of work performed in this branch.

Hydrants and Gates.

3 new Lowry hydrants have been placed by this department the past year.

12 old Lowry and 1 post have been taken out and replaced with new.

17 rotten hydrant-boxes have been replaced.

There have been added 9 new gates, 7 4-inch and 2 6-inch, the past year.

49 rotten gate-boxes have been renewed.

Service–Pipes and Boxes.

54 new services have been laid in this district the past year. There has been repaired and relaid 197, in which there was used 1,561 feet of lead pipe.

61 were alterations of tin-lined; 35 leaks; 38 stoppages by eels; 6 by rust, and 57 frozen.

525 wooden service-boxes were replaced by iron, and 2 fire-pipes were put in.

New Services.

Size.	⅝ of an inch.	¾ of an inch.	2-inch.	Total number.	Total feet.
Number	50	2	2	54	1,317

Summary of Services connected with the Works, May 1, 1885.

	Charlestown.	Somerville.	Chelsea.	Everett.	Totals.
Services	5,595	4,046	4,456	842	14,939
Feet	149,908	132,788	120,600	18,978	422,274

422,274 feet, or 79 mile, 5,154 feet.

Breaks and Leaks on Distribution-Pipe.

Size of Pipe.	16	12	10	8	6	4	3	2	Total.
Charlestown	1	1	. . .	3	27	14	. . .	. . .	46
Somerville	. . .	. . .	. . .	3	29	33	. . .	. . .	65
Chelsea	. . .	. . .	8	4	15	20	4	. . .	51
Everett	. . .	. . .	1	. . .	3	4	. . .	. . .	8
Totals	1	1	9	10	74	71	4	. . .	170

Extension of Distribution-Pipe.

Location.	Size of Pipe.		Total feet.
	4-inch.	6-inch.	
Ham's Court	24	. . . . .	24
Frothingham avenue	. . . . .	48	48
Cordis-st. avenue	175	6	181
Waterman's wharf	12	36	48
Somerville	1,913	3,703	5,616
Chelsea	857	2,837	3,694
Everett	455	1,225	1,680
Totals	3,436	7,855	11,291

Distribution-Pipe Relaid.

Location.	Original Size.	4-inch.	6-inch.	8-inch.	16-inch.	
	Inches.	Feet.	Feet.	Feet.	Feet.	Total ft.
Main street	16	24	24	....	1,752	1,800
Warren avenue	4	....	564	6	....	570
Essex street	6	....	60	....	....	60
Miller street	4	....	192	....	....	192
Bunker Hill street	8	84	306	2,112	....	2,502
Fitchburg railroad	4	108	....	....	....	108
Totals	.....	216	1,146	2,118	1,752	5,232

Summary of Pipes connected with the Works, May 1, 1885.

	Size of Pipe.	36-inch.	30-inch.	24-inch.	20-inch.	16-inch.	12-inch.	10-inch.	8-inch.	6-inch.	4-inch.	3-inch.	2-inch.	Totals.	Aggregate Total.
Charlestown	Cast Iron, and	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....
	Cement Lined, feet.	974	24,869	16,867	6,180	18,200	14,600	4,700	20,000	48,000	35,200	2,400	....	191,990	191,990
Somerville	Cast Iron, feet	....	....	....	....	....	....	....	....	224	....	....	....	224	.....
	Cement Lined, feet.	....	....	....	....	....	8,614	4,586	37,535	103,713	90,235	7,872	1,793	254,848	255,072
Chelsea	Cast Iron, feet	....	....	....	....	1,460	....	4,246	....	7,802	16,718	426	....	30,652	.....
	Cement Lined, feet.	....	....	....	....	....	....	9,841	11,117	22,607	61,386	18,214	....	123,207	153,859
Everett	Cast Iron, feet	....	....	....	....	....	....	....	....	1,225	503	....	....	1,728	.....
	Cement Lined, feet.	....	....	....	....	....	....	7,128	2,481	38,593	30,192	914	215	79,523	81,251
Totals	.....	....	....	....	....	....	....	....	....	....	....	....	....	....	682,172 or 129.2 miles.

Summary of Gates connected with the Works.

Size.	30-inch.	24-inch.	20-inch.	16-inch.	12-inch.	10-inch.	8-inch.	6-inch.	4-inch.	3-inch.	Total.
Charlestown	11	7	4	21	30	12	45	170	145	12	457
Somerville	.....	.....	.....	.....	6	5	6	148	196	16	377
Chelsea	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	235
Everett	.....	.....	.....	.....	.....	3	3	38	43	4	91

Number of Hydrants connected with the Works.

Hydrants.	Charlestown.	Somerville.	Chelsea.	Everett.	Totals.
Lowry	187	3	.....	1	191
Flush	31	25	6	.....	62
Post	54	274	145	70	543
Totals	272	302	151	71	796

Connected with the works are the necessary tools, horses, and wagons to do the work, all of which are in good condition.

Yours, respectfully,

J. HENRY BROWN,

Superintendent.

REPORT OF THE SUPERINTENDENT OF THE METER DIVISION.

METER DIVISION, 221 FEDERAL ST.,
BOSTON, May 15, 1885.

HON. W. A. SIMMONS, *Chairman Boston Water Board:*—

SIR, — The annual report of Superintendent of Meter Division for the year ending April 30, 1885, is herewith submitted.

The total number of meters in the Cochituate Department, doing duty at the commencement of the year, was 2,653.

There have since been applied 1,841, and in the same time 102 have been discontinued, making a total in this branch, at the present time, of 4,392.

In the Mystic Department the year commenced with 496 meters doing duty. There have since been applied 114, and during the same time 44 have been discontinued, making the total number in this branch 567, and the total number in the whole works 4,959.

Accompanying this report is furnished, in tabular form, the different sizes and styles of all the meters in use at date: —

Summary of Meters connected with the Works April 30, 1885.

	STYLE.	6-inch.	4-inch.	3-inch.	2-inch.	1½-inch.	1-inch.	¾-inch.	⅝-inch.
Cochituate.	Worthington . .	. . . .	6	10	67	16	409	. . . .	445
	Crown	1	5	16	20	25	110	48	851
	Tremont	. . . .	. . . .	. . . .	. . . .	. . . .	99	2,248	
	All others . . .	. . . .	. . . .	. . . .	. . . .	. . . .	3	. . . .	13
Mystic.	Worthington . .	. . . .	7	2	40	5	74	57	93
	Crown	2	6	2	8	2	13	48	65
	Tremont	. . . .	. . . .	. . . .	. . . .	. . . .	13	119	
	All others . . .	. . . .	. . . .	3	5	. . . .	. . . .	2	1
		3	24	33	140	48	721	2,522	1,468

During the year 41 meters have been condemned as useless (worn out in service).

