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THIRD ANNUAL REPORT  
OF THE  
WATER COMMISSIONER



FOR THE YEAR ENDING  
JANUARY 31, 1898

No 6355.52

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1897/8.



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# THIRD ANNUAL REPORT

OF THE

# WATER COMMISSIONER

FOR THE

YEAR ENDING JANUARY 31, 1898.

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Printed for the Department.



BOSTON:  
MUNICIPAL PRINTING OFFICE.  
1898.

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1898

Boston Water Dept.

Aug. 16, 1898



MASSACHUSETTS  
WATER BOARD  
1888

OFFICE OF THE WATER COMMISSIONER,  
CITY HALL, BOSTON, February 1, 1898.

HON. JOSIAH QUINCY, *Mayor* :

SIR: I submit a report of the doings of the Water Department for the year ending January 31, 1898.

The net income of the department shows an increase over last year, and the net debt a marked decrease.

In addition to the general detail work of the department 28.2 miles of main pipe have been laid, seven miles of which were relaid.

The many improvements in progress in the city, such as the South Union Station, Subway, Stony brook improvement and grade crossings, have made the department work of a very difficult nature. The taking of a portion of the yard of our Distribution Division has so curtailed our storage capacity as to increase the difficulties and the cost of handling our pipe. This together with the ever-increasing necessity of doing work on Sundays and at night, in order that the public may be least inconvenienced in the crowded portions of the city, is each year adding to the cost of our work, especially in the city proper.

The original pipes, laid fifty years ago, when the Cochituate system was introduced into Boston, are not in some localities large enough to give the proper supply of water, and in others have deteriorated in strength to such an extent as to necessitate their being taken up and new pipes of a larger diameter laid in their places. The department has had a great deal of this work for the last two years, and will have more in the future. This means heavy expenditures and increased cost in maintenance.

In the outlying sections of the city the number of buildings erected has been phenomenal, necessitating the laying of a large number of new mains and service pipes.

The amount of work done by the department is very much in excess of that accomplished in previous years, and it is absolutely necessary that the wharf facilities of the Distribution Division for storing of pipe, etc., be increased at

once, in order that the main pipe, stock, etc., can be handled quickly and economically.

The practice of setting service pipes for vacant lands on streets laid out under chapter 323, Acts of 1891, which has heretofore been followed, presents many objectionable features. One of the most serious is the opportunity afforded for waste of water. Some of the services get broken by the settlement of the street, by the road-roller in construction, by electrolysis, etc. Under these conditions, as the pipe is under pressure from the main to the sidewalk, leaks occur which are often not apparent on the surface. In a few years, as the number of services which are not connected to buildings are liable to increase, the number of leaks of this kind must be large and serious. Another objection is the fact that neither the size of the service nor its proper location can be accurately determined in advance. In many cases no lotting of the land has been made, and if made the land may change ownership, involving oftentimes a complete relaying. Under the present methods, in order to provide for every possible service, it has resulted, and will result, in the location of many pipes which will never be used, and which eventually must be a means of waste. It is my intention to change the policy of the department in reference to these service pipes, so as to prevent the faults of the present method of laying them.

The work of extending the salt-water mains for the Fire Department is progressing very satisfactorily.

In the nigh future it is possible to somewhat curtail the expenses of the department by shutting down some of the smaller pumping-stations. This will be made possible by the completion of the laying of large mains upon which the department is at work at the present time.

The organization of the department has been practically completed. The method of keeping the general accounts, reporting on the work, etc., applied last year to Districts 1, 2 and 3, are in use in District 4 and the Meter Division. The lack of any correct accounts in the Meter Division has made this change a very difficult one. With the coming year, I am of the opinion that the method of keeping the accounts in all

the divisions will be more than satisfactory. The report of the expert accountant engaged to examine our accounts is to the effect that the books and accounts are kept correctly.

The Meter Division has been transferred from what was formerly known as the Eastern Division to the Income Division. By this change all matters pertaining to income are part of the Income Division, and all matters pertaining to supply remain with the Distribution Division (formerly Eastern Division).

On January 1, 1898, the Metropolitan Water Board made a taking of the sources of supply of our department outside the limits of Boston. The taking includes all the property of the department (including basins, aqueducts, mains, etc.) outside the territorial limits of Boston, except the Fisher Hill Reservoir, the old Brookline Reservoir, their connections, and some mains in the immediate vicinity of Boston, but not within her limits. The division of the department formerly known as the Eastern is now known as the Distribution Division. The Western Division has been done away with. Boston no longer supplies Somerville, Chelsea and Everett with water. The receipts from income during January were somewhat less, because of our ceasing to supply these cities; and for the same reason during the coming year the receipts will be materially less than for the year just ended.

The purity of the water has been maintained by constant inspection and attention. The work of the Deacon meter service in the detection of waste has been conscientiously carried on; but Boston is meeting the same difficulty that is met with in other cities, viz., an increased consumption brought about partially by waste, but in part by the increased demands made by the modern methods of living.

The department has paid particular attention to electrolysis, and under the head of the City Engineer's report will be found the facts in detail.

The demands for new work during the coming year will, of necessity, be larger than during the past. With your approval the practice inaugurated in previous years of paying for work under chapter 177, Acts of 1872, has been aban-

done, and all expenditures of the department will be paid for out of the regular appropriation. In addition to the extension of mains and the relaying of old pipe, it will be necessary this year to lay a 12-inch main from Neponset, through Quincy, to Moon Island, in order to properly supply Long Island and the various islands and fortifications in the harbor with water. The present 6-inch pipe is totally inadequate. It will also be necessary to lay an additional pipe under Shirley Gut to Deer Island, and an additional pipe across Chelsea creek to East Boston, as one of the mains has become so weakened by age as to become totally useless.

The receipts and disbursements of the department for the year were as follows:

Total receipts of the Water Works, from all sources, for the year ending January 31, 1898:

Income from sales of water . . . . .	\$2,590,496 89	
Income from shutting off and letting on water and fees . . . . .	6,051 72	
Elevator, fire and service pipes, sale of old materials, etc. . . . .	60,328 61	
Total receipts . . . . .	\$2,656,877 22	
Less refunded water-rates . . . . .	1,892 18	
Net receipts . . . . .		<u>\$2,654,985 04</u>

Total expenditures of the Water Works, from revenue, for the year ending January 31, 1898:

*Current expenses . . . . .	\$623,476 51
Interest on funded debt . . . . .	887,638 02
Sinking-fund requirement, 1896-97 . . . . .	193,395 00
† Extension of mains, etc. . . . .	281,782 32
Amount paid Chelsea, Somerville and Everett, under contracts . . . . .	180,222 94
Damages . . . . .	4,910 75
Balance to general revenue account of city . . . . .	483,559 50
	<u>\$2,654,985 04</u>

#### COST OF CONSTRUCTION, AND CONDITION OF THE WATER DEBT.

Cost of construction of Water Works to February 1, 1897 . . . . .	\$26,414,817 32
Cost of construction of Water Works to February 1, 1898 . . . . .	26,831,753 14
Increase during the year . . . . .	<u>\$416,935 82</u>
Stock on hand February 1, 1897 . . . . .	\$99,885 22
Stock on hand February 1, 1898 . . . . .	152,665 07
Increase during the year . . . . .	<u>\$52,779 85</u>

\*Details on page 12. † Details on page 13.

WATER DEPARTMENT.

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The outstanding Water Loans February 1, 1897 were . . . . .	\$18,261,273 98
The outstanding Water Loans February 1, 1898 were . . . . .	17,911,273 98
Decrease during the year . . . . .	<u>\$350,000 00</u>
The Water Sinking-Fund February 1, 1897 was . . . . .	\$8,704,387 99
The Water Sinking-Fund February 1, 1898 was . . . . .	9,852,760 01
Increase during the year . . . . .	<u>\$148,372 02</u>
Net Water Debt February 1, 1897 . . . . .	\$8,556,885 99
Net Water Debt February 1, 1898 . . . . .	8,058,513 97
Decrease during the year . . . . .	<u>\$498,372 02</u>

SUMMARY OF COST OF WORKS TO FEBRUARY 1, 1898.

Cochituate supply:

Lake Cochituate . . . . .	\$291,838 35	
Compensating reservoirs . . . . .	66,859 80	
Land and water damages . . . . .	248,827 34	
Engineering expenses to January 1, 1852 . . . . .	40,000 00	
Cochituate aqueduct . . . . .	1,068,425 24	
	<u>                    </u>	\$1,715,950 73

Sudbury supply:

Reservoir No. 1 . . . . .	\$257,143 81	
“ “ 2 . . . . .	465,954 11	
“ “ 3 . . . . .	419,402 72	
“ “ 4 . . . . .	813,846 38	
“ “ 5, to date . . . . .	1,114,752 43	
“ “ 6 . . . . .	911,752 33	
Whitehall pond . . . . .	330,975 46	
Cedar swamp . . . . .	33,599 21	
Work about Farm pond . . . . .	17,297 94	
Roadway in Framingham . . . . .	23,947 32	
Land damages, not otherwise specified . . . . .	348,346 38	
Water damages . . . . .	559,190 64	
Temporary connection with Lake Cochituate . . . . .	75,611 73	
Investigations of Shawshine and Charles rivers, etc. . . . .	27,646 59	
Protection of supplies . . . . .	363,883 32	
Engineering and engineering expenses . . . . .	300,371 22	
Office expenses, travelling, etc. . . . .	80,594 74	
Miscellaneous . . . . .	40,388 76	
Conduit and connections at Chestnut-Hill Reservoir . . . . .	3,082,661 95	
	<u>                    </u>	9,267,367 04

*Carried forward,*

\$10,983,317 77

<i>Brought forward,</i>		\$10,983,317 77
Distributing reservoirs and distribution:		
Brookline Reservoir . . .	\$200,077 21	
Beacon-Hill " (net cost)	363,533 21	
Chestnut-Hill " . . .	2,277,042 93	
South Boston " . . .	90,908 10	
East " " . . .	66,103 09	
Parker-Hill " . . .	205,793 81	
Fisher-Hill " . . .	191,135 35	
Roxbury high service . . .	103,829 53	
Brighton " " . . .	7,745 00	
East Boston high service . . .	30,208 12	
West Roxbury high service . . .	22,346 56	
Chestnut-Hill pumping-station	525,195 46	
Jamaica-pond aqueduct . . .	88,417 20	
Pipe-yards and buildings . . .	94,832 16	
Engineering expenses . . .	57,873 58	
Distribution . . .	10,871,844 18	
		<u>15,196,885 49</u>

Total cost of Sudbury and Cochituate Works, \$26,180,203 26

Cost of Mystic Works to February 1, 1898:		
Land damages . . .	\$153,211 63	
Dam . . . \$17,167 26		
Grubbing at lake . . . 9,393 26		
Lowering Mystic river . . . 3,012 06		
	<u>29,572 58</u>	
Conduit . . . . .	129,714 30	
Engine-house . . . \$83,388 75		
Engines . . . . . 213,834 72		
	<u>297,223 47</u>	
Reservoir . . . . .	141,856 26	
Distribution . . . . .	874,863 58	
Buildings . . . . .	18,603 05	
Engineering, inspection and salaries . . . . .	53,216 27	
Mystic-valley sewer . . . . .	83,608 70	
Miscellaneous . . . . .	24,446 88	
	<u>\$1,806,316 72</u>	
Total cost of Mystic Works,		\$1,806,316 72
Total cost of combined supplies . . .		\$27,986,519 98
Credit by amount received from the State on account of taking (January 4, 1896) . . .		1,154,766 84
		<u>\$26,831,753 14</u>



WATER DEPARTMENT.

The outstanding Water Loans on this date, February 1, 1898, are as follows :

Loans.	Date of Maturity.	Amount.
6 per cent. Currency,	Due June, 1898 . . . . .	\$450,000 00
6 " " "	" Oct., 1898 . . . . .	540,000 00
6 " " "	" April, 1899 . . . . .	250,000 00
6 " " "	" Jan., 1901 . . . . .	625,000 00
6 " " "	" April, 1901 . . . . .	688,000 00
6 " " "	" July, 1901 . . . . .	330,000 00
6 " " "	" July, 1902 . . . . .	100,000 00
5 " " Sterling Loan,	" Oct., 1902 . . . . .	1,947,273 98
6 " " Currency,	" April, 1903 . . . . .	905,000 00
6 " " "	" Jan., 1904 . . . . .	8,000 00
6 " " "	" April, 1904 . . . . .	38,000 00
6 " " "	" Jan., 1905 . . . . .	161,000 00
6 " " "	" April, 1905 . . . . .	142,700 00
6 " " "	" July, 1905 . . . . .	44,000 00
6 " " "	" Oct., 1905 . . . . .	6,000 00
5 " " Gold Loan,	" Oct., 1905 . . . . .	1,000,000 00
6 " " Currency,	" Jan., 1906 . . . . .	82,550 00
6 " " "	" April, 1906 . . . . .	8,750 00
5 " " Gold Loan,	" April, 1906 . . . . .	552,000 00
5 " " "	" Oct., 1906 . . . . .	2,000,000 00
6 " " Currency,	" Oct., 1906 . . . . .	4,000 00
6 " " "	" Jan., 1907 . . . . .	8,000 00
6 " " "	" April, 1907 . . . . .	5,000 00
6 " " "	" July, 1907 . . . . .	1,000 00
5 " " Currency Loan,	" Oct., 1907 . . . . .	1,000 00
5 " " "	" April, 1908 . . . . .	12,000 00
4 " " "	" April, 1908 . . . . .	588,000 00
4 " " Loan,	" July, 1909 . . . . .	82,000 00
4½ " " "	" Oct., 1909 . . . . .	268,000 00
4 " " "	" April, 1910 . . . . .	280,000 00
4 " " "	" April, 1912 . . . . .	324,000 00
4 " " "	" July, 1913 . . . . .	111,000 00
4 " " "	" Oct., 1913 . . . . .	336,000 00
4 " " "	" Jan., 1914 . . . . .	466,000 00
4 " " "	" April, 1914 . . . . .	18,500 00
4 " " "	" Oct., 1914 . . . . .	16,000 00
4 " " "	" Jan., 1915 . . . . .	50,000 00
3½ " " "	" April, 1915 . . . . .	50,000 00
4 " " "	" April, 1915 . . . . .	145,700 00
3½ " " "	" Oct., 1915 . . . . .	50,000 00
4 " " "	" Oct., 1915 . . . . .	23,000 00
3½ " " "	" Jan., 1916 . . . . .	100,000 00
4 " " "	" Jan., 1916 . . . . .	58,000 00
4 " " "	" April, 1916 . . . . .	128,500 00
3½ " " "	" July, 1916 . . . . .	75,000 00
3¼ " " "	" Oct., 1916 . . . . .	25,000 00
4 " " "	" Oct., 1916 . . . . .	286,300 00
4 " " "	" Jan., 1917 . . . . .	21,000 00
3 " " "	" April, 1917 . . . . .	200,000 00
3½ " " "	" April, 1917 . . . . .	275,000 00
4 " " "	" April, 1917 . . . . .	161,000 00
4 " " "	" July, 1917 . . . . .	7,000 00
4 " " "	" Oct., 1917 . . . . .	160,700 00
4 " " "	" Jan., 1918 . . . . .	20,000 00
4 " " "	" April, 1918 . . . . .	6,300 00

Carried forward,

\$14,241,273 98

Loans.		Date of Maturity.	Amount.
<i>Brought forward,</i>			\$14,241,273 98
3½	per cent. Loan,	Due July, 1918 . . . .	100,000 00
4	" " "	" Oct., 1918 . . . .	100,000 00
4	" " "	" April, 1919 . . . .	200,000 00
3½	" " "	" Oct., 1919 . . . .	145,000 00
4	" " "	" Oct., 1919 . . . .	300,000 00
3½	" " "	" Nov., 1919 . . . .	130,000 00
3½	" " "	" Jan., 1920 . . . .	220,000 00
4	" " "	" Oct., 1920 . . . .	384,000 00
4	" " "	" April, 1921 . . . .	100,000 00
4	" " "	" Oct., 1921 . . . .	162,500 00
4	" " "	" Jan., 1922 . . . .	100,000 00
4	" " "	" April, 1922 . . . .	75,000 00
4	" " "	" Oct., 1922 . . . .	283,000 00
4	" " "	" Oct., 1923 . . . .	576,275 00
4	" " "	" Oct., 1924 . . . .	644,225 00
3½	" " "	" Oct., 1927 . . . .	150,000 00
Total . . . . .			<u>\$17,911,273 98</u>

## SUMMARY.

3	per cent. Loans . . . . .	\$200,000 00
3½	" " " . . . . .	1,320,000 00
4	" " " . . . . .	6,214,000 00
4½	" " " . . . . .	268,000 00
5	" " Currency Loans . . . . .	13,000 00
5	" " Gold " . . . . .	3,552,000 00
5	" " Sterling " . . . . .	1,947,273 98
6	" " Loans . . . . .	4,397,000 00
Total . . . . .		<u>\$17,911,273 98</u>

**Cochituate Water Debt, Gross and Net,**

At the Close of Each Fiscal Year.

Fiscal Year.	Gross Debt.	Sinking-Funds.	Net Debt.
1847-48 .....	\$2,129,056 32 <sup>1</sup>	.....	\$2,129,056 32
1848-49 .....	3,787,328 98	.....	3,787,328 98
1849-50 .....	4,463,205 56	.....	4,463,205 56
1850-51 .....	4,955,613 51	.....	4,955,613 51
1851-52 .....	5,209,223 26	.....	5,209,223 26
1852-53 .....	5,972,976 11	.....	5,972,976 11
1853-54 .....	5,432,261 11	.....	5,432,261 11
1854-55 .....	5,403,961 11	.....	5,403,961 11
1855-56 .....	5,230,961 11	.....	5,230,961 11
1856-57 .....	5,031,961 11	.....	5,031,961 11
1857-58 .....	4,724,961 11	.....	4,724,961 11
1858-59 .....	4,754,461 11	.....	4,754,461 11
1859-60 .....	3,846,211 11	.....	3,846,211 11
1860-61 .....	3,455,211 11	.....	3,455,211 11
1861-62 .....	3,012,711 11	.....	3,012,711 11
1862-63 .....	2,992,711 11	.....	2,992,711 11
1863-64 .....	2,992,711 11	.....	2,992,711 11
1864-65 .....	2,942,711 11	.....	2,942,711 11
1865-66 .....	3,152,711 11	.....	3,152,711 11
1866-67 .....	3,370,711 11	.....	3,370,711 11
1867-68 .....	3,867,711 11	.....	3,867,711 11
1868-69 .....	5,107,711 11	.....	5,107,711 11
1869-70 .....	5,731,711 11	.....	5,731,711 11
1870-71 .....	6,482,711 11	\$1,100,000 00	5,382,711 11
1871-72 .....	6,812,711 11	1,185,049 67	5,627,661 44
1872-73 .....	6,912,711 11	1,268,234 97	5,644,476 14
1873-74 .....	7,863,711 11	1,372,953 62	6,490,757 49
1874-75 .....	8,123,711 11	1,533,890 28	6,589,820 83
1875-76 .....	9,735,711 11	1,560,917 83	8,174,793 28
1876-77 .....	11,548,711 11	1,709,492 60	9,839,218 51
1877-78 .....	11,545,273 98	2,043,764 73	9,501,509 25
1878-79 .....	11,753,273 98	2,143,847 85	9,609,426 13
1879-80 .....	11,697,273 98	1,771,692 92	9,925,581 06
1880-81 .....	11,631,273 98	1,989,300 88	9,641,973 10
1881-82 .....	11,631,273 98	2,281,857 89	9,349,416 09
1882-83 .....	11,955,273 98	2,607,768 46	9,347,505 52
1883-84 .....	12,882,273 98	2,746,505 58	10,135,768 40
1884-85 .....	13,045,473 98	3,106,323 82	9,939,150 16
1885-86 .....	13,491,473 98	3,385,201 26	10,106,272 72
1886-87 .....	14,142,273 98	3,947,616 92	10,194,657 06
1887-88 .....	14,741,273 98	4,373,304 09	10,367,969 89
1888-89 .....	14,941,273 98	4,864,092 54	10,077,181 44
1889-90 .....	15,696,273 98	5,440,819 47	10,255,454 51
1890-91 .....	16,267,773 98	5,979,297 80	10,288,476 18
1891-92 .....	16,423,773 98	6,471,545 34	9,952,228 64
1892-93 .....	16,758,773 98	7,019,058 38	9,739,715 60
1893-94 .....	17,055,273 98	7,649,504 87	9,405,769 11
1894-95 .....	17,761,273 98	8,444,773 55	9,316,500 43
1895-96 .....	18,261,273 98	9,099,966 39	9,161,307 59
1896-97 .....	18,261,273 98	9,704,387 99	8,556,885 99
1897-98 .....	17,911,273 98	9,852,760 01	8,058,513 97

<sup>1</sup> No account taken of amounts borrowed temporarily from 1846 to 1852 and afterwards funded by the issue of the water bonds that figure in this statement.

**Cochituate Water Sinking-Fund Receipts.**

[SINCE THE ESTABLISHMENT OF THE BOARD OF SINKING-FUND COMMISSIONERS IN 1871.]

YEAR.	From Tax Levy or City Income.	Interest on Investments.	Interest on Bank Deposits.	Water Rates, etc.	Premiums on Loans.	Other Sources.	Totals.
1871. April 30, received from Committee on Reduction of Debt . . . . .	\$1,100,000 00						\$1,100,000 00
1871-72 . . . . .	14,325 00 Taxes, 9,375 00	\$61,000 00	\$349 67				85,049 67
1872-73 . . . . .	9,000 00	70,137 50	1,017 80				80,155 30
1873-74 . . . . .	30,090 00	76,799 60	2,072 65				108,962 25
1874-75 . . . . .	75,973 28	82,842 25	2,121 13				160,936 66
1875-76 . . . . .	65,554 00	85,470 00	3,617 55			\$386 00	155,027 55
1876-77 . . . . .	234,814 00	86,245 66	4,119 47	\$26,480 18		915 46	352,574 77
1877-78 . . . . .	Taxes, 214,500 00	85,830 85	10,809 31	27,099 92			338,240 08
1878-79 . . . . .	Taxes, 207,456 00	93,264 49	6,131 26	177,195 91		9,874 21	493,971 87
1879-80 . . . . .		90,472 42	5,687 62	214,707 24		4,411 64	315,278 92
1880-81 . . . . .		86,460 00	167 32	195,668 90		1,762 04	284,058 26
1881-82 . . . . .		96,546 35	2,767 90	193,840 36		494 08	293,648 69

WATER DEPARTMENT.

1882-83.....	105,129 51	8,486 33	219,581 72	1,241 04	331,488 60
1883-84.....	138,120 90	2,268 22	.....	.....	141,362 12
1884-85.....	143,049 45	7,510 40	209,258 39	.....	359,818 24
1885-86.....	156,694 01	5,804 31	120,129 12	442 27	283,069 71
1886-87.....	181,264 89	2,644 70	297,928 95	5,081 12	562,415 66
1887-88.....	199,883 90	4,178 16	221,630 11	.....	425,682 17
1888-89.....	213,048 22	8,958 69	256,013 57	\$11,552 50	489,572 98
1889-90.....	228,000 83	11,730 60	300,903 00	36,092 50	576,726 93
1890-91.....	229,509 17	29,763 94	242,675 22	36,530 00	538,478 33
1891-92.....	175,808 33	22,560 16	275,014 05	78,865 00	552,247 54
1892-93.....	260,506 20	30,148 34	240,435 00	16,413 50	547,503 04
1893-94.....	298,224 44	18,133 03	299,467 27	14,621 75	630,446 49
1894-95.....	312,332 05	18,524 22	297,518 29	.....	638,268 68
1895-96.....	378,819 55	5,892 29	205,701 00	64,690 00	655,192 84
1896-97.....	403,840 02	5,225 08	194,740 00	616 50	604,421 60
1897-98.....	421,928 45	8,337 21	193,395 00	15,877 86	648,372 02
	\$2,037,556 28	\$229,077 36	\$4,406,463 20	\$188,733 75	\$11,752,920 97

DETAILED EXPENDITURES UNDER THE SEVERAL  
APPROPRIATIONS.

FEBRUARY DRAFT, 1897, TO FEBRUARY DRAFT, 1898.

*Water Department (from Revenue).*

Salaries :		
Commissioner . . . . .	\$5,000 00	
Assistant Commissioner . . . . .	3,000 00	
Secretary . . . . .	3,000 00	
Employees . . . . .	455,621 56	
	<hr/>	\$466,621 56
Fuel . . . . .		25,309 38
Machinery, tools, hardware, iron, steel and other materials for repairs and furnishing . . . . .		23,698 10
Altering and repairing reservoirs, buildings and streets . . . . .		17,980 48
Horses, purchase of . . . . .	\$1,135 00	
Feed and board . . . . .	5,704 94	
Shoeing and veterinary services, . . . . .	3,120 66	
Wagons, sleigh and repairs of vehicles . . . . .	3,994 65	
Harnesses and repairs . . . . .	1,311 24	
	<hr/>	15,266 49
Transportation of employees . . . . .		11,388 14
Castings . . . . .		11,325 05
Alterations of Albany-street stable . . . . .		10,746 54
Meters and repairs . . . . .		9,628 16
Printing . . . . .		5,259 51
Taxes . . . . .		3,231 11
Cartage and freights . . . . .		3,039 08
Lead and lead pipe . . . . .		2,759 85
Telephone service . . . . .		2,408 86
Stationery . . . . .		2,161 31
Examination of property to be taken by the State, and report on same . . . . .		2,000 00
Grounds, care, seeds, trees and tools . . . . .		1,538 73
Four meter books . . . . .		1,500 00
Oils . . . . .		1,444 77
Expert services . . . . .		1,356 87
Salt . . . . .		1,180 71
Rents . . . . .		1,001 00
Widow of Charles L. Bancroft, balance of sal- ary for 1896 (order of City Council, April 13, 1897) . . . . .		821 33
Insulating water-pipes . . . . .		800 00
Board of injured man . . . . .		782 17
	<hr/>	
<i>Carried forward</i> . . . . .		\$623,249 20

WATER DEPARTMENT.

13

<i>Brought forward</i> . . . . .	\$623,249 20
Compiling and indexing statutes relating to Boston water supply . . . . .	700 00
Insurance on boilers . . . . .	650 00
Inspector of castings at foundry . . . . .	644 60
Gas . . . . .	519 81
Advertising . . . . .	496 84
Furniture . . . . .	491 51
Salt hay . . . . .	400 04
Examination of accounts . . . . .	350 00
Analyses of water . . . . .	325 00
Water-proof clothing . . . . .	234 85
Blasting trenches . . . . .	93 15
Electric lighting . . . . .	36 26
Typewriting and small items . . . . .	13 26
	<hr/>
	\$628,204 52
Less amount transferred to additional supply of water . . . . .	4,728 01
	<hr/>
	\$623,476 51
Refunded water-rates . . . . .	1,892 18
Sinking-Fund payment . . . . .	193,395 00
Interest on loans (including exchange on London where part of interest is payable) . . . . .	887,638 02
Proportion of water-rates paid under contract . . . . .	180,222 94
Damages . . . . .	4,910 75
	<hr/>
	<u>\$1,891,535 40</u>

From the above amount \$623,476.51 should be deducted \$11,801.25 expended for work for outside corporations, etc., during the year, leaving the amount of \$611,675.26 as the actual current expenses of the Water Department.

EXTENSION OF MAINS, ETC. (FROM REVENUE).

Labor . . . . .	\$139,542 54
Castings, pipes, stop-cocks, gates and hydrant frames . . . . .	117,322 65
Lead and lead pipe . . . . .	16,244 34
Blasting trenches . . . . .	11,252 28
Tools, hardware and supplies . . . . .	8,446 92
Travelling expenses . . . . .	8,260 15
Repairs . . . . .	7,535 04
Teaming and freights . . . . .	6,431 76
Lumber . . . . .	4,018 73
Inspector of castings at foundry . . . . .	1,432 82
	<hr/>
<i>Carried forward</i> . . . . .	\$320,487 23

<i>Brought forward</i> . . . . .	\$320,487 23
Oil . . . . .	334 87
Fuel . . . . .	214 16
	<hr/>
	\$321,036 26
Less transferred to additional supply of water,	39,253 94
	<hr/>
	\$281,782 32

From this amount should be deducted the sum of \$1,499.48 expended for work for outside corporations, etc., during the year, leaving the amount of \$280,282.84 as the actual expenditure for Extension of Mains.

*Additional Supply of Water (from Loans).*

*General:*

Land . . . . .	\$30,589 82	
Engineering . . . . .	1,735 38	
Expert services . . . . .	1,701 36	
Examinations of titles and small items . . . . .	258 28	
Damage for flowing land . . . . .	135 18	
	<hr/>	\$34,420 02

*Indian brook:*

Labor . . . . .	\$7,303 77	
Teaming . . . . .	438 25	
Tools, hardware and supplies . . . . .	235 94	
Lumber and carpentry . . . . .	215 25	
Right of way through private land . . . . .	100 00	
Board of men . . . . .	66 70	
Engineering expenses . . . . .	29 99	
	<hr/>	8,389 90

*Whitehall pond:*

Labor . . . . .	\$1,345 08	
Pile-driving . . . . .	2,019 35	
Lumber and carpentry . . . . .	1,819 92	
Teaming . . . . .	1,011 31	
Alteration of coffer-dam . . . . .	552 50	
Town of Hopkinton, building fence and grading . . . . .	405 80	
Masonry . . . . .	344 00	
Tools, hardware and supplies . . . . .	301 15	
Engineering expenses . . . . .	198 44	
Board of men . . . . .	60 00	
	<hr/>	8,057 55
Basin and Dam VI. . . . .		76 33

*Carried forward* . . . . . \$50,943 80



WATER DEPARTMENT.

15

<i>Brought forward</i>	.	.	.	.	.	\$50,943 80
<i>New mains, etc.:</i>						
Labor	.	.	.	.	\$68,404 58	
Castings	.	.	.	.	48,922 36	
Lead and lead pipe	.	.	.	.	7,422 88	
Teaming and freights	.	.	.	.	3,941 86	
Laying new mains	.	.	.	.	2,941 26	
Blasting trenches	.	.	.	.	1,352 67	
Lumber	.	.	.	.	945 00	
Covering submerged pipe	.	.	.	.	500 00	
Paving and repairs	.	.	.	.	451 52	
Masonry	.	.	.	.	410 01	
Filling	.	.	.	.	355 07	
Tools, hardware and supplies	.				249 85	
					<hr/>	\$135,897 06
Transferred from-water-works,						4,728 01
Transferred from extension of						
mains, etc.	.	.	.	.		39,253 94
					<hr/>	179,879 01
						<hr/>
						\$230,822 81
						<hr/>

RECAPITULATION.

Water Department	.	.	\$1,891,535 40
Extension of mains, etc.	.	.	281,782 32
Additional supply of water	.	.	230,822 81
			<hr/>
			\$2,404,140 53
			<hr/>

**Contracts Made and Pending during Year commencing February 1, 1897, and ending January 31, 1898.**

*Contracts marked thus (\*) are completed. Amounts marked thus (†) are for extra work.*

DATE.	CONTRACTORS.	WORK.	AMOUNT.	PAID ON CONTRACT.		
				Previous Years.	Year 1897.	Total.
1896. * Mar. 5,	Mechanics' Iron Foundry Company.	{ Iron and service-box castings for year ending March 15, 1897, viz., 800,000 lbs. Iron Increased about 700,000 " " service box; 300,000 " "	{ Total, 1,800,000 lbs. (estimated) @ 1.68 cents per lb. ....	\$28,630 43	\$6,021 71	\$34,652 14
* " 9,	{ Pierce F. Lonergan & Co. ....	{ Teaming water-pipes, etc., for year ending March 15, 1897. ....	{ 35 cents per ton (short haul) 2½ miles ..... 85 cents per ton (long haul over 2½ miles) .....	3,379 50	679 05	4,076 55
* June 26,	Dennis F. O'Connell. ....	{ Laying pipes in Boston, Dorchester and Telegraph streets, South Boston, and in Dorchester avenue and Adams street, Dorchester, viz.: 3,900 linear feet, 24 inch @ 87 cents. .... 3,450 " " 16 " @ 62 " .....	{ \$5,656 (estimated). ....	{ † 51 98 } { 5,801 3; }	307 38	6,160 73
* Oct. 8,	O'Rourke & Nelson. ....	{ Laying 2,130 feet 20-inch pipe in Border street East Boston .....	{ \$1.00 per linear foot. .... \$1.00 per joint. ....	1,785 00	{ † 265 05 } { 867 80 }	2,417 85
* " 19,	Thomas L. Livermore. ....	Blasting Bynner street, Roxbury. ....	\$3.00 per cubic yard. ....	474 00	474 00	474 00
* " 29,	Thomas Burke. ....	Blasting Beach Glen Avenue, Roxbury. ....	\$4.00 " " " .....	15 20	15 20	15 20
* " 30,	O'Rourke & Nelson. ....	{ Laying 16-inch pipe in Blue Hill avenue, Dorchester. ....	{ 80 cents per linear foot ..... \$5.00 per cubic yard for rock excavation above grade. .... \$1.00 per cubic yard for earth excavation below grade. .... \$10.00 per M. feet for lumber for shoring. .... 80 cents each for 16-inch pipe-joints. ....	1,798 97	94 68	1,893 65

WATER DEPARTMENT.

* Nov. 4,	L. G. Burnham & Co.....	{ Furnishing 800 tons Cumberland coal in bins } { Chestnut Hill Pumping Station..... }	\$4.15 per ton, 2,240 lbs.. ..	2,340 60	1,045 80	3,386 40
* " 16,	James Dolan.....	Blasting Blue Hill avenue, Dorchester .....	\$2.00 per cubic yard .....		392 60	392 60
* " 21,	Granular Metal Co.....	{ Composition castings to amount of \$2,000 } { (authority given by Mayor to purchase with- } { out advertising) .....	{ No. 1, 21 <sup>10</sup> cents per lb. .... } { " 2, 20 <sup>10</sup> " " " " " } { " 3, 19 <sup>10</sup> " " " " " }	1,021 23	2,885 90	3,907 13
* " 27,	{ Warren Foundry and } { Machine Company.. }	400 tons 12-inch pipe, Class B.....	{ \$18.40 per ton f. o. b. cars, } { Boston..... }		7,274 23	7,274 23
* " 27,	John J. Kelley .....	Blasting Arnold street, West Roxbury.....	\$2.44 per cubic yard .....		277 67	277 67
* " 27,	{ Warren Foundry and } { Machine Company.. }	30 tons 4-inch B pipe.....	{ \$19.40 per ton, 2,000 lbs. f. o. b. } { cars, Boston .....		586 53	586 53
* Dec. 2,	Marth J. Connolly .....	Blasting Bellevue and Stanley streets, Dorchester,	{ Withdrawn from } { contractor, De- } { cember 28, and } { work given to } { Thomas Burke, } { December 26, 1896, } { to be finished by } { day work..... }	{ 25 95 } { 106 95 } { ..... }	{ ..... }	{ paid } { Con- } { nolly. } { ..... } { paid } { Burke. } { ..... }
* " 2,	Marth J. Connolly .....	Blasting Blue Hill avenue, Dorchester .....	{ Withdrawn from } { contractor De- } { cember 17, and } { contract made, De- } { cember 19, 1896, } { with Thos. Burke } { to finish the work, } { @ 2.70 per cubic yd. }	68 85	68 85	68 85
* " 3,	James Fagan.....	Alterations on stable, Albany street yard.....	\$10,242.	{ ..... }	{ 504 54 } { 10,242 00 }	{ 10,746 54 }
* " 17,	James McDonald.....	Blasting, Harold street, Roxbury.....	\$3.25 per cubic yard .....		186 55	186 55
* " 19,	Thomas Burke.....	" Blue Hill avenue, Dorchester .....	\$2.70 "		68 85	68 85

Contracts Made and Pending during Year. — Continued.

DATE.	CONTRACTORS.	WORK.	AMOUNT.	PAID ON CONTRACT.		
				Previous Years.	Year 1897.	Total.
1896. * Dec. 22,	{ George H. Stoddard, } { Manager .....	{ Insulating 20-inch main over Cottage Farm } { Bridge .....	\$800.00 .....	\$800 00	\$800 00	
* " 28,	James McDonald .....	Blasting, Wait street, Roxbury .....	\$2.98 per cubic yard .....	87 61	87 61	
1897. * Jan. 6,	Horatio Wellington & Co. ....	{ 1,500 tons Cumberland coal delivered into bins, } { Mystic Pumping Station .....	\$3.81 per ton 2,240 lbs. ....	5,841 48	5,841 48	
* " 11,	Thomas Burke .....	Blasting, Centre street, Roxbury .....	\$7.00 per cubic yard .....	14 00	14 00	
* " 15,	Patrick Cushing .....	" Rockledge street, Roxbury .....	\$4.50 " .....	33 75	33 75	
* " 20,	{ Camden Iron Works, } { Philadelphia, Pa. ....	{ 275 tons 8-inch "B" pipe .....	@ \$17.38 per ton, { estimated, } 2,000 lbs. { \$52,748.30 }	55,451 94	55,451 94	
		{ 800 " 12 " "B" " .....				
		{ 240 " 16 " "A" " .....				
		{ 540 " 24 " "B" " .....				
		{ 505 " 30 " "B" " .....				
		{ 625 " 36 " "A" " .....				
		{ 2,985 " " .....				
		{ 50 " Specials .....				
* " 20,	{ McNeal Pipe and } { Foundry Co., Burling- } { ton, N. J. ....	{ 700 tons 6-inch "B" pipe .....	@ \$17.17 per ton, } 2,000 lbs. { estimated } \$53,767.55 }	54,306 59	54,306 59	
		{ 550 " 12 " "A" " .....				
		{ 635 " 20 " "A" " .....				
		{ 505 " 30 " "B" " .....				
		{ 625 " 36 " "A" " .....				
		{ 3,015 " " .....				
		{ 50 " Specials .....				
			{ \$40.00 per ton, } 2,000 lbs. }			

WATER DEPARTMENT.

			\$3.75 per cubic yard		204 75	204 75
* " 30,	Alexander McMurtry	Blasting, Leicester street, Brighton				
		{ 4 36-inch stop cocks @ \$488.50 each				
		{ 4 30 " " " 312.50 "				
* Feb. 2,	Coffin Valve Company	{ 12 24 " " " 178.00 "			9,085 00	9,085 00
		{ 15 20 " " " 138.00 "				
		{ 50 12 " " " 37.50 "				
* " 4,	{ Lockwood Manufacturing Company	Patterns for specials	\$220.00		220 00	220 00
* " 4,	Atlantic Works	{ Repairs on pumping engine No. 3, at Chestnut Hill Pumping Station	{ \$2,397.00, less \$75.00 on account of change in specifications..		2,322 00	2,322 00
* " 24,	James McLaughlin & Son.	Blasting, Geneva avenue, Dorchester	\$4.50 per cubic yard		32 40	32 40
* " 27,	Thomas Burke	" service-pipe trench 33 Quincy street	\$7.00 "		18 20	18 20
Mar. 2,	Matthew E. Nawn	{ Teaming water-pipes for year ending March 15, 1898	{ 37½ cents per ton, short haul } { 88½ " " " long " }		3,161 04	3,161 04
" 2,	William Curley	{ Brass and Composition Castings for year ending March 15, 1898	{ No. 1, 17½ cents per lb. } { No. 2, 14½ " " " } { No. 3, 12 " " " }		4,617 51	4,617 51
* " 4,	John J. Kelley	Blasting, Robinwood street, West Roxbury	\$7.00 per cubic yard		42 70	42 70
* " 10,	John H. O'Donnell	" Calumet street, Roxbury	\$3.20 "		13 76	13 76
* " 15,	Thomas Burke	" Fowler street, Dorchester	\$7.00 "		28 00	28 00
* " 20,	" "	" Wabon street, Roxbury	\$6.90 "		27 60	27 60
* " 22,	Thomas & Co.	{ 800 tons Cumberland coal delivered in bins at Chestnut Hill Pumping Station	\$3.57 per ton (2,240 lbs)		2,716 12	2,716 12
* " 22,	{ Coöperative Foundry Company, Lynn, Mass	Iron castings for year ending March 15, 1898	{ No. 1, 1 1/8 cents per lb. } { " 2, 1 1/8 " " }		1,790 50	1,790 50
* April 2,	Patrick Cushing	Blasting, Tonavanda street, Dorchester	\$4.20 per cubic yard		58 80	58 80
* " 8,	John J. Kelley	" Marcella street, Roxbury	\$3.70 "		61 42	61 42

Annulled May 28, 1897

Contracts Made and Pending during Year. — Continued.

DATE.	CONTRACTORS.	WORK.	AMOUNT.	PAID ON CONTRACT.		
				Previous Years.	Year 1897.	Total.
1897.						
*April 10,	John J. Kelley.....	Blasting, Quincy street, Dorchester.....	\$4.00 per cubic yard.....	.....	\$83 20	\$83 20
*May 1,	Thomas Burke.....	“ Walnut Park, Roxbury.....	\$2.75 “ “.....	.....	228 25	228 25
* “ 3,	“ “.....	“ East street, Dorchester.....	\$3.44 “ “.....	.....	68 80	68 80
* “ 7,	John J. Kelley.....	“ Blue Hill avenue, Dorchester.....	\$2.69 “ “.....	.....	241 29	241 29
* “ 7,	R. D. Wood & Co.....	{ 100 tons (estimated) of 6-inch to 20-inch special } { castings.....	\$37.00 per ton, 2,000 lbs.....	.....	3,445 95	3,445 95
* “ 17,	O'Rourke and Nelson ...	Laying 24-inch pipe within park lines.....	\$2.50 per foot.....	.....	1,604 35	1,604 35
* “ 18,	{ George M. Winslow & } { Co.....	{ 1,500 tons Georges Creek coal delivered in bins } { at Mystic Pumping Station.....	\$3.18 “ ton, 2,240 lbs.....	.....	4,990 57	4,990 57
* “ 20,	John J. Kelley.....	Blasting, Calumet street, Roxbury.....	\$3.47 “ cubic yard.....	.....	23 60	23 60
“ 21,	Osgood & Hart.....	{ Service box castings, class No. 1..... } { Iron castings, class No. 2..... } { Hydrant and gate frames and covers..... } 1 1/2 “ “.....	2 cents per lb..... 1 1/2 “ “..... 1 1/2 “ “.....	.....	2,373 95	2,373 95
* “ 21,	Daniel M. Dwyer.....	Blasting, Washington street, Dorchester.....	\$4.50 per cubic yard.....	.....	17 10	17 10
* “ 21,	“ “.....	“ Richmond road, Dorchester.....	\$3.50 “ “.....	.....	301 00	301 00
* “ 28,	John J. Kelley.....	“ Mattapan street, Dorchester.....	\$3.47 “ “.....	.....	40 60	40 60
* “ 28,	Thomas Burke.....	“ Kilton street, Dorchester.....	\$2.28 “ “.....	.....	74 56	74 56
June 1,	{ Sessions Foundry } { Company, Bristol, } { Conn.....	Iron castings for year ending March 15, 1898.....	1 1/2 cents per lb.....	.....	16,518 73	16,518 73

* " 1,	O'Rourke & Nelson.....	{ Laying about 200 feet, 24-inch pipe in South street, West Roxbury, northerly from Arnold Arboretum entrance.....	{ \$1.50 per linear foot for pipe laid..... \$4.00 per cubic yard, for rock excavation above grade... \$5.00 per cubic yard for rock excavation below grade... \$1.20 per pipe joint run solid with lead.....	330 00	330 00
* " 3,	Patrick Cushing.....	Blasting, Columbus avenue extension.....	\$1.90 per cubic yard.....	760 63	760 63
* " 11,	John J. Kelley.....	" Wolcott street, Dorchester.....	\$3.97 " ".....	31 76	31 76
* " 11,	Thomas Burke.....	" Columbus avenue Extension.....	\$2.45 " ".....	63 70	63 70
* " 18,	" ".....	" Champney street, South Boston.....	\$4.00 " ".....	41 60	41 60
" 19,	A. J. Wellington.....	{ Excavating pipe trench in South Huntington avenue, Basswood, Floyd and Crawford sts., Roxbury.....	{ 30 cents per linear foot for excavation and back filling... \$2.25 per cubic yard for rock excavation.....	710 55	710 55
* " 21,	Thomas Burke.....	Blasting, Gay street, Roxbury.....	\$4.00 per cubic yard.....	26 40	26 40
* " 21,	John J. Kelley.....	" Merlin street, West Roxbury.....	\$2.97 " ".....	130 68	130 68
* " 23,	Daniel W. Dwyer.....	" Oakland street, Dorchester.....	\$3.25 " ".....	264 55	264 55
* " 25,	L. G. Burnham & Co.....	{ 800 tons Georges Creek coal for Chestnut Hill Pumping-station.....	\$3.47 per ton, 2,240 lbs.....	2,852 40	2,852 40
* " 30,	John J. Kelley.....	Blasting, Montebello Road, West Roxbury.....	\$2.97 per cubic yard.....	251 86	251 86
* July 2,	James McDonald.....	" Adelaida street, " ".....	\$2.72 " ".....	340 27	340 27
* " 8,	O'Rourke & Nelson.....	{ Removing about 640 feet 12-in. pipe in Federal street, between Essex street and Mt. Washington avenue.....	75 cents per linear foot.....	512 25	512 25
* " 9,	{ James McLaughlin & Son.....	Blasting, Kilton street, Dorchester.....	\$3.50 per cubic yard.....	16 10	16 10
* " 10,	Thomas Burke.....	" Cherokee street, Roxbury.....	\$2.85 " ".....	47 60	47 60

Contracts Made and Pending during Year.— Continued.

DATE.	CONTRACTORS.	WORK.	AMOUNT.	PAID ON CONTRACT.		
				Previous Years.	Year 1897.	Total.
* July 10, 1897.	Thomas Burke .....	Blasting, Devon street, Dorchester.....	\$3.00 per cubic yard .....	.....	\$81 80	\$81 80
* " 21,	{ Metropolitan Con- struction Company, }	{ Repair of bridges supporting water-pipe over Boston & Maine R.R. tracks on Main street, Charlestown .....	\$900 .....	.....	900 00	900 00
* " 24,	Thomas Burke.....	Blasting, Norton street, Dorchester.....	\$5.00 per cubic yard .....	.....	44 50	44 50
* " 24,	John J. Kelley.....	" Columbus avenue, Roxbury.....	\$2.44 " .....	.....	313 05	313 05
* " 28,	" .....	" Capen street, Dorchester .....	\$7.00 " .....	.....	74 20	74 20
* " 30,	John McLaughlin .....	" Codman park, Roxbury .....	\$3.75 " .....	.....	16 88	16 88
* Aug. 3,	{ Metropolitan Con- struction Company, }	{ Scraping and repainting iron supports of 20- inch pipe over Boston & Maine R.R. tracks, Main street, Charlestown .....	\$85 .....	.....	35 00	35 00
* " 5,	John J. Kelley .....	Blasting, Heath street, Roxbury .....	\$2.75 per cubic yard .....	.....	515 08	515 08
* " 10,	Coffin Valve Company ..	50 — 16-inch valves.....	\$54.25 each .....	.....	2,712 50	2,712 50
* " 16,	Thomas Burke.....	Blasting, Tower street, Roxbury.....	\$3.38 per cubic yard .....	.....	330 23	330 23
* " 20,	O'Rourke & Nelson .....	Removing 12-inch pipe, Federal street .....	75 cents per linear foot .....	.....	780 00	780 00
" 23,	John O'Brien .....	{ Excavating and refilling pipe trench, Haley, Hinkleley and Harrishof streets, Roxbury, viz.: Digging and refilling trench 5 feet below sub-grade, in earth .....	30 cents per lin. ft. of trench ..	.....	411 00	411 00
		{ Earth excavation less than 5 feet below sub- grade .....	60 cents per cubic yard. ....	.....		
		{ Rock excavation and refilling .....	\$2.75 .....	.....		



WATER DEPARTMENT.

* Sept. 1,	Thomas Burse.....	Blasting, Adams, street, Dorchester .....	\$4.00 per cubic yard .....	59 60
* " 2,	James McDonald.....	" Woodlawn avenue, Dorchester .....	\$2.80 " " .....	79 80
" 2,	Kimball, Freed & Co.....	Cylinder oil and engine oil for current year .....	{ Cylinder oil @ $\frac{33}{100}$ cents per lb., Engine " @ $\frac{2\frac{1}{2}}{100}$ " " }	432 18
* " 3,	J. J. Kelley.....	Blasting, Burney street, Roxbury .....	\$4.00 per cubic yard .....	22 00
* " 10,	Thomas Burke.....	" Calumet street, Roxbury (service-pipe), .....	\$3.25 " " .....	18 85
* " 11,	" " .....	" Quincy street, Dorchester .....	\$4.40 " " .....	24 64
* " 11,	" " .....	" Elmo street, Dorchester .....	\$2.40 " " .....	287 52
* " 13,	" " .....	" Fowler street, Dorchester.....	\$4.60 " " .....	22 54
* " 14,	{ James McLaughlin & Son..... }	" Kiltont street, Dorchester.....	\$3.95 " " .....	56 49
* " 15,	James McDonald.....	" Calumet street, Roxbury (service-pipe), .....	\$4.00 " " .....	23 20
* " 16,	John E. Brewer .....	Inspection of hydraulic elevators in Department, .....	\$400 .....	131 87
* " 18,	Thomas Burke.....	Blasting, Columbus avenue, Roxbury .....	\$2.90 per cubic yard .....	26 10
* " 22,	James McDonald.....	" Coffin street, Dorchester .....	\$2.98 " " .....	177 01
" 22,	{ McNeal Pipe and Foundry Co., Burling. ton, N. J. }	{ 15 tons 4-inch "P" pipe..... 200 " 6 " " .....	@ \$16.03 per ton of 2,000 lbs., estimated.....	7,848 29
" 22,	M. F. Sullivan.....	Building Sanitary at Chestnut Hill Reservoir.....	\$1,300.	
* " 25,	Thomas Burke.....	Blasting Dunreath street, Roxbury .....	\$2.40 per cubic yard.....	66 00
* " 27,	" " .....	" Allston Heights, Brighton.....	\$7.00 " " .....	145 60
* Oct. 8,	" " .....	{ Dudley street, Dorchester (4 service pipe trenches)..... }	\$4.30 " " .....	119 97

Contracts Made and Pending during Year. — Concluded.

DATE.	CONTRACTORS.	WORK.	AMOUNT.	PAID ON CONTRACT.		
				Previous Years.	Year 1897.	Total.
1897.						
* Oct. 15,	Thomas Burke.....	Blasting, Mascot avenue, Dorchester.....	\$3.98 per cubic yard.....	.....	\$69 25	\$69 25
* " 19,	Thomas Livermore.....	" Bynner street, Roxbury.....	\$3.00 " ".....	.....	474 00	474 00
* " 22,	James McDonald.....	" Phipps avenue, Dorchester.....	\$2.25 " ".....	.....	205 88	205 88
* " 25,	{ James McLaughlin & Son..... }	{ Devon street, Dorchester (service pipe- trench)..... }	{ \$4.25 " "..... }	.....	18 28	18 28
* " 25,	Thomas Burke.....	" Percival street, Dorchester.....	\$2.97 " ".....	.....	308 58	308 58
Nov. 8,	{ George H. Stoddard ) and Gardner T. Voor- ) hees..... }	{ Covering 20-inch water-pipe on Cottage Farm ) bridge with additional covering of felt and ) rosin..... }	{ \$225 }.....	.....	.....	.....
* " 10,	Patrick Cushing.....	Blasting, Gawain street, Dorchester.....	\$3.75 per cubic yard.....	.....	74 25	74 25
* " 15,	James McDonald.....	" Delle avenue, Roxbury.....	\$4.75 " ".....	.....	99 75	99 75
* " 15,	" ".....	" Carmel street, Roxbury.....	\$4.25 " ".....	.....	42 50	42 50
* " 18,	Thomas Burke.....	" Normandie street, Dorchester.....	\$3.75 " ".....	.....	235 13	235 13
* " 18,	" ".....	" Arcola street, Roxbury.....	\$2.97 " ".....	.....	94 45	94 45
Dec. 9,	" ".....	" Columbia road, Dorchester.....	\$9.00 " ".....	.....	.....	.....
" 17,	" ".....	" Ritchie street, Roxbury.....	\$8.75 " ".....	.....	.....	.....
" 23,	John J. Kelley.....	{ Patten, Rodman and Wachusett ) streets, West Roxbury..... }	{ \$2.57 }.....	.....	.....	.....
" 23,	Thomas Burke.....	" Geneva avenue, Dorchester.....	\$2.74 " ".....	.....	.....	.....

1898. Jan. 5,	John C. Coleman & Son..	{ Excavating and refilling water-pipe trenches, Columbia road, Dorchester..... }	{ 55 cents per cubic yard for earth excavation and re- filling; \$1.49 per cubic yard for rock excavation and re- filling. }
" 13,	John J. Kelley .....	Blasting, Maple street extension, West Roxbury..	\$3.98 per cubic yard.
" 21,	{ James McLaughlin & Son..... }	" Bellevue street, Dorchester .....	\$3.50 " "
" 26,	O'Brien & Byrne .....	" Wabon and Wabeno streets, Roxbury..	\$2.35 " "

In the appendices annexed hereto are submitted the reports of the City Engineer and the superintendents of the department. They furnish full details of the present condition of the works and what has been accomplished.

Respectfully,

JOHN R. MURPHY,

*Water Commissioner.*

## APPENDIX A.

## REPORT OF THE INCOME DIVISION.

OFFICE OF GENERAL SUPERINTENDENT, INCOME DIVISION,  
CITY HALL, BOSTON, February 1, 1898.

HON. JOHN R. MURPHY,  
*Water Commissioner :*

SIR: Herewith please find report of the Income Division, Water Department, for the calendar year ending December 31, 1897, it being impracticable to render report of this division for the financial year; also tables covering the work of the Meter Service branch of the Income Division for the financial year ending January 31, 1898.

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Table I.

	COCHIT- UATE.	MYSTIC.				Totals.
	Boston, ex- cluding Charlestown.	Charlestown.	Chelsea.	Somerville.	Everett.	
Number of takers by annual rates . . . . .	90,434	6,802	6,964	14,552	5,561	124,313
Number of takers by meter . . . . .	4,173	208	94	140	36	4,651
Number of takers of all kinds . . . . .	94,607	7,010	7,058	14,692	5,597	128,964

Table II.

Showing the purposes for which water was taken by Annual Rates, and the districts where taken.

PURPOSES FOR WHICH WATER WAS TAKEN BY ANNUAL RATES.	COCHIT- UATE.	MYSTIC.				Totals.
	Boston, ex- cluding Charlestown.	Charlestown.	Chelsea.	Somerville.	Everett.	
Armories . . . . .		3	1			4
Bakeries . . . . .	258	23	26	14	6	327
Bath-houses . . . . .	5					5
Building purposes . . . . .	1,675	26	41	303	179	2,224
Cemeteries . . . . .	11		1	1		13
Churches . . . . .	215	12	13	25	7	272
Clubs . . . . .	99	24	19	17	8	167
<i>Carried forward . . . . .</i>	2,263	88	101	360	200	3,012

Table II. — *Concluded.*

PURPOSES FOR WHICH WATER WAS TAKEN BY ANNUAL RATES.	COCHIT- UATE.		MYSTIC.			Totals.
	Boston ex- cluding Charlestown.	Charlestown.	Chelsea.	Somerville.	Everett.	
<i>Brought forward</i> .....	2,263	88	101	360	200	3,012
Depots.....	38	2	1	6	4	51
Disinfectant.....	1					1
Dwelling-houses.....	49,102	4,660	4,929	9,015	3,697	71,403
Fire Department:						
Chemical engines.....	10					10
Combination wagons..	2					2
Hydrants and reser- voirs.....	6,824	289	94	149	53	7,409
Ladder companies.....	16					16
Steam fire-engines....	40	5	6	6	2	59
Water towers.....	1					1
Filling tank (special)..	1					1
Fountains.....	24	4	4	10	4	46
Freight-houses.....	5	12				17
Gate-house.....	1					1
Greenhouses.....	70		2	13	7	92
Gymnasiums.....	4					4
Halls.....	139	11	10	9	8	177
Hand hose.....	9,022	252	618	2,764	774	13,430
Hospitals.....	60		2	1		63
Hotels.....	3					3
Laundries.....	463	35	30	45	17	590
Libraries and museums.	10	1	1	1	2	15
Manufactories.....	23	7	30	15	9	84
Model houses.....	8,155	441	227	435	108	9,366
Morgue.....	1					1
Motors.....	12	1	2	2	1	18
Offal stations.....	2					2
Offices.....	1,444	43	52	29	18	1,586
Photograph rooms.....	28	2	2	2	1	35
Police stations.....	7	1	1		1	10
Public buildings.....	8	1	1		1	11
Public institutions.....	4					4
Puddling trenches.....	24		3	1	1	29
Restaurants and lunches	345	13	8	9	7	382
Saloons.....	491	52				543
Schools.....	120	5	9	9	4	147
Sewers (building).....						
Sewers (flushing).....	2		1	1		4
Shops.....	2,705	167	105	126	33	3,136
Shipping.....	29					29
Stables.....	3,613	323	377	1,220	484	6,017
Steam-engines.....	156	21	12	9	5	203
Steam-rollers.....	7					7
Steam-crushers.....	7			1		8
Stores.....	5,107	365	335	313	119	6,239
Theatres (special).....	5					5
Town of Revere.....	1					1
Urinals (public).....	11					11
Ward-rooms.....	7					7
Washing carts.....	3					3
Watering streets.....	18	1	1	1	1	22
<b>Totals.....</b>	<b>90,434</b>	<b>6,802</b>	<b>6,964</b>	<b>14,552</b>	<b>5,561</b>	<b>124,313</b>

Table III.

Showing the amounts assessed for water taken by Annual Rates, the purposes for which and the places where taken.

STYLE OF PREMISES.	COCHITUAUATE.	MYSTIC.				Totals.
	Boston, excluding Charlestown.	Charlestown.	Chelsea.	Somerville.	Everett.	
Armories.....		\$56 50	\$12 00			\$68 50
Bakeries.....	\$3,363 44	296 00	348 00	\$187 00	\$91 00	4,285 44
Bath-houses....	206 00					206 00
Building purposes.....	15,840 16	176 62	199 83	1,416 75	621 59	18,254 95
Cemeteries....	94 17		10 00	5 00		109 17
Churches.....	2,591 00	139 00	160 50	243 67	90 00	3,224 17
Clubs.....	1,754 67	270 00	231 25	268 00	97 50	2,621 42
Depots.....	746 63	29 50	19 50	87 00	98 00	980 63
Disinfectant..	25 00					25 00
Dwell'g-houses,	720,369 55	62,263 79	64,112 28	119,140 09	44,277 33	1,010,163 04
Fire Department:						
Chemical engines....	150 00					150 00
Combination wagons....	30 00					30 00
Hydrants and reservoirs.....	102,360 00	4,335 00	2,670 00	4,172 00	1,484 00	115,021 00
Ladder companies.....	240 00					240 00
Steam fire-engines.....	1,000 00	115 00	140 00	140 00	50 00	1,445 00
Water towers.....	15 00					15 00
Filling tank (special).....	156 00					156 00
Fountains.....	464 67	40 00	30 00	74 00	28 75	637 42
Freight-houses,	47 50	83 33				130 83
Gate-house....	15 00					15 00
Greenhouses..	1,176 00		24 00	103 00	64 00	1,367 00
Gymnasiums...	546 50					546 50
Halls.....	1,992 92	125 00	180 00	93 50	88 50	2,489 92
Hand-hose....	45,110 00	1,260 00	3,090 00	13,820 00	3,870 00	67,150 00
Hospitals.....	4,445 00		33 00	170 00		4,648 00
Hotels.....	377 00					377 00
Laundries.....	8,461 95	665 83	555 67	747 20	304 09	10,731 74
Libraries and museums....	172 00	10 00	12 00	26 00	36 00	256 00
Manufactories.	455 24	147 62	359 17	212 42	68 50	1,242 95
Model houses..	177,090 76	8,219 61	4,952 74	9,142 82	2,327 51	201,733 44
Morgue.....	10 00					10 00
Motors.....	655 40	20 00	155 00	10 00	5 00	845 40
Offal-stations..	225 00					225 00
Offices.....	14,347 46	441 00	518 00	275 25	147 33	15,729 04
Photograph rooms.....	547 50	39 50	35 00	43 00	12 00	677 00
Police-stations,	130 00	13 00	17 00		20 00	180 00
<i>Carried forward,</i>	\$1,105,211 52	\$78,756 30	\$77,864 94	\$150,376 70	\$53,781 10	\$1,465,990 56



Table III. — *Concluded.*

STYLE OF PREMISES.	COCHITUATE.	MYSTIC.				Totals.
	Boston, excluding Charlestown.	Charlestown.	Chelsea.	Somerville.	Everett.	
<i>Brought forw'd,</i>	\$1,105,211 52	\$78,756 30	\$77,864 94	\$150,376 70	\$53,781 10	\$1,465,990 56
Public build- ings .....	532 00	44 50	39 00	.....	32 50	648 00
Public Institu- tions.....	7,200 00	.....	.....	.....	.....	7,200 00
P u d d l i n g trenches.....	1,044 46	.....	231 63	303 32	330 00	1,909 41
R e s t a u r a n t s and lunches.	6,125 85	221 08	120 00	133 34	94 00	6,694 27
Saloons.....	18,294 23	2,116 50	.....	.....	.....	20,410 73
Schools.....	1,734 67	80 33	179 67	146 25	55 17	2,196 09
Sewers (build- ing).....	.....	.....	.....	.....	.....	.....
Sewers (flush- ing).....	502 25	.....	100 00	40 00	.....	642 25
Shops.....	24,625 78	1,140 40	842 59	864 20	236 25	27,709 22
Shipping .....	1,148 32	.....	.....	.....	.....	1,148 32
Stables .....	25,390 13	2,868 45	1,791 35	6,774 99	1,970 31	38,795 23
Steam-engines.	4,412 09	324 58	160 00	61 16	33 00	4,990 83
Steam-rollers..	155 22	.....	.....	.....	.....	155 22
Steam-crush'rs,	153 34	.....	.....	98 31	.....	251 65
Stores .....	59,354 68	3,173 37	2,964 01	2,874 32	952 24	69,318 62
Theatres (spe- cial).....	224 04	.....	.....	.....	.....	224 04
Town of Re- vere.....	4,481 14	.....	.....	.....	.....	4,481 14
Urinals (pub- lic) .....	345 00	.....	.....	.....	.....	345 00
Ward-rooms...	70 00	.....	.....	.....	.....	70 00
Washing carts,	100 00	.....	.....	.....	.....	100 00
Watering sts...	46,710 40	50 00	1,507 20	4,731 28	647 68	53,646 56
Totals.....	\$1,307,815 12	\$88,775 51	\$85,800 39	\$166,403 87	\$58,132 25	\$1,706,927 14

Table IV.

Showing the purposes for which water was taken by Meter, and the districts where taken.

PURPOSES FOR WHICH WATER WAS TAKEN BY METER.	COCHIT- UATE.	MYSTIC.				Totals.
	Boston, ex- cluding Charlestown.	Charlestown.	Chelsea.	Somerville.	Everett.	
Bakeries .....	8	4	1			13
Bath-houses.....	5					5
Boarding-houses .....	61			2	2	65
Bottling.....	44	2				46
Breweries .....	25	1				26
Cemeteries .....	3	1			1	5
Chemicals.....	9			2	1	12
Club-houses.....	24					24
Chutes .....	1					1
Distilleries .....	4	1		2		7
Electrical companies.....	12	2	1			15
Elevators and motors ...	508	9	5	5	3	530
Factories.....	234	29	35	25	7	330
Fish-houses .....	20					20
Gas-works .....	12	2	1			15
Greenhouses .....	13				2	15
Halls.....	16	2	1	1		20
Hospitals .....	21	1	3	2		27
Hotels .....	103	6		3		112
Iron-works.....	35	2	3	1	1	42
Laundries .....	18	2	3		1	24
Markets .....	6					6
Mills and engines.....	59	9	2	5	1	76
Model houses .....	875	20	3	4		902
Navy Yard and barracks, .....		3				3
Offices, stores and shops, .....	1,105	23	10	26	4	1,168
Oil-works .....	7					7
Parks .....	10	1				11
Police-stations .....	13			1		14
Public institutions .....	28	2		1		31
Saloons and restaurants, .....	322	2				324
Schools .....	116	14	4	19	8	161
Slaughtering-houses ...	4			6		10
Stables .....	297	51	15	26	4	393
Steam & Str't R.R. co.'s, .....	58	13	5	7	1	84
Stone-works .....	7					7
Sugar refineries.....	1					1
Tanneries .....	4					4
Theatres .....	15					15
Warehouses .....	8					8
Wharves and shipping..	62	6	2	2		72
<b>Totals.....</b>	<b>4,173</b>	<b>208</b>	<b>94</b>	<b>140</b>	<b>36</b>	<b>4,651</b>

Table V.

Showing the amounts assessed by Meter rates, the purposes for which and the districts where water was taken.