These were of the Worthington pattern, and were of the older numbers in use in the works, having done a duty of 200,000 cubic feet and upwards.

In the wear of these I have especially noticed that those from the northern sections of the city are much more scarred, and show a destroying substance to contend with that is not apparent in those removed from other localities.

This destroying agency is manifest in the scouring process to which they give evidence of having been subjected, proving, in many cases, to have been very destructive.

Owing to the continued extreme cold of the past winter 77 meters were frozen, fully 33 per cent. of which were located in street-boxes placed 4½ to 5 feet below the surface, while the balance were located in the most available places in buildings, — generally the cellars, — carefully packed with hay for protection from frost.

In all cases where these were frozen some portion of the service-pipe was exposed; this exposed part was first affected; the ice, once formed in the pipes, naturally and quickly extends along the services, and soon comes in contact with the meter.

The effect is to disable if not entirely destroy it. In my opinion the packing of meters for protection, where any portion of the service-pipes are exposed to frost, is of little or no account, and until consumers are made to realize the necessity of properly protecting their fixtures from frost the city will suffer.

It has been the custom to let the water run to waste in extreme cold weather, thereby keeping a circulation to prevent freezing.

The application of meters somewhat interferes with this arrangement, at first causing a vigorous and determined opposition, manifested very impressively to the employés of the department while performing their legitimate duties, more especially in localities where a lesser degree of intelligence may be looked for.

Seventy-five decayed street-boxes have been replaced with new ones, and 27 have been repaired.

For the safety of the community these require constant and careful attention.

There are also in connection with the works, and under the supervision of this department, 234 elevators, having supply-pipes varying from 2 to 6 inches in diameter.

Six of these have meters attached; 228 are operated with cord and pulley, or ratchet, according to style, and are sup-

plied with one to four indicators each. These attachments are adjusted by actual measurement, and record the consumption comparatively correct, and might be considered reliable, provided they were not so liable to disarrangement, either by carelessness or accident; this cord is easily displaced or broken, and I am of the opinion that the city is not properly protected by such arrangements, and I most respectfully recommend to the consideration of the Board the application of meters, at the expense of applicants, to all elevator-pipes hereafter granted.

In addition to the above, there are in the Cochituate works 40 motors with indicators attached, and in the Mystic Department 4, making 44 in the whole works. These motors are generally of one style, viz., Boston Motor Company's make, and are owned privately by the parties using them, they having been proved and accepted by the department.

Alterations made last season in the ¾-inch Tremont meter proved, after trial, unsatisfactory, and they are at the present time being removed.

The trouble being in the mechanical construction, this has caused delay in the work of the departmen, and annoyance to the consumers who were unfortunately brought in contact with them.

Beside the substituting of these rejected ones with perfect machines, the contracting parties assume the expense of relocating all such, thus relieving the city of all extra outlay occasioned thereby.

There have been purchased during the year 2,818 ¾-inch, and 281 1-inch Tremont meters, and, adding 882 previously purchased, makes the total 3,981, distributed as follows: —

Placed in service.	2,479
On hand in stock.	345
Obsolete	87
At factory for alterations	1,070

43 Crown meters have been purchased, viz.: 3 6-inch, 4 4-inch, 2 3-inch, 13 2-inch, 9 1½-inch, 6 1-inch, and 6 ½-inch.

The 6 ½-inch were disposed of to consumers for private use, they reimbursing the city for the same, and becoming owners thereof. The others have been placed in service, with the exception of 1 4-inch, 2 2-inch, and 1 1-inch, which are still retained in stock.

98 Crowns, of different sizes, have been repaired, at an outlay of $643.72.

Repairs of this style of meter incur the extra expense of transportation to and from New York.

53 Worthingtons have been purchased, viz.: 2 4-inch, 15 2-inch, 17 1½-inch, 18 1-inch, and 1 ⅝-inch, and they have all been put in service excepting 2 2-inch, which still remain in stock.

The repairs of this class are almost entirely done in the department, and charged to maintenance.

Respectfully submitted,

HIRAM CUTTS,
Superintendent Meter Dept.

REPORT OF THE SUPERINTENDENT OF THE INSPECTION AND WASTE DIVISION.

DIVISION OF INSPECTION AND WASTE,
CITY HALL, BOSTON, May 1, 1885.

WILLIAM A. SIMMONS, Esq., *Chairman Boston Water Board:* —

SIR, — In compliance with the order of the Board I herewith respectfully submit the report of the work of this division for the year from May 1, 1884, to May 1, 1885.

At the date of my last annual report (May 1, 1884) nearly half of the general house-to-house inspection in the Cochituate Department, for assessing the revenue of the present year, had been done. The entire inspection, with the exception of premises classed as "buildings" and "model houses," on which special examinations were to be made later in the year, was completed early in June, when the inspectors were sent to their various districts to check waste, and see that the hose regulations of the Board were enforced. Three of the divisions, viz., 1, 3, and 4, were subsequently specially detailed for hose and waste service, their working hours being changed to from 1 o'clock P.M. to 8 o'clock P.M.; the evening being the principal time at which violations of hose regulations occur. The result of this arrangement was that a large number of persons were found illegally using hose, not having paid for the privilege, while others were violating the regulations in using it during prohibited hours; fines were inflicted on some, others being compelled to take out the necessary license from the water-registrars.

In the beginning of June, some additional inspectors having been appointed, a division was formed called "The Deacon Division," to check the waste indicated by the Deacon meters. This division attended exclusively to this service until the end of December, when the meters were removed on account of the freezing of the ground.

On July 28 all of the inspectors were placed on Deacon waste service until the end of the second week of August, when Division 1 was sent to the Mystic Department to make the inspection for revenue (January bills) in Charlestown

and Somerville. Division 3 was then detailed to inspect special business buildings, which, on account of the frequent changes in occupancy, water-fixtures, etc., it is not deemed advisable to take earlier in the year. Division 4 was at the same time placed inspecting model houses for which special rates are charged.

As we proceed with our examinations of the water-fixtures in dwelling-houses, I find that a great many of the sources of waste in past years are gradually ceasing to exist; for example, persons who habitually left open the valves of water-closets to flush out the soil-pipes have generally ceased doing so, as an inspector is liable at any time to call and find the water wasting, in which case the premises are fined $2 for each offence. Again, where old, leaky fixtures existed for years, new ones have been put in, or proper repairs made; the inspection visits to examine the fixtures being anticipated, the plumber is frequently sent for before such occurs.