ASSESSED BY METER RATES.	COCHITU- ATE.	MYSTIC.				Totals.
	Boston, excluding Charlestown.	Charlestown.	Chelsea.	Somerville.	Everett.	
Bakeries .....	\$386 00	\$979 60	\$84 00			\$1,449 60
Bath-houses .....	1,044 50					1,044 50
Boarding-houses...	3,681 90			\$15 00	\$91 00	3,787 90
Bottling .....	4,216 80	197 30				4,414 10
Breweries.....	38,383 30	3,096 00				41,479 30
Cemeteries.....	119 40				47 10	166 50
Chemicals .....	709 50	246 90		453 60	2,097 60	3,507 60
Club-houses .....	5,675 40					5,675 40
Chutes.....	729 00					729 00
Distilleries .....	866 20	160 80		227 20		1,254 20
Electrical compa- nies.....	22,707 30	848 10	1,484 40			25,039 80
Elevators and motors .....	62,434 95	1,217 00	187 20	61 96	45 00	63,946 11
Factories .....	57,361 20	3,252 90	8,927 10	4,905 10	426 60	74,872 90
Fish-houses.....	1,916 00					1,916 00
Gas-works.....	15,114 10	848 10	180 70			16,142 90
Greenhouses.....	1,126 00				27 60	1,153 60
Halls .....	2,558 35	77 00	23 80	35 00		2,694 15
Hospitals .....	18,963 80	111 70	1,933 10	204 80		21,213 40
Hotels .....	59,864 50	683 50		260 80		60,808 80
Iron-works .....	7,961 30	419 10	30 80	56 00	364 80	8,832 00
Laundries .....	7,632 10	666 10	256 70		191 10	8,746 00
Markets.....	533 00					533 00
Mills and engines..	11,495 05	2,719 90	926 30	324 60	22 40	15,488 25
Model-houses.....	78,938 25	1,367 60	270 00	423 70		80,999 55
Navy Yard and bar- racks .....		5,831 40				5,831 40
Offices, stores and shops .....	141,810 12	1,687 60	512 00	1,201 60	107 55	145,318 87
Oil-works .....	920 40					920 40
Parks .....	1,550 30	18 20				1,568 50
Police-stations...	2,272 40			58 80		2,331 20
Public institutions.	17,271 40	3,482 60		68 60		20,822 60
Saloons and restau- rants.....	32,656 50	65 80				32,722 30
Schools .....	16,386 50	1,247 70	139 30	1,240 30	307 40	19,321 20
Slaughtering- houses.....	2,350 40			14,684 50		17,034 90
Stables.....	19,016 85	2,506 20	854 70	1,787 55	146 60	24,311 90
Steam and street R.R. companies..	98,684 00	28,467 80	3,095 60	12,305 20	152 30	142,704 90
Stone-works .....	1,923 00					1,923 00
Sugar-refineries...	21,542 40					21,542 40
Tanneries.....	600 90					600 90
Theatres .....	3,029 40					3,029 40
Warehouses .....	4,913 80					4,913 80
Wharves and ship- ping .....	26,558 80	4,176 20	1,725 20	92 40		32,552 60
Totals.....	\$795,910 07	\$64,375 10	\$20,630 90	\$38,406 71	\$4,027 05	\$923,349 83

Table VI.

Showing the quantities of water taken by Meter, the purposes for which and the districts where taken.

STYLE OF PREMISES TAKING WATER BY METER.	COCHIT- UATE.	MYSTIC.				Totals.
	Boston, ex- cluding Charlestown.	Charlestown.	Chelsea.	Somerville.	Everett.	
	Cubic ft.	Cubic ft.	Cubic ft.	Cubic ft.	Cubic ft.	Cubic ft.
Bakeries.....	278,000	769,000	60,000			1,107,000
Bath-houses.....	793,000					793,000
Boarding-houses..	2,652,000			7,000	65,000	2,724,000
Bottling.....	3,145,000	142,000				3,287,000
Breweries.....	31,842,000	2,560,000				34,402,000
Cemeteries.....	85,000				34,000	119,000
Chemicals.....	514,000	186,000		358,000	1,728,000	2,786,000
Club-houses.....	4,487,000					4,487,000
Chutes.....	591,000					591,000
Distilleries.....	686,000	119,000		170,000		975,000
Electrical compa- nies.....	17,530,000	695,000	1,217,000			19,442,000
Elevators and mo- tors.....	47,773,000	925,000	133,000	32,000	16,000	48,879,000
Factories.....	50,232,000	2,404,000	7,060,000	3,688,000	303,000	63,687,000
Fish-houses.....	1,451,000					1,451,000
Gas-works.....	12,951,000	696,000	132,000			13,779,000
Greenhouses.....	830,000				18,000	848,000
Halls.....	2,030,000	55,000	17,000	25,000		2,127,000
Hospitals.....	15,644,000	80,000	1,551,000	153,000		17,428,000
Hotels.....	48,589,000	484,000		193,000		49,266,000
Iron-works.....	5,188,000	304,000	22,000	40,000	284,000	5,838,000
Laundries.....	6,144,000	523,000	187,000		141,000	6,995,000
Markets.....	386,000					386,000
Mills and engines..	8,912,000	2,154,000	739,000	238,000	16,000	12,059,000
Model-houses.....	60,244,000	990,000	195,000	313,000		61,742,000
Navy Yard and bar- racks.....		5,004,000				5,004,000
Offices, stores and shops.....	107,343,000	1,270,000	362,000	844,000	73,000	109,892,000
Oil-works.....	752,000					752,000
Parks.....	1,215,000	13,000				1,228,000
Police-stations....	1,712,000			42,000		1,754,000
Public institutions,	13,969,000	2,861,000		49,000		16,879,000
Saloons and res- taurants.....	24,491,000	47,000				24,538,000
Schools.....	12,609,000	907,000	90,000	897,000	204,000	14,707,000
Slaughter'g-houses,	1,879,000			13,947,000		15,826,000
Stables.....	13,906,000	1,790,000	601,000	1,304,000	100,000	17,701,000
Steam and street R.R. companies..	99,743,000	27,295,000	2,522,000	12,740,000	111,000	142,411,000
Stone-works.....	1,493,000					1,493,000
Sugar-refineries...	24,898,000					24,898,000
Tanneries.....	455,000					455,000
Theatres.....	2,311,000					2,311,000
Warehouses.....	4,003,000					4,003,000
Wharves and ship- ping.....	21,264,000	3,416,000	1,413,000	66,000		26,159,000
Totals.....	655,020,000	55,689,000	16,301,000	35,106,000	3,093,000	765,209,000

Table VII.  
Number and Amounts of Abatements Allowed during the Year 1897.

ON ACCOUNT OF ASSESSMENTS FOR YEAR.	COCHITUATE.				MYSTIC.							
	Boston, excluding Charlestown.				Charlestown.		Chelsea.		Somerville.		Everett.	
	No.	Amount.	No.	Amount.	No.	Amount.	No.	Amount.	No.	Amount.	No.	Amount.
1897.....	3,277	\$21,188 21	200	\$1,071 42	311	\$1,669 57	342	\$1,533 62	210	\$1,014 49	210	\$1,014 49
1896.....	1,594	*47,389 14	97	*3,304 47	176	1,321 36	363	2,238 30	161	1,017 38	161	1,017 38
1895.....	12	2,243 50	1	2 50	.....	.....	2	7 80	.....	.....	.....	.....
<b>Total, Cochituate.....\$70,820 65</b>												
<b>Total, Mystic.....\$13,180 91</b>												

The abatements allowed on account of 1897 assessments, amounting to \$26,477.31, were due to changes in occupancy of premises, changes in ownership, vacancies, errors in valuations and assessments, inaccuracy of meters as proved by tests, underground leaks for which the owner could not be held entirely responsible, and for other reasons, which, in the judgment of the General Superintendent, entitled the water-taker to consideration.

\* Of these amounts, \$32,622 Cochituate, and \$2,575 Mystic, were abated on bills against the Fire Department, on account of reduction in rate for fire-hydrants.

The abatements on account of 1896 and 1895, not including amounts specially noted above, were due to bills uncollectible, changes of ownership, failures, shut off for non-payment, taking of property by the Boston Terminal Company and cleaning up old accounts.

Tables VIII., IX. and X. represent the work of the Off and On Service, as follows:

Table VIII.

NEW ELEVATOR, MOTOR, FIRE AND SERVICE PIPES.	COCHITUATE.	MYSTIC.				Totals.
	Boston, ex- cluding Charlestown.	Charlestown.	Chelsea.	Somerville.	Everett.	
Elevator .....	21	.....	.....	.....	.....	21
Motor.....	6	1	.....	.....	.....	7
Fire.....	49	.....	.....	.....	.....	49
Service .....	2,420	61	73	562	227	3,343
Totals .....	2,496	62	73	562	227	3,420

Table IX.

TURNING WATER OFF AND ON.	COCHITUATE.	MYSTIC.				Totals.
	Boston, ex- cluding Charlestown.	Charlestown.	Chelsea.	Somerville.	Everett.	
For repairs in mains.....	1,268	6	.....	.....	.....	1,274
For repairs in services...	3,687	400	13	12	7	4,119
For non-payments.....	1,592	90	128	118	128	2,056
For waste.....	20	.....	1	.....	1	22
Turning on first time....	3,173	171	349	484	268	4,445
Vacants .....	2,221	51	70	323	213	2,878
Totals .....	11,961	718	561	937	617	14,794

Table X.

	Cochituate.	Mystic.	Total.
Received for turning water off and on for repairs, deposited with the City Collector..	\$1,742 50	\$221 00	\$1,963 50

**Table XI.**

*Showing the kind of fixtures in use January 31, 1898, their number and the districts wherein located.*

CLASS OF FIXTURES IN USE JANUARY 31, 1898.	COCHIT- UATE.	MYSTIC.				Totals.
	Boston, ex- cluding Charlestown.	Charlestown.	Chelsea.	Somerville.	Everett.	
Bath-tubs .....	58,227	1,769	2,430	7,661	3,328	73,415
Bowls.....	92,640	2,545	2,978	8,009	3,096	109,268
Foot-tubs .....	414	10	6	8	1	439
Sinks .....	153,298	12,459	9,924	17,639	5,860	199,180
Taps .....	23,140	1,302	1,178	3,416	922	29,958
Urinals, automatic.....	4,622	101	41	25	2	4,791
“ otherwise.....	594	86	37	28	21	766
Wash-tubs .....	90,853	2,295	2,851	9,517	3,195	108,711
Water-closets .....	135,170	8,438	7,536	15,321	4,647	171,112
<b>Totals .....</b>	<b>558,958</b>	<b>29,005</b>	<b>26,981</b>	<b>61,624</b>	<b>21,072</b>	<b>697,640</b>

**Table XII.**

## WASTE DETECTION.

Premises on which defective fixtures were found .	1,435
Premises re-examined . . . . .	1,448
Second notices to repair issued . . . . .	116
Wilful waste . . . . .	2

The defective fixtures may be divided into the following classes:

Ball-cocks and valves . . . . .	959
Sink, hopper, bowl and bath faucets . . . . .	521
Service pipes burst . . . . .	120
Wilful waste . . . . .	2

Number of returns of waste received from the Waste and Deacon Division . . . . .	7,647
Second notices on above issued from Income Division office . . . . .	2,782

**Table XIII.****ELEVATOR, MOTOR AND FIRE-PIPE SERVICE, FOR THE YEAR ENDING DECEMBER 31, 1897.**

Total number of hydraulic elevators in service December 31, 1897 . . . . .	525
New elevators added to service during 1897 . . . . .	16
Elevators changed to steam-power . . . . .	5
Elevators changed to electric-power . . . . .	13
Elevator cylinders measured and clocks compared . . . . .	352
Elevator cylinders remeasured and clocks compared . . . . .	148
Elevator clocks found requiring readjustment . . . . .	74
Elevator clocks found requiring repairs . . . . .	28
Elevator mechanism found requiring repacking . . . . .	21
Total number of hydraulic motors in service December 31, 1897 . . . . .	121
New motors added to service during 1897 . . . . .	3
Number of buildings equipped with fire service December 31, 1897 . . . . .	443
Number of visits made to such premises . . . . .	710
Number of outlet valves inspected . . . . .	5,254
Number of outlet valves sealed and resealed . . . . .	2,422
Inspection of hydrants . . . . .	158
Resealing of hydrants . . . . .	93

**METER SERVICE.**

The following tables represent the work of the Meter Service branch of the Income Division for the year ending January 31, 1898:

**Table XIV.****STATEMENT OF METERS FOR YEAR ENDING JANUARY 31, 1898.**

Meters belonging to department, January 31, 1897 . . . . .	5,164
Purchased during year . . . . .	160
	<hr/>
	5,324
Condemned during year . . . . .	17
Lost in service during year . . . . .	7
	<hr/>
	24
	<hr/>
Meters belonging to department, January 31, 1898 . . . . .	<u>5,300</u>



**Table XV.**

DISTRIBUTION OF METERS, JANUARY 31, 1898.

In service . . . . .	4,937
At department shop . . . . .	274
At factory for repairs . . . . .	89
	5,300

**Table XVI.**

GENERAL STATEMENT OF WORK PERFORMED ON METERS DURING YEAR ENDING JANUARY 31, 1898.

	Meters.	Boxes.
Applied . . . . .	363	98
Discontinued . . . . .	232	
Changed . . . . .	1,373	
Changed location . . . . .	29	
Tested . . . . .	2,887	
Repaired at shop . . . . .	945	
Repaired at factory . . . . .	233	
Repaired in service . . . . .	722	142

**Table XVII.**

METERS CONDEMNED.

	DIAMETER IN INCHES.					Totals.
	2	1½	1	¾	⅝	
Metropolitan . . . . .			2	10		12
Ball & Fitts . . . . .			1		1	2
Worthington . . . . .	1			1	1	3
<b>Totals . . . . .</b>	<b>1</b>		<b>3</b>	<b>11</b>	<b>2</b>	<b>17</b>

**Table XVIII.**  
**METERS APPLIED.**

	DIAMETER IN INCHES.								Totals.
	6	4	3	2	1½	1	¾	⅝	
Worthington.....				11	23	51	31	.....	116
Crown.....		3	7	5	14	34	21	81	165
Hersey .....		2	1	3	6	13	21	1	47
Metropolitan.....					2	3	18	.....	23
B. W. W.....							8	.....	8
Ball & Fitts.....				1					1
Lambert.....								1	1
Empire.....							1	.....	1
Gem.....		1							1
<b>Totals.....</b>		<b>6</b>	<b>8</b>	<b>20</b>	<b>45</b>	<b>101</b>	<b>100</b>	<b>83</b>	<b>363</b>

**Table XIX.**  
**METERS DISCONTINUED.**

	DIAMETER IN INCHES.								Totals.
	4	3	2	1½	1	¾	⅝		
Worthington.....	1	.....	7	9	22	16	1	56	
Crown .....	2	3	3	8	12	24	58	110	
Hersey.....			2	4	3	3	.....	12	
Metropolitan.....				3	6	37	1	47	
Gem.....	1	1						2	
Ball & Fitts.....			1			1	.....	2	
Thomson.....							1	1	
B. W. W.....						2	.....	2	
<b>Totals.....</b>	<b>4</b>	<b>4</b>	<b>13</b>	<b>24</b>	<b>43</b>	<b>83</b>	<b>61</b>	<b>232</b>	

**Table XX.**  
METERS PURCHASED.

	DIAMETER IN INCHES.								Totals.
	6	4	3	2	1½	1	¾	⅝	
Worthington.....	.....	1	.....	2	11	21	.....	.....	35
Crown.....	1	3	2	2	9	35	23	.....	75
Empire.....	.....	.....	.....	.....	.....	.....	1	.....	1
Hersey.....	.....	1	1	4	11	16	14	.....	47
Lambert.....	.....	.....	.....	.....	.....	.....	.....	2	2
<b>Totals .....</b>	<b>1</b>	<b>5</b>	<b>3</b>	<b>8</b>	<b>31</b>	<b>72</b>	<b>38</b>	<b>2</b>	<b>160</b>

**Table XXI.**  
METERS REPAIRED AT FACTORY.

	DIAMETER IN INCHES.						Totals.
	3	2	1½	1	¾	⅝	
Crown.....	2	4	3	15	31	151	206
Worthington .....	.....	20	10	24	.....	4	58
Hersey .....	1	1	.....	3	11	2	18
Ball & Fitts.....	.....	.....	.....	.....	1	.....	1
<b>Totals.....</b>	<b>3</b>	<b>25</b>	<b>13</b>	<b>42</b>	<b>43</b>	<b>157</b>	<b>283</b>

**Table XXII.**  
**METERS REPAIRED IN SERVICE.**

CHARACTER OF REPAIRS.	Totals.
Clock defaced.....	81
Hands loose.....	14
Pawl stuck.....	1
Spindle leaks.....	172
Hands broken.....	83
Unsatisfactory.....	5
Stoppage.....	2
Not registering.....	21
Leak at coupling.....	36
Clock detached.....	3
Spindle stuck.....	7
Spindle broken.....	4
Ratchet broken.....	3
Clock loose.....	2
Leak at body.....	6
Rust.....	1
No force.....	2
Hands stuck.....	2
Leak at stop-cock.....	2
Clock broken.....	7
Glass broken.....	70
Cap broken.....	195
Gears did not mesh.....	2
Piston stuck.....	1
<b>Total.....</b>	<b>722</b>

**Table XXIII.**  
**METERS CHANGED.**

CAUSE.	Totals.
Test .....	507
Unsatisfactory .....	90
Not registering .....	411
Frozen .....	9
Stoppage .....	64
Leak at body .....	19
Clock defaced .....	14
No force .....	63
Clock broken .....	44
Relocation .....	15
Enlargement .....	61
Leak at spindle .....	41
Spindle stuck .....	5
Cylinder injured .....	1
Clock out of order .....	20
Clock lost .....	3
Leak at coupling .....	4
Disconnected .....	1
Cap loose .....	1
<b>Total .....</b>	<b>1,373</b>

**Table XXIV.**  
METERS IN SERVICE JANUARY 31, 1898.

	DIAMETER IN INCHES.								Totals.
	6	4	3	2	1½	1	¾	⅝	
Worthington.....	2	20	34	160	125	631	434	16	1,422
Crown .....	7	43	54	86	162	371	460	1,227	2,410
Hersey.....		5	12	23	41	79	184	19	363
Metropolitan.....				4	18	118	543	1	684
Thomson .....								3	3
B. W. W.....							42		42
Gem.....	1	5							6
Ball & Fitts.....			1	1					2
Champion.....							1		1
Torrent.....	1								1
Lambert .....								1	1
Empire.....							1		1
Nash .....								1	1
<b>Total.....</b>	<b>11</b>	<b>73</b>	<b>101</b>	<b>274</b>	<b>346</b>	<b>1,199</b>	<b>1,665</b>	<b>1,268</b>	<b>4,937</b>

**Table XXV.**  
METERS AT FACTORY FOR REPAIRS, JANUARY 31, 1898.

	DIAMETER IN INCHES.						Totals.
	3	2	1½	1	¾	⅝	
Metropolitan .....				8	58		66
Crown .....				2	2	13	17
Hersey .....				1			1
Worthington .....		1	1	3			5
<b>Total .....</b>		<b>1</b>	<b>1</b>	<b>14</b>	<b>60</b>	<b>13</b>	<b>89</b>

Table XXVI.

METERS AT DEPARTMENT SHOP, JANUARY 31, 1898.

	DIAMETER IN INCHES.								Totals.
	6	4	3	2	1½	1	¾	⅝	
Worthington .....		3	1	5	3	8	12	8	40
Crown .....		2		2	2	4	12	102	124
Hersey .....				1	2	2	3	1	9
Metropolitan .....					2	4	39	2	47
B. W. W. ....							1		1
Thomson .....				2	3	2	6	8	21
Ball & Fitts .....						1	5	1	7
Empire .....							1		1
Gem .....	1		2	2					5
Nash .....								1	1
Lambert .....								1	1
Proportional .....							1		1
Niagara .....								1	1
Duplex .....						1			1
Beck & Co. ....								1	1
Equitable .....							1		1
Undine .....							1	4	5
Spooner .....								1	1
Desper .....								2	2
Balance valve .....								1	1
Tremont .....						1		1	2
No name .....								1	1
Totals .....	1	5	3	12	12	23	82	136	274

Respectfully submitted,  
 J. H. CALDWELL,  
 General Superintendent Income Division.

## REPORT OF THE DISTRIBUTION DIVISION.

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OFFICE OF SUPERINTENDENT OF DISTRIBUTION DIVISION,  
710 ALBANY STREET, BOSTON, February 1, 1898.

HON. JOHN R. MURPHY,

*Water Commissioner :*

I herewith submit the annual report of the Distribution Division for the year ending January 31, 1898.

In accordance with instructions received from you on January 5, 1898, the name of this division was changed from that of the Eastern Division to the Distribution Division.

The taking, by the Metropolitan Water Board on January 1, 1898, of certain portions of the Western and Mystic Divisions will necessitate a revision in our records, so that the summaries of pipes and fixtures in use will represent what belongs to the Distribution Division as it stands to-day, exclusive of what has been taken by the State.

As this division supplied Somerville, Chelsea and Everett for eleven months of the year, I shall include the usual yearly statement of what has been done in these cities. This will appear apart from that which concerns the city of Boston.

#### MAIN PIPE.

*City of Boston.* — There were laid during the year, in connection with the distribution system of the city of Boston, 28.2 miles of main pipe. Of this amount 5,601 feet were private mains, laid for various parties, and 2,093 feet were hydrant, blow-off and reservoir pipes. These two items are not included in the total length of our system. The total amount laid also embraces 948 feet of main pipe lowered, which, although it does not effect the total length of our system, represents an amount of labor greater than that usually involved in ordinary pipe-laying.

Seven and five-tenths miles of pipe were abandoned, which, with the amount taken by the Metropolitan Water Board, makes the total length of our distribution system 666.2 miles.

Of the 28.2 miles laid, 7 miles were relaid, a much greater amount than has been customary in previous years.

A most helpful device in the form of a portable steam-boiler, having arrangements for thawing the frozen earth, was



introduced this year, enabling us to carry on our main-pipe work during the winter without interruption from frost.

Last August we began laying the new 12-inch salt water main for the Fire Department. Starting near the corner of Atlantic avenue and Congress street, we continued through Congress street and Post-office square to Exchange place, through Exchange place and Central street to Atlantic avenue, at Long wharf. We then returned to Atlantic avenue, at Congress street, and laid in Congress street easterly to the bridge; where, on account of the weather and other obstructions, we stopped. The work will be resumed in the spring. It is necessarily a costly job, on account of its slow progress. This is occasioned by the conditions of the work, solid walls of masonry, old fire-reservoirs, steam-heating conduits and obstacles of all kinds being common occurrences. Besides this we are laying in connection with the fire-pipe a 3-inch cement-lined pipe, laid in concrete, to serve as a conduit for the electrical portion of the system.

With the exception of a short distance at the junction of Columbus avenue extension and Centre street, which has been delayed by the construction of Stony Brook conduit, the 36-inch new high-service main laid in Heath street in 1895 is now complete to a point in Geneva avenue, about seventy feet from Blue Hill avenue. Near this point the main is reduced to thirty inches in diameter. We are now engaged in laying isolated sections of it further along in Geneva avenue and in Bowdoin street, which at some future time will be connected, giving to Dorchester a most efficient high-pressure supply.

During the year an auxiliary main, 42 inches in diameter, was laid in Fisher avenue, Brookline, between Boylston street and the Fisher Hill Reservoir. This was much needed, as heretofore the high service of the city was practically dependent upon the original 30-inch main between those two points.

A 20-inch low-service main was laid through Canton street, from Albany to Tremont streets, thus giving an efficient fire service to the dangerous lumber district.

About 1,500 feet of 20-inch low-service main was laid in Border street, East Boston, also for better fire protection.

The 24-inch main laid last year through Dorchester avenue and Adams street was reduced to 20 inches, and continued this year through Adams street to Minot street, a distance of over a mile. This gives considerable increase of head to this section.

Some of the most important relaying jobs performed during

the year were State street, between Washington and Commercial streets, where the old 12-inch pipe, which was in a most deplorable condition, was replaced by a 16-inch main; Washington street, between Dover and Kneeland streets, where the old 6 and 12 inch pipes were replaced by a 16-inch main, and the dead ends at the Boston and Albany Railroad bridge connected; Maverick street, between New and Chelsea streets, where about 1,150 feet of 6-inch pipe was replaced with 16-inch; Tremont street, between Warrenton and Boylston streets, where the old 8-inch was replaced by a 12-inch, and Boylston street, between Tremont street and Park square, where the old 6-inch was replaced by a 12-inch.

In that part of Federal street which was taken for the site of the new Union Station, and in portions of the adjacent streets, it was necessary to abandon the pipes and relay in their place 16 and 12-inch mains in New Cove street.

Changes in our mains occasioned by the construction of the Subway have been carried on during the year, important among which are— Tremont street, at Court street, 185 feet of 12-inch relaid with 16-inch; Washington street, between Elm street and Dock square, 151 feet of 8-inch relaid with 12-inch; Adams square, between Devonshire street and Cornhill, 140 feet of 12-inch relaid with 12-inch; Cornhill, between Adams square and Court street, 475 feet of 12-inch relaid with 12-inch; Tremont street, at Pemberton square, 35 feet of 8-inch relaid with 8-inch; Tremont row, at Howard street, 72 feet of 4-inch relaid with 8-inch, and Court street, at Cornhill, 80 feet of 12-inch relaid with 12-inch.

In the vicinity of Hogg's bridge it was necessary to temporarily relocate our 16 and 12 inch lines to allow of the construction of Stony Brook conduit.

At Congress street, where the grade crossing is to be abolished, it was necessary to abandon our 30 and 24 inch mains in Congress and D streets, and relay them in Danby and B streets. The abandoned pipe which had been laid only a few years was taken out of the ground by contract, and has since been used in the construction of other lines. Several of the temporary lines laid during 1896, on account of the elevation of the tracks on the Providence Division of the N.Y., N.H. & H. R.R., and abandoned at a later date, were taken out of the ground during the past year, and at the present writing we are about to begin making the necessary changes in our pipes caused by the proposed elevation of the tracks on the Dedham branch of this railroad.

*Somerville, Chelsea and Everett.*— The distribution system has been extended by the addition of 150 feet of 1½-inch

pipe, 70 feet of 1½-inch pipe, 1,029 feet of 2-inch pipe, 20 feet of 4-inch pipe, 7,156 feet of 6-inch pipe, 1,421 feet of 8-inch pipe, 2,730 feet of 10-inch pipe, 1,050 feet of 12-inch pipe, 39 feet of 16-inch pipe and 858 feet of 20-inch pipe, making a total of 14,523 feet added to the system. Twenty-four thousand six hundred and seventy-five feet of pipe were relaid, replacing as a rule pipe of smaller sizes.

#### GATES OR STOP-COCKS.

*City of Boston.* — Five hundred and twenty-seven gates were established and 179 abandoned; of the former 11 were “blow-off” and seven private gates, and of the latter two were “blow-off” and one private gates. This would make the total number of gates in use, exclusive of “blow-off” and private gates, and also of those taken by the Metropolitan Water Board on January 1, as part of its system, 7,931. Special attention has been paid the condition of the gates this year. Our aim is to have every gate in thorough working order so in time of emergency they may not fail to operate.

*Somerville, Chelsea and Everett.* — In these cities 118 gates of different sizes were established.

#### AIR-COCKS.

*City of Boston.* — During the year 18 air-cocks were established in various parts of the city.

#### DEACON METERS.

*City of Boston.* — One was established in the Roxbury district and one on Deer Island.

*Somerville and Chelsea.* — One was abandoned in each of these cities.

#### HYDRANTS.

*City of Boston.* — Four hundred hydrants were established and 218 abandoned, making a net increase for the year of 182, and a total, exclusive of those taken by the Metropolitan Water Board on January 1, as part of its system, of 7,235.

The usual requests from the Fire Department for raising, lowering, relocating, changing style, and establishing new hydrants have been attended to promptly. These requests have become more frequent than in previous years, owing no doubt to the system now in vogue in the Fire Department, which requires a monthly report by the several District

Chiefs on the condition of the hydrants in their districts. During the winter months, the Water Department makes a daily inspection of all hydrants in the important districts of the city, and a frequent inspection in suburban parts. In addition to this a small force of men are kept employed throughout the winter in pumping water and other accumulations from the hydrant boxes, and otherwise preventing liability of delay in the operation of these important means of protection against fire. Six thousand nine hundred and seventy-four bushels of salt were purchased by this department, and delivered to the Fire Department to be used on hydrants during the cold weather.

*Somerville, Chelsea and Everett.* — There were established 107 post-hydrants, and 32 were abandoned, making a net increase to the system of 75.

#### WATER-POSTS.

*City of Boston.* — Five water-posts were established during the year and two abandoned, making an increase of three, and the total number in use January 31, 1898, 408. The usual attention, such as painting, new valves, hose and couplings was given them.

*Somerville, Chelsea and Everett.* — Three water-posts were established and two abandoned, making a net increase of one, and a total of 97 now in use in these cities.

#### FOUNTAINS.

*City of Boston.* — Three drinking fountains were established and four abandoned. One was also established for the Park Department in the North End Park. The services of two men are employed throughout the year in the care and maintenance of fountains, special attention being given to the sanitary condition of the same.

*Somerville, Chelsea and Everett.* — One drinking fountain was established in Everett and one abandoned in Somerville.

#### SERVICE-PIPES.

*City of Boston.* — Two thousand eight hundred and twenty service-pipes (64,128 feet) have been laid during the year, and 312 (7,072 feet) abandoned, showing a net increase of 2,508 service-pipes (57,056 feet) for the year, and making the total number of pipes now in use 82,026, with a length of 2,297,566 feet.

Under the law governing the laying out of new streets, we were obliged to lay to vacant lots 453 service-pipes, with a

length of 7,240 feet, from which no revenue is at present derived.

## METERS.

On September 1, 1897, the meter service, which previous to that date was in charge of this division, was transferred to the Income Division, whose report will contain a statement of what was done during the past year.

## MACHINE, CARPENTER AND BLACKSMITH SHOPS.

It has not been customary to state what work was done in these shops located at our yard, No. 710 Albany street, but, as requested by you, I give below a statement of the work performed. It does not include the small repairs. The articles manufactured are taken from the rough stock and finished ready for use. The boxes and other things made in the carpenter shop represent a small part of its work, as during a great portion of the year the force, which includes painters, is engaged on all kinds of work maintaining the property of the department. In fact, it is a very rare occurrence now to have any repairs made by outside parties, except upon wagons and harnesses.

*Machine Shop. — Manufactures.*

Gates, 3-inch . . . . .	60
“ 4 “ . . . . .	113
“ 6 “ . . . . .	272
“ 8 “ . . . . .	108
“ 10 “ . . . . .	20
“ 12 “ . . . . .	24
Total . . . . .	597
Corporation cocks, $\frac{5}{8}$ -inch . . . . .	2,984
“ “ $\frac{3}{4}$ “ . . . . .	200
“ “ 1 “ . . . . .	183
“ “ $1\frac{1}{2}$ “ . . . . .	77
Total . . . . .	3,444
Nipples, $\frac{5}{8}$ -inch. . . . .	100
“ $\frac{3}{4}$ “ . . . . .	100
“ 1 “ . . . . .	101
“ $1\frac{1}{2}$ “ . . . . .	175
“ 2 “ . . . . .	176
Total . . . . .	652

Coupling nuts, $\frac{5}{8}$ -inch. . . . .	7,113
“ “ $\frac{3}{4}$ “ . . . . .	177
“ “ 1 “ . . . . .	562
“ “ $1\frac{1}{2}$ “ . . . . .	202
“ “ 2 “ . . . . .	150
Total . . . . .	<hr/> 8,204
Coupling tubes, $\frac{5}{8}$ -inch. . . . .	5,834
“ “ $\frac{3}{4}$ “ . . . . .	625
“ “ 1 “ . . . . .	589
“ “ $1\frac{1}{2}$ “ . . . . .	235
“ “ 2 “ . . . . .	210
Total . . . . .	<hr/> 7,493
Male couplings, $\frac{3}{4}$ -inch. . . . .	59
“ “ 1 “ . . . . .	251
“ “ $1\frac{1}{2}$ “ . . . . .	257
“ “ 2 “ . . . . .	26
Total . . . . .	<hr/> 593
Plugs, $\frac{5}{8}$ -inch. . . . .	447
“ $\frac{3}{4}$ “ . . . . .	100
“ 1 “ . . . . .	89
“ $1\frac{1}{4}$ “ . . . . .	16
“ $1\frac{1}{2}$ “ . . . . .	20
“ 2 “ . . . . .	16
Total . . . . .	<hr/> 688
Air-cocks . . . . .	30
Lowry hydrants . . . . .	72
Boston Lowry hydrants . . . . .	49
Post hydrants . . . . .	248
Boston hydrants . . . . .	11
Salt water hydrants . . . . .	6
Hydrant wastes, large . . . . .	480
Hydrant wastes, small . . . . .	40
Set screws . . . . .	5,268
Lowry hydrant bolts . . . . .	1,124
Post hydrant bolts . . . . .	232
Boston Lowry hydrant bolts . . . . .	300
Sidewalk tops . . . . .	3,601

Thimbles, various sizes . . . . .	66
Boston Lowry extensions . . . . .	38
Burnett valves . . . . .	126
Two-inch female hose-couplings . . . . .	173
Three-inch to 2-inch reducing plugs . . . . .	47

Repairs were made on the following:

Gates of various sizes . . . . .	17
Lowry hydrants . . . . .	253
Boston Lowry hydrants . . . . .	22
Post hydrants . . . . .	16
Boston hydrants . . . . .	9

*Carpenter Shop — Manufactures.*

Lowry hydrant boxes . . . . .	159
Boston Lowry hydrant boxes . . . . .	62
Post hydrant boxes . . . . .	228
Boston hydrant boxes . . . . .	23
Gate-boxes . . . . .	579
Wooden horses . . . . .	137
Paving rammers . . . . .	40

*Blacksmith Shop.*

Picks pointed . . . . .	15,000
Picks resteeled . . . . .	225

MAINTENANCE.

*City of Boston.* — We have made 2,781 repairs on pipes during the year, for causes of which see table appended. A most interesting exhibit is our statement of miscellaneous work performed, while it does not give an idea of the expense or the difficulties attached to each one of the jobs, still it will assist in forming an idea of how a part of the department occupied its time during the year, and shows what a variety of work we are called upon to perform. Among other things, 10,268 gate locations were either marked or remarked; 9,362 gates salted an account of cold weather; 4,224 hydrant boxes cleaned out; 1,646 hydrants repaired in service; 1,257 street repairs; 1,004 stop-cock or gate-boxes repaired in service; 953 examinations caused by false reports; 833 meters hayed on account of cold weather; 808 hydrants hayed for same reason; 665 water posts repaired; 635 hydrant boxes repaired in service, and 426 sidewalk up-rights raised or lowered.

Those parts of the various bridges over which our main pipes are carried have been given unusual attention this year. The supports were strengthened and renewed; the boxes covering the pipes repaired and painted, and in some instances replaced entirely. All excavations in the streets that were likely to expose our pipes were carefully inspected, with a view of protecting said pipes from damage, and in all cases where corporations were at work laying conduits, etc., in the streets, an inspection was made to prevent encroachment and the covering of our pipes by said corporations.

#### HARBOR SERVICE.

*City of Boston.* — Although no additional mains have been laid in the harbor this year, considerable attention has been given to the protection of the existing ones. Bulkheads have been built, and during the winter months it was necessary on several occasions to replace the earth which was washed away by the sea, thereby exposing our pipes to danger of breaking and freezing. As a precaution against freezing during the cold spells a small stream was allowed to run continuously on Rainsford's and Galloupe's Islands. Located in various parts of the harbor are signs, warning ships not to anchor in the vicinity of our pipes. These have been repaired and painted.

#### RESERVOIRS AND STAND-PIPES.

*East Boston.* — This reservoir is in good condition.

*Parker Hill.* — The keeper's house has been thoroughly renovated, and with the rest of the property is in first-class condition.

*South Boston.* — This reservoir is abandoned, and the connections with our system removed.

*College Hill.* — Up to January 1, 1898, the time when this property was taken by the Metropolitan Water Board, this reservoir was maintained in its usual good condition, and handed over to the State in first-class order. About 300 feet of roadway on the grounds was macadamized.

*Fisher Hill and Brookline.* — These two basins came under the care of this division January 1, 1898, and will require considerable attention before we can safely say they are in good condition. We are now repairing the buildings.

*Breed's Island Stand-pipe.* — The extensive repairs reported as in progress in our last statement have been completed, and the tower is now in the best condition.



*Mt. Bellevue Stand-pipe.* — This building has been thoroughly overhauled. New floors were laid, a copper sheathing placed between the upper and lower floors of the observatory, guard rails placed around the windows, the masonry pointed and the land surrounding the building graded. During the summer season the tower is well patronized for observation purposes, it being located on the highest land in the city of Boston. A keeper was placed in charge of the grounds, with good results.

#### FIRE RESERVOIRS.

During the year the following fire reservoirs were abandoned on account of the operations of this department.

Washington street, at Common.

“ “ “ Motte.

“ “ “ Davis.

East Canton street, opposite No. 89.

#### PUMPING STATIONS.

*Mystic.* — During that portion of the past year when this station was in our charge, Engine No. 3 was stopped and thoroughly repaired. The pump plungers were taken out and cylinders scraped of corrosion and painted inside on the steam end. Three new piston valves and two new valve stems were set in place of old ones. The air-pump beams were taken out, relined and rebabbited, and pumps fastened to foundations. The lagging on all the pumps was repaired.

The following is a statement of the time each engine was run up to December 31, 1897 :

Engine No. 1, 2,365 hours, 15 minutes.

“ “ 2, 1,500 “ 15 “

“ “ 3, 1,308 “ 50 “

“ “ 4, 6,420 “

Number of gallons of water pumped by all four engines 4,404,156,637.

In boilers Nos. 1, 2 and 3 it was found necessary to reline the fire boxes and place new arches over the fire doors. Three new sets of head plates were also required for the same boilers. A new brick floor was put in the fire-room. The bridge at the pumping station was entirely rebuilt and painted, and the dwelling-house and other buildings located on the grounds were thoroughly overhauled and put in first-class condition, preparatory to their transfer to the State.

*West Roxbury.* — Two new air-pumps were connected with the pumping apparatus, thus stopping the disagreeable noise

in the pipes so frequently complained of in the past. Connection was made with the sewer in Washington street, giving to the station a much-needed drainage.

*Wayne street.*— This station will in all probability be abandoned some time during the year, and at present answers all requirements.

*East Boston.*— With the exception of placing new tubes in the boilers nothing was done at this station; it being in a generally good condition.

#### YARDS.

*Albany street.*— Although greatly cramped last year, this year the City Hospital took quite a slice off the yard for the purpose of building a coal-pocket, and this contracts our working space to a degree where it is almost impossible to move around in the busy season. The stable which was in process of reconstruction at the writing of my last report was completed during the year, and we now have an almost model stable. A large stationary derrick was erected in the yard which greatly facilitates the loading and unloading of heavy castings. Our large stock of valuable patterns have been given space on the upper floor of the machine-shop and arranged, tagged and catalogued under the direction of the City Engineer. The buildings have been painted and repaired where necessary, and extra accommodations prepared for the meter service of the Income Department.

*Charlestown.*— Extensive repairs have been made here. The fence has been entirely rebuilt; the buildings painted, new doors and floors placed in the stable and new window frames in the repair shop.

*West Roxbury.*— The removal to more commodious quarters recommended in last year's report has been made, and the beneficial results are most apparent. A two and one-half story wooden frame building serving as an office, workshop and stable, surrounded by a large and roomy yard, was secured on Williams street, West Roxbury, a short distance from Washington street. This is a much more central location than the old one on Seaverns avenue, and will undoubtedly answer the requirements of this large and growing district for some time to come.

*Dorchester, Brighton and East Boston* have all received some attention as regards their condition, and are at present sufficiently equipped to handle the work in their districts. The Brighton District will, however, soon need better accommodations.

## MYSTIC LAKE AND CONDUIT.

Constant attention was paid during the year to the condition of the Lake and the streams entering it, with a view to removing as far as possible all foreign bodies. The conduit was flushed out several times, scraped and cleansed, and new planking placed on the bridge at the Lake. For statistics of the rain-fall, and rise and fall of water in the Lake, see Engineer's report.

## WATER-SOURCES.

The following is a summary of the inspection work for the year 1897: Total number of cases inspected, 382. The present condition of all inspected cases is: Present safe, 279; seem safe, 9; suspected, 8; unsatisfactory, 17; remedied, 69. Four legal notices were served.

## ELECTROLYSIS.

Electrical tests have been made throughout the whole city. The object of these tests was first to determine the districts, if any, in which electrolytic action is marked, and then to ascertain the extent to which it is going on. The work so far has been confined principally to finding the potential differences between the pipes and the adjacent ground, as they furnish the information from which conclusions as to relative rates of electrolytic decomposition can be most readily drawn. The results obtained are merely comparative ones, but serve as a guide to the correct examination of the system.

## DEACON AND WASTE SERVICE.

The Deacon meter service has been continued during the past year with good results. Sixty-two of these meters were in operation for a period of seven months and twenty-three days, and 731 readings and tests were made on 150 sections. Seven hundred and eleven diagrams, showing results of 355 readings of 24 hours, and 356 night tests, from 11 P.M. to 4 A.M., were delivered to the Engineer for compilation.

The inspection of premises for waste was continued during the entire year, principally in streets where the consumption of water had been shown by the Deacon meters to be excessive. The number of premises inspected during the year was 47,778; the number of streets, 823; waste reports

made, 7,652; defective fixtures discovered, 9,211; premises re-examined, 11,121.

Appended you will find tables showing details of the work performed.

Yours respectfully,

HUGH McNULTY,

*General Superintendent Distribution Division.*

TABLES SHOWING DETAILS OF WORK PERFORMED IN CITY OF BOSTON.

Table showing Total Length of B. W. W. System, January 31, 1897. Length of Distribution Mains laid or relaid, and abandoned during the Year 1897. Amount taken by the Metropolitan Water Board, January 1, 1898, and the Length of the Distribution System of the City of Boston, January 31, 1898.

	DIAMETER OF PIPES IN INCHES.													Totals.				
	60	48	42	40	36	30	28	24	20	16	12	10	8		6	4	3	2
Total connected with works, January 31, 1897.....	266	49,912	15,705	24,539	35,778	98,514	244	80,608	73,515	120,331	932,802	67,476	442,331	1,383,387	141,630	8,373	3,745	3,479,206
Length laid or relaid during the year.....	.....	.....	1,108	.....	5,452	2,032	.....	3,050	9,578	9,302	40,560	5,416	20,567	42,591	427	13	.....	140,146
Length abandoned during the year.....	.....	.....	.....	.....	.....	949	.....	555	378	503	7,927	800	1,257	14,826	12,188	480	.....	39,893
Amount taken by Metropolitan Water Board from Western Division.....	266	15,511	.....	1,435	1,166	2,140	.....	.....	.....	20	2,043	.....	.....	360	.....	.....	.....	22,941
Amount taken by Metropolitan Water Board from Eastern Division (including old Mystic).....	.....	730	.....	.....	2,337	20,010	.....	10,820	.....	.....	2,125	.....	1,105	1,435	120	.....	.....	83,732
Total length of Distribution System of City of Boston, January 31, 1898.....	.....	33,671	16,813	23,104	37,677	77,497	244	72,283	82,715	129,110	961,267	72,092	460,556	1,409,357	129,749	7,906	3,745	3,517,786 or 666.2 m.

Statement of Hydrant, Blow-off and Reservoir Pipes, January 31, 1898.

	DIAMETER IN INCHES.								Totals.
	16	12	10	9	8	6	4	3	
Total length in use January 31, 1897.....	472	7,083	100	2,915	1,062	24,932	10,778	3	47,345
Length laid or relaid during the year.....		65				1,872	156		2,093
Length abandoned during the year.....				66		67	374		507
Taken by Metropolitan Water Board.....						55			55
Total length in use January 31, 1898.....	472	7,148	100	2,849	1,062	26,682	10,560	3	48,876

Statement of Service Pipes Laid and Abandoned during the Year ending January 31, 1898.

	CITY PROPER.		SOUTH BOSTON.		EAST BOSTON.		ROXBURY.		DORCHESTER.		WEST ROXBURY.		BRIGHTON.		CHARLES-TOWN.		TOTALS.	
	Number of services.	Length in feet.	Number of services.	Length in feet.	Number of services.	Length in feet.	Number of services.	Length in feet.	Number of services.	Length in feet.	Number of services.	Length in feet.	Number of services.	Length in feet.	Number of services.	Length in feet.	Number of services.	Length in feet.
8-inch laid.....	1	49															1	49
6 " ".....	3	66												1	12		4	78
4 " ".....	44	1,099	2	31	1	16	1	24					3	48	1	6	52	1,224
3 " ".....	13	283	1	16			4	117							2	44	20	460
3 " abandoned.....	1	18															1	18
2 " laid.....	19	524	2	20	2	5	1	24					1	15			25	588
2 " abandoned.....	2	21					1	17									3	38
1½ " laid.....	26	688					5	125	4	105	5	78	2	56	1	32	43	1,084
1½ " abandoned.....	3	39					1	10									4	49
1½ " laid.....	20	647	4	126			6	170	2	60	2	17	3	16	1	25	38	1,061
1½ " abandoned.....	2	51	1	19													3	70
1 " laid.....	77	1,923	7	165	3	88	37	1,029	5	149	6	115	7	169	4	160	146	3,798
1 " abandoned.....	27	599	1	16			6	98	1	3	2	27					38	775
¾ " laid.....	24	800	6	189	2	57	21	675	2	31	3	65	2	42	3	56	63	1,915

Statement of Service Pipes Laid and Abandoned. — *Concluded.*

	CITY PROPER.		SOUTH BOSTON.		EAST BOSTON.		ROXBURY.		DORCHESTER.		WEST ROXBURY.		BRIGHTON.		CHARLES-TOWN.		TOTALS.		
	Number of services.	Length in feet.	Number of services.	Length in feet.	Number of services.	Length in feet.	Number of services.	Length in feet.	Number of services.	Length in feet.	Number of services.	Length in feet.	Number of services.	Length in feet.	Number of services.	Length in feet.	Number of services.	Length in feet.	
3/4 inch abandoned.....	10	192	.....	.....	.....	.....	2	23	2	210	1	.....	.....	.....	.....	1	33	16	458
5/8 " laid.....	158	2,482	140	3,504	75	2,126	572	11,865	949	21,363	360	8,633	128	2,894	46	1,004	2,428	53,871	
5/8 " abandoned.....	132	3,070	18	479	8	146	40	855	14	372	9	75	1	16	5	155	222	5,168	
1/2 " ".....	.....	.....	4	111	5	122	7	120	1	17	.....	.....	.....	.....	8	126	25	496	
Total laid.....	385	8,561	162	4,051	83	2,292	647	14,029	962	21,708	376	8,908	147	3,252	58	1,827	2,850	64,128	
Total abandoned.....	177	3,990	24	625	8	268	57	1,123	18	602	12	102	1	16	15	346	312	7,072	
Net increase.....	208	4,571	138	3,426	75	2,024	590	12,906	944	21,106	364	8,806	145	3,236	43	981	2,538	57,056	



**Statement of Location, Size and Number of Feet of Main Pipe Relaid during the Year ending January 31, 1898.**

NOTE.—C. P., indicates City Proper; Rox., Roxbury; W. R., West Roxbury; Bri., Brighton; Dor., Dorchester; So. B., South Boston; E. B., East Boston; Chn., Charlestown.

In what Street.	Between what Streets.	District.	Size.	Length.	Original Size.
Tremont st. ....	Opposite Common st. ....	C. P.	30-in.	11	30-in.
Danby st. ....	C and D sts. ....	So. B.	"	526	24 and 30 in.
	Total 30-inch .....			537	
Essex st. ....	At Washington st. ....	C. P.	24-in.	5	24-in.
Adams st. ....	" Tenean brook. ....	Dor.	"	72	12-in.
B st. ....	Danby and Congress sts. ....	So. B.	"	985	24 and 30 in.
Danby st. ....	B and C sts. ....	"	"	542	"
	Total 24-inch .....			1,604	
Dover st. ....	At Washington st. ....	C. P.	20-in.	12	20-in.
Tremont st. ....	" School st. ....	"	16-in.	21	12-in.
Boston Common ...	Opposite Mason st. ....	"	"	5	8-in.
Tremont st. ....	School st. and Scollay sq. ....	"	"	424	12-in.
Washington st. ....	Kneeland and Dover sts. ....	"	"	2,580	12 and 6 in.
State st. ....	Washington and Commercial sts. ...	"	"	1,174	12-in.
Commercial st. ....	At State st. ....	"	"	15	"
Cove st. ....	Kneeland and Essex sts. ....	"	"	860	6-in.
Tremont st. ....	At Court st. ....	"	"	185	12-in.
Blue Hill ave. ....	Walk Hill and Fessenden sts. ....	Dor.	"	8	16-in.
Centre st. ....	At Hogg's Bridge .....	Rox.	"	210	"
" " .....	" " " .....	"	"	160	"
Maverick st. ....	New and Chelsea sts. ....	E. B.	"	1,154	6-in.
	Total 16-inch .....			6,796	
Adams sq. ....	Devonshire st. and Cornhill. ....	C. P.	12-in.	140	12-in.
Washington st. ....	Elm st. and Dock sq. ....	"	"	151	8-in.
Tremont st. ....	Opp. Common st. ....	"	"	12	12-in.
Dover st. ....	At Washington st. ....	"	"	82	8-in.
India st. ....	" State st. ....	"	"	22	12-in.
	<i>Carried forward</i> .....			407	

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

In what Street.	Between what Streets.	District.	Size.	Length.	Original Size.
	<i>Brought forward</i> .....			407	
Washington st.....	At State st. ....	C. P.	12-in.	12	6-in.
Hanover st.....	“ Court “ .....	“	“	32	12-in.
“ “ .....	“ “ “ .....	“	“	33	“
Harrison ave.....	“ Asylum st.....	“	“	6	“
“ “ .....	“ Lovering pl.....	“	“	5	“
Boylston st.....	Park sq. and Tremont st.....	“	“	775	6-in.
Atlantic ave.....	At Congress st.....	“	“	18	12-in.
Washington st.....	Union Park and Waltham sts.....	“	“	289	6-in.
Cove st.....	Kneeland and Federal sts.....	“	“	905	12-in.
Stoddard st.....	Court and Howard sts.....	“	“	166	4-in.
Howard st.....	Stoddard and Somerset sts.....	“	“	144	6-in.
Tremont st.....	Boylston and Warrenton sts.....	“	“	925	8-in.
Cornhill.....	Adams sq. and Court st.....	“	“	475	12-in.
Court st.....	At Cornhill.....	“	“	80	“
Sydney st.....	Romsey st. and Crescent ave.....	Dor.	“	381	6-in.
Walk Hill st.....	At Blue Hill ave.....	“	“	30	12-in.
Blue Hill ave.....	Esmond and Glenway sts.....	“	“	760	10-in.
Walk Hill st.....	N. W. cor. Blue Hill ave.....	“	“	20	12-in.
Morton st.....	West of Norfolk st.....	“	“	17	“
Dorchester ave.....	At Edson green.....	“	“	7	“
Ashmont st.....	Near Washington st.....	“	“	16	“
Geneva ave.....	West of Columbia st.....	“	“	21	“
Savin Hill ave.....	Endleigh st. and Railroad.....	“	“	802	6-in.
Wesley ave.....	From Savin Hill ave.....	“	“	50	“
Savin Hill ave.....	“ Grampian way.....	“	“	550	“
Grampian way.....	Savin Hill ave. and Evandale terrace.....	“	“	679	“
Barry st.....	From Barrington st.....	“	“	23	6-in.
Columbia road .....	Washington st. and Geneva ave...	“	“	24	12-in.
Geneva ave .....	“ “ Wilder st. ....	“	“	125	6-in.
Clifton st.....	At Dudley st. ....	“	“	6	12-in.
East First st.....	“ City Point pl.....	So. B.	“	5	“
Walnut pk.....	Washington st. and Walnut ave...	Rox.	“	20	4-in.
Blue Hill ave.....	Georgia st. and Geneva ave.....	“	“	14	12-in.
	<i>Carried forward</i> .....			7,822	

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

In what Street.	Between what Streets.	District.	Size.	Length.	Original Size.
	<i>Brought forward</i> .....			7,822	
Centre st. ....	At Hogg's Bridge.....	Rox.	12-in.	210	12-in.
“ .....	“ “ “ .....	“	“	220	“
Amory st. ....	“ “ “ .....	“	“	80	“
Heath st. ....	Lawn and Cranford sts. ....	“	“	96	8-in.
West Walnut pk. ....	Washington st. and Columbus ave.,	“	“	202	6-in.
Marcella st. ....	“ “ Highland st....	“	“	1,353	“
Florence st. ....	Brooks and Ashland sts. ....	W. Rox.	“	20	12-in.
Commonwealth ave.,	Harvard ave. and Allston st. ....	Bri.	“	280	6-in.
Oakland st. ....	Washington and Faneull sts. ....	“	“	744	“
Chelsea st. ....	Junction of Joiner st. ....	Chn.	“	12	12-in.
Maverick st. ....	New and Chelsea sts. ....	E. B.	“	188	6-in.
Border st. ....	Intersection of Maverick st. ....	“	“	20	12-in.
Marginal st. ....	“ “ Orleans st. ....	“	“	9	“
Sumner st. ....	“ “ “ “ .....	“	“	4	“
Meridian st. ....	Junction of Maverick st. ....	“	“	7	“
Marginal st. ....	Cottage and Ruth sts. ....	“	“	786	6-in.
Orleans st. ....	Marginal and Sumner sts. ....	“	“	600	“
Fisher ave. ....	At Fisher Hill Reservoir .....	B'kline.	“	43	12-in.
	Total 12-inch .....			12,696	
Compton st. ....	Tremont and Washington sts. ....	C. P.	10-in.	1,127	6-in.
“ .....	At Washington st. ....	“	“	34	“
Joiner st. ....	Chelsea and Park sts. ....	Chn.	“	209	“
	Total 10-inch .....			1,370	
Boylston st. ....	At Washington st. ....	C. P.	8-in.	10	8-in.
Congress st. ....	Atlantic ave. and High st. ....	“	“	390	6-in.
Pelham st. ....	Washington and Shawmut ave. ....	“	“	449	4-in.
Avery st. ....	Mason and Washington sts. ....	“	“	410	6-in.
Tremont row .....	At Howard st. ....	“	“	72	4-in.
Pemberton sq. ....	“ Tremont st. ....	“	“	35	8-in.
Quincy st. ....	“ Bellevue st. ....	Dor.	“	8	“
Bernard st. ....	“ Kerwin st. ....	“	“	8	“
McLellan ave. ....	Blue Hill ave. and Erie st. ....	“	“	168	6-in.
	<i>Carried forward</i> .....			1,550	

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

In what Street.	Between what Streets.	District.	Size.	Length.	Original Size.
	<i>Brought forward</i> .....			1,550	
Hilton st.....	From Swett st.....	Rox.	8-in.	300	4-in.
Green st.....	High and Main sts.....	Chn.	"	190	3-in.
Hull st.....	Chelsea and Vine sts.....	"	"	3	8-in.
Pine st.....	Off Vine st.....	"	"	3	"
Maverick st.....	New and Chelsea sts.....	E. B.	"	12	6-in.
Liverpool st.....	Intersection of Maverick st.....	"	"	6	8-in.
	Total 8-inch.....			2,064	
Garland st.....	At Washington st.....	C. P.	6-in.	24	4-in.
Lucas st.....	" " " .....	"	"	27	"
Cherry st.....	" " " .....	"	"	27	"
Davis st.....	" " " .....	"	"	14	"
Asylum st.....	" " " .....	"	"	6	"
Bumstead court.....	" Boylston st.....	"	"	7	"
Lovering pl.....	Washington and Harrison ave.....	"	"	340	"
Asylum st.....	" " " " .....	"	"	346	"
Boylston pl.....	From Boylston st.....	"	"	29	"
Ashton pl.....	Off Charles st.....	"	"	29	"
Webster ave.....	At Unity st.....	"	"	17	"
Unity court.....	" " " .....	"	"	12	"
Wiget st.....	Salem and North Margin sts.....	"	"	250	"
Gray st.....	Clarendon and Berkeley sts.....	"	"	630	"
Pelham-st. pl.....	From Pelham st.....	"	"	22	"
Carlton st. ....	At West Newton st.....	"	"	36	"
Exeter pl.....	Harrison ave. and Chauncy st....	"	"	180	"
Paul st. ....	Tremont and Emerald sts.....	"	"	480	"
Alden st.....	Court and Sudbury sts.....	"	"	240	"
Tamworth st. ....	At La Grange st.....	"	"	15	"
Lawrence st.....	Berkeley and Dartmouth sts.....	"	"	1,260	"
Haymarket pl.....	From Avery st.....	"	"	249	"
Carlton st. ....	At Berwick pk. ....	"	"	50	"
Berwick pk. ....	At Carlton st. ....	"	"	27	"
Van Rensselaer pl..	Off Tremont st.....	"	"	22	"
Seaver pl.....	" " " .....	"	"	3	6-in.
	<i>Carried forward</i> .....			4,333	

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

In what Street.	Between what Streets.	District.	Size.	Length.	Original Size.
	<i>Brought forward</i> .....			4,333	
Clifton st.....	At Dudley st. ....	Dor.	6-in.	36	4-in.
Blue Hill ave.....	At Glenway st. ....	"	"	44	6-in.
Virginia st. ....	At Davenport ave.....	"	"	4	"
Holden pl. ....	From Dudley st.....	"	"	26	4-in.
Fenton pl. ....	From Greenwich st., north side ...	"	"	27	"
" " .....	" " " south "	"	"	4	"
Savin Hill ave.....	At Grampian way .....	"	"	26	6-in.
Bispham st. ....	From Park st.....	"	"	174	3-in.
Everett ave. ....	From Stoughton st. ....	"	"	4	6-in.
E st.....	North of Sixth st. ....	So. B.	"	3	"
Bowen st.....	At E st. ....	"	"	18	"
Gold st. ....	" " " .....	"	"	50	4-in.
" " .....	At F st.....	"	"	52	"
Broadway .....	At B st. ....	"	"	8	6-in.
Gold st. ....	D and Dorchester sts.....	"	"	1,597	4-in.
Mercer st.....	At Vale st. ....	"	"	14	6-in.
Beckler ave.....	From K st. ....	"	"	254	4-in.
G st.....	At James ave. ....	"	"	5	6-in.
Gates st. ....	Dorchester and Telegraph sts.....	"	"	440	4-in.
Gates st. ....	Telegraph and Eighth sts.....	"	"	616	"
Silver st. ....	Dorchester and G sts.....	"	"	658	"
Gold st. ....	B st. and R.R. ....	"	"	151	"
Dacia pl. ....	From Dacia st.....	Rox.	"	34	"
Dacia terrace .....	" " " .....	"	"	36	"
Willow pk.....	Off Shawmut ave.....	"	"	168	3 and 6 in.
Adams pl.....	From Williams st. ....	"	"	15	4-in.
Kensington pk. ....	Off Warren st.....	"	"	52	"
Centre st. pl. ....	" Centre " .....	"	"	140	"
Bromley st. ....	At Old Heath st. ....	"	"	12	6-in.
Walnut pk.....	Washington st. and Walnut ave....	"	"	1,184	4-in.
West Walnut pk. ...	" " " Columbus ave.	"	"	11	12-in.
Custer st. ....	At Arborway .....	W. Rox.	"	3	6-in.
Sycamore st. ....	" Ridge st. ....	"	"	10	"
Concord ave.....	Concord and Jefferson sts. ....	Chn.	"	24	4-in.
	<i>Carried forward</i> .....			10,283	

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

In what Street.	Between what Streets.	District.	Size.	Length.	Original Size.
	<i>Brought forward</i> .....			10,233	
Sullivan st.....	Russell and Bunker Hill sts. ....	Chn.	6-in.	217	4-in.
Sullivan st.....	Off Main st.....	"	"	48	"
Stacey st.....	" " " .....	"	"	36	"
Ellwood st.....	" " " .....	"	"	24	"
Hudson st.....	" Chelsea st. ....	"	"	16	3-in.
Tufts court.....	" Tufts st. ....	"	"	36	4-in.
Tufts court.....	" Corey st.....	"	"	24	"
Ludlow st. ....	" Mead st.....	"	"	30	"
Hull st.....	Chelsea and Vine sts.....	"	"	209	"
Pine st.....	Off Vine st. ....	"	"	36	"
Auburn ave.	" Auburn st.....	"	"	25	"
Avon pl. ....	Off Sullivan st.....	"	"	13	3-in.
Wall st. ....	" " " .....	"	"	29	4-in.
Mason ct.....	" " " .....	"	"	16	"
Wesley st.....	" " " .....	"	"	15	"
Linwood pl.....	Off Main st. ....	"	"	54	"
London st.....	Intersection of Maverick st.....	E. B.	"	11	6-in.
Havre st.....	" " " " .....	"	"	12	"
Paris st.....	" " " " .....	"	"	16	"
Murray ct.....	Off Orleans st.....	"	"	40	4-in.
Boston Dye Wood Company Wharf..	" Border st.....	"	"	20	"
Dry Dock Company Wharf.....	" " " .....	"	"	20	"
Haynes st. ....	" Orleans st.....	"	"	35	"
Sumner st. ....	New and Border st.....	"	"	34	6-in.
	Total 6-inch .....			11,249	
Trumbull st. ....	At Newland st.....	C. P.	4-in.	8	4-in.
Mason ct. ....	Off Sullivan st.....	Chn.	"	4	"
Wesley st.....	" " " .....	"	"	5	"
Exeter pl.....	" " " .....	"	"	6	3-in.
	Total 4-inch .....			23	
Hudson st. ....	Off Chelsea st.....	Chn.	3-in.	4	3-in.
Avon pl. ....	" Sullivan st.....	"	"	9	"
	Total 3-inch .....			13	

**Statement of Location, Size and Number of Feet of Main Pipe Extended during the Year ending January 31, 1898.**

In what Street.	Between what Streets.	District.	Size.	Length.
Fisher ave. ....	Boylston st. and Reservoir .....	Brookline,	42-in.	1,108
Boylston st. ....	Opposite Fisher ave. ....	"	36-in.	18
Fisher ave. ....	Boylston st. and Reservoir .....	"	"	124
Old Heath st. ....	New Heath and Columbus ave. ....	Rox. .	"	547
Blue Hill ave. ....	Geneva ave. and Georgia st. ....	"	"	69
Georgia st. ....	Blue Hill and Elm Hill aves. ....	"	"	1,117
Elm Hill ave. ....	Georgia and Ruthven sts. ....	"	"	63
Ruthven st. ....	At Elm Hill ave. ....	"	"	73
Walnut pk. ....	Walnut ave. and Washington st. ....	"	"	1,280
West Walnut pk. ....	Washington st. and Columbus ave. ....	"	"	166
Columbus ave. ....	West Walnut pk. and Stony brook. ....	"	"	1,995
	Total 36-inch .....			<u>5,452</u>
Fisher ave. ....	Boylston st. and Reservoir .....	Brookline,	30-in.	32
Geneva ave. ....	Olney and Bowdoin sts. ....	Dor.	"	610
Bowdoin st. ....	Homes ave. and Westville st. ....	"	"	662
C st. ....	At Danby st. ....	So. B.	"	7
Geneva st. ....	From Blue Hill ave. ....	Dor.	"	68
Blue Hill ave. ....	Geneva ave. and Georgia st. ....	Rox.		166
	Total 30-inch .....			<u>1,545</u>
Adams st. ....	Junction Neponset ave. ....	Dor.	24-in.	24
Danby st. ....	D and E sts. ....	So. B.	"	71
South st. ....	Arnold Arboretum and Morton st. ....	W. R.	"	508
Roadway of Arnold Arboretum (contract) .....	Westerly from South st. ....	"	"	623
South st. (contract) ...	Northerly from entrance to Arnold Arboretum .....	"	"	220
	Total 24-inch .....			<u>1,446</u>
Canton st. ....	Albany and Tremont sts. ....	C. P.	20-in.	2,554
Tremont st. ....	At West Canton st. ....	"	"	32
Adams st. ....	Neponset ave. and Minot st. ....	Dor.	"	5,474
Border st. ....	Maverick st. and Central sq. ....	E. B.	"	1,506
	Total 20-inch ... ..			<u>9,566</u>

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

In what Street.	Between what Streets.	District.	Size.	Length.
Blue Hill ave.....	Fessenden and Walk Hill sts. ....	Dor.	16-in.	211
Adams st. ....	Junction Neponset ave. ....	"	"	56
" " .....	At Minot st. ....	"	"	5
Stoughton st.....	Hancock and Salcombe sts. ....	"	"	1,315
Talbot ave.....	West of Bernard st. ....	"	"	57
Vale st. ....	Dorchester and Mercer sts. ....	So. B.	"	808
Walnut pk. ....	Walnut ave. and Washington st. ....	Rox.	"	6
Blue Hill ave.....	Georgia and Geneva ave. ....	"	"	7
Border st. ....	Maverick st. and Central sq.....	E. B.	"	41
	Total 16-inch .....			<u>2,506</u>
Washington st. ....	Over B. & A. R.R. bridge.....	C. P.	12-in.	115
Grenville pl. ....	At Columbus ave. ....	"	"	40
Purchase st. ....	High and Oliver sts. ....	"	"	113
Portland st. ....	Travers and Merrimac sts. ....	"	"	20
Tremont st. ....	At West Canton st. ....	"	"	13
Shawmut ave .....	" " " .....	"	"	27
Washington st. ....	" " " .....	"	"	32
Harrison ave.....	" East Canton st. ....	"	"	17
Albany st. ....	" " " .....	"	"	5
Portland st.....	Travers and Causeway sts.....	"	"	285
Spencer st.....	From W. Park st.....	Dor.	"	271
Sydney st. ....	Romsey st. and Crescent ave.....	"	"	671
Geneva st.....	West of Columbia st.....	"	"	356
Grampian way.....	Savin Hill ave. and Evandale terrace,	"	"	507
Barry st.....	From Barrington st.....	"	"	294
Romsey st.....	" Sydney st.....	"	"	19
Dorchester way.....	Dorchester ave. and Boston st.....	"	"	1,210
Westville st. ....	Geneva ave. and Ditson st.....	"	"	232
Bloomfield st.....	Geneva ave. and Greenbrier st.....	"	"	316
Geneva ave.....	Waldeck st. and Dorchester ave. ....	"	"	1,232
Ponemah st. ....	Blue Hill ave. and Duke st.....	"	"	995
Spencer st.....	Wheatland and Talbot aves. ....	"	"	40
Kilton st.....	From Washington st. ....	"	"	84
Washington st.....	Fairmount and Codman sts. ....	"	"	417
	<i>Carried forward</i> .....			<u>7,311</u>