A large percentage of the waste that in former years raised the consumption to over 100 gallons per head of the population, I consider, from the results of the past two years, must have occurred from bursts in street-mains and service-pipes before reaching their source of supply. During the year covered by this report I have notified the service division of the Cochituate Department of over 200 bursts in street mains and pipes; also, of a large number of public fountains and hydrants found wasting water; the necessary repairs were made in each case.

The work of this division in checking waste and cutting down the supply will be readily seen by the following table, which gives, by way of comparison, the consumption for each month for a year before the house-to-house inspection began, with the corresponding figures for each month since that time. The increase in the consumption for the first three months of the present year is accounted for by the fact that it was an exceptionally cold season, in consequence of which faucets in nearly all parts of the city were left open to prevent freezing: —

Cochituate Department.

Consumption in Gallons.

The year before Inspection.			Since Inspection began.		
	1882.	1883.	1883.	1884.	1885.
January	.....	34,715,500	.....	32,162,300	26,711,900
February	.....	32,690,700	.....	24,598,000	31,847,400
March	.....	34,110,700	.....	21,862,600	27,697,200
April	.....	30,617,600	.....	21,460,700	22,720,450
May	.....	32,169,500	.....	23,708,500	.....
June	.....	33,419,200	.....	26,184,600	.....
July	.....	36,774,000	.....	25,409,000	.....
August	.....	37,141,000	.....	25,065,200	.....
September	31,691,600	.....	33,645,600	26,389,500	.....
October	31,563,800	.....	29,575,800	25,022,850	.....
November	31,318,700	.....	28,839,300	22,954,250	.....
December	32,352,800	.....	30,174,200	24,234,800	.....

The saving for the entire year, 1884, as compared with the consumption of the year before inspection, averaged per day 8,292,742 gallons in the Cochituate Department. The daily average consumption the year before inspection was 33,213,758, while for 1884 it was but 24,921,016.

In the Mystic Division a considerable saving in the consumption was effected during the year through checking waste; but, owing to the imperfect condition of the street mains in Somerville and Chelsea, it bears no comparison to that effected in the Cochituate Division.

After the Deacon service was discontinued for the year, in conformity with the order of the Board, the Inspectors were, each in turn, beginning January 1, suspended, with loss of pay, for twenty days; these suspensions ended April 24, when all the inspectors were again at work.

The work of the present year was opened with the service of the January bills for the Water-Registrars. In the Cochituate Department, 37,557 bills, and in the Mystic Department for Somerville and Charlestown, 9,281 bills, were delivered; this work was completed in eleven days.

The house-to-house inspection, at present in progress for the revenue of next year, was begun January 12; it is, at the

time of writing (May 22), more than half done. The entire of the inspection-books for South Boston have been passed to Water-Registrar Davis, and a large part of the result of the inspection throughout the city is ready for delivery to him. The inspection for Registrar Caldwell, of Chelsea, Everett, and Revere — for his July bills — will, I expect, be ready in a few days.

A large number of inaccuracies existed in the returns of rateable fixtures sent to the Water-Registrars in the last inspection; this resulted from not having in my possession accurate returns of previous inspections, and consequently being unable to compare the returns, as they came in, with those of former inspections. To obviate this, and give to Registrar Davis this year, a perfect account of all taxable water-fixtures in the Cochituate Department, I, with the consent of the Board, detailed two inspectors to compare the present with last year's return; where discrepancies were found, I placed four of the most reliable inspectors on the work of verification, their duty being to visit the premises, examine the fixtures, and bring in correct reports of what they found. Some thousands of errors were discovered and corrected, the result of this will be that the inspection on which the Division is at present engaged, will be the only thoroughly accurate and reliable one ever made. I expect to complete the inspection of the Cochituate Department early in July.

On February 17 I received a communication from the Water Board stating that "the Board of Health desire to be informed of the number of privy-vaults and wells, whether used or not, within the city," and instructing me to obtain the information, and transmit the same to the Board of Health. I was further instructed by the Water Board to call on the members of the Board of Health, and ascertain if they needed any additional information that this division could furnish, I did so with the result that immediately afterwards I had printed in schedule form a return to be filled up by each inspector, giving the following information of all privy-vaults and wells within the limits of the City of Boston, viz.: — Of vaults — the "street and number; if in use, condition, whether broken, if full, etc.; and of wells — their number, if in use, etc." I have thus far transmitted to the Board of Health returns of 3,533 vaults, and of 200 wells, with their condition as stated above. In addition to the foregoing, I was requested by the Board of Health to give them an approximation, from any source which I then had in hand, of the number of privy-vaults within the city limits; the following copy of a letter which I wrote them explains my action in reference: —

"INSPECTION AND WASTE DIVISION.
WATER DEPARTMENT, March 7, 1885.

SAMUEL H. DURGIN, ESQ., M.D.,
Chairman, Board of Health: —

DEAR SIR, — In conformity with instructions received from the Water Board, February 17, I herewith send you returns of vaults and wells taken by the inspectors of this division since that date, and which I shall continue to furnish you with during the progress of the present inspection. Below you will find an approximation of the number of privy-vaults in the various districts within the limits of the City of Boston, asked for by your Board in our recent interview.

Respectfully yours,

D. B. CASHMAN,
Superintendent.

South Boston	2,082
City Proper	2,874
Boston Highlands	1,314
Dorchester District	1,114
Brighton District	880
East Boston	1,682
Charlestown District	1,545
	11,491"

I consider that there is a marked improvement in the discipline and efficiency of the Division. Only a few trivial reports were received from citizens during the past year of any impropriety on the part of inspectors, and on investigation they proved groundless; no serious complaint has been made against any of the men.

Refusals to admit the Inspectors into dwelling-houses for purposes of inspection are now very rare, although they were quite frequent in the earlier days of house-to-house inspection.

Metered premises are examined for waste the same as those not metered. In cases where waste is found to exist, the persons interested are orally notified; no notice to repair is served. By this course we frequently save such persons considerable expense, as otherwise they would have to pay for the water received through the meter, whether used or wasted.

Schedules of the Work Performed by each Inspector.

In the following schedules the work performed by each Inspector for the year will be found. It is but just, however, to remark, that, in some cases where the figures do not seem to give large results, the work done was of an intricate and important kind, that required time and care, hence, the figures do not in all cases give the value of the work done.

INSPECTION OF 1884.

Cochituate Department.

The following tables give the work of each Inspector from May 1, 1884, to the end of the house-to-house inspection then in progress (June 6, 1844) :—

Division 1. — James H. McGuire, Chief Inspector.