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

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i> .....			7,311
Fairmount ave. ....	Washington and Ogden sts. ....	Dor.	12-in.	127
Ogden st. ....	At Fairmount ave. ....	"	"	4
Park st. ....	Waldeck and Greenbrier sts. ....	"	"	60
Woodlawn ave. ....	W. Selden and Delhi sts. ....	"	"	204
Oakland st. ....	Regent road and Haven st. ....	"	"	1,188
Richmond road ....	Randolph road and Oakland st. ....	"	"	652
Capen st. ....	Norfolk and Evans sts. ....	"	"	260
Romsey st. ....	W. of Sidney st. ....	"	"	235
Kilton st. ....	From Washington st. ....	"	"	305
Adams st. ....	At Lonsdale st. ....	"	"	17
Woodlawn ave. ....	From W. Selden st. ....	"	"	195
Bakersfield st. ....	Stoughton and Willis sts. ....	"	"	812
Geneva ave. ....	Corona st. and Homes ave. ....	"	"	656
Bernard st. ....	Nightingale and W. Park sts. ....	"	"	680
" " ....	At Culvert. ....	"	"	29
Normandie st. ....	From Lawrence ave. ....	"	"	270
Massachusetts ave. ...	Boston and Clapp sts. ....	"	"	328
Danby st. ....	D and E sts. ....	So. B.	"	512
E st. ....	Danby and Congress sts. ....	"	"	966
Congress st. ....	E st. and L-st. bridge ....	"	"	802
East First st. ....	P and Q sts. ....	"	"	530
Q st. ....	First and Second sts. ....	"	"	40
N st. ....	At E. First st. ....	"	"	41
Shirley st. ....	Roswell and Clifton sts. ....	Rox.	"	24
Columbus ave. ....	West Walnut pk. and Dimock st. ....	"	"	882
Calumet st. ....	From Hillside st. ....	"	"	347
Vancouver st. ....	Ruggles st. and Huntington ave. ....	"	"	270
Centre st. ....	At Cedar st. ....	"	"	3
Calumet st. ....	From Hillside st. ....	"	"	45
Ritchle st. ....	At Centre st. ....	"	"	22
Heath st. ....	At Day st. ....	"	"	95
Columbus ave. ....	Dimock st. and Stony brook ....	"	"	1,123
Heath st. ....	Lawn and Day sts. ....	"	"	550
Blue Hill ave. ....	Geneva ave. and Georgia st. ....	"	"	34
	<i>Carried forward</i> .....			19,629

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

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i> .....			19,629
Heath st. ....	Lawn and Cranford sts.....	Rox.	12-in.	174
Basswood st.....	From South Huntington ave. ....	"	"	473
So. Huntington ave. . .	Floyd and Bynner sts.....	"	"	805
" " " ...	From Heath st.....	"	"	950
Cranford st.....	Heath and Floyd sts.....	"	"	225
Arborway.....	Hampstead road and Centre st.....	W. Rox.	"	334
" .....	Washington and South sts.....	"	"	319
Merlin st. ....	Centre and Weld sts. ....	"	"	199
Hyde Park ave.....	Walk Hill and Patten sts. ....	"	"	310
Colberg ave. ....	Malcom and Cornell sts.....	"	"	146
" ".....	Montello and Malcom sts. ....	"	"	96
Park st. ....	Centre st. and Clement ave.....	"	"	117
Beech st. ....	Near Washington st.....	"	"	96
" ".....	At Belgrade ave.....	"	"	96
Centre st. ....	Fletcher and Farquhar sts. ....	"	"	139
Merlin st. ....	Centre and Weld sts.....	"	"	145
Selwyn st.....	Arundel and Mozart sts.....	"	"	109
Montebello road .....	From Walnut ave. ....	"	"	270
Beech st. ....	At Belgrade ave.....	"	"	66
Atherton st.....	Amory and Lamartine sts.....	"	"	715
Lassell st.....	Dent and Perham sts.....	"	"	225
Maple st.....	From Weld st.....	"	"	221
Baker st.....	Ballinakill ave. and Johnson st.....	"	"	338
Oakland st.....	Washington and Faneuil sts. ....	Bri.	"	592
Faneuil st. ....	Oakland and Hobart sts.....	"	"	671
Nonantum st.....	At Newton line.....	"	"	108
Blackington st. ....	Walley and Leyden sts.....	E. B.	"	96
Frankfort st.....	Off Maverick st.....	"	"	200
	Total 12-inch.....			<u>27,864</u>
Devonshire st. ....	Franklin and Milk sts.....	C. P.	10-in.	92
Congress st.....	From Atlantic ave. (east).....	"	"	380
Greenbrier st.....	Bloomfield and Park sts.....	Dor.	"	786
Tonawanda st.....	From Greenbrier st.....	"	"	6
	<i>Carried forward</i> .....			<u>1,264</u>

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

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i> .....			1,264
Tonawanda st.....	Geneva ave. and Greenbrier st.....	Dor.	10-in.	1,755
Milton st.....	From Granite ave. ....	"	"	260
Capen st.....	Evans and Maxwell sts. ....	"	"	263
Harrishof st.....	From Walnut ave.....	Rox.	"	394
Colberg ave.....	At Arden st.....	W. Rox.	"	74
" " .....	" " " .....	"	"	36
	Total 10-inch.....			4,046
Hanover st.....	At Court st.....	C. P.	8-in.	98
Columbus ave.....	Berkeley st. and B. & A. R.R. bridge,	"	"	132
Hanover st.....	Elm and Washington sts. ....	"	"	208
Washington st.....	Hanover and Brattle sts.....	"	"	477
Hanover st.....	At Court st. ....	"	"	6
McLellan ave.....	Blue Hill ave. and Erie st. ....	Dor.	"	212
Faxon st. ....	Clinton and Trescott st.....	"	"	35
Charles st. ....	Geneva ave. and Ditson st. ....	"	"	479
Ormond st.....	Ponemah and Duke sts.....	"	"	678
Waldeck st.....	From Geneva ave.....	"	"	311
Fenton st.....	" Duncan st.....	"	"	93
McLellan ave.....	At Blue Hill ave.....	"	"	23
Charlotte st.....	" " " " .....	"	"	8
Pontine st.....	Clifton and Batchelder sts. ....	"	"	200
Fairmount ave.....	Ogden and Nevada sts. ....	"	"	536
Randolph road.....	Richmond and Rockingham roads...	"	"	527
Rockingham road.....	Randolph road and Oakland st.....	"	"	722
Denney st.....	From Savin Hill ave.....	"	"	451
Adams st.....	Rosemont and King sts. ....	"	"	3
Kerwin st.....	Bernard st. and Talbot ave.....	"	"	300
Thatcher road .....	From Stoughton st. ....	"	"	10
Phipps ave.....	" Blue Hill ave.....	"	"	502
Astoria st.....	" Elizabeth st.....	"	"	39
Homes ave.....	Bowdoin st. and Geneva ave.....	"	"	360
Waldeck st.....	Tremlett pk. and Park st.....	"	"	125
McLellan ave.....	Bradshaw st. and Paige ave.....	"	"	82
	<i>Carried forward</i> .....			6,617

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

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i> .....			6,617
Spencer st.....	At W. Park st. ....	Dor.	8-in.	3
Greenwood st. ....	“ May st.....	“	“	146
Private way .....	From Fremont st.....	“	“	453
Wellesley pk.....	Melville ave. and Park st. ....	“	“	863
Rosseter st. ....	From Bowdoin ave.....	“	“	182
Melville ave. ....	Upland st. and railroad.....	“	“	156
Wellesley pk. ....	At Melville ave.....	“	“	12
Egmont st.....	From E st.....	So. B.	“	3
Fargo st. ....	“ “ “ .....	“	“	6
Wormwood st.....	At New England Railroad.....	“	“	59
Hilton st.....	From Swett st. ....	Rox.	“	271
Sherwood st.....	“ Norfolk ave.....	“	“	54
Bragdon st.....	At Columbus ave.....	“	“	31
Bynner st. ....	Catalpa and Day sts.....	“	“	300
Ruggles st.....	Parker st. and Huntington ave.....	“	“	542
Norway st.....	Massachusetts ave. and Parker st....	“	“	768
Turner st.....	Haviland and Astor sts. ....	“	“	442
Arcola st. ....	From Day st.....	“	“	270
Dunreath st. ....	Aspen and Warren sts. ....	“	“	411
Day st.....	At Heath st.....	“	“	150
Cranford st. ....	Heath and Floyd sts.....	“	“	178
Willow st. ....	Dunbar and Weid sts.....	W. Rox.	“	205
Patten st.....	Hyde Park ave. and Rodman st.....	“	“	874
Wachussetts st.....	Patten and Rodman sts. ....	“	“	315
Hemlock st.....	Washington and Bellevue sts.....	“	“	84
Clement ave.....	Stratford ave. and Park st.....	“	“	147
Aldworth st.....	From Centre st. ....	“	“	827
Hautvale st.....	“ Clarendon ave.....	“	“	57
Clarendon ave.....	Beech and Hautvale sts.....	“	“	316
Wiedman st.....	From Canterbury st.....	“	“	245
Winslow st.....	Perham and Temple sts.....	“	“	153
Fletcher st.....	Montclair ave. and Centre st.....	“	“	320
Montclair ave. ....	From Fletcher st. ....	“	“	81
Farquhar st.....	Centre and South sts.....	“	“	85
	<i>Carried forward</i> .....			15,626

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

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i> .....			15,626
Tower st.....	From Hyde Park ave.....	W. Rox.	8-in.	658
Kittredge st.....	At Cornell st.....	"	"	39
Cornell st.....	" Kittredge st.....	"	"	134
Mapleton st.....	Murdock and Market sts.....	Bri.	"	1,005
Ayr road.....	Beacon st. and Orkney road.....	"	"	254
Orkney road.....	From Ayr road.....	"	"	326
Allston Heights.....	" Ridgemont st.....	"	"	290
Ridgemont st.....	At Allston Heights.....	"	"	12
Unton st.....	" Shannon st.....	"	"	80
Green st.....	High and Main sts.....	Chn.	"	79
	Total 8-inch.....			<u>18,503</u>
Lovering pl.....	At Washington st.....	C. P.	6-in.	17
Water st.....	Devonshire and Congress sts.....	"	"	108
Devonshire st.....	At State st.....	"	"	38
Otis st.....	From Summer st.....	"	"	188
Grenville pl.....	At Columbus ave.....	"	"	142
Sears st.....	Central wharf and India st.....	"	"	345
Devonshire st.....	State and Water sts.....	"	"	291
Portland st.....	Travers and Merrimac sts.....	"	"	60
Hathaway pl.....	Off Congress st.....	"	"	85
Washington st.....	At W. Canton st.....	"	"	12
Blackwell st.....	From St. Botolph st.....	"	"	270
Barton st.....	At Milton st.....	"	"	90
Lewis st.....	Moon and North sts.....	"	"	144
Noyes pl.....	From Salem st.....	"	"	180
Mascot ave.....	" Ballou ave.....	Dor.	"	230
Elmo st.....	" Erie ave.....	"	"	330
Banfield st.....	" Woodlawn ave.....	"	"	3
Coffin st.....	" Savin Hill ave.....	"	"	325
Oakwood ave.....	" Capen st.....	"	"	183
Pleasant st.....	" Savin Hill ave.....	"	"	35
Salcombe st.....	" Stoughton st.....	"	"	183
Trescott st.....	" Bakersfield st.....	"	"	12
	<i>Carried forward</i> .....			<u>3,321</u>

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

In what Street.	Between what Street.	District.	Size.	Length.
	<i>Brought forward</i> .....			3,321
Hinckley st.....	From Bakersfield st.....	Dor.	6-in	10
Percival ave.....	“ Bowdoin st.....	“	“	243
Corona st.....	“ Geneva ave.....	“	“	3
Oakley st.....	“ “ “ .....	“	“	15
Holiday st.....	West of “ “ .....	“	“	3
“ “ .....	East of “ “ .....	“	“	40
Burt ave.....	From Washington st.....	“	“	9
Gawain st.....	Harvard and Park sts.....	“	“	743
Browning ave.....	From Bernard st.....	“	“	43
Helen st.....	“ “ “ .....	“	“	44
Drayton ave.....	“ Quincy “ .....	“	“	192
Flint st.....	“ Norfolk “ .....	“	“	137
Peverall st.....	“ Salcombe st.....	“	“	152
Newhall ave.....	Adams and Newhall st.....	“	“	421
Monson st.....	From Sturbridge st.....	“	“	103
May “ .....	Glenway and Greenwood sts.....	“	“	39
Mascot ave.....	From Ballou ave.....	“	“	24
Wellesley pk.....	Meville ave. and Park st.....	“	“	527
Norton st.....	From Stonehurst st... ..	“	“	35
Bellevue st.....	Columbia and Trull sts.....	“	“	100
Burt ave.....	Washington and Ashmont sts.....	“	“	197
Hartland st.....	Sydney st. and Tuttle ave.....	“	“	108
Malvern st.....	Adams and Milton sts.....	“	“	204
Trescott “ .....	From Faxon st.....	“	“	263
Soudan “ .....	“ Sydney “ .....	“	“	20
Mallett “ .....	Adams st. and Shaw pk.....	“	“	311
Dorchester way.....	Dorchester ave. and Pond st.....	“	“	836
Pond st.....	From Dorchester way.....	“	“	414
Proposed st.....	“ Pond st.....	“	“	4
Castle Rock st.....	“ Gramplan way .....	“	“	6
Dakota st.....	Geneva ave. and Greenbrier st.....	“	“	102
Vinson “ .....	At Geneva ave.....	“	“	18
Gibson “ .....	From Dorchester ave.....	“	“	46
Ditson “ .....	Charles and Josephine sts.....	“	“	263
	<i>Carried forward</i> .....			8,996

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

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i> .....			8,996
Ditson st. ....	Leroy and Westville sts. ....	Dor.	6-in.	62
Duke st. ....	Ponemah and Ormond st. ....	"	"	627
Lindsay st. ....	From Greenbrier sts. ....	"	"	23
Stratford st. ....	" " " .....	"	"	30
Samoset st. ....	Welles ave. and Centre st. ....	"	"	393
Rosemont st. ....	Samoset st. and Dorchester ave. ....	"	"	550
May st. ....	From Glenway st. ....	"	"	48
Blue Hill ave. ....	Walk Hill and Ponemah sts. ....	"	"	704
Tileston st. ....	From Blue Hill ave. ....	"	"	16
Chamberlain st. ....	Cook and Algonquin sts. ....	"	"	192
Ellet st. ....	Adams st. and Dorchester ave. ....	"	"	129
East st. ....	Highland ave. and Dorchester ave. ....	"	"	80
Brunswick st. ....	From Blue Hill ave. ....	"	"	24
Dracut st. ....	Dorchester ave. and Bruce st. ....	"	"	100
Hunter st. ....	From Morton st. ....	"	"	100
Southern st. ....	" Washington st. ....	"	"	141
Hopestill st. ....	" Southern ave. ....	"	"	30
Athelwold st. ....	At Culvert. ....	"	"	27
Mattapan st. ....	From Tileston ave. ....	"	"	42
Moultrie ave. ....	Allston and Seaborn sts. ....	"	"	627
Nevada st. ....	At Fairmount ave. ....	"	"	6
Roach st. ....	From Dorchester ave. ....	"	"	51
Edson green .....	Dorchester ave. and Pond st. ....	"	"	1,385
Devon st. ....	From Blue Hill ave. ....	"	"	60
White terrace. ....	Lauriat ave. and Jones ave. ....	"	"	264
Roland road. ....	Randolph road and Oakland st. ....	"	"	359
Selden st. ....	Morton and Capen sts. ....	"	"	160
May st. ....	From Glenway st. ....	"	"	60
Harrison st. ....	Greenhill and Preston sts. ....	"	"	206
Coleman st. ....	At Quincy st. ....	"	"	32
Oakwood ave. ....	From Capen st. ....	"	"	19
Dudley st. ....	Monadnock and Virginia sts. ....	"	"	250
Virginia st. ....	From Dudley st. ....	"	"	115
Morton st. ....	West of Bowdoin st. ....	"	"	54
Rupert st. ....	From Kilton st. ....	"	"	6
	<i>Carried forward</i> .....			15,968

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

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i> .....			15,968
Oak ave. ....	Adams and Plain sts. ....	Dor.	6-in.	33
“ “ .....	“ “ “ .....	“	“	125
Pierce ave. ....	“ “ “ .....	“	“	74
Barry st. ....	South of Barrington st. ....	“	“	172
“ “ .....	North of Barrington st. ....	“	“	24
Adams st. ....	Rosemont and King sts. ....	“	“	154
Dudley st. ....	Virginia st. and Upham's Corner....	“	“	374
Bellevue st. ....	East of Quincy st. ....	“	“	40
“ “ .....	West of Quincy st. ....	“	“	21
Sawyer ave. ....	At Cushing ave. ....	“	“	381
Bellevue st. ....	From Barrington st. ....	“	“	110
Woodlawn ave. ....	From Savin Hill ave. ....	“	“	4
Granville st. ....	From Milton st. ....	“	“	15
Cunningham st. ....	From Hartford st. ....	“	“	19
Gold st. ....	C and D sts. ....	So. B.	“	3
Champney st. ....	From Mercer st. ....	“	“	538
Broadway .....	E and F sts. ....	“	“	556
Sixth st. ....	At F st. ....	“	“	6
Roswell st. ....	Shirley and Langdon sts. ....	Rox.	“	280
Glenbrook st. ....	Dewey and Dalmatia sts. ....	“	“	48
Rockledge st. ....	Lambert ave. and Thornton st. ....	“	“	21
Columbus ave. ....	West Walnut pk. and Dimock st. ....	“	“	824
Bragdon st. ....	At Columbus ave. ....	“	“	30
Colony pl. ....	Off Fellows st. ....	“	“	111
Hamerton st. ....	From Humboldt ave. ....	“	“	144
Linden Park st. ....	From Gay st. ....	“	“	10
Cherokee st. ....	From Hillside st. ....	“	“	79
Gay st. ....	At Linden Park st. ....	“	“	69
Ruggles st. ....	Huntington ave. and Fens. ....	“	“	444
Wensley st. ....	From Heath st. ....	“	“	72
Daniel st. ....	Mall and Webber sts. ....	“	“	265
Carmel st. ....	From Tremont st. ....	“	“	233
Zamora st. ....	Perkins and Castleton sts. ....	“	“	613
Heath st. ....	Cranford and So. Huntington ave. ....	“	“	96
	<i>Carried forward</i> .....			21,956



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

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i> .....			21,956
Floyd st. ....	Cranford and So. Huntington ave....	Rox.	6-in.	290
Albany st. ....	Mall and Dearborn sts. ....	"	"	149
Whipple st. ....	Astor and Haviland sts. ....	"	"	50
Binney st. ....	From Longwood ave.....	"	"	84
Delle ave.....	At Burney st. ....	"	"	59
Burney st. ....	At Delle ave.....	"	"	24
Haley st.....	Harrishof and Dennison sts.....	"	"	335
Whiting st. ....	At Moreland st. ....	"	"	60
Dennison st. ....	Haley and Harrishof sts. ....	"	"	418
Burney st. ....	Tremont st. and Delle ave.....	"	"	120
Colony pl.....	From Fellows st.....	"	"	27
Wabeno st. ....	Wabon and Waumbeck sts.....	"	"	44
Wabon st.....	At Wabeno st.....	"	"	33
Columbus ave. ....	Dimock st. and Stony brook.....	"	"	1,114
Proposed street (from 6-inch main).....	Off Columbus ave., north of Dimock st.,	"	"	22
Proposed street (from 12-inch main).....	" " " " " "	"	"	26
Proposed street.....	" " " 2d " " "	"	"	18
Lamartine st. ....	From Bell st. ....	W. Rox.	"	226
Spaulding st. ....	From South st. ....	"	"	346
Wren st.....	Oriole and Rutledge sts.....	"	"	212
Rockland st.....	From Washington st.....	"	"	72
Newsome pk. ....	" Eliot st.....	"	"	277
Maxfield st.....	Bellevue and La Grange sts.....	"	"	201
Robinwood st.....	From Locksley st.....	"	"	87
Newburn st.....	At Carolina ave.....	"	"	78
Eldredge st.....	From Metropolitan ave.....	"	"	96
Arden st.....	At Colberg ave.....	"	"	27
Congreve st.....	Centre and South sts.....	"	"	192
Avalon road.....	From Weld st.....	"	"	372
Johnson st.....	At Baker st.....	"	"	200
Custer st.....	" Arborway .....	"	"	38
Fresno st.....	Off Dudley ave.....	"	"	222
Robinwood ave.....	At Enfield st.....	"	"	70
	<i>Carried forward</i> .....			27,545

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

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i> .....			27,545
Morton st.....	At Arborway .....	W. Rox.	6-in.	36
Chestnut sq.....	From Chestnut ave.....	"	"	140
Flora st.....	Near Clement ave.....	"	"	217
Sylvia st.....	Washington and Forest Hills sts.....	"	"	84
Fletcher st.....	Centre and South sts.....	"	"	168
Newbern st.....	At Carolina ave.....	"	"	111
Rodman st.....	Wachusets and Patten sts.....	"	"	594
Lorraine st.....	Colberg ave. and Belgrade st.....	"	"	360
Fresno st.....	Off Dudley ave.....	"	"	79
Irving st.....	From Pelton st.....	"	"	115
Adelaide st.....	Boylston st. and Spring Park ave...	"	"	120
" pl.....	From Adelaide st.....	"	"	15
Orange st.....	" Cornell st.....	"	"	96
Leicester st. ....	Surrey and Bennett sts.....	Bri.	"	145
Spring st. ....	Etna and George sts.....	"	"	36
Rena st. ....	Hubbard st. and Western ave.....	"	"	36
Shannon st. ....	At Union st.....	"	"	142
Telford st. ....	Off Western ave.....	"	"	366
Linden st.....	At Brighton ave.....	"	"	65
Boyle st. ....	Cordis and Pleasant sts. ....	Chn.	"	173
Seminary st. ....	Lawrence and Austin sts.....	"	"	158
Beacham st.....	Main and West sts.....	"	"	277
Byron st.....	Off Saratoga st. ....	E. B.	"	60
Bellevue .....	Quincy, Mass.....		"	204
	Total 6-inch .....			<u>31,342</u>
Salvisberg ave. ....	Off Hampshire st.....	Rox.	4-in.	72
Beacon st.....	At Chestnut Hill ave. ....	Bri.	"	264
Fisher ave.....	At Fisher Hill Reservoir.....	Brookline.	"	68
	Total 4-inch .....			<u>404</u>

**Statement of Private Mains Laid and Relaid during the Year ending January 31, 1898.**

For whom Laid.	Where Laid.	Size.	Length.
Park Department.....	Arborway, between Washington and South sts.....	10-in.	359
“ “ .....	Arborway, between Hampstead road and Centre st.....	“	88
“ “ .....	M-st. Playground, South Boston .....	4-in.	216
“ “ .....	“ “ “ “ .....	6-in.	390
Fire Department (salt water main).....	Atlantic ave., Congress, Central sts. and Exchange pl.....	12-in.	3,870
Town of Brookline (re-laid).....	Fisher ave. between Boylston st. and Reservoir .....	16-in.	660
Town of Brookline (re-laid).....	Fisher ave., between Boylston st. and Reservoir .....	8-in.	18
	Total number of feet.....		<u>5,601</u>

**Statement of Main Pipe Lowered.**

In what Street.	Between what Streets.	District.	Size.	Length.
Blue Hill ave.....	Fessenden and Walk Hill sts.....	Dor.	16-in.	100
Bernard st. ....	Talbot ave. and Helen sts.....	“	12-in.	100
“ “ .....	South of Talbot ave. ....	“	“	100
Walk Hill st.....	Under Railroad Bridge.....	W. R.	“	77
	Total 12-inch.....			<u>377</u>
Elizabeth st.....	Norfolk and Astoria sts.....	Dor.	8-in.	200
Talbot ave.....	Bernard and Westcott sts.....	“	6-in.	68
Tremont st. ....	Under Railroad Bridge.....	Rox.	“	26
Adelaide st.....	Boylston st. and Spring Park ave. ...	W. R.	“	277
	Total 6-inch .....			<u>371</u>

## Statement of Main Pipe Abandoned.

In what Street.	Between what Streets.	District.	Size.	Length.
Tremont st.....	Opp. Common st.....	C. P.	30-in.	11
D st.....	Danby and Congress sts.....	So. B.	"	914
Fisher ave.....	Boylston st. and Reservoir.....	Brookline.	"	24
	Total 30-inch.....			949
Essex st.....	At Washington st.....	C. P.	24-in.	5
Congress st.....	B and D sts.....	So. B.	"	550
	Total 24-inch.....			555
Dover st.....	At Washington st.....	C. P.	20-in.	12
Thomas pk.....	" Reservoir.....	So. B.	"	366
	Total 20-inch.....			378
Columbus ave.....	At Elmwood-st. pumping station.....	Rox.	16-in.	125
Centre st.....	" Hogg's bridge.....	"	"	210
" ".....	" " ".....	"	"	160
Blue Hill ave.....	Walk Hill and Fessenden sts.....	Dor.	"	8
	Total 16-inch.....			503
Adams sq.....	Devonshire st. and Cornhill.....	C. P.	12-in.	125
Tremont st.....	At School st.....	"	"	21
" ".....	School st. and Scollay sq.....	"	"	415
" ".....	Opp. Common st.....	"	"	12
Washington st.....	Kneeland and Dover sts.....	"	"	1,457
State st.....	Washington and Commercial sts.....	"	"	1,174
India st.....	At State st.....	"	"	22
Commercial st.....	" " ".....	"	"	15
Hanover st.....	" Court st.....	"	"	49
Harrison ave.....	" Asylum st.....	"	"	6
" ".....	" Lovering pl.....	"	"	5
Atlantic ave.....	" Congress st.....	"	"	18
Beach st.....	Cove and Federal sts.....	C. P.	12-in.	155
Federal st.....	Kneeland and Essex sts.....	"	"	798
" ".....	" " " ".....	"	"	900
Cornhill.....	Adams sq. and Court st.....	"	"	475
	<i>Carried forward</i> .....			5,642

Statement of Main Pipe Abandoned. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i> .....			5,642
Court st.....	At Cornhill .....	C. P.	12-in.	80
Tremont st.....	“ “ .....	“	“	185
Charlesgate West ...	“ Boston & Albany bridge .....	“	“	115
Walk Hill st.....	“ Blue Hill ave. ....	Dor.	“	30
Blue Hill ave.....	“ Charlotte st.....	“	“	125
“ “ “ .....	Glenway st. and McLellan ave.....	“	“	30
Walk Hill st.....	At Northwest corner of Blue Hill ave..	“	“	20
Dorchester ave. ....	“ Edson Green .....	“	“	7
Adams st. ....	“ Tenean brook.....	“	“	72
Geneva ave. ....	West of Columbia st. ....	“	“	21
Columbia road.....	Washington st. and Geneva ave.....	“	“	24
Clifton st. ....	At Dudley st. ....	“	“	6
Morton st.....	West of Norfolk st. ....	“	“	17
Ashmont st. ....	Near Washington st.....	“	“	16
Egmont st. ....	C and E sts.....	So. B.	“	80
Thomas pk.....	At Reservoir.....	“	“	264
Centre st.....	“ Hogg's bridge.....	Rox.	“	210
“ “ .....	“ “ “ .....	“	“	220
Amory st. ....	“ “ “ .....	“	“	80
Across vacant land and under railroad,	Lamartine and Amory sts. ....	“	“	545
West Walnut pk. ....	Washington st. and Columbus ave.....	“	“	11
Blue Hill ave. ....	Georgia st. and Geneva ave. ....	“	“	12
Florence st.....	Brooks and Ashland sts. ....	W. Rox.	“	20
Chelsea st.....	Junction of Joiner st. ....	Chn.	“	12
Border st. ....	Intersection of Maverick st.....	E. B.	“	20
Meridian st. ....	Junction of Maverick st. ....	“	“	7
Sumner st.....	Intersection of Orleans st. ....	“	“	4
Marginal st.....	“ “ “ “ .....	“	“	9
Fisher ave.....	At Reservoir.....	Brookline	“	43
	Total 12-inch. ....			<u>7,927</u>
Essex st. ....	At Federal and Cove st..	C. P.	10-in.	25
Blue Hill ave. ....	Esmond and Glenway sts.....	Dor.	“	755
Ward st. (J. P. A.)...	At Reims pl.....	Rox.	“	20
	Total 10-inch. ....			<u>800</u>

Statement of Main Pipe Abandoned. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
Boston Common . . . . .	Opposite Mason st. . . . .	C. P.	8-in.	6
Washington st. . . . .	Elm st. and Dock sq. . . . .	"	"	151
Dover st. . . . .	At Washington st. . . . .	"	"	36
Boylston st. . . . .	" " " . . . . .	"	"	10
Pemberton sq. . . . .	At Tremont st. . . . .	"	"	35
Tremont st. . . . .	Boylston and Warrenton sts. . . . .	"	"	925
Quincy st. . . . .	At Bellevue st. . . . .	Dor.	"	8
Bernard st. . . . .	" Kerwin st. . . . .	"	"	8
Heath st. . . . .	Lawn and Cranford sts. . . . .	Rox.	"	96
Hull st. . . . .	Chelsea and Vine sts. . . . .	Chn.	"	3
Pine st. . . . .	Off Vine st. . . . .	"	"	3
Liverpool st. . . . .	Intersection of Maverick st. . . . .	E. B.	"	6
	Total 8-inch. . . . .			1,287
Tremont st. . . . .	School st. and Scollay sq. . . . .	C. P.	6-in.	300
Washington st. . . . .	Kneeland and Dover sts. . . . .	"	"	1,135
Compton st. . . . .	At Washington st. . . . .	"	"	34
Compton st. . . . .	Tremont and Washington sts. . . . .	"	"	1,127
Washington st. . . . .	At State st. . . . .	"	"	12
Congress st. . . . .	Atlantic ave. and High st. . . . .	"	"	390
Washington st. . . . .	Waltham and Union Park sts. . . . .	"	"	289
Avery st. . . . .	Mason and Washington sts. . . . .	"	"	410
Cove st. . . . .	Kneeland and Essex sts. . . . .	"	"	640
East st. . . . .	Cove and Federal sts. . . . .	"	"	80
Howard st. . . . .	Stoddard and Somerset sts. . . . .	"	"	144
Seaver pl. . . . .	From Tremont st. . . . .	"	"	3
Shaving st. . . . .	Federal st. and Mt. Washington ave. . . . .	"	"	460
Ashton pl. . . . .	From Charles st. . . . .	"	"	19
Boylston st. . . . .	Park sq. and Tremont st. . . . .	"	"	775
Sydney st. . . . .	Romsey st. and Crescent ave. . . . .	Dor.	"	381
Blue Hill ave. . . . .	At Glenway . . . . .	"	"	36
Virginia st. . . . .	" Davenport ave. . . . .	"	"	4
Clapp st. . . . .	From Massachusetts ave. . . . .	"	"	360
Savin Hill ave. . . . .	Endleigh st. and railroad . . . . .	"	"	802
Wesley ave. . . . .	From Savin Hill ave. . . . .	"	"	50
Savin Hill ave. . . . .	" Grampian Way . . . . .	"	"	550
	<i>Carried forward.</i>			8,001

Statement of Main Pipe Abandoned. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i> .....			8,001
Savin Hill ave. ....	At Grampian Way.....	Dor.	6-In.	26
Grampian way .....	Savin Hill ave. and Evandale terrace,	"	"	679
Everett ave. ....	From Stoughton st. ....	"	"	25
McLellan ave. ....	Blue Hill ave. and Erie st. ....	"	"	168
Barry st. ....	From Barrington st. ....	"	"	23
Geneva ave. ....	Washington and Wilder sts. ....	"	"	125
E st. ....	North of Sixth st. ....	So. B.	"	4
Bowen st. ....	At Est. ....	"	"	16
Broadway.....	" B st. ....	"	"	8
Mercer st. ....	" Vale st. ....	"	"	14
G st. ....	" James st. ....	"	"	2
W. Walnut park.....	Washington st. and Columbus ave. ....	Rox.	"	198
Marcella st. ....	Washington and Highland sts. ....	"	"	1,353
Bromley st. ....	At Old Heath st. ....	"	"	8
Willow park .....	Off Shawmut ave. ....	"	"	118
Sycamore st. ....	At Ridge st. ....	W. Rox.	"	10
Custer st. ....	At Arborway .....	"	"	3
Commonwealth ave. ....	Harvard ave. and Allston st. ....	Erl.	"	270
Oakland st. ....	Washington and Faneuil sts. ....	"	"	744
Joiner st. ....	Chelsea and Park sts. ....	Chn.	"	209
Maverick st. ....	New and Chelsea sts. ....	E. B.	"	1,354
London st. ....	Intersection of Maverick st. ....	"	"	11
Havre st. ....	" " " " .....	"	"	12
Paris st. ....	" " " " .....	"	"	16
Marginal st. ....	Cottage and Ruth sts. ....	"	"	786
Orleans st. ....	Marginal and Sumner sts. ....	"	"	613
Sumner st. ....	New and Border st. ....	"	"	30
	Total 6-Inch .....			<u>14,826</u>
Haymarket pl. ....	Off Avery st. ....	C. P.	4-In.	249
Tremont row. ....	At Howard st. ....	"	"	72
Stoddard st. ....	Court and Howard sts. ....	"	"	166
Carlton st. ....	At Berwick pk. ....	"	"	50
Berwick pk. ....	At Carlton st. ....	"	"	27
Van Rensselaer pl. ....	From Tremont st. ....	"	"	22
	<i>Carried forward</i> .....			<u>586</u>

Statement of Main Pipe Abandoned.— *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i> .....			586
Ashton pl.....	From Charles st.....	C. P.	4-in.	158
Garland st.....	At Washington st. ....	"	"	24
Lucas st. ....	" " " .....	"	"	27
Cherry st. ....	" " " .....	"	"	27
Davis st. ....	" " " .....	"	"	14
Asylum st. ....	" " " .....	"	"	6
Bumstead court. . . . .	At Boylston st. ....	"	"	7
Trumbull st.....	At Newland st.....	"	"	8
Lovering pl.....	Washington st. and Harrison ave. ....	"	"	340
Asylum st. ....	" " " " " " .....	"	"	346
Boylston pl.....	From Boylston st. ....	"	"	20
Ashton pl.....	" Charles st. ....	"	"	29
Webster ave.....	At Unity st.....	"	"	12
Unity court.....	" " " .....	"	"	12
Wiget st. ....	Salem and Marginal sts.....	"	"	250
Gray st. ....	Berkeley and Clarendon sts. ....	"	"	630
Pelham st. ....	Washington st. and Shawmut ave.....	"	"	449
Pelham-Street pl.....	From Pelham st.....	"	"	22
Carlton st.....	At W. Newton st. ....	"	"	24
Exeter pl. ....	Harrison ave. and Chauncy st.....	"	"	180
Paul st. ....	Tremont and Emerald sts. . . . .	"	"	480
Alden st. ....	Court and Sudbury sts.....	"	"	240
Tamworth st.....	At La Grange st.....	"	"	15
Avery pl.....	From Avery st. ....	"	"	15
Lawrence st. ....	Berkeley and Dartmouth sts.....	"	"	1,260
Hilton st.....	From Swett st.....	Rox.	"	300
Holden pl.....	" Dudley st. ....	Dor.	"	26
Fenton pl. ....	" Greenwich st., north side .....	"	"	27
" " .....	" " " south " .....	"	"	4
Clifton st.....	At Dudley st. ....	"	"	36
Gold st.....	" E st. ....	So. B.	"	50
" " .....	" F st. ....	"	"	50
" " .....	D and E sts .....	"	"	553
" " .....	E and F " .....	"	"	500
	<i>Carried forward</i> .....			6,727



Statement of Main Pipe Abandoned. — *Continued.*

In what Street.	Between what Streets.	District.	Size.	Length.
	<i>Brought forward</i> .....			6,727
Gold st. ....	F and Dorchester sts.....	So. B.	4-in.	541
Beckler ave.....	From K st.....	"	"	254
Gates st.....	Dorchester and Telegraph sts.....	"	"	440
" " .....	Telegraph and Eighth sts.....	"	"	616
Silver st.....	Dorchester and G sts.....	"	"	658
Gold st.....	B st. and railroad.....	"	"	151
Dacia pl.....	From Dacia st.....	Rox.	"	34
" terrace .....	" " " .....	"	"	36
Adams pl.....	" Williams st.....	"	"	18
Kensington pk.....	" Warren st.....	"	"	52
Rheims pl. (J.P.A.)..	" Ward st.....	"	"	200
Downing st.....	" Vernon st.....	"	"	170
Centre-street pl.....	" Centre st.....	"	"	140
Walnut pk.....	Washington st. and Walnut ave.....	"	"	1,204
Concord ave.....	Concord and Jefferson sts.....	Chn.	"	24
Sullivan st.....	Russell and Bunker Hill sts.....	"	"	217
" " .....	Off Main st. ....	"	"	48
Stacey st.....	" " " .....	"	"	36
Ellwood st.....	" " " .....	"	"	24
Tufts ct. ....	" Tufts st.....	"	"	36
" " .....	" Corcy st.....	"	"	24
Ludlow st.....	" Mead st.....	"	"	30
Hull st.....	Chelsea and Vine sts.....	"	"	209
Pine st.....	Off Vine st.....	"	"	36
Auburn ave.....	" Auburn st.....	"	"	25
Wall st.....	" Sullivan st.....	"	"	29
Mason ct.....	" " " .....	"	"	20
Wesley st.....	" " " .....	"	"	20
Linwood pl.....	" Main st.....	"	"	54
Murray ct.....	" Orleans st.....	E. B.	"	40
Boston Dye Wood Co. Wharf .....	" Border st.....	"	"	20
Dry Dock Co. Wharf,	" " " .....	"	"	20
Haynes st.....	" Orleans st.....	"	"	35
	Total 4-inch .....			<u>12,188</u>

**Statement of Main Pipe Abandoned. — Concluded.**

In what Street.	Between what Streets.	District.	Size.	Length.
Willow Park .....	Off Shawmut ave.....	Rox.	3-in.	50
Bispham st. ....	From Park st.....	Dor.	"	174
Hudson st. ....	Off Chelsea st.....	Chn.	"	20
Green st. ....	High and Main sts. ....	"	"	190
Avon pl.....	Off Sullivan st.....	"	"	22
Exeter pl.....	" " " .....	"	"	24
	Total 3-inch .....			480

Gates Established and Abandoned during the Year and Number in use January 31, 1898, exclusive of Blow-off, Private, and those gates taken by Metropolitan Water Board January 1, 1898.

	DIAMETER IN INCHES.												Totals.	
	48	40	36	30	24	20	16	12	10	8	6	4		3
Total number in use Jan 31, 1897.....	6	7	29	54	65	53	179	1,529	120	940	3,397	792	13	7,684
Established during the year.....	.....	.....	6	4	4	9	32	111	17	65	254	6	1	509
Abandoned during the year.....	.....	.....	.....	.....	2	1	3	30	2	9	55	71	3	176
Number taken by Met. Water Board....	5	.....	9	17	5	.....	2	14	1	2	17	14	.....	86
Total number in use, Jan. 31, 1898....	1	7	26	41	62	61	206	1,586	134	994	4,079	713	11	7,931

### Blow-off Gates Established and Abandoned During the Year.

	DIAMETER IN INCHES.			Total.
	4-in.	6-in.	12-in.	
Number established.....	6	3	2	11
Number abandoned.....	1	1	.....	2
Increase.....	5	2	2	9

### Private Gates Established and Abandoned During the Year.

	DIAMETER IN INCHES.					Total.
	6-in.	8-in.	10-in.	12-in.	16-in.	
Number established.....	1	3	1	1	1	7
Number abandoned.....	.....	.....	.....	1	.....	1
Increase.....	1	3	1		1	6

Hydrants Established and Abandoned During the Year.

	ESTABLISHED.					ABANDONED.					Totals.	Increase.	Decrease.
	Lowry.	B. Lowry.	Post.	Boston.	Totals.	Lowry.	B. Lowry.	Post.	Boston.	Totals.			
City Proper (Public).....	53	1	8	....	62	33	3	2	24	62			
"    (Private).....									1	1			1
South Boston (Public) ...	9	3	15	1	28	....	1	....	18	19			9
"    (Private).....			4	....	4	....		....	1	1			3
East Boston (Public).....	10	....	15	....	25	7	....	....	13	20			5
Roxbury (Public).....	8	11	34	....	53	9	6	2	3	20			33
Dorchester (Public).....	3	36	113	....	152	19	28	15	2	64			88
"    (Private). ...			1	....	1	....		....					1
West Roxbury (Public)...	36	11	1	48	....	13	5	2	20	28			
Brighton (Public).....	5	17	1	23	3	2	1	4	10	13			
Charlestown (Public).....	1	3	....	4	....								4
Medford .....									1	1			1
<b>Total Public .....</b>	<b>83</b>	<b>93</b>	<b>216</b>	<b>3</b>	<b>395</b>	<b>71</b>	<b>53</b>	<b>25</b>	<b>67</b>	<b>216</b>	<b>180</b>		<b>1</b>
<b>Total Private .....</b>			<b>5</b>		<b>5</b>				<b>2</b>	<b>2</b>	<b>4</b>		<b>1</b>

## Total Number of Hydrants in use January 31, 1898.

	Lowry.	Post.	B. Lowry.	Boston Y.	Boston.	Totals.	NOTES.
City Proper (Public)....	747	307	56	....	366	1,476	
“ “ (Private).....		10	.....	....	45*	55	*27 not for fire.
South Boston (Public)...	228	126	25	....	185	564	
“ “ (Private)..	2	13*	.....	1	32*	48	*2 Bostons } *4 Posts } not for fire.
East Boston (Public)....	147	134	25	....	78	384	
“ “ (Private)...	8	7	.....	....	25*	40	*7 not for fire.
Roxbury (Public).....	641	357	87	....	64	1,149	
“ (Private).....	1*	.....	.....	....	10*	11	*1 Lowry } *1 Boston } not for fire.
Dorchester (Public)....	564	767	247	....	50	1,628	
“ (Private).....		1*	1	....	5*	7	*2 Bostons } *1 Post } not for fire.
West Roxbury (Public)..	129	561	221	....	40	951	
“ “ (Private).....		13	.....	....	1	14	
Brighton (Public).....	75	326	73	....	27	501	
“ (Private).....		6	.....	....	2*	8	*2 not for fire.
Charlestown (Public) ...	205	41	37	....	4	287	
“ (Private)...	14	36	1	....	6*	57	*1 not for fire.
Deer Island (Private)...		18	.....	.....	.....	18	
Long Island (Private)...		6	.....	.....	.....	6	
Thompson's Island (Private).....		2	.....	.....	.....	2	
Rainsford's Island (Private).....		1	3	....	1*	5	*1 not for fire.
Galloupe's Island (Private).....		1	.....	.....	1*	2	*1 not for fire.
Brookline.....	5	.....	.....	.....	3	8	
Chelsea .....	.....	.....	.....	.....	7	7	
Quincy .....	.....	7	.....	.....	.....	7	
Total number Public Hydrants .....	2,736	2,619	771	....	814	6,940	
Total number Private and Suburban Hydrants....	30	121	5	1	138	295	

NOTE.—This list does not include the following hydrants taken January 1, 1898, by the Metropolitan Water Board.—

Brighton (Public) .....	3 Posts
Pumping Station, West Somerville (Private).....	{ 1 Boston 2 Posts
Medford .....	{ 5 Bostons 2 Posts

Water Posts.

DISTRICT.	Number in use Jan. 31, 1897.	Established during the Year.	Abandoned during the Year.	Number in use Jan. 31, 1898.
City Proper.....	54	1	.....	55
South Boston.....	28	.....	.....	28
East Boston.....	32	.....	.....	32
Roxbury.....	69	.....	.....	69
Dorchester.....	80	3	.....	83
West Roxbury.....	75	1	.....	76
Brighton.....	47	.....	2	45
Charlestown.....	20	.....	.....	20
	405	5	2	408

Repairs of Pipes during the Year ending Jan. 31, 1898.

	DIAMETER OF PIPES IN INCHES.															Totals.			
	48	36	30	24	20	16	12	10	8	6	4	3	2	1½	1¼		1	¾	5/8
City Proper.....	1	2	17	3	6	35	190	3	58	81	30	6	6	1	2	16	17	787	1,261
South Boston.....	..	..	2	..	3	..	14	..	1	13	8	..	..	..	..	..	..	243	284
East Boston.....	..	..	..	1	8	..	11	1	1	5	1	..	..	..	..	1	..	109	138
Roxbury.....	..	2	1	3	10	1	14	2	1	25	5	..	..	..	..	4	3	384	455
Dorchester.....	..	..	..	..	..	2	8	3	6	31	4	..	..	..	..	..	..	237	291
West Roxbury.....	..	1	1	..	1	1	20	..	3	12	..	..	..	..	..	1	..	124	164
Brighton.....	..	..	..	1	1	..	3	..	5	4	..	..	..	..	1	..	..	40	55
Charlestown.....	..	..	1	3	1	8	4	..	2	5	1	..	2	..	..	..	..	101	128
Brookline.....	1	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4
Newton, L. F.....	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Totals.....	2	5	26	11	30	47	264	9	77	176	49	6	8	1	2	23	20	2,025	2,781

Causes of repairs that have been made on pipes of 4-inch diameter and upwards :

Blasting . . . . .	28
Defective joints . . . . .	136
" stop-cocks . . . . .	122
" pipes . . . . .	9
" packing . . . . .	103
In way of various corporations . . . . .	26
Joints strained by settling in subway . . . . .	218
On account of Sewer Division . . . . .	17
Settling of earth . . . . .	31
Struck by pick . . . . .	6
	<hr/>

696

On 3 inch and on service pipes :

Broken in wall . . . . .	19
" " sewer . . . . .	81
" by builders of subway . . . . .	51
" " team . . . . .	4
" " steam-roller . . . . .	11
" " blasting . . . . .	14
" " pick . . . . .	200
" " settling of earth . . . . .	244
Defective pipe . . . . .	162
" joints . . . . .	37
" stop-cocks . . . . .	47
" packing . . . . .	10
" coupling . . . . .	56
" valve . . . . .	1
Eaten by soil . . . . .	4
" " electricity . . . . .	1
Frozen . . . . .	55
Gnawed by rats . . . . .	7
In way of various corporations . . . . .	86
Relaying main pipe . . . . .	250
Stopped by rust . . . . .	490
" " dirt . . . . .	135
" " fish . . . . .	111
" " gasket . . . . .	8
Broken by pile-driver . . . . .	1
	<hr/>

2,085

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2,781



**Statement of Miscellaneous Work Performed during  
the Year.**

Locations of gates marked and remarked . . . . .	10,268
Dead ends blown off . . . . .	190
Hydrant barrels changed for repairs . . . . .	229
“ boxes repaired in service . . . . .	635
“ “ renewed “ “ . . . . .	110
“ changed on account of no guides . . . . .	136
“ repaired in service . . . . .	1,646
“ boxes cleaned out . . . . .	4,224
Boxes over bridges repaired . . . . .	36
Main cocks renewed . . . . .	49
Sidewalk cocks renewed . . . . .	154
“ uprights raised or lowered . . . . .	426
“ “ moved on account of edgestones . . . . .	65
New main uprights put on . . . . .	12
Stop-cock or gate-boxes repaired in service . . . . .	1,004
“ “ “ “ renewed “ “ . . . . .	272
Water-posts repaired . . . . .	665
Fire reservoirs repaired . . . . .	9
Streets repaired . . . . .	1,257
Gates salted on account of cold weather . . . . .	9,362
Hydrants hayed “ “ “ “ . . . . .	808
Meters “ “ “ “ “ . . . . .	833
Number of examinations caused by false reports . . . . .	953

## Statement of Leaks and Stoppages, from 1850 to 1897.

YEAR.	DIAMETER IN INCHES.		TOTAL.
	Four inches and upwards.	Less than four inches.	
1850 .....	32	72	104
1851 .....	64	173	237
1852 .....	82	241	323
1853 .....	85	260	345
1854 .....	74	280	354
1855 .....	75	219	294
1856 .....	75	232	307
1857 .....	85	278	363
1858 .....	77	234	311
1859 .....	82	449	531
1860 .....	134	458	592
1861 .....	109	399	508
1862 .....	117	373	490
1863 .....	97	397	494
1864 .....	95	394	489
1865 .....	111	496	607
1866 .....	139	536	675
1867 .....	122	487	609
1868 .....	82	449	531
1869 .....	82	407	489
1870 .....	157	707	864
1871 .....	185	1,380	1,565
1872 .....	188	1,459	1,647
1873 .....	153	1,076	1,229
1874 .....	434	2,160	2,594
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	883	1,028
1882 .....	170	1,248	1,418
1883 .....	171	782	953
1884 .....	253	1,127	1,380
1885 .....	111	638	749

Statement of Leaks and Stoppages, etc. — *Concluded.*

YEAR.	DIAMETER IN INCHES.		TOTAL.
	Four inches and upwards.	Less than four inches.	
1886.....	150	725	875
1887.....	172	869	1,041
1888.....	216	1,140	1,356
1889.....	183	849	1,032
1890.....	180	718	898
1891.....	194	758	952
1892.....	212	1,232	1,444
1893.....	327	1,555	1,882
1894.....	349	1,354	1,703
1895.....	215	1,320	1,535
1896.....	820	1,976	2,796
1897.....	696	2,085	2,781

TABLES SHOWING DETAILS OF WORK PERFORMED IN SOMERVILLE, CHELSEA  
AND EVERETT.

**Length of Distributing Mains Laid and Relaid during the Year.**

	DIAMETER IN INCHES.										Totals.
	1½-in.	1¾-in.	2-in.	4-in.	6-in.	8-in.	10-in.	12-in.	16-in.	20-in.	
Somerville.....		70	1,271	26	4,345	3,403	4,432	6,685	101	1,649	21,982
Chelsea.....					3,818	2,807	1,516				8,141
Everett.....	150		173		7,344		1,408				9,075
Totals.....	150	70	1,444	26	15,507	6,210	7,356	6,685	101	1,649	39,198

Number of Gates Established during the Year.

	DIAMETER IN INCHES.								Totals.
	2-in.	4-in.	6-in.	8-in.	10-in.	12-in.	20-in.	Various Sizes.	
Somerville .....								65	65
Chelsea .....			7	8	4				19
Everett .....	4	1	25		2	1	1		34
<b>Totals</b> .....	4	1	32	8	6	1	1	65	118

New Services.

	SIZE.								Total Feet.
	1/2-in.	3/8-in.	1/2-in.	3/4-in.	1-in.	1 1/4-in.	2-in.	Total.	
Somerville .....									16,027
Chelsea .....	12		546		11	3	2	74	1,818
Everett .....			4					227	4,543
<b>Totals</b> .....	12		551		12	3	3	803	22,388

Distribution-Pipes Relaid.

LOCATIONS.	Original Size.	2-in.	4-in.	6-in.	8-in.	10-in.	12-in.	16-in.	20-in.
Somerville:									
Beacon pl. ....	4-in.			34					
Cameron ave. ....	6-in.					1,025			
"    " ....	4-in.			11					
Chauncey ave. ....	6-in.						171		
Clarendon ave. ....	8-in.				191				
Clark st. ....	6-in.					400			
"    " ....	4-in.			5					
Concord ave. ....	6-in.						2,000		
"    " ....	4-in.			32					
Congress pl. ....	1-in.	108							
Gilman st. ....	6-in.					7			
Heath st. ....	4-in.					792			
Lamson court. ....	1-in.	134							
Main st. ....	4-in.			3					
Maple ave. ....	4-in.			323					
Marion st. ....	6-in.				21				
Medford st. ....	6-in.						871		
"    " ....	4-in.			8					
Melrose st. ....	6-in.			28					
Mt. Vernon ave. ....	2-in.					100			
Mystic ave. ....	6-in.						2,320		
Newbury st. ....	6-in.				1,238				
"    " ....	4-in.			14					
Newton st. ....	4 and 16-in.								95
"    " ....	12-in.							62	
"    " ....	4-in.						116		
"    " ....	4-in.				490				
Partridge ave. ....	6-in.			3					
Pearl st. ....	6-in.						53		
Prospect pl. ....	4-in.			14					
Prospect st. ....	6-in.								58
School st. ....	6-in.					896			
"    " ....	4-in.			9					
Somerville ave. ....	4-in.			13					
"    " ....	6-in.				42				
<i>Carried forward</i> .....		242		497	1,982	3,220	5,531	62	153

Distribution-Pipes Relaid. — *Concluded.*

LOCATIONS.	Original Size.	2-in.	4-in.	6-in.	8-in.	10-in.	12-in.	16-in.	20-in.
<i>Brought forward</i> .....		242		497	1,982	3,220	5,531	62	153
Temple st.....	8-in.						86		
Tennyson st.....	6-in.			293					
Thurston st.....	6-in.			1,384					
“ “.....	4-in.			6					
Walnut st.....	6-in.					248			
“ “.....	6-in.						18		
Webster ave.....	6, 14 and 16-in.								638
“ “.....	4-in.		6						
Wyatt st.....				43					
Chelsea:									
Eldridge pl.....	3-in.			360					
Carter st.....	4-in.					450			
Maple st.....	4-in.			137					
Medford st.....	4-in.			36					
Bloomingtondale st.....	4-in.				1,947				
Addison st.....	4 in.			1,007					
Orange st.....	3 and 4-in.			776					
Carmel st.....	4-in.			720					
Eden st.....	4-in.				860				
Everett:									
Second st.....	6-in.					708			
“ “.....	“	173							
Cottage st.....	4-in.			187					
Tremont st.....	4-in.			758					
Everett st.....	4-in.			1,112					
Prescott st.....	4-in.			1,035					
Totals.....		415	6	8,351	4,789	4,626	5,635	62	791

Extension of Distribution-Pipes.

LOCATIONS.	1½-in.	2-in.	4-in.	6-in.	8-in.	10-in.	12-in.	16-in.	20-in.	
Somerville:										
Appleton st.....		13								
Bolton st.....					20					
Broadway.....		10								
“.....							208			
“.....							398			
“.....									39	
“.....					32					
“.....							21		380	
Browning road.....					406					
“ “.....					6					
Cameron ave.....					11					
Chester st.....		196								
Clarendon ave.....					7					
Clark st.....					5					
Concord ave.....								39		
“ “.....					541					
“ “.....					26					
Crown st.....					220					
Cutter ave.....					23					
Day st.....		106								
Fairlee st.....			5	3						
Forest st.....		129								
Fosket st.....						196				
Gilson terrace.....					165					
Glendale ave.....					252					
Heath st.....					4					
Highland ave.....					11					
“ “.....					31					
Holts ave.....		130								
Houghton st.....					8					
Kent st.....					6					
Kidder ave.....					7					
Lowell st.....					10					
Malloy court.....		70								
Maple ave.....					7					
<i>Carried forward ..</i>		70	584	5	1,228	573	196	627	39	419



Extension of Distribution-Pipes. — *Continued.*

LOCATIONS.	1½-in.	2-in.	4-in.	6-in.	8-in.	10-in.	12-in.	16-in.	20-in
<i>Brought forward</i> .. . . .	70	584	5	1,228	573	196	627	39	419
Meacham st.....		65							
Mead st.....				181					
Medford st.....						596			
“ “ .....				16					
Melburn pl. ....		150							
Montrose st.....				6					
Moreland st.....				19					
Mt. Vernon ave. ....						172			
“ “ “ .....				8					
Mystic ave.....				42					
Newbury st.....				14					
New Cross st. ....				7					
Newton st. ....									439
“ “ .....				12					
Norfolk “ .....				10					
Pearl “ .....				12					
Prospect “ .....				24					
Russell st.....		230							
Simpson ave.....							298		
“ “ .....				6					
Tennyson st. ....				70					
“ “ .....				15					
Thurston “ .....				18					
Tower “ .....						12			
Tremont “ .....					9				
Union sq.....					15				
Walnut st.....						44			
Walnut st.....					9				
Waterhouse st.....						792			
“ “ .....					63				
Webster ave.....					12				
“ “ .....				15					
Westminster st.....					305				
“ “ .....					6				
Willow ave. ....							125		
<i>Carried forward</i> .. . . .	70	1,029	20	2,107	1,421	964	1,050	39	858

**Extension of Distribution-Pipes. — Concluded.**

LOCATIONS.	1½-in.	1½-in.	2-in.	4-in.	6-in.	8-in.	10-in.	12-in.	16-in.	20-in.
<i>Brought forward</i> .....		70	1,029	20	2,107	1,421	964	1,050	39	858
Willow ave. ....					8					
Windom st. ....					7					
Chelsea:										
Cypress st. ....							1,066			
Harvard st. ....					296					
Murray st. ....					180					
Ingleside ave. ....					210					
Springvale ave. ....					96					
Everett:										
Jackson ave. ....					96					
Jefferson ave. ....					593					
Clay ave. ....					106					
Calhoun ave. ....					50					
Spring st. ....					531					
Broadway .....							700			
Elm st. ....					72					
Springvale ave. ....					72					
Burdett st. ....					112					
Timothy ave. ....					376					
Summit ave. ....					248					
Tremont st. ....					216					
Walnut st. ....					119					
Orchard st. ....					197					
Baldwin terrace. ....	150									
Myrtle st. ....					436					
Villa ave. ....					120					
Rover st. ....					284					
Robbins st. ....					192					
Rockvalley ave. ....					84					
Dane st. ....					132					
Greenhalge ave. ....					216					
<b>Totals</b> .....	150	70	1,029	20	7,156	1,421	2,730	1,050	39	858

**Hydrants Established and Abandoned.**

	ESTABLISHED.	ABANDONED.	Increase.
	Post.	Post.	
Somerville.....	79	21	58
Chelsea.....	15	10	5
Everett .....	13	1	12
<b>Totals .....</b>	<b>107</b>	<b>32</b>	<b>75</b>

**Water Posts Established and Abandoned.**

	Established.	Abandoned.	Increase.	Decrease.	Net Increase.
Somerville.....	2	.....	2		
Chelsea .....	1	.....	1		
Everett .....	.....	2	.....	2	
<b>Totals .....</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>1</b>

## APPENDIX B.

---

 REPORT OF THE RESIDENT ENGINEER AND  
 GENERAL SUPERINTENDENT OF THE WEST-  
 ERN DIVISION.
 

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SOUTH FRAMINGHAM, January 1, 1898.

HON. JOHN R. MURPHY,

*Water Commissioner :*

SIR: The annual report of the Western Division of the Boston Water Works is herewith submitted.

## SUDBURY-RIVER RESERVOIRS.

*Water-shed, 75.2 Square Miles.*

The rainfall for 1897 was 44.89 inches at Framingham and 46.17 inches at Chestnut-Hill Reservoir. The mean rainfall on the Sudbury-river water-shed, from observations taken at Framingham Centre and Reservoir No. 4, was 46.19 inches, which is about the average for a long period. The rainfall for May, June, July and August was large and very uniformly distributed. There was but one month during the whole year when the rainfall was very small, and that was October, when the gauge at Framingham registered 0.41 of an inch for the month.

The following table shows the average yield of the Sudbury-river water-shed for 1875-96 and the yield for 1897 :

*Yield of the Sudbury-river Water-shed in millions of gallons  
per square mile per day.*

Month.	Mean 1875-96.	1897.
January . . . . .	1.205	0.845
February . . . . .	1.884	1.067
March . . . . .	2.871	2.565
April . . . . .	2.028	1.515
May . . . . .	1.112	0.915
June . . . . .	0.469	0.962

Month.	Mean 1875-96.	1897.
July . . . . .	0.183	0.658
August . . . . .	0.276	0.591
September . . . . .	0.247	0.182
October . . . . .	0.547	0.094
November . . . . .	0.937	0.909
December . . . . .	1.021	1.584
Mean . . . . .	1.065	0.991

## RESERVOIR 1.

*Grades, H. W., 160.79; Tops of Flash-boards, 159.29 and 158.41; Crest of Dam, 157.54. Area, Water Surface at 159.29, 143 acres; Greatest depth, 15 ft.; Contents, below 160.79, 365,560,000; below 159.29, 288,400,000 gals.*

On January 1, 1897, water in this reservoir stood at elevation 156.37. The surface rose, and on the 8th, 9th and 10th, water was wasted over the stone crest of the dam. It soon receded, however, to 156.00, remaining at this level until about March 6, when it rose rapidly, and on the 7th began wasting over the crest. Waste continued until April 2, when both sets of flash-boards were placed in position. On April 8 waste took place over the flash-boards and continued through the gates and over the flash-boards until the 21st. The reservoir remained practically full, with waste occurring at times, until August 3. On August 4 a gate was opened to draw the water out of the reservoir in order to allow the Metropolitan Water Board to prepare for the laying of a new 48-inch main from Reservoir No. 3 to Sudbury Aqueduct below Dam No. 1. The water in the reservoir was lowered to about elevation 148.00, where it remained until the latter part of November. In December the reservoir was allowed to fill, reaching grade 156.75 on December 31.

The highest elevation reached during the year was 159.66 on June 10, and the lowest 145.90 on September 16.

Both sets of flash-boards were placed in position on January 18; they were removed on February 2, replaced on April 2, and finally removed on August 16.

Water was not drawn wholly from this reservoir for the supply of the city during the year. It was drawn partially from this reservoir and from Reservoir No. 2 from 7 A.M., January 1, to 10.40 A.M., May 27, and from 7 A.M., August 3, to 12 M., August 4. It was drawn partly from this reservoir and partly from Reservoir No. 3 from 7 A.M., July 30, to 7 A.M., July 31.

When the reservoir was emptied in the autumn the joints in the stone masonry overflow and in the wing-wall of the overflow and on the side of the gate-house were all thoroughly pointed. The masonry in the gate-house and in the wing-wall of the gate-house on the side next to the reservoir were also pointed where necessary.

The slope paving in front of and adjacent to the overflow was taken out in order to allow the joints of the crest stones at the back of the dam to be thoroughly pointed. Advantage was also taken of the low water to calk five joints in the 48-inch pipe from Dam No. 2, and two joints in the 48-inch pipe from Dam No. 3, where there were leaks. One joint was found from which the lead was partially drawn out and this was thoroughly recalked. About 300 feet of the 48-inch pipe from Dam No. 3, from which the covering had been washed away, was recovered to an average depth of two feet. The 48-inch pipes have been flushed into the river below Dam No. 1 once during the year.

#### RESERVOIR 2.

*Grades, H. W., 167.87; Tops of Flash-boards, 167.12 and 166.49; Crest of Dam; 165.87. Area, Water Surface, at 167.87, 134 acres; Greatest Depth, 17 ft., Contents, below 167.87, 562,580,000; below 167.12, 529,860,000 gals.*

On January 1, 1897, the surface of the water in this reservoir stood at elevation 162.63, and on the 12th at 165.72. It gradually receded to 160.35 on February 7. It soon rose again, however, and remained at about 162.50 until March 3 when it rose rapidly.

Both sets of flash-boards were placed in position on March 6, and on the 7th waste began over the tops of the flash-boards. On April 22 an extra set of flash-boards was put in place on top of the regular sets in order to store as much water as possible for the supply of the city. The water rose to 167.88 on April 30, remaining at about this grade until May 27, when it gradually receded to 164.85 on June 9, rising to 167.98 on June 14. By September 3 the water had fallen to 163.05. It was kept between 162.75 and 163.00 on an average until November 12 by drawing, as occasion required, from Reservoirs Nos. 4, 6 and 8. The water then rose to 164.85 on December 8, remaining at about this height until December 15, when it rose and overflowed the lower set of flash-boards on December 16 and continued to overflow until the 26th, the flash-boards being removed on the 28th and 29th. Waste continued over the stone crest, and on December 31 the water stood at elevation 166.03 with waste still continuing.

The highest elevation that the water in the reservoir reached during the year was 168.09 on May 6, and the lowest 160.35 on February 7.

The lowest set of flash-boards was placed in position on March 5, and the upper set on the 6th, and one-half of an extra set was placed on top of the regular flash-boards on April 16, and the remaining half of the additional set was placed in position on the 21st and 22d. All the flash-boards were removed on October 31 in order to point the joints of the stone crest. The lower set was replaced on November 6. On December 28 three bays of the lower set were removed and the remainder on the 29th.

Water for the supply of the city was drawn wholly from this reservoir from 10.40 A.M., May 27, to 11 A.M., July 13; from 7 P.M., November 6, to 10 A.M., November 10; from 11 A.M., November 12, to 11 A.M., December 2, and from 11 A.M., December 9, to 12 M., December 27. The water was drawn partly from this reservoir and partly from Reservoir No. 3 from 11 A.M., July 13, to 7 A.M., July 30; from 7 A.M., July 31, to 7 A.M., August 3; from 12 M., August 4, to 3 P.M., October 24; from 11 A.M., October 26, to 7 P.M., November 6; from 10 A.M., November 10, to 11 A.M., November 12; from 11 A.M., December 2, to 11 A.M., Dec. 9, and from 12 M., December 28, to the end of the year. Water was drawn partly from this reservoir and partly from Reservoir No. 1, as already given under Reservoir No. 1.

While Reservoir No. 1 was emptying in the autumn all of the joints of the crest stones of the overflow of Reservoir No. 2, and all the horizontal and vertical joints of the first three courses below the crest stones in the face of the overflow were thoroughly cut out and pointed with Portland cement mortar. The remainder of the joints in the masonry on the face of the overflow and also the joints in part of the wing wall of the overflow, and on that side of the gate-house facing the overflow, and below high water in Reservoir No. 1, were repointed. Some repairs at the same time were made upon the paving on the embankments of the dam, and about 1,600 feet of fence on Fountain street was built and painted.

The average number of organisms present for the year was 140 against 95 for 1896. The usual spring growth of Diatomaceæ was practically absent. The autumn growth commenced late in August, reached a maximum of 240 on September 9, and decreased throughout the remainder of the year. The growth of Chlorophyceæ commenced in July, reached a maximum of 120 units on July 27, and disappeared early in October. Cyanophyceæ were unimportant except

during August and September when the growth consisted mainly of *Anabæna* and *Clathrocystis*, and reached a maximum of 480 units on August 12. Infusoria were present in small numbers throughout the year. The maximum growth, consisting almost entirely of *Uroglæna*, occurred on May 18, and amounted to 400 units per c.c.