Inspectors.	Date of Appointment.	Number of Premises Inspected for Revenue.	Defective Fixtures.				Wilful Waste Reports.		Hose Reports.	
			Waste Reports Received.	Notices to Repair Issued.	Reëxaminations made.	Fine Notices Issued for Non-repair.	Reports Received.	Fine Notices Issued.	Reports Received.	Fines Imposed.
Bacharach, Solomon . .	1884. May 19.	251	0	0	0	0	0	0	0	0
Dunn, Jno. J.	1884 Jan. 14.	494	0	0	0	0	0	0	0	0
Finnegan, D. A.	"	721	0	0	0	0	0	0	0	0
Furlong, L. P.	1883. July 16.	418	1	2	4	0	0	0	0	0
Hassett, J. B.	"	478	1	1	2	0	0	0	0	0
McAuliffe, J. J.	"	272	0	0	0	0	0	0	0	0
Quigley, J. L.	1884. Jan. 1.	404	2	2	1	0	0	0	0	0
Ross, George F.	1883. July 16.	723	0	0	0	0	0	0	0	0
Toland, Jos. H.	"	266	0	0	0	0	0	0	0	0
Total	. . . . .	4,027	4	5	7	0	0	0	0	0

Division 2. — JOHN B. MAGUIRE, Chief Inspector.

INSPECTORS.	Date of Appointment.	Number of Premises Inspected for Revenue.	Defective Fixtures.				Wilful Waste Reports.		Hose Reports.	
			Waste Reports Received.	Notices to Repair Issued.	Reëxaminations made.	Fine-Notices Issued for Non-Repairs.	Reports Received.	Fine-Notices Issued.	Reports Received.	Fines Imposed.
Connolly Jno. A. . . .	1884. Jan. 1.	582	8	11	4	0	0	0	0	0
Corbett, Jno. J.	1883. July 16.	105	5	5	6	0	0	0	0	0
Daly, Jas. F.	Aug. 18.	511	1	1	0	0	0	0	20	10
Desmond, Jno. F. . . .	July 16.	517	0	0	0	0	0	0	0	0
Haley, Jno. A.	"	395	13	13	7	0	0	0	0	0
McNamara, Jno. . . .	"	591	0	0	0	0	0	0	0	0
McCarthy, T., Jr. . . .	1884. Jan. 14.	596	4	4	5	0	0	0	0	0
Rosnosky, Raphael . .	May 19.	180	6	6	4	0	0	0	0	0
Sweeney, C. F.	1883. July 16.	539	1	1	0	0	0	0	0	0
Total	. . . . .	4,016	38	41	26	0	0	0	20	10

Division 3. — WILLIAM P. CARROLL, Chief Inspector.

INSPECTORS.	Date of Appointment.	Number of Premises Inspected for Revenue.	Defective Fixtures.				Wilful Waste Reports.		Hose Reports.	
			Waste Reports Received.	Notices to Repair Issued.	Reëxaminations made.	Fine-Notices Issued for Non-repairs.	Reports Received.	Fine-Notices Issued.	Reports Received.	Fine-Notices Issued.
	1883.									
Butler, Wm. F.	July 16.	385	6	9	4	0	0	0	0	0
Corbett, Jno. J.	"	248	4	4	56	0	0	0	0	0
Cassidy, M. F. J. . . .	"	486	3	3	16	0	0	0	0	0
	1884.									
Leahan, Jno. W. . . .	May 19.	401	2	2	6	0	0	0	0	0
	1883.									
Maguire, R. E.	July 16.	494	4	4	11	0	0	0	0	0
	1884.									
McKenna, B. F.	Jan. 14.	613	9	9	11	0	0	0	0	0
	1883.									
Quigley, J. J.	July 16.	565	4	3	1	0	0	0	0	0
Ready, Edward	"	81	5	5	9	0	0	0	0	0
	1884.									
Smith, P. J.	Jan. 1.	635	35	35	9	0	0	0	0	0
Total	. . . . .	3,708	72	74	123	0	0	0	0	0

Division 4. — JAMES J. STRANGE, Chief Inspector.

INSPECTORS.	Date of Appointment.	Number of Premises Inspected for Revenue.	Defective Fixtures.				Wilful Waste Reports.		Hose Reports.	
			Waste Reports Received.	Notices to Repair Issued.	Reëxaminations made.	Fine-Notices Issued for Non-repairs.	Reports Received.	Fine-Notices Issued.	Reports Received.	Fine-Notices Issued.
Cullen, Jno. F.	1883. July 16.	268	3	3	6	0	0	0	0	0
Edmonds, Michael . .	"	159	1	1	6	3	0	0	0	0
Kilduff, William . . .	"	592	6	6	10	0	0	0	0	0
Murray, Thomas F. . .	"	585	5	5	14	0	0	0	0	0
Murray, Richard J. . .	"	579	0	0	0	0	0	0	0	0
Murphy, Jno. J.	1884. Jan. 14.	488	11	14	22	4	0	0	0	0
Neagle, Joseph B. . . .	"	220	1	1	6	0	0	0	0	0
Wood, Walter B. . . .	"	519	17	17	18	0	0	0	0	0
Total	. . . . .	3,410	44	47	82	7	0	0	0	0

Summary of the Part of the Inspection of 1884 comprised in the foregoing Schedules: —

DIVISION.	Number of Premises Inspected for Revenue.	Defective Fixtures.				Wilful Waste Reports.		Hose Reports.	
		Waste Reports Received.	Notices to Repair Issued.	Reëxaminations made.	Fine-Notices Issued for Non-repairs.	Reports Received.	Fine-Notices Issued.	Reports Received.	Fine-Notices Issued.
One	4,027	4	5	7	0	0	0	0	0
Two	4,016	38	41	26	0	0	0	20	10
Three	3,708	72	74	123	0	0	0	0	0
Four	3,410	44	47	82	7	0	0	0	0
Total	15,161	158	167	238	7	0	0	20	10

DEACON SERVICE.

The following tables give the work of each Inspector, in checking waste, from the time of districting the men, June 7, 1884, to the end of the year: —

Division 2. — JAMES H. McGUIRE, Chief Inspector.