### RESERVOIR 3.

*Grades, H. W., 176.74; Crest of Dam, 175.24.  
Area at 176.74, 253 acres; Contents, below 176.74, 1,203,180,000 gals.  
Area at 175.24, 248 acres; Contents, below 175.24, 1,081,500,000 gals.  
Greatest depth, 21 feet.*

On January 1, 1897, water in this reservoir stood at grade 174.82. On the 5th it rose to the stone crest and began flowing over the dam. It ceased overflowing on the 18th, but rose and fell alternately until March 13, and then continued to rise until April 1, when one set of flash-boards was placed on the crest. On April 20 a second set of flash-boards was placed in position and water wasted over the top of this set until August 1, after which time the surface receded to 168.80 on September 23. On the 27th it rose to 169.19 and was kept at about 169.25 by drawing from Reservoir No. 5 until November 7; then it gradually rose to 170.55 on the 27th. It was at grade 174.74 on December 31.

The highest elevation that the water in the reservoir reached during the year was 176.80 on July 2, and the lowest 168.80 on September 23.

The first set of flash-boards was placed in position on the stone crest on April 1, one-half of the second set on the 17th, and the other half on the 20th. All the flash-boards were removed on December 11. The top of the first set of flash-boards is at elevation 175.86, and the top of the second set at elevation 176.50.

Water for the supply of the city was drawn wholly from this reservoir from 5.40 P.M., October 25, to 11 A.M., October 26. Water was drawn partly from this reservoir and partly from Reservoirs Nos. 1 and 2 on dates already given.

In order to increase temporarily the storage capacity of Reservoir No. 3, pin-holes were drilled in the stone crest and iron pins fixed in position to hold flash-boards. This work was done early in the spring.

The average number of organisms for the year was 859 against 506 for 1896. The spring growth of *Diatomaceæ* commenced about the first of April, reached a maximum of 2,096 units per c.c. on June 30, and decreased during July. These organisms were present in large numbers again from



the first of October to the end of the year. Chlorophyceæ were present in moderate numbers from May until the end of the year. The maximum of 90 units per c.c. was reached on August 25. Cyanophyceæ appeared in April and were abundant in June. The growth increased after July 15, reached a maximum of 640 units on September 15, and disappeared about the first of December. The growth consisted of Clathrocystis, Coelosphaerium, Microcystis and Anabæna. Infusoria were present in large numbers throughout the year. Uroglæna constituted almost entirely the large growth which extended from May 19 to July 7, and which reached a maximum of 4,515 units.

#### RESERVOIR 4.

*Grades, H. W., 215.21; Tops of Flash-boards, 215.21 and 214.89.; Crest of Dam, 214.21.*  
*Area, Water Surface, at 215.21, 167 Acres; Greatest Depth, 49 feet; Contents, below 215.21, 1,416,350,000 gals.*

On January 1, 1897, the surface of the water in this reservoir was at elevation 195.11. It rose to 213.90 on April 2, when both sets of flash-boards were placed in position. It continued to rise, and on April 10 water was flowing over the tops of the flash-boards and continued to overflow, portions of the upper set of flash-boards being removed from time to time to prevent the water in the reservoir from rising too high. On July 1 a gate was opened to draw water into Reservoir No. 2. The surface had fallen to 208.24 on July 23 when the gate was closed. The surface then rose to 210.31 on September 5, when the gate was opened again. It then receded, with slight rises at times as the gate was opened and closed, reaching grade 200.96 on November 2, when the gate was finally closed for the year, except for one day at the last of the month. The surface stood at elevation 209.98 on December 31.

The highest elevation reached during the year was 215.51 on May 12, and the lowest, 195.11 on January 1.

Both sets of flash-boards were placed in position on April 2, and on July 13 the flash-boards were removed.

For several years it has been noticed that the berm at the foot of the slope paving, on the water side of the embankment, was gradually disappearing, and at places was lowered by the action of the ice and waves. Accordingly, when the water was lowered sufficiently in the autumn, a large quantity of stone was brought on rafts to the berm and put in place, and its width and grade restored. This work was completed from the overflow to a point 300 feet west of the gate-house,

a distance of about 650 feet. More of this work must be done as occasion allows.

The stone masonry at the outlet of the two 48-inch pipes was pointed during the autumn. The gate-house was provided with a new door.

Work on the Cold-spring brook channel near Main street, which was in progress at the beginning of the year, was finished about March 1. The abutments of the bridge over the channel at Main street were entirely rebuilt from the foundations, a difficult work on account of quicksand. Their lower portions were laid in cement mortar and their upper portions were pointed only. A new bridge of wood was built across the stream.

The average number of organisms for the year was 90 against 103 for 1896. The organisms throughout the year were small. The spring growth of Diatomaceæ commenced in the middle of May, reached a maximum in the middle of June, and disappeared July 6. The autumn growth commenced in October and continued throughout the year. Chlorophyceæ were present from May until the end of November. They were most abundant during August and September, when they reached a maximum of 80 units. Cyanophyceæ growths were unimportant. Infusoria were present in small numbers throughout the year. A growth of Uroglena amounted to 400 units in the surface sample on April 6.

#### RESERVOIR 5.

*Grades, H. W., 250.00; Top of Stone Crest, 249.00. Estimated Area 1,258 acres; Estimated Contents, 7,609,000,000 gals.*

The construction of this reservoir was begun by the city of Boston, but it was seized by the Metropolitan Water Board on January 4, 1896. While the construction of this reservoir is in the hands of the Metropolitan Water Board, the water has been considered by common consent to be under the control of the city of Boston.

Owing to the completion of the sections in the lower portion of the reservoir, 1,700,000,000 gallons were stored during the winter and spring of 1896-97 for a reserve for the use of the city. The reservoir was filled to a point within 16 feet of the top of the overflow, but owing to the ample rainfall it became necessary to use only a small portion of the water during the past year. The reservoir has been practically completed and will be filled to the overflow by April, 1898.

The average number of organisms for the year was 149. The spring growth of Diatomaceæ commenced April 12, reached a maximum of 180 units on May 17, and disappeared the first of June. The autumn growth commenced September 22, reached a maximum of 460 units on October 27, and decreased to the end of the year. The most important form was Asterionella. Chlorophyceæ appeared April 12 and continued in small numbers throughout the year. The maximum of 70 units was reached in April. Gonium has been a characteristic form. Cyanophyceæ appeared August 11, reached a maximum of 230 on August 18, after which they decreased rapidly and remained only in small numbers during the remainder of the year. Infusoria were present in small numbers throughout the year. During April and May they were present to the extent of about 100 units. The amorphous matter was very high from the time the samples were first collected until the middle of May, on account of filling the reservoir.

#### RESERVOIR 6.

*Grades, H. W., 295.00; Tops of Flash-boards, 304.67 and 305.00; Crest of Dam, 294.00; Area, 185 acres; Contents, 1,520,900,000 gals.*

On January 1, 1897, the surface of the water in this reservoir was at elevation 266.42. It gradually rose to 294.00 on May 16, when the first set of flash-boards was put in position. The second set was added on the 19th. On June 7 water began to waste over the flash-boards and continued to overflow until July 3, when an outlet gate was opened. From this date until October 7 the water was kept just below the top of the flash-boards, by wasting on Sunday into the brook, which was found not to interfere with the work on the new channel. After October 7, work in the new channel being finished, the gate was kept open nearly all the time, and water fell from 294.77 on the 7th to 291.62 on November 4. On December 13 the gates were finally closed, and at that time the water stood at 292.12. The water then rose, and both sets of flash-boards having been removed it began to flow over the stone crest on December 16, and continued to overflow until the end of the year.

The highest elevation reached during the year was 295.32, on June 12, and the lowest, 266.33, on January 2.

Owing to the presence of Clathrocystis in this reservoir, all of the supply which was drawn for the city from the first week in August to November 27 was filtered through filter-beds Nos. 1, 2, 3 and 4 for the purpose of removing algæ.

On account of the work of excavation on Indian-brook channel, and the presence of algæ in the water, this reservoir was not lowered during the year as much as usual.

Early in the season a line of bench levels was run between Dam No. 6 and the permanent bench-marks on the line of Sudbury river. The connection which had previously been made with less precaution to ensure minute accuracy, was proved to be correct.

For several years the city has been compelled to pay damages to Mrs. Levina K. Howes for flooding her land, which lies on both sides of Indian brook, when water was being drawn from the reservoir. This flooding could only be prevented by excavating a capacious channel through her land, and extending it a few hundred feet further through land of Emma E. Bowker to the falls. No arrangement could be made with Mrs. Bowker for her land, and accordingly a seizure was made of 2.75 acres.

On July 6 a day force was placed on this work, and continued until October 1. For a length of 950 feet a rectified channel was excavated, 14 feet in width at bottom, with side slopes of 3 horizontal to 1 vertical, having a capacity of 100 cubic feet per second when the water is a foot below the surface of the meadow. The next 200 feet or more of channel was through a mass of boulders, and its section was made 20 feet wide at bottom with very steep side slopes. For 380 feet further down stream the old bed of the brook was enlarged and deepened by removing boulders and stones. At Cross-street bridge it was intended to widen and deepen the channel and build new abutments for the bridge, but the selectmen of Ashland insisted that the city should build a stone arch. The plan was therefore changed, and the channel was deepened temporarily by building a wooden flume between the abutments.

In September a small force was employed on improving the grounds at the south end of the dam and near the attendant's house. The work was not entirely finished.

While the filter beds were in use during the autumn the water on Bed No. 1 almost disappeared at one time, and it was found that the wall of an old cellar, which was just below the surface of the bed and which extended under the edge of the outside embankment, was acting as a blind drain. This wall which was about 3 feet deep and 24 feet long, was removed and the hole filled with gravel.

The average number of organisms for the year was 536 against 137 for 1896. Diatomaceæ appeared in June, and continued in moderate numbers throughout the year. Chlo-

rophyceæ appeared in April, and continued in small numbers throughout the year. Cyanophyceæ mainly *Clathrocystis*, appeared in large numbers on July 27, reached a maximum of 2,630 on October 12, and decreased during the remainder of the year. Infusoria were present throughout the year, but were unimportant except from April to June and during August and September.

## RESERVOIR 8.

*Grades, H. W., 327.91; Bottom of Gates, 317.78.*

*Area at 327.91, 601 acres; Contents, between 327.91 and 317.78, 1,256,900,000 gals.*

*H. W. of temporary Dam., 329.91; Contents at 329.91, 1,654,800,000 gals.*

On January 1, 1897, the surface of the water in this reservoir stood at elevation 324.77 or 3.14 feet below old high water. On February 2 it reached grade 325.45, when the outlet gate was opened to lower the water for aiding work on the coffer-dam. The water fell to 325.29 on March 4 when the gate was closed. The water then rose to 328.66 on July 8, when the gate was opened again to feed Reservoir No. 2. The water rose and fell alternately, remaining generally at about grade 326.50 until December 31, when it stood at 326.43.

The highest elevation reached during the year was 328.76 on June 15, 20 and 21, and the lowest 324.77 on January 1 and 2.

The work of increasing the storage of this reservoir was alluded to in the last annual report. It was commenced on December 28, 1896, by the driving of sheeting at the site of the dike.

On account of the fact that the completion of Reservoir No. 5 had been unavoidably delayed, it was necessary to store as much water as possible at other points on the works, and it was decided to raise the level of the pond two feet by the construction of another dam and a dike and other work connected therewith. Work on the dike was finished on March 4, 1897. The raising of a road, including the building of a culvert, was begun on January 22, and finished on February 23. The building of the coffer-dam, just above the site of the old dam, was begun on January 15 and finished March 18. The work of erecting this coffer-dam was very difficult on account of the presence of a large quantity of boulders at the bottom of the reservoir, making it difficult to drive the 4-inch sheeting. A great many of the boulders had to be removed, and some were blown out with dynamite before the sheeting could be driven. The coffer-dam was internally

braced and filled with earth. The raising of the water line two feet flooded quite an amount of land which was covered with brush and trees. Arrangements were made with the various owners of the land bordering on the reservoir to remove the timber, and in consideration of their taking the wood they were obliged to remove the brush. From June 1 to July 3 men were employed in clearing away the rubbish, filling cellars and grading grounds on the site of the Wood shoe factory and of the houses bought by the city on Exchange street.

The bulkhead and gates in the outlet flume of the reservoir, which were old and weak, were removed, and a new bulkhead and gates built and put in place.

In July the overflow of the first mill-pond below Reservoir No. 8 was thoroughly rebuilt and a new gate erected at the entrance to the waste pipe.

The average number of organisms at the dam was 386, on the shallow portions of the reservoir 341, and at the upper 241. Diatomaceæ were present in small numbers throughout the year. Chlorophyceæ have been most abundant in the shallow flowage, especially during February, April, May, September and October. With the exception of a single sample, taken during February, which contained 1,020 units of *Gloescystis*, the maximum was 200 units. Cyanophyceæ were present in considerable quantity near the dam, especially during June, September and October. Infusoria have been present at various times in large numbers at all parts of the pond. A growth of *Mallomonas* occurred during August at some depth below the surface in the upper pond, and reached a maximum of 2,209 units. In the shallow portion Infusoria were abundant during February and again during May, when they reached a maximum of 900 units; *Uroglena* were present during September and October, and reached a maximum of 1,200 units on October 11. At the dam, Infusoria were abundant during March and April and the first part of May; *Uroglena* appeared about September 20, reached a maximum of 2,012 on October 11, and disappeared during November.

#### FARM POND.

*Grades, H. W., 149.25; Low Water, 146.00. -  
Area at 149.25, 159 acres; Contents, between 149.25 and 146.00, 167,520,000 gals.*

On January 1, 1897, the water in this pond stood at elevation 148.78, on March 25 at 149.40, and was kept at about 149.00 until September 11.

The highest elevation reached during the year was 149.50 on April 16 to 22 inclusive, and the lowest 147.84 on December 1.

No water has been drawn from this pond for the supply of the city. Owing to the fact that the flow of 1,500,000 gallons, which is required by law to be wasted into the river every day, could not be drawn from Reservoir No. 1 while the trench for the 48-inch pipe was being sunk into the bed of the stream just below Dam No. 1 by the Metropolitan Water Board, arrangement was made to draw this amount of water from Farm pond from September 14 to December 1. Owing to this draught, the pond fell to 147.88 on October 24 and 147.84 on December 1. The pond was partially refilled after the above dates by water drawn from Reservoirs Nos. 2 and 3. On December 31 the pond stood at grade 148.70.

The Framingham Water Company has pumped 117,600,000 gallons during the year, an average of 322,192 gallons daily.

The total waste into the river from Farm pond during the year was 117,200,000 gallons.

During the autumn the coping stones at the entrance to Farm-pond sluice were anchored by iron rods to timbers laid in concrete, to prevent them from being moved by ice.

#### LAKE COCHITUATE.

*Grades, H. W., 134.36; Invert of Aqueduct, 121.03; Top of Aqueduct, 127.36.*

*Area, Water Surface at 134.36, about 776 acres.*

*Contents, between 134.36 and 127.36, 1,508,300,000; between 134.36 and 125.00, 1,908,200,000 gals.*

*Approximate Contents, between 134.36 and 121.03, 2,447,000,000 gals.; between 134.36 and 117.03, 2,907,000,000 gals.*

On January 1, 1897, the water in the lake stood at elevation 127.43, or 6.93 feet below high water mark. By drafts from the Sudbury source the water was raised to 134.35 on April 10. Between April 11 and 16 the waste gate at the dam was opened to prevent the water rising too far. From April 16 to June 27 the water was maintained above elevation 134.00; it then receded gradually, with slight gains at times due to drafts from the Sudbury source, dropping to 129.42 on November 1. It then rose slightly, but remained below 130.00 until December 15, after which it rose quite rapidly for a time, and was at 130.84 on December 31.

The total waste from the lake at the outlet was 117,000,000 gallons, all during the month of April.

The following table shows the amounts of water drawn into the lake from the Sudbury reservoirs during the year:

	Gallons.
January . . . . .	210,500,000
February . . . . .	4,000,000
March . . . . .	462,200,000
April . . . . .	31,500,000
May . . . . .	9,700,000
July . . . . .	66,200,000
August . . . . .	163,900,000
Total . . . . .	<u>948,000,000</u>

Owing to the widening of the Boston & Albany Railroad in 1896 a large mud bank was formed on the northerly side of the railroad, reaching within a few feet of high water mark. This mud bank was covered with four inches of clean, coarse gravel in the month of January.

The average number of organisms in the lake water for the year was 698, against 569 in 1896. The spring growth of Diatomaceæ was large and long continued, extending from April to July. It reached a maximum of 710 on June 15, which was considerably later than usual, owing to the colder spring weather. They were not abundant again until the appearance of the autumn growth about the first of October, continuing until the end of the year. The spring growth consisted mainly of *Tabellaria*, and the autumn growth of *Tabellaria*, *Melosira* and *Asterionella*. There have been no growths of *Chlorophyceæ* of any importance. They were present in January and February and reappeared on the first of June, the maximum autumn growth amounting to 575 on October 25, which consisted of *Aphanizomenon*. Infusoria were present in considerable numbers throughout the year. They were particularly abundant during January, April and the autumn months. The general forms were *Synura*, *Glenodinium* and *Dinobryon*. *Crenothrix* was present at the bottom as usual throughout the year. It was present at the surface about the first of April and at the time of the overturn about the middle of November.

The Pegan filters have been in use almost continuously during the year. The following table shows the total number of gallons pumped and the amount delivered to each bed:



1897. MONTH.	No. of Days Pumps were run.	AMOUNT OF WATER PUMPED.		AMOUNT OF WATER DELIVERED ON BEDS.			
		Total for Month.	Average for each Day Pumps ran.	No. 1.	No. 2.	No. 3.	No. 4.
		Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.
January ...	31	24,106,000	777,600	8,700,000	5,022,000	10,384,000	
February ..	27	24,008,000	889,200	6,609,000	3,791,000	13,608,000	
March .....	29	28,447,000	980,900	7,808,000	4,471,000	14,742,000	1,426,000
April .....	30	26,827,000	894,200	1,231,000	940,000	3,499,000	21,157,000
May.....	30	22,615,000	753,800	6,772,000	1,620,000	11,178,000	3,045,000
June.....	28	23,036,000	822,700	6,804,000	.....	.....	16,282,000
July .....	23	16,330,000	710,000	356,000	.....	11,243,000	4,731,000
August.....	19	16,654,000	876,500	.....	.....	.....	16,654,000
September .	14	12,506,000	893,300	.....	.....	.....	12,506,000
October ....	9	7,808,000	867,600	.....	.....	.....	7,808,000
November .	20	18,630,000	931,500	2,462,000	1,037,000	.....	15,131,000
December..	26	28,998,000	1,115,300	7,841,000	4,018,000	8,586,000	8,553,000
For year...	286	249,965,000	874,000	48,583,000	20,899,000	73,240,000	107,243,000

The total amount of coal used during the year was 282,030 pounds ; 886.3 gallons were pumped per pound of coal.

All of the water of Pegan brook was filtered during the year and none ran over the waste way. The area available for filtration was much reduced by the new location of the Boston & Albany Railroad, which passed through the filter beds, and it was found impossible to stop the flow upon any bed long enough to clean it. It is also necessary to maintain a greater depth of water upon the beds than was originally intended. By an arrangement with the Boston & Albany Railroad, water was pumped on to a large area of land west of Bed No. 3 and between the old and new locations of the railroad, and on March 30 water was delivered on to this area, which has been used from time to time as convenience required. This area is designated in the table as Bed No. 4. Surveys, plans and estimates have been made for a new bed to restore the capacity lost by the new location of the Boston & Albany Railroad.

The following is a statement of land taken by the Boston & Albany Railroad :

Land east of filter beds, formerly owned by David M. Whitney, 48,800 square feet.

Remaining area east of filter beds, formerly owned by Willard C. Childs, 52,370 square feet.

Area across filter beds, 42,900 square feet.

Area west of filter beds to Lake Cochituate, 32,775 square feet.

Total, 176,845 square feet.

### Feeders of Lake Cochituate.

*Means of Monthly Observations (1897).*

	Temperature. Fahr.	Color.	Organisms. <sup>1</sup>	Amorphous. <sup>1</sup>	Bacteria. <sup>2</sup>
Beaver Dam brook .....	51.1 <sup>o</sup>	1.12	313	215	446
Beaver Dam brook (last culvert) ...	52.6	1.02	97	291	387
Course brook .....	53.3	1.00	126	167	339
Dug pond .....	53.1	0.21	889	219	333
Circular dam .....	52.5	1.01	182	215	464
Pegan brook .....	53.3	0.18	146	320	2,096
Snake brook .....	52.6	0.71	78	362	1,375

<sup>1</sup>Standard units per c.c.

<sup>2</sup>Number per c.c.

### DUDLEY POND.

*Grades, H. W., 146.46; 18-inch Pipe, 130.36 and 127.36. Area, Water Surface, 81 acres; Greatest Depth, 27 feet; Contents, above 130.36, 250,000,000 gals.*

On January 1, 1897, water in this pond stood at an elevation of 143.16, 3.3 feet below high water mark, and on December 31 it was at grade 143.24. No water has been drawn from the pond during the year.

### SUDBURY-RIVER AQUEDUCT.

*Grades, 141.35 at Farm Pond; 124.05 at Terminal Gate-House. Length of main aqueduct, 15.89 miles; size, 7 ft. 8 in. x 9 ft.; present capacity, 86,000,000 gals. in 24 hours.*

The three parts of this aqueduct are in good condition. The main aqueduct has been in use 354.2 days, and the supply aqueduct from Dam No. 1 to Farm pond 356.9 days, as it was necessary to run water into Farm pond several times

while drawing the daily flow of 1,500,000 gallons from that pond. The flow in the aqueduct has been stopped for cleaning, and to put in and remove the coffer dam in the supply aqueduct at the entrance of the chamber at the end of the new 48-inch main at Reservoir No. 1, on account of the Metropolitan Water Works; it has also been stopped for purpose of making preparations for cleaning the southerly pipe at the Rosemary siphon; in all, twelve times during the year.

The amount of water sent to the city has been 15,451,100,000 gallons, a daily average of 43,332,000 gallons. In addition to the above, 948,000,000 gallons have been supplied to Lake Cochituate.

At the Rosemary siphon, between August 31 and September 3, the tubercles were carefully removed from the interior of the southerly 48-inch main. The pipe had been in use about twenty-one years. The inside surface was about half covered with tubercles. These were carefully scraped off with special wooden tools, so as to not injure the tar coating under the tubercles. Fifteen cubic feet of tubercles were wheeled out, and the pipe carefully washed and brushed. Fifteen men were employed for four days in cleaning the pipe, which is 1,800 feet in length. Eighteen joints were pointed with Portland cement, mixed with one part of sand. They were from one to two inches in width and  $1\frac{1}{2}$  inches in depth.

On October 11, Course brook waste-weir, the Rockland tunnel, Badger Hill tunnel, Waban bridge and Bacon's and Fuller's waste-weirs were cleaned. They were all covered with a dirty, black deposit, and a large quantity of sponge was removed from the bottoms of the tunnels.

The supply and Farm-pond aqueducts were cleaned twice by machine, on April 28 and September 30. The main aqueduct was cleaned by machine from Farm pond to the west siphon chamber on October 25 and 26. The length was 10.25 miles. The aqueduct was very dirty and covered with a black deposit. A large amount of sponge was found on the bottom and sides, extending to a level about one foot above the skew-back. The easterly part of the aqueduct could not be cleaned at this time, owing to work which the city of Newton was carrying on below Clark's waste-weir.

On December 28 the Beacon-street tunnel was carefully examined for its entire length. No fallen stone was found except about three cubic feet at Station 783+50, in the slate section, and one cubic foot at Station 789+25.

The old flap-gates at the east siphon chamber were replaced with new ones of kyanized spruce.

### COCHITUATE AQUEDUCT.

*Grades, 121.03 at Lake; 116.77 at Brookline Reservoir.  
Length, 14.60 miles; Size, 5 ft. x 6 ft. 4 in.; Capacity, 16,000,000 gals. in 24 hours.*

This aqueduct has been in constant use during the year, except from 5 P.M., April 11, to 5 A.M., April 15, when the flow was stopped for cleaning. The aqueduct was cleaned at this time from Lake Cochituate to the influent gate-house at Chestnut-Hill Reservoir. From the lake to Station 130 the interior was covered with large patches of sponge and a great quantity of black deposit; this section had to be washed twice. From the siphon at Charles-river bridge easterly the sponge gradually diminished. On October 21 and 22 the portion of the aqueduct from the intermediate gate-house to the Brookline Reservoir was cleaned. On December 14 two new galvanized-iron gate-rods were put into Webbers' waste-weir. A depth of six and one-half feet at the lake has been maintained in the aqueduct throughout the year, except for the first five days in January, when the lake was not high enough to furnish this flow.

In May the city of Newton laid a sewer-pipe over the aqueduct in the Newton Boulevard near Chestnut-Hill Reservoir. The pipe was ten inches in diameter and thirty-six feet in length, with leaded joints, with a sub-drain four inches in diameter. The pipes were encased in Portland cement concrete, ten inches in thickness, to prevent any possible leakage into the aqueduct.

The leakage at Waban bridge has been the same as in previous years. The frequent freezings and thawings have acted upon the cement joints in the masonry on the exterior, and also on the interior below the bottom of the aqueduct. It will be necessary during the coming year to point the granite belting courses and the exterior of the brickwork. The asphalt covering also requires to be renewed.

The granite belting courses on the Charles-river bridge need repointing; also portions of the granite-work on the north and south sides of the structure. Some of the external brickwork also needs repairing. At the top of the pilasters the bricks are cracked, and portions are falling out. The concrete on top of the bridge also should be renewed.

The following repairs have been made during the year: Bacon's and Fuller's waste-weirs were scraped, pointed and painted with asphalt paint by the aqueduct force; a con-

siderable amount of fencing has been built, and the whole extent of the line has been mowed from South Framingham to Newton Centre; the culverts have been kept in good order, and the channels leading to and from them cleaned out.

#### CHESTNUT-HILL RESERVOIR.

*Grades, H. W., 124.00; Dam, 128; Effluent pipes, 99.80.  
Area, Lawrence Basin, 37.5 acres; Contents, 156,000,000 gals.; Area, Bradlee Basin, 87.5 acres; Contents, 391,000,000 gals.  
Total Contents above grade, 100.00, 557,000,000, gals.*

In November the Metropolitan Water Board began the laying of two lines of 48-inch pipes through the grounds on the southerly side of the Bradlee basin. During the summer a road was constructed from Commonwealth avenue to the reservoir driveway, through the old right-of-way known as Brown's lane. The street was built by representatives of Margaret Wade, and was constructed on the lines given by the Street Laying-Out Department. As it was extremely undesirable that a road should enter the driveway, a fence was built across the end of the road, and although the owners of the land threatened to remove the fence this was not done. Later, plans were prepared for the taking of the land necessary to protect the driveway at this point. The driveway entering Commonwealth avenue on the north-west side of the Lawrence basin was closed to travel during the year owing to the danger threatening bicyclists at this point. The driveways and buildings have been properly cared for during the year, but the large amount of new work upon which the Metropolitan Water Board is entering has made more or less confusion in different portions of the grounds, especially east of the pumping station. Late in the autumn the carriage shed at the westerly end of the pumping station and the shrubbery surrounding the station were removed preparatory to the construction of the extension of the pumping station by the Metropolitan Water Board.

The area of water works' land taken by the Street Department for the extension of Commonwealth avenue was ascertained to be 104,528 square feet. The extension of this boulevard was referred to in the last annual report.

In March some experiments were made under my direction by Mr. Charles W. Sherman, Assistant Engineer, on losses of head due to friction in the 30-inch force main. The velocities ranged from 0.75 to 5.1 feet per second. The pipe was laid in 1887, and its length is 5,740 feet. The quantity of water flowing was measured over the 5-foot weir at Fisher Hill. The losses of head were determined by the

readings of piezometer gauges placed on the pipes. The coefficient  $c$  in the Chezy formula  $v = c (RS)^{\frac{1}{2}}$  was found to be 103+, corresponding to Kutter's coefficient for roughness  $n = .0133$ .

At the same time a single experiment was made on the 36-inch pipe, which showed its condition to be about the same as at the time of the test made last year. The following table gives the results of the several experiments on both pipes:

PIPE.	Date of Experiment.	$c$ .	$n$ .
30-inch pipe 5,740 feet long laid in 1887	1888	111	.0124
	1897	<sup>1</sup> 103	.0133
36-inch pipe 5,500 feet long laid in 1894	1895	136	.0107
	1896	<sup>1</sup> 113	.0125
	1897	<sup>2</sup> 114	.0126

<sup>1</sup> Mean of a series of observations.

<sup>2</sup> One experiment.

It appears that the condition of the 30-inch pipe in 1888, one year after laying, was about the same as that of the 36-inch pipe in 1897, three years after laying. Both of these pipes were opened by the Metropolitan Water Works in December, for the purpose of making connections, and an examination of the pieces taken out showed the interior condition of the pipes to be quite similar as far as the organic growth of plant and animal life was concerned. On the 30-inch pipe the iron tubercles were nearly twice as large as those on the 36-inch pipe.

It is probable that the rapid deterioration in the first year or so after the large mains were laid is due to growths of protozoa, sponge, etc., and the formation of incipient iron tubercles; and the subsequent slow increase in frictional resistance is due to the growth of the tubercles.

Measuring tapes of steel were tested during the year by comparison with the standard of length at Chestnut-Hill Reservoir for the Massachusetts Topographical Survey Commission, the Engineering and Street Laying-Out Departments of the city of Boston, the Engineering Departments of the cities of Cambridge and Newton, and the Metropolitan Water Works. This work has been done free of charge. A

number of levelling rods have also been tested for the Metropolitan Water Works.

The number of organisms in the samples collected during the year at the effluent gate-house averaged 366, against 224 for 1896. The number of organism, in the samples collected during ten months from the surface, mid-depth and bottom of the middle of the reservoir, averaged 373, against 245 for a period of nine months during 1896. Diatomaceæ appeared during the last of April, reached a maximum of 685 units on June 21, and were present in considerable numbers throughout the remainder of the year. Chlorophyceæ were present from April until the middle of December. They reached a maximum of 70 units on July 23. Cyanophyceæ appeared during the last of May, and continued throughout the remainder of the year. The maximum growth amounting to 250 units occurred on October 18. Infusoria were present throughout the year, and were especially abundant during May, June and August. The maximum growth of 195 units occurred May 1. During August there was a considerable growth of *Synura*, which was unusual, as *Synura* is generally abundant only in cold weather.

#### CHESTNUT-HILL PUMPING STATION.

*Two Gaskill Pumping Engines, Capacity, 8,000,000 gals. each per day, and one Leavitt Pumping Engine, Capacity, 20,000,000 gals. per day.*

During September, the work on the extension of the pumping station was commenced by the Metropolitan Water Board preparatory to the installation of the new 30-million-gallon pumping engine to be furnished by the E. P. Allis Company of Milwaukee.

The dynamo engine, which was furnished by the lighting department of the city, was found not to be up to the contract capacity. It was tested by Messrs. Dean and Main. A new engine was afterwards put in place.

The extensive repairs on Gaskill Engine No. 1 by the Lockwood Manufacturing Company were completed early in the present year, and Gaskill Engine No. 2 has been overhauled and put into good condition.

During the year stuffing boxes were placed upon the plungers of the pumps connected with the Leavitt engine. It was found that a considerable amount of water was passing around the plungers, due to wear on the bottom, which gave

a very large slip. The following table shows the decrease in slip due to the repairs :

Time.	Speed, Revolutions per Minute.	Slip.
Before repairs . . . . {	50.3	6.77 p. c.
	37.4	8.05 p. c.
After repairs . . . . {	36.8	3.05 p. c.
	33.7	4.18 p. c.

The Metropolitan Water Board makes a seizure of this pumping station on January 1, 1898, and it now passes into the control of that Board.

#### BROOKLINE RESERVOIR.

*Grade, H. W., 124.00; Area, 23 acres; Greatest depth, 24 feet; Contents, 115,000,000 gals.*

Everything in connection with this reservoir is in good condition. The Metropolitan Water Board laid a 42-inch main across the reservoir grounds at the westerly end, and this work has somewhat disturbed the condition of the grounds. No special work of maintenance has been done at this point during the year.

#### FISHER-HILL RESERVOIR.

*Grades, H. W., 241.00; Pipe inverts, 220.00; Depth, 21 feet; Contents, 15,400,000 above 223.00.*

This high service reservoir is in good condition. It was maintained during the year by the force at Chestnut-Hill Reservoir. The 10-foot weir at the reservoir was built of wood and was intended only as a temporary expedient for measuring the flow from the pumps at the pumping station. I recommend its removal under proper supervision as soon as it can conveniently be undertaken.

#### INSPECTION OF WATER SOURCES.

The following is a summary of the work of the Inspection of Pollution Department for the year 1897, Mr. John S. Concannon, Chief Inspector :

Total number of cases inspected :

Old cases . . . . .	597
New cases . . . . .	2
Total . . . . .	599
Eliminated during 1897 . . . . .	100
Remaining cases . . . . .	499



## Present condition of all cases :

Remedied . . . . .	192
Present safe . . . . .	291
Seem safe . . . . .	4
Suspected . . . . .	4
Unsatisfactory . . . . .	8
	<hr/>
	499

## Cases in which sewer connections were made :

There were in Natick . . . . .	29
“ Framingham . . . . .	5
“ Westborough . . . . .	4
“ Marlborough . . . . .	7
	<hr/>
Total . . . . .	45

These forty-five sewered cases are included in the 192 remedied cases, and, in the regular order, would not be reported as “Eliminated” until January, 1899.