INSPECTORS.	Date of Appointment.	Number of Premises Inspected for Revenue.	Number of Premises Inspected for Waste.	Defective Fixtures.				Wilful Waste Reports.		Hose Reports.	
				Waste Reports Received.	Notices to repair issued.	Reëxaminations made.	Fine-Notices issued for Non-repairs.	Reports Received.	Fine-Notices Issued.	Reports Received.	Fine-Notices Issued.
Dunn, John J. . . .	1884. Jan. 14.	. . .	3,237	370	370	332	4	1	1	11	8
Desmond, John F. .	1883. July 16.	. . .	2,940	245	244	320	10	1	1	1	0
Finnegan, Daniel A.	1884. Jan. 14.	. . .	3,609	394	390	468	12	0	0	3	0
Furlong, L. P. . . .	1883. July 16.	. . .	288	20	20	30	0	0	0	0	0
Murray, T. F. . . .	"	. . .	614	83	83	32	11	1	1	2	2
McKenna, B. F. . .	1884. Jan. 14.	. . .	231	45	45	43	3	0	0	0	0
McCormack, D. . . .	July 9.	. . .	2,888	152	152	227	0	1	1	1	0
Ross, George F. . .	1883. July 16.	. . .	3,848	256	254	255	4	12	12	10	6
Rosnosky, Raphael .	1884. May 19.	. . .	3,810	479	481	448	7	4	4	1	0
Toland, Jos. H. . . .	1883. July 16.	. . .	2,950	69	68	48	0	0	0	0	0
Total	. . . . .	. . .	24,415	2,113	2,107	2,203	51	20	20	29	16

Division 3. — JAMES J. STRANGE, Chief Inspector.

INSPECTORS.	Date of Appointment.	Number of Premises Inspected for Revenue.	Number of Premises Inspected for Waste.	Defective Fixtures.				Wilful Waste Reports.		Hose Reports.	
				Waste Reports Received.	Notices to repair issued.	Reëxaminations made.	Fine-Notices Issued for Non-repairs.	Reports Received.	Fine-Notices Issued.	Reports Received.	Fine-Notices Issued.
Bacharach, Solomon.	1884. May 19.	49	1,946	384	382	358	6	8	8	18	5
Berran, Joseph . . .	1884. July 9.	110	1,754	411	401	481	13	6	6	0	0
Edmonds, Michael .	1883. July 16.	82	1,419	203	201	208	9	0	0	23	13
Kilduff, William . .	"	30	2,277	231	228	243	2	0	0	5	2
McKenna, B. F. . .	1884. Jan. 14.	0	1,781	188	187	160	5	0	0	6	2
Maguire, R. E. . . .	1883. July 16.	24	1,569	160	160	167	2	0	0	0	0
Smith, P. J.	1884. Jan. 1.	26	2,383	852	852	879	40	10	7	0	0
Total	. . . . .	321	13,129	2,429	2,411	2,496	77	24	21	52	21

Division 4. — WILLIAM P. CARROLL, Chief Inspector.

INSPECTORS.	Date of Appointment.	Number of Premises inspected for Revenue.	Number of Premises inspected for Waste.	Defective Fixtures.				Wilful Waste Reports.		Hose Reports.	
				Waste Reports Received.	Notices to Repair Issued.	Reëxaminations Made.	Fine-Notices Issued for Non-repairs.	Reports Received.	Fine-Notices Issued.	Reports Received.	Fine-Notices Issued.
Corbett, John J. . .	1883. July 16.	10	2,777	312	312	353	3	2	2	12	5
Foye, John E. . . .	1884. July 7.	0	0	0	0	0	0	0	0	3	2
Leahan, John W. .	May 19.	26	2,474	302	301	323	5	0	0	9	3
Murphy, John J. . .	Jan. 14.	0	2,729	400	398	441	5	4	4	13	10
Quigley, John J. . .	1883. July 16.	12	2,594	120	120	87	0	5	5	11	4
Woods, Walter B. .	1884. Jan. 14.	24	2,572	362	361	396	6	1	1	13	5
Total	. . . . .	72	13,146	1,496	1,492	1,600	19	12	12	61	29

Deacon Division, 5. — EDWARD READY, Chief Inspector.

The following table gives the work of the Deacon Division, (No. 5), from its inception, May 13, 1884, to the end of year.

INSPECTORS.	Date of Appointment.	Number of Premises inspected for Revenue.	Number of Premises inspected for Waste.	Defective Repairs.				Wilful Waste Reports.		Hose Reports.	
				Waste Reports Received.	Notices to Repair Issued.	Reëxaminations Made.	Fine-Notices Issued for Non-repairs.	Reports Received.	Fine-Notices Issued.	Reports Received.	Fine-Notices Issued.
	1883.										
Butler, William F. .	July 16	. . .	612	167	167	131	1	4	4	2	1
Cullen, John F. . . .	"	. . .	676	118	118	83	8	0	0	0	0
Cassidy, M. F. J. . .	"	. . .	2,455	483	483	690	7	3	3	2	1
Daly, James F. . . .	Aug. 18.	. . .	256	34	34	49	3	0	0	7	7
Edmonds, Michael .	July 16.	. . .	128	11	11	4	0	0	0	0	0
	1884.										
Foye, John E. . . .	July 9.	. . .	1,568	155	155	132	2	3	3	2	2
	1883.										
Furlong, Lawrence P.	July 16.	. . .	2,141	286	287	197	0	0	0	1	1
McAuliffe, John J. .	"	. . .	2,286	375	375	338	6	7	7	0	0
McNamara, John . .	"	. . .	2,203	178	178	245	0	5	5	0	0
Murray, T. F. . . .	"	. . .	1,878	248	248	271	5	3	3	0	0
	1884.										
Maguire, H. G. . . .	Sept. 20.	. . .	1,042	167	167	133	0	0	0	0	0
Neagle, Joseph B. .	Jan. 14.	. . .	2,019	297	297	243	6	2	2	2	2
Quigley, J. L. . . .	Jan. 1.	. . .	1,780	292	291	194	7	1	1	0	0
	1883.										
Ready, Edward . .	July 16.	. . .	80	18	18	5	0	0	0	0	0
Sweeney, C. F. . . .	"	. . .	224	28	28	4	0	0	0	0	0
Toland, Joseph H. .	"	. . .	248	27	27	14	0	0	0	0	0
Total	. . . . .	. . .	19,596	2,884	2,884	3,480	45	28	28	16	14

MYSTIC DEPARTMENT.

The following table shows the work of each Inspector, checking waste in the Mystic Division from the time of districting the men (June 7, 1884), to the end of the year, and also includes the house-to-house inspection in the Mystic Department.

Division 1. — JOHN B. MAGUIRE, Chief Inspector.

INSPECTOR.	Date of Appointment.	No. of Premises inspected for Revenue.	No. of Premises inspected for Waste.	Defective Fixtures.				Wilful Waste Reports.		Hose Reports.	
				Waste Reports Received.	Notice to Repair Issued.	Re-examinations made.	Fine-Notices Issend for Non-Repair.	Reports Received.	Fine-Notices Issued.	Reports Received.	Fine-Notices Issued.
Connolly, John A. . .	1884. Jan. 1.	2,376	694	158	158	148	4	0	0	37	4
Daly, James F. . . .	1883. Aug. 18.	0	71	22	22	18	0	0	0	0	0
Haley, John A. . . .	July 16.	0	439	48	48	48	0	0	0	19	11
Hassett, John B. . .	"	1,429	1,933	265	261	265	0	1	1	0	0
Murray, R. J.	"	1,509	1,353	195	195	223	14	0	0	15	4
McCarthy, T., Jr. . .	1884. Jan. 14.	2,515	750	276	276	245	4	0	0	38	5
McDavitt, D. B. . . .	July 9.	1,664	895	130	130	134	12	0	0	1	1
McAuliffe, John J. .	1883. July 16.	15	52	16	16	0	0	0	0	0	0
Quigley, J. L.	1884. Jan. 1.	858	216	263	259	270	11	3	3	0	0
Sweeney, C. F. . . .	1883. July 16.	1,405	1,096	128	129	110	0	1	1	20	7
Total		11,771	7,499	1,501	1,494	1,461	45	5	5	130	32

Summary of the foregoing Tables of Deacon work: —

INSPECTORS.	Date of Appointment.	No. of Premises inspected for Revenue.	No. of Premises inspected for Waste.	Defective Fixtures.				Wilful Waste Reports.		Hose Reports.	
				Waste Reports Received.	Notice to Repair Issued.	Re-examinations made.	Fine-Notices Issued for Non-repairs.	Reports Received.	Fine-Notices Issued.	Reports Received.	Fine-Notices Issued.
Division 1	. . . .	11,771	7,499	1,501	1,494	1,461	45	5	5	130	32
" 2	. . . .	0	24,415	2,113	2,107	2,203	51	20	20	29	16
" 3	. . . .	321	13,129	2,429	2,411	2,496	77	24	21	52	21
" 4	. . . .	72	13,146	1,496	1,492	1,600	19	12	12	61	29
" Deacon (5) .	. . . .	0	19,596	2,884	2,884	3,480	45	28	28	16	14
Total		12,164	77,785	10,423	10,388	11,240	237	89	86	288	112

INSPECTION FOR REVENUE, 1885.

The following schedule gives that part of the house-to-house inspection at present in progress for the revenue of 1886, together with the returns of Vaults and Wells for the Board of Health:—

INSPECTOR.	Date of Appointment.	No. of Premises Inspected for Revenue.	No. of Premises Inspected for Waste.	Defective Fixtures.				Wilful Waste Reports.		Hose Reports.		Water Bills Delivered.	No. of Vaults Inspected.	No. of Wells Inspected.
				Reports Received.	Notices to Repair Issued.	Reëxaminations Made.	Fine Notices Issued for Non-Repairs.	Reports Received.	Fine Notices Issued.	Reports Received.	Fines Imposed.			
	1884.													
Bacharach, Solomon	May 19.	611	....	5	5	....	....	....	....	....	....	776	41	3
Berran, Joseph	July 9.	1,162	....	15	25	17	....	....	....	....	....	1,834	1	
Connolly, John A.	Jan. 1.	1,276	....	18	17	30	....	....	....	1	1	1,660		
	1883.													
Cassidy, M. F. J.	July 16.	846	521	11	11	34	....	....	....	....	....	2,187	51	
Corbett, John J.	"	1,379	....	17	17	30	3	....	....	....	....	1,643	177	37
	1885.													
Cutter, Harry H.	March 28.	132	208	16	15	8	....	....	....	....	....	....	5	
	1883.													
Daly, James F.	Aug. 18.	340	....	1	1	1	....	....	....	....	....	....	90	
Desmond, John F.	July 16.	1,419	....	12	13	6	....	....	....	....	....	2,062	107	1
	1884.													
Dunn, John J.	Jan. 14.	1,464	....	5	4	3	....	....	....	....	....	2,496	25	1
	1883.													
Edmonds, Michael	July 16.	1,232	....	6	8	8	....	1	1	....	....	1,953	6	2
Furlong, L. P.	"	1,150	18	6	4	5	....	....	....	....	....	1,566	87	3
	1884.													
Finnegan, D. A.	Jan. 14.	1,540	....	14	18	8	....	....	....	....	....	2,264	21	
Foye, John E.	July 9.	1,091	230	43	42	9	....	....	....	....	....	1,479	88	
	1883.													
Hassett, J. B.	July 16.	1,455	....	23	27	21	....	....	....	....	....	....	94	2
Kilduff, Wm.	"	1,323	....	6	9	10	....	....	....	....	....	1,930	80	
	1884.													
Leahan, John W.	May 19.	1,449	....	31	30	25	....	....	....	....	....	1,466	72	8

INSPECTION FOR REVENUE, 1885. — *Continued.*

INSPECTOR.	Date of Appointment.	No. of Premises inspected for Revenue.	No. of Premises inspected for Waste.	Defective Fixtures.				Wilful Waste Report.		Hose Reports.		Water Bills Delivered.	No. of Vaults Inspected.	No. of Wells Inspected.
				Reports Received.	Notices to Repair Issued.	Reëxaminations Made.	Fine Notices Issued for Non-Repairs.	Reports Received.	Fine Notices Issued.	Reports Received.	Fines Imposed.			
McAuliffe, John J.	July 16, 1883.	1,380	....	1	1	3	....	....	....	....	....	1,629		
McNamara, John	" 16, 1883.	1,284	....	1	1	7	....	....	....	....	....	1,558	170	
Maguire, R. E.	" 16, 1883.	1,038	....	11	8	3	....	....	....	....	....	1,616	127	2
Maguire, H. G.	Sept. 20, 1884.	1,285	....	12	12	8	....	1	1	....	....	1,972	188	25
McCarthy, T., Jr.	Jan. 14, 1884.	1,408	....	51	65	131	....	....	....	....	....	1	1	
McKenna, B. F.	" 14, 1884.	1,555	....	32	33	44	....	....	....	....	....	1,937	375	4
Murray, T. F.	July 16, 1883.	984	290	50	47	23	....	....	....	....	....	....	75	6
Murphy, Jno. J.	Jan. 14, 1884.	987	261	106	94	51	3	....	....	....	....	....	43	7
McCormack, Dillon	July 9, 1884.	1,635	....	2	2	4	....	....	....	....	....	....	56	
McCarthy, C. F.	Mar. 28, 1885.	39	132	16	15	41	1	....	....	....	....	....	6	
McDavitt, D. B.	July 9, 1884.	852	....	3	3	5	....	....	....	....	....	1,086		
Neagle, Jos. B.	Jan. 14, 1884.	514	43	2	2	2	....	....	....	....	....	1,422		
O'Toole, Robert W.	Mar. 28, 1885.	290	....	11	10	8	....	....	....	....	....	....	89	
Quigley, J. L.	Jan. 1, 1884.	1,279	....	32	32	27	....	....	....	....	....	1,410		
Quigley, J. J.	July 16, 1883.	1,185	....	23	23	50	....	....	....	....	....	1,526	2	
Ross, George F.	" 16, 1883.	520	....	3	6	3	....	....	....	....	....	2,205		
Rosnosky, Raphael	May 19, 1884.	1,448	....	23	23	24	....	....	....	....	....	1,855	90	
Roth, Jno. H.	Feb. 3, 1885.	961	....	37	37	49	....	....	....	....	....	....	246	12
Sweeney, C. F.	July 16, 1883.	1,352	....	36	33	38	1							
Smith, L. F.	Mar. 28, 1885.	207	....	52	47	28	2							
Smith, P. J.	Jan. 1, 1884.	1,146	....	94	95	130	8	2	2	....	....	1,259	75	
Toland, Jos. H.	July 16, 1883.	894	....	1	2	4	....	....	....	....	....	2,147		
Wood W. B.	Jan. 14. 1884.	1,402	....	48	49	49	....	....	....	....	....	1,899	190	17
Kane, J. J.	April 21, 1885.	Being	instructed in	his duty										
Total	.....	41,514	1,703	876	886	947	18	4	4	1	1	46,838	2,678	130

Other work done by the Division, and not included in the foregoing schedules, is as follows: —

From what Source received.	Defective Fixture reports received.	Wilful waste reports received.	Violation of Hose reports received.
Engineer's Department	2	1	2
Police "	85	3	5
Health "	65	2	
Service Division	7	1	
	159	7	7

During the year 614 fines have been inflicted for non-repairs of water-fixtures, wilful waste of water, and violations of hose regulations.

Of these 176 were collected, and 438 abated for various causes.

During the same period the water has been cut off for non-repairs from 96 premises and let on again to 95.

The amount of cash received for fines and turned over to the Water-Registrars is as follows: —

To Registrar of Cochituate Dep't.	$296 00
Mystic Dep't.	36 00
	332 00
Amount refunded	32 00
Total	$364 00

The $32 collected in fines, and afterward refunded to the parties, was done by order of the Water Board.

Very respectfully,

D. B. CASHMAN,

Superintendent.

CIVIL ORGANIZATION OF THE WATER-WORKS, FROM THEIR COMMENCEMENT TO MAY 1, 1885.

WATER COMMISSIONERS.

NATHAN HALE, JAMES F. BALDWIN, THOMAS B. CURTIS. From May 4, 1846, to January 4, 1850.

ENGINEERS FOR CONSTRUCTION.

JOHN B. JERVIS, of New York, Consulting Engineer. From May, 1846, to November, 1848.

E. S. CHESBROUGH, Chief Engineer of the Western Division. From May, 1846, to January 4, 1850.

WILLIAM S. WHITWELL, Chief Engineer of the Eastern Division. From May, 1846, to January 4, 1850.

CITY ENGINEERS HAVING CHARGE OF THE WORKS.

E. S. CHESBROUGH, Engineer. From November 18, 1850, to October 1, 1855.

GEORGE H. BAILEY, Assistant Engineer. From January 27, 1851, to July 19, 1852.

H. S. MCKEAN, Assistant Engineer. From July 19, 1852, to October 1, 1855.

JAMES SLADE, Engineer. From October 1, 1855, to April 1, 1863.

N. HENRY CRAFTS, Assistant Engineer. From October 1, 1855, to April 1, 1863.

N. HENRY CRAFTS, City Engineer. From April 1, 1863, to November 25, 1872.

THOMAS W. DAVIS, Assistant Engineer. From April 1, 1863, to December 8, 1866.

HENRY M. WIGHTMAN, Resident Engineer at C. H. Reservoir. From February 14, 1866, to November, 1870.

A. FTELEY, Resident Engineer on construction of Sudbury-river works, from May 10, 1873, to April 7, 1880.

JOSEPH P. DAVIS, City Engineer. From Nov. 25, 1872, to March 20, 1880.

HENRY M. WIGHTMAN, City Engineer. From April 5, 1880, to April 3, 1885.

WILLIAM JACKSON, City Engineer. From April 21, 1885, to present time.

After January 4, 1850, Messrs. E. S. CHESBROUGH, W. S. WHITWELL, and J. AVERY RICHARDS, were elected a Water Board, subject to the direction of a Joint Standing Committee of the City Council, by an ordinance passed December 31, 1849, which was limited to keep in force one year; and in 1851 the Cochituate Water Board was established.

COCHITUATE WATER BOARD.

Presidents of the Board.

THOMAS WETMORE, elected in 1851, and resigned April 7, 1856‡ . . . . . Five years.

JOHN H. WILKINS, elected in 1856, and resigned June 5, 1860‡ . . . . . Four years.

EBENEZER JOHNSON, elected in 1860, term expired April 3, 1865‡ . . . . . Five years.
OTIS NORCROSS, elected in 1865, and resigned January 15, 1867‡ . . . . . One year and nine months.
JOHN H. THORNDIKE, elected in 1867, term expired April 6, 1868‡ . . . . . One year and three months.
NATHANIEL J. BRADLEE, elected April, 6, 1868, and resigned January 4, 1871 . . . Two years and nine months.
CHARLES H. ALLEN, elected January 4, 1871, to May 4, 1873 . . . . . Two years and four months.
JOHN A. HAVEN, elected May 4, 1873, to Dec. 17, 1874‡ . . . . . One year and seven months.
THOMAS GOGIN, elected Dec. 17, 1874, and resigned May 31, 1875 . . . . . Six months.
L. MILES STANDISH, elected August 5, 1875, to July 31, 1876 . . . . . One year.

Members of the Board.

THOMAS WETMORE, 1851, 52, 53, 54, and 55‡ . . Five years.
JOHN H. WILKINS, 1851, 52, 53, *56, 57, 58, and 59‡ . Eight years.
HENRY B. ROGERS, 1851, 52, 53, *54, and 55 . . . Five years.
JONATHAN PRESTON, 1851, 52, 53, and 56 . . . Four years.
JAMES W. SEAVER, 1851‡ . . . . . One year.
SAMUEL A. ELIOT, 1851‡.
JOHN T. HEARD, 1851‡ . . . . . One year.
ADAM W. THAXTER, Jr., 1852, 53, 54, and 55‡ . . Four years.
SAMPSON REED, 1852 and 1853‡ . . . . . Two years.
EZRA LINCOLN, 1852‡ . . . . . One year.
THOMAS SPRAGUE, 1853, 54, and 55‡ . . . . Three years.
SAMUEL HATCH, 1854, 55, 56, 57, 58, and 61 . . . Six years.
CHARLES STODDARD, 1854, 55, 56, and 57‡ . . . Four years.
WILLIAM WASHBURN, 1854 and 55 . . . . . Two years.
TISDALE DRAKE, 1856, 57, 58, and 59‡ . . . . Four years.
THOMAS P. RICH, 1856, 57, and 58‡ . . . . Three years.
JOHN T. DINGLEY, 1856 and 59‡ . . . . . Two years.
JOSEPH SMITH, 1856‡ . . . . . Two months.
EBENEZER JOHNSON, 1857, 58, 59, 60, 61, 62, 63, and 64,‡ Eight years.
SAMUEL HALL, 1857, 58, 59, 60, and 61‡. . . . Five years.
GEORGE P. FRENCH, 1859, 60, 61, 62, and 63‡. . . Five years.
EBENEZER ATKINS, 1859‡ . . . . . One year.
GEORGE DENNIE, 1860, 61, 62, 63, 64, and 65 . . . Six years.
CLEMENT WILLIS, 1860 . . . . . One year.
G. E. PIERCE, 1860‡ . . . . . One year.
JABEZ FREDERICK, 1861, 62, and 63‡ . . . . Three years.
GEORGE HINMAN, 1862 and 63 . . . . . Two years.
JOHN F. PRAY, 1862 . . . . . One year.
J. C. J. BROWN, 1862 . . . . . One year.
JONAS FITCH, 1864, 65, and 66‡ . . . . . Three years.
OTIS NORCROSS, *1865 and 66‡ . . . . . Two years.
JOHN H. THORNDIKE, 1864, 65, 66, and 67‡ . . . Four years.
BENJAMIN F. STEVENS, 1866, 67, and 68 . . . . Three years.
WILLIAM S. HILLS, 1867 . . . . . One year.
CHARLES R. TRAIN, 1868‡ . . . . . One year.
JOSEPH M. WIGHTMAN, 1868, and 69‡ . . . . Two years.
BENJAMIN JAMES, *1858, 68, and 69 . . . . Three years.
FRANCIS A. OSBORN, 1869 . . . . . One year.
WALTER E. HAWES, 1870‡ . . . . . One year.
JOHN O. POOR, 1870 . . . . . One year.
HOLLIS R. GRAY, 1870 . . . . . One year.

NATHANIEL J. BRADLEE, 1863, 64, 65, 66, 67, 68, 69, 70, and 71	Nine years.
GEORGE LEWIS, 1868, 69, 70, and 71	Four years.
SIDNEY SQUIRES, 1871‡	One year.
CHARLES H. HERSEY, 1872	One year.
CHARLES H. ALLEN, 1869, 70, 71, and 72	Four years.
ALEXANDER WADSWORTH, *1864, 65, 66, 67, 68, 69, and 72	Seven years.
CHARLES R. MCLEAN, 1867, 73, and 74‡	Three years.
EDWARD P. WILBUR, 1873 and 74	Two years.
JOHN A. HAVEN, 1870, 71, 72, 73, and 74‡	Five years.
THOMAS GOGIN, 1873, 74, and 75*	Three years.
AMOS L. NOYES, 1871, 72, and 75	Three years.
WILLIAM G. THACHER, 1873, 74, and 75‡	Three years.
CHARLES J. PRESCOTT, 1875	One year.
EDWARD A. WHITE, 1872, 73, 74, 75, and 76†	Five years.
LEONARD R. CUTTER, 1871, 72, 73, 74, 75, and 76†	Six years.
L. MILES STANDISH, 1860, 61, 63, 64, 65, 66, 67, 74, 75, and 76†	Ten years.
CHARLES E. POWERS, *1875 and 1876†	Two years.
SOLOMON B. STEBBINS, 1876†	One year.
NAHUM M. MORRISON, 1876†	One year.
AUGUSTUS PARKER, 1876†	One year.

*Mr. John H. Wilkins resigned Nov. 15, 1855, and Charles Stoddard was elected to fill the vacancy. Mr. Henry B. Rogers resigned Oct. 22, 1865. Mr. Wilkins was re-elected Feb., 1856, and chosen President of the Board, which office he held until his resignation, June 5, 1860, when Mr. Ebenezer Johnson was elected President; and July 2 Mr. L. Miles Standish was elected to fill the vacancy occasioned by the resignation of Mr. Wilkins. Otis Norcross resigned Jan. 15, 1867, having been elected Mayor of the City. Benjamin James served one year, in 1858, and was reëlected in 1868. Alexander Wadsworth served six years, 1864–69, and was reëlected in 1872. Thomas Gogin resigned May 31, 1875. Charles E. Powers was elected July 15, to fill the vacancy occasioned by the resignation of Mr. Gogin.

† Served until the organization of the Boston Water Board.

‡ Deceased.

Boston Water Board, *Organized July 31, 1876.*

Timothy T. Sawyer, from July 31, 1876, to May 5, 1879; and from May 1, 1882, to May 4, 1883.
Leonard R. Cutter, from July 31, 1876, to May 4, 1883.
Albert Stanwood, from July 31, 1876, to May 7, 1883.
Francis Thompson, from May 5, 1879, to May 1, 1882.
William A. Simmons, from May 7, 1883, to present time.
George M. Hobbs, from May 4, 1883, to present time.
John G. Blake, from May 4, 1883, to present time.

Organization of the Board for Year 1884–85.

Chairman.
William A. Simmons.

Clerk.
Walter E. Swan.

City Engineer and Engineer of the Board.
Henry M. Wightman.

Water-Registrar of the Cochituate Department.
William F. Davis.

Water-Registrar of the Mystic Department.
Joseph H. Caldwell.

Superintendent of the Eastern Division of Cochituate Department.
Ezekiel R. Jones.

Superintendent of the Western Division of Cochituate Department.
Desmond FitzGerald.

Superintendent of Mystic Department.
J. Henry Brown.

Superintendent of Meter Division.
Hiram Cutts.

Superintendent of Inspection and Waste Division.
D. B. Cashman.

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