There are eight unsatisfactory cases, located as follows :

Marlborough . . . . .	4
Natick . . . . .	1
Cordaville . . . . .	1
Southborough . . . . .	1
Westborough . . . . .	1

There are four suspected cases, located as follows :

Natick . . . . .	3
Southborough . . . . .	1

## BIOLOGICAL LABORATORY.

The laboratory is now under the charge of F. S. Hollis, Ph.D. During the year 1897, 1,921 microscopical and 1,749 bacteriological examinations of water were made at the laboratory. Of the microscopical examinations, 1,675 were of the regular weekly samples, and 246 were in connection with special investigations of the sources of supply. Samples for bacteriological examination have been taken regularly from the middle of Chestnut-Hill Reservoir, the gate-houses at Chestnut Hill Reservoir, tap at Park square in Boston, and occasionally from the sources of supply. In addition to the sources before examined, samples have been taken regularly during the year from Reservoirs Nos. 5 and 8.

Special attention has been given, as in former years, to following the indications obtained from the analyses of the regular samples and tracing them to their original sources and studying the causes. As examples may be mentioned the study of the occurrence of *Uroglena* in Reservoirs Nos. 3 and 8 of *Clathrocystis* in Reservoir No. 6, and of *Synura* in Lake Cochituate. No water was drawn from these sources for use while the growths were abundant.

The degree of turbidity of the water of Reservoir No. 5, resulting from filling the newly stripped area and from work still in progress at the upper end, has been studied by means of frequent series of disc readings. The study of stagnation phenomena has been made by means of the regular series of temperature observations and color readings taken at the different sources. Color readings have been taken frequently as an aid in regulating the flow of water from the Sudbury and Cochituate aqueducts through the distributing reservoirs.

*Boston Tap Water.*—The average number of organisms for the year was 351 against 182 for 1896. Diatomaceæ were present in considerable numbers throughout the year. They were present to the extent of 953 units in June, and of 450 units in November. Chlorophyceæ were unimportant, but were present throughout the year. Cyanophyceæ were present throughout the year, except during the latter part of March and during April. They were most abundant from July to the end of the year, reaching a maximum of 500 on August 30. Infusoria were present throughout the year, amounting to 240 units on April 20, and 225 units on November 16.

Opportunities have occurred during the year for the examination of growths in the Sudbury aqueduct, the conduit leading from Chestnut-Hill Reservoir to Brookline Reservoir, and the 30-inch and 36-inch mains leading from the Chestnut-Hill Reservoir to Fisher-Hill Reservoir. Considerable information of interest has been gained by these examinations.

During the year the form heretofore provisionally called *Anabæna* (sterile), which is characteristic of Lake Cochituate, has been definitely identified as *Aphanizomenon flos aqua*. This identification was confirmed by Prof. W. G. Farlow.

The following tables give, first, the average condition of the tap water shown by the chemical analyses made under the direction of the State Board of Health, and secondly, the averages of monthly analyses of the sources of supply; then follow the biological tables giving the results of these works at

the laboratory at Chestnut-Hill Reservoir. Following these tables are the usual tables of detailed expenditures and of rainfall.

As nearly all of the works connected with what has been known as the Western Division of the Boston Water Works pass to-day into the control of the Metropolitan Water Board, this is the last report that will be made of these works under the control of the city of Boston. The undersigned has had immediate charge of this division for the past twenty-five years, and has seen the consumption grow from 15,000,000 gallons daily from the Cochituate works in 1872 to 60,000,000 gallons daily from the Sudbury and Cochituate works in 1898.

Very truly yours,

DESMOND FITZGERALD,

*General Superintendent.*

Average Condition of Tap Water, Boston, 1897. (State Board of Health).

PARTS IN 100,000.

LOCALITY.	COLOR.		RESIDUE ON EVAPORATION.			Chlorine.	NITROGEN.					Oxygen consumed.	Hardness.	
	Nessler scale.	Platinum scale.	Total.	Loss on ignition.	Fixed.		Total.	Albuminoid Ammonia.		Free Ammonia.	Nitrites.			Nitrates.
								In solution.	In suspension.					
Service pipe, State House .....	0.65	0.55	4.82	1.84	2.98	0.40	.0193	.0177	.0016	.0009	.0001	.0137	0.64	1.6

Average of Monthly Analyses, January 1 to December 31, 1897.

PARTS IN 100,000. (STATE BOARD OF HEALTH.)

LOCALITY.	COLOR.		RESIDUE ON EVAPORATION.			Chlorine	NITROGEN.					Oxygen consumed.	Hardness.	
	Nessler scale.	Platinum scale.	Total.	Loss on igni- ton.	Fixed.		Albuminoid Ammonia.			Free Ammonia.	Nitrates.			Nitrites.
							Total.	In solu- tion.	In sus- pension.					
Reservoir No. 2, influent .....	1.21	0.96	4.83	2.26	2.57	.33	.0264	.0288	.0026	.0013	.0001	.0068	0.99	1.2
Reservoir No. 2, near outlet .....	0.96	0.77	4.53	2.04	2.49	.32	.0253	.0230	.0023	.0013	.0001	.0088	0.89	1.1
Reservoir No. 3, influent .....	0.50	0.46	7.43	2.15	5.28	.46	.0297	.0205	.0022	.0103	.0005	.0403	0.52	2.6
Reservoir No. 3, near outlet .....	0.59	0.51	5.42	1.83	3.59	.39	.0243	.0294	.0039	.0034	.0002	.0161	0.37	1.9
Reservoir No. 4, influent .....	1.40	1.09	5.20	2.70	2.50	.32	.0533	.0307	.0025	.0011	.0001	.0038	1.29	1.3
Reservoir No. 4, near outlet, 1 foot below surface .....	0.84	0.66	4.07	1.81	2.26	.31	.0242	.0254	.0018	.0017	.0001	.0028	0.79	1.1
Reservoir No. 4, bottom .....	0.86	0.67	4.30	1.94	2.36	.31	.0223	.0207	.0016	.0022	.0001	.0047	0.78	1.2
Reservoir No. 5, influent, Walker's brook ..	0.72	0.59	14.71	4.20	10.51	2.01	.0268	.0245	.0023	.0079	.0056	.1544	0.68	5.6
Reservoir No. 5, near outlet, 1 foot below surface .....	0.63	0.54	5.70	1.98	3.72	.39	.0259	.0227	.0032	.0101	.0003	.0184	0.60	2.0
Reservoir No. 5, mid-depth .....	0.67	0.56	5.72	1.91	3.81	.39	.0250	.0217	.0033	.0101	.0003	.0165	0.61	2.0
Reservoir No. 5, bottom .....	0.65	0.55	5.75	2.08	3.67	.38	.0253	.0218	.0035	.0130	.0003	.0192	0.59	2.0
Reservoir No. 6, influent .....	1.66	1.26	5.97	3.25	2.72	.45	.0338	.0325	.0013	.0010	.0001	.0036	1.61	1.4
Reservoir No. 6, near outlet, 1 foot below surface .....	0.76	0.61	4.18	1.85	2.33	.37	.0221	.0198	.0023	.0019	.0001	.0059	0.75	1.2
Reservoir No. 6, near outlet, bottom .....	0.71	0.58	4.06	1.73	2.33	.37	.0188	.0173	.0013	.0020	.0001	.0078	0.73	1.1
Lake Cochituate .....	0.31	0.34	5.11	1.73	3.38	.32	.0202	.0172	.0060	.0102	.0001	.0093	0.44	2.1
Service Pipe, State House .....	0.65	0.55	4.82	1.84	2.98	.40	.0193	.0177	.0016	.0069	.0001	.0137	0.64	1.6
Mystic Lake .....	0.18	0.24	11.58	2.51	9.07	1.44	.0226	.0164	.0062	.0103	.0006	.0601	0.32	4.2

Lake Cochituate, 1897.

MONTH.	ORGANISMS. <sup>1</sup>					AMORPHOUS. <sup>1</sup>					REMARKS.
	Sur.	Mid.	Pot.	Mean.	Willow Br.	Sur.	Mid.	Pot.	Mean.	Willow Br.	
	January.....	451	549	673	538	108	275	296	733	455	
February.....	253	216	343	271	81	191	238	377	269	153	
March.....	231	204	328	421	251	207	214	220	214	193	Infusoria. (Crenothrix.)
April.....	554	381	421	452	194	207	222	283	237	243	{ Infusoria. (Crenothrix.) { Diatomaceae.
May.....	481	294	292	356	135	134	247	321	234	172	Diatomaceae, Infusoria.
June.....	1,243	387	534	721	232	182	187	548	306	191	Diatomaceae. (Crenothrix.)
July.....	324	391	536	417	474	135	219	960	438	141	{ Cyanophyceae. (Crenothrix.) { Diatomaceae. (Crenothrix.)
August.....	468	323	606	406	798	147	245	1,261	551	209	Cyanophyceae. (Crenothrix.)
September.....	642	270	432	448	384	189	216	636	347	212	Cyanophyceae. (Crenothrix.)
October.....	860	292	1,949	1,034	2,097	259	246	1,680	728	219	{ Diatomaceae. Cyanophyceae. { Infusoria. (Crenothrix.)
November.....	2,248	1,720	1,689	1,886	3,690	177	196	1,104	492	226	{ Diatomaceae. Cyanophyceae. { Infusoria. (Crenothrix.)
December.....	1,421	1,301	1,312	1,345	577	204	231	285	240	165	{ Diatomaceae, Infusoria. { Cyanophyceae.
Mean.....	765	527	801	698	797	192	230	706	376	190	

<sup>1</sup> Standard units per c.c.

Reservoir 2, 1897.

MONTH.	ORGANISMS. <sup>1</sup>					AMORPHOUS. <sup>1</sup>					REMARKS.
	Sur.	Mid.	Bot.	Mean.	Influent.	Sur.	Mid.	Bot.	Mean.	Influent.	
	January.....	28	19	31	26	50	136	122	136	131	
February.....	16	15	11	14	23	121	115	153	130	209	
March.....	31	27	17	25	17	175	162	188	175	155	
April.....	85	106	61	84	80	232	178	185	198	141	
May.....	454	40	108	201	161	278	272	309	286	174	Infusoria, Diatomaceae.
June.....	73	72	80	75	94	179	234	210	208	259	
July.....	159	142	91	131	146	225	251	233	236	154	Chlorophyceae.
August.....	640	626	313	526	157	218	230	244	231	172	{ Cyanophyceae, Infusoria, Chloro- phyceae.
September.....	379	333	213	308	209	243	236	267	245	186	{ Diatomaceae, Cyanophyceae, Chlo- rophyceae.
October.....	165	185	158	169	119	286	347	363	332	186	{ Diatomaceae.
November.....	93	71	81	82	93	168	162	162	164	126	
December.....	40	34	54	43	62	139	133	123	132	180	
Mean.....	180	140	102	140	101	200	203	214	206	178	

<sup>1</sup>Standard units per c.c.

Reservoir 3, 1897.

MONTH.	ORGANISMS. <sup>1</sup>				AMORPHOUS. <sup>1</sup>				REMARKS.
	Sur.	Mid.	Bot.	Mean.	Sur.	Mid.	Bot.	Mean.	
January .....	202	222	214	213	167	165	155	162	Diatomaceae. Infusoria.
February .....	218	63	339	207	183	206	248	212	Infusoria.
March .....	160	56	89	102	286	228	205	240	Infusoria.
April .....	354	388	282	341	391	367	399	386	Infusoria. Diatomaceae.
May .....	1,812	1,819	2,353	1,995	180	230	287	232	Infusoria. Diatomaceae.
June .....	3,183	2,906	2,850	2,980	177	198	205	193	Infusoria. Diatomaceae. Cyanophyceae.
July .....	362	634	754	588	161	167	227	185	{ Diatomaceae. Infusoria. Cyanophyceae. Chlorophyceae.
August .....	900	725	562	729	237	262	311	270	{ Cyanophyceae. Diatomaceae. Infusoria. Chlorophyceae.
September .....	1,008	786	646	813	233	260	255	251	{ Cyanophyceae. Infusoria. Chlorophy- ceae. Diatomaceae.
October .....	1,375	793	745	971	374	381	391	382	Cyanophyceae. Diatomaceae. Infusoria.
November .....	790	578	686	684	253	272	254	260	Diatomaceae. Cyanophyceae. Infusoria.
December .....	786	656	633	692	192	194	201	196	Diatomaceae. Infusoria.
Mean .....	929	802	846	859	237	244	262	247	

<sup>1</sup>Standard units per c.c.



Reservoir 4, 1897.

MONTH.	ORGANISMS. <sup>1</sup>					AMORPHOUS. <sup>1</sup>					REMARKS.
	Sur.	Mid.	Bot.	Mean.	Influent.	Sur.	Mid.	Bot.	Mean.	Influent.	
January .....	89	60	180	110	12	113	164	401	226	94	Diatomacea.
February .....	46	26	19	30	20	151	197	238	195	236	
March .....	46	29	11	29	26	144	191	175	170	123	
April .....	284	144	49	159	42	196	206	212	205	160	Infusoria.
May .....	158	45	39	81	114	170	203	211	195	364	
June .....	103	88	61	84	26	142	161	161	155	194	Diatomacea.
July .....	88	122	31	80	63	108	122	126	119	110	
August .....	155	88	51	98	31	138	160	165	154	118	Infusoria, Chlorophyceae.
September .....	166	120	56	114	65	146	164	179	163	122	Chlorophyceae.
October .....	105	69	81	85	46	158	166	173	166	174	
November .....	51	86	55	64	46	195	211	217	208	102	
December .....	109	182	147	146	46	119	133	126	126	107	Infusoria.
Mean .....	117	88	65	90	36	148	173	199	174	153	

<sup>1</sup> Standard units per c.c.

Reservoir 5, 1897.

MONTH.	ORGANISMS. <sup>1</sup>				AMORPHOUS. <sup>1</sup>				REMARKS.
	Sur.	Mid.	Bot.	Mean.	Sur.	Mid.	Bot.	Mean.	
January.....	.....	.....	.....	.....	.....	.....	.....	.....	
February.....	19	12	19	17	720	740	990	817	
March.....	9	20	18	16	2,076	2,092	1,858	2,009	
April.....	167	177	26	123	620	409	723	584	Infusoria. Chlorophyceæ.
May.....	226	197	155	198	401	212	418	344	Diatomaceæ. Infusoria. Chlorophyceæ.
June.....	43	33	29	35	119	140	180	149	
July.....	73	23	27	41	134	194	191	173	
August.....	417	110	43	190	189	190	255	211	Cyanophyceæ.
September.....	258	215	96	190	196	209	342	249	Cyanophyceæ. Chlorophyceæ.
October.....	500	430	365	432	307	339	365	337	Diatomaceæ. Cyanophyceæ.
November.....	190	177	186	184	184	213	330	242	Diatomaceæ. Cyanophyceæ.
December.....	205	244	201	217	188	202	217	202	Diatomaceæ. Cyanophyceæ.
Mean.....	192	149	106	149	467	449	534	488	

<sup>1</sup> Standard units per c.c.

Reservoir 6, 1897.

MONTH.	ORGANISMS.†					AMORPHOUS.‡					REMARKS.
	Sur.	Mid.	Bot.	Meau.	Influent.	Sur.	Mid.	Bot.	Mean.	Influent.	
	January.....	114	126	64	101	16	157	174	168	166	
February.....	49	26	73	49	14	146	162	202	170	135	
March.....	54	76	39	59	48	106	192	166	155	143	Infusoria.
April.....	283	164	162	203	79	207	217	233	219	138	Infusoria.
May.....	157	83	94	111	133	176	219	254	216	241	Infusoria.
June.....	324	97	76	166	45	148	166	178	164	171	Infusoria. Diatomaceae.
July.....	312	91	48	150	51	107	124	147	126	125	Diatomaceae.
August.....	2,045	708	417	1,257	25	163	183	180	175	143	{ Cyanophyceae. Infusoria. { Diatomaceae.
September.....	2,174	1,326	725	1,408	30	180	189	193	187	116	Cyanophyceae. Infusoria.
October.....	2,733	1,562	1,959	2,095	40	222	224	252	233	151	{ Cyanophyceae. Chlorophyceae. { Diatomaceae.
November.....	554	607	435	532	22	186	203	213	201	135	Cyanophyceae. Diatomaceae.
December.....	192	431	275	299	21	152	165	151	156	81	Diatomaceae. Infusoria.
Mean.....	799	444	364	536	44	163	185	195	181	138	

Standard units per c.c.

Reservoir 8, 1897.

MONTH.	ORGANISMS. <sup>1</sup>			AMORPHOUS. <sup>1</sup>			REMARKS.
	At Dam.	Shallow Flowage.	Upper Pond.	At Dam.	Shallow Flowage.	Upper Pond.	
January.....	.....	.....	.....	.....	.....	.....	
February.....	284	1,012	97	143	170	101	Infusoria.
March.....	375	508	83	235	207	162	Infusoria.
April.....	619	628	133	516	243	205	Infusoria. Diatomaceae.
May.....	280	497	127	140	197	190	Infusoria. Chlorophyceae. Diatomaceae.
June.....	302	77	136	158	155	162	Cyanophyceae.
July.....	50	51	91	148	113	182	
August.....	207	77	747	182	146	238	Infusoria.
September.....	693	498	618	182	151	234	Infusoria. Cyanophyceae. Chlorophyceae. Diatomaceae.
October.....	1,494	605	311	270	192	294	Infusoria. Cyanophyceae. Diatomaceae. Chlorophyceae.
November.....	234	176	250	218	238	193	Diatomaceae. Infusoria.
December.....	143	66	.....	165	128	.....	Diatomaceae.
Mean.....	386	341	241	196	162	178	

<sup>1</sup> Standard units per c.c.

Gate-Houses and Tap, 1897.

MONTH.	CHESTNUT-HILL RESERVOIR.						BROOKLINE-RESERVOIR GATE-HOUSE.		TAP IN BOSTON, PARK SQUARE.	
	Organisms. <sup>1</sup>			Amorphous. <sup>1</sup>			Organisms. <sup>1</sup>	Amorphous. <sup>1</sup>	Organisms. <sup>1</sup>	Amorphous. <sup>1</sup>
	Sudbury.	Cochituate.	Effluent.	Sudbury.	Cochituate.	Effluent.				
January.....	132	448	244	174	259	181	257	171	219	127
February.....	44	178	90	209	200	174	71	168	62	124
March.....	159	216	173	160	206	202	119	151	139	136
April.....	143	391	204	259	209	165	235	187	259	151
May.....	282	510	166	458	166	178	152	174	154	281
June.....	65	1,146	808	381	179	208	1,209	219	539	199
July.....	144	269	361	334	176	193	560	105	273	220
August.....	418	438	546	305	167	221	433	211	419	215
September.....	437	532	492	247	155	200	417	180	557	196
October.....	439	905	433	233	257	250	529	240	532	190
November.....	174	1,848	402	204	234	165	566	175	584	132
December.....	163	1,248	475	169	206	151	571	159	478	138
Mean.....	209	681	366	265	201	191	423	186	351	177

<sup>1</sup>Standard units per c.c.

**Chestnut-Hill Reservoir, 1897.**

MONTH.	ORGANISMS. <sup>1</sup>				AMORPHOUS. <sup>1</sup>				REMARKS.
	Sur.	Mid.	Bot.	Mean.	Sur.	Mid.	Bot.	Mean.	
	January .....					173	185	207	
February .....	145	91	105	114	155	183	210	183	
March .....	227	232	134	198	184	212	289	228	Infusoria.
April.....	222	219	88	176	210	187	252	216	{ Diatomacee. { Infusoria.
May .....	994	471	213	559	189	205	238	211	{ Infusoria. { Diatomacee.
June .....	590	286	97	324	174	221	288	228	{ Chlorophyceae. Infusoria. { Diatomacee. Cyanophyceae.
July .....	703	354	300	452	207	217	239	221	{ Infusoria. { Diatomacee.
August .....	664	492	286	481	227	232	262	240	{ Cyanophyceae. { Diatomacee.
September .....	461	448	374	426	178	162	178	173	{ Cyanophyceae. { Diatomacee.
October .....	531	476	416	474	170	173	189	177	{ Diatomacee.
November.....	510	563	502	525	187	198	235	207	
December .....									
Mean.....	505	363	252	373					

<sup>1</sup> Standard units per c.c.

Temperature (Fahrenheit), 1897.

MONTH.	LAKE COCHITUCATE.				BASIN 2.				BASIN 3.				BASIN 4.				BASIN 5.				BASIN 6.				BASIN 8.					
	Sur.	Mid.	Bot.	Mean.	Sur.	Mid.	Bot.	Mean.	Sur.	Mid.	Bot.	Mean.	Sur.	Mid.	Bot.	Mean.	Sur.	Mid.	Bot.	Mean.	Sur.	Mid.	Bot.	Mean.	Influent.	At Dam.	Shallow Flowage.	Upper Pond.		
Jan.....	35.6	37.8	39.5	37.6	33.1	35.3	36.8	35.1	32.7	33.2	35.2	37.3	35.2	36.8	37.1	37.8	37.2	33.3	.....	.....	.....	.....	.....	.....	35.5	38.0	38.5	37.3	32.3	
Feb.....	.....	.....	.....	.....	33.0	34.2	36.2	34.5	32.5	33.1	34.6	36.9	34.9	33.4	37.0	38.9	36.4	32.5	.....	.....	.....	.....	.....	.....	34.0	36.5	38.3	32.5	32.5	
March ..	.....	.....	.....	.....	35.5	36.3	38.1	36.6	35.9	35.6	36.5	38.1	36.7	35.7	37.5	39.1	37.4	36.8	.....	.....	.....	.....	.....	.....	35.2	37.2	38.6	37.0	35.3	
April ....	49.2	44.6	43.5	45.8	48.4	48.0	46.9	47.8	49.0	48.5	47.0	46.0	47.2	46.5	46.5	46.1	46.4	46.3	.....	.....	.....	.....	.....	.....	47.3	46.6	45.6	46.5	46.7	
May .....	60.3	47.7	45.1	51.0	59.5	58.0	56.4	58.0	59.0	59.7	58.0	56.7	58.1	59.1	54.6	49.8	54.5	59.8	.....	.....	.....	.....	.....	.....	58.8	52.2	48.8	53.3	59.0	
June .....	66.0	47.8	44.8	52.9	66.5	65.3	64.1	65.3	65.6	65.3	64.8	63.8	64.6	65.2	59.6	49.8	58.2	62.0	.....	.....	.....	.....	.....	.....	64.8	56.6	49.5	57.0	59.0	
July .....	77.2	47.5	44.2	56.3	77.5	75.6	73.8	75.6	74.4	77.2	75.4	72.9	75.2	74.5	62.0	48.8	61.8	72.3	.....	.....	.....	.....	.....	.....	76.9	57.5	50.2	61.5	75.3	
August ..	71.4	47.5	43.4	54.1	73.5	72.0	70.5	72.0	72.2	72.7	71.4	70.2	71.4	69.4	48.5	60.1	67.1	.....	.....	.....	.....	.....	.....	.....	67.5	53.9	46.4	55.9	64.5	
Sept. ....	64.6	45.7	41.1	50.5	65.4	65.1	64.5	65.0	64.9	65.0	64.7	64.2	64.6	59.5	57.8	45.4	54.2	57.9	.....	.....	.....	.....	.....	.....	60.2	54.7	42.7	52.5	55.3	
Oct. ....	57.3	46.9	42.6	48.9	56.3	55.9	55.6	55.9	55.8	56.3	56.2	56.2	56.2	47.0	46.8	45.8	46.5	50.5	.....	.....	.....	.....	.....	.....	46.1	45.3	41.8	44.2	48.4	
Nov. ....	44.5	44.7	44.4	44.5	42.4	43.7	44.3	43.5	42.1	42.5	43.8	44.4	43.6	41.5	41.5	41.5	40.6	40.6	.....	.....	.....	.....	.....	.....	41.7	42.0	40.6	41.4	38.8	
Dec. ....	38.3	38.3	38.7	38.4	34.7	35.3	36.6	35.5	34.6	35.2	35.6	36.7	35.8	38.6	38.8	38.8	38.7	35.0	.....	.....	.....	.....	.....	.....	37.8	38.0	38.3	38.0	34.0	
Mean,	56.4	44.9	42.7	48.0	52.1	52.1	52.0	52.1	51.6	52.0	51.9	51.0	52.0	50.6	48.5	44.2	47.7	49.5	.....	.....	.....	.....	.....	.....	50.5	46.5	43.2	46.7	48.4	
																										55.9	60.4	57.1		

## Temperatures (Fahrenheit), 1897.

MONTH.	CHESTNUT-HILL RESERVOIR GATE-HOUSES.			CHESTNUT-HILL RESERVOIR.				BROOK- LINE RES'VR.	TAP.
	Stadbury.	Cochituate.	Effluent.	Surface.	Mid-depth.	Bottom.	Mean.	Gate-House.	Park Sq.
January.....	37.2	37.6	36.3	.....	.....	.....	.....	36.8	40.8
February.....	36.2	38.1	36.0	.....	.....	.....	.....	37.1	37.1
March.....	37.2	38.8	37.1	37.7	37.5	37.5	37.6	38.3	38.2
April.....	48.6	46.4	47.9	48.5	47.2	45.8	47.2	47.8	47.3
May.....	58.3	57.5	57.7	59.4	57.9	52.7	56.7	58.1	57.0
June.....	63.8	64.0	63.9	66.5	65.9	59.0	63.8	64.8	62.7
July.....	73.0	73.7	74.6	77.0	73.3	64.5	71.6	74.8	71.4
August.....	71.5	72.2	71.9	73.4	71.8	65.6	70.3	72.3	69.4
September.....	67.4	68.4	67.6	66.6	67.3	61.2	65.0	68.6	66.6
October.....	57.0	58.3	57.7	57.5	56.9	56.7	57.0	58.1	58.3
November.....	45.5	48.0	46.6	45.5	45.5	45.4	45.5	46.5	48.0
December.....	37.7	39.1	37.1	38.2	38.2	38.2	38.2	37.8	39.2
Mean.....	52.8	53.5	52.9	57.0	56.2	52.7	55.3	53.4	53.0



WATER DEPARTMENT.

Color, 1897. (Platinum Standard.)

MONTH.	LAKE COCHITUATE.					BASIN 2.				BASIN 3.			BASIN 4.				BASIN 5.			BASIN 6.				BASIN 8.							
	Sur.	Mid.	Bot.	Mean. <sup>1</sup>	Willow Bridge Influent.	Sur.	Mid.	Bot.	Mean.	Influent.	Sur.	Mid.	Bot.	Mean.	Influent.	Sur.	Mid.	Bot.	Mean.	Sur.	Mid.	Bot.	Mean.	Influent.	At dam.	Shallow Flodge.	Upper Pond.				
January	.84	.35	.50	.40	.63	.85	.85	.85	.85	.88	.87	.87	.88	.87	.87	.88	.87	.88	.87	.90	.93	.93	.92	1.18							
February	.87	.32	.40	.46	.63	.69	.69	.69	.69	.69	.72	.81	.81	.78	.82	.90	.89	.87	.95	.83	.83	.83	.83	.84	.86	.89	.86	.95	.77	.45	
March	.38	.35	.80	.51	.61	.65	.66	.67	.66	.70	.61	.67	.66	.65	.77	.78	.80	.78	.86	.80	.80	.80	.80	.68	.71	.73	.71	.84	.56	.47	.38
April	.41	.41	.41	.41	.60	.81	.81	.82	.81	.91	.61	.60	.60	.60	.84	.84	.84	.84	1.09	.72	.71	.71	.71	.72	.73	.73	.73	1.33	.54	.54	.45
May	.31	.31	.37	.33	.60	.85	.84	.84	.84	1.07	.51	.52	.52	.52	.78	.77	.77	.77	1.38	.57	.57	.58	.57	.63	.63	.63	.63	1.82	.58	.55	.60
June	.30	.30	.76	.45	.61	1.02	1.03	1.04	1.03	1.17	.55	.56	.58	.56	.81	.81	.75	.79	1.53	.58	.57	.62	.59	.70	.65	.62	.66	1.87	.63	.54	.59
July	.30	.33	1.67	.77	.56	.91	.92	.92	.92	1.22	.44	.49	.65	.53	.73	.73	.69	.72	1.12	.67	.68	.77	.71	.67	.62	.57	.62	1.69	.56	.60	.56
August	.26	.32	1.68	.75	.53	1.23	1.28	1.33	1.28	1.64	.49	.51	.60	.53	.66	.66	.66	.66	1.81	.63	.65	.84	.71	.65	.65	.59	.63	1.98	.55	.58	.58
September	.27	.33	1.41	.67	.52	1.07	1.08	1.08	1.08	.86	.55	.55	.55	.55	.63	.63	.64	.63	.88	.64	.64	.83	.70	.64	.62	.58	.61	1.29	.59	.60	.61
October	.32	.41	2.93	1.22	.51	.79	.79	.81	.80	.81	.55	.55	.56	.55	.63	.63	.65	.64	.95	.61	.62	.64	.62	.65	.66	.72	.68	1.21	.63	.65	.63
November	.40	.42	1.42	.75	.50	.86	.86	.88	.87	.89	.54	.54	.54	.54	.62	.63	.64	.63	1.29	.57	.57	.61	.58	.61	.62	.62	.62	1.38	.72	.70	.60
December	.37	.38	.39	.38	.56	.85	.85	.85	.85	.87	.50	.51	.50	.50	.65	.65	.65	.65	1.21	.58	.58	.60	.59	.63	.63	.63	.63	1.24	.72	.74	.....
Mean	.34	.35	1.06	.59	.57	.88	.89	.90	.89	.97	.58	.60	.62	.60	.74	.75	.75	.75	1.15	.66	.66	.71	.68	.70	.69	.69	.69	1.40	.61	.61	.55

<sup>1</sup> This does not fairly represent the average color, as the high color of the bottom represents but a very small proportion of the water of the lake.

## Color, 1897. (Platinum Standard.)

MONTH.	CHESTNUT-HILL RESERVOIR GATE-HOUSES.			CHESTNUT-HILL RESERVOIR.				BR'K- LINE RES.	TAP.
	Sudbury.	Cochituate.	Effluent.	Surface.	Mid-depth.	Bottom.	Mean.	Gate-House.	Park Sq.
January .....	.87	.34	.70	.....	.....	.....	.....	.65	.69
February .....	.67	.36	.63	.....	.....	.....	.....	.57	.62
March .....	.62	.37	.53	.55	.55	.55	.55	.49	.54
April .....	.73	.36	.54	.54	.54	.54	.54	.53	.54
May .....	.75	.31	.54	.53	.54	.54	.54	.53	.54
June .....	.95	.30	.61	.61	.61	.58	.60	.62	.61
July .....	.82	.30	.65	.64	.66	.62	.64	.63	.64
August.....	.96	.25	.58	.58	.60	.54	.57	.57	.59
September .....	.82	.25	.61	.61	.61	.69	.64	.59	.60
October.....	.66	.30	.61	.57	.58	.59	.58	.52	.57
November.....	.81	.35	.53	.53	.54	.54	.54	.52	.53
December .....	.79	.35	.63	.63	.63	.64	.63	.62	.63
Mean.....	.79	.32	.60	.58	.59	.58	.58	.57	.59

## Bacteria, 1897.

MONTH.	CHESTNUT-HILL RESERVOIR GATE-HOUSES.			CHESTNUT-HILL RESERVOIR.			BR'K- LINE RES.	TAP.
	Sudbury.	Cochituate.	Effluent.	Surface.	Mid-depth.	Bottom.	Gate-House.	Park Sq.
January .....	77	52	42	.....	.....	.....	57	17
February .....	669	283	268	.....	.....	.....	262	182
March.....	467	160	141	114	164	168	173	123
April.....	186	77	134	110	131	133	133	102
May.....	81	113	65	50	59	74	92	64
June .....	108	122	46	48	47	80	70	44
July .....	80	159	72	50	60	70	68	132
August.....	196	133	97	58	272	89	65	115
September.....	73	85	70	61	50	73	58	83
October.....	144	311	91	83	93	83	98	98
November.....	458	722	162	114	133	138	169	101
December.....	291	85	160	64	141	112	179	197
Mean.....	236	192	112	75	115	102	120	105

Maintenance, Western Division, February 1, 1897, to January 31, 1898.

DRAFTS.	Western Division.	Basins.	Sudbury Aqueduct.	Cochnuate Aqueduct.	Lake Cochnuate.	Pegan Filters.	Chestnut-Hill Reservoir.	Chestnut-Hill Driveway.	Brookline Reservoir.	Fisher-Hill Reservoir.	Biological Department.	Inspection Department.	High-Service Pumping Station.	Totals.
February 1, 1897.....	\$442 91	\$1,113 09	\$149 40	\$40 00	\$8 19	\$65 35	\$60 94	\$170 91	\$10 40	\$10 40	\$115 81	\$299 64	\$1,518 10	\$4,004 64
March 1, ".....	1,052 98	3,081 24	664 01	201 84	180 28	266 94	804 55	718 62	211 50	157 50	831 02	387 15	3,405 17	11,482 75
April 1, ".....	1,397 38	857 95	684 06	173 32	162 71	292 59	856 38	812 74	148 45	248 95	834 20	522 34	1,786 94	8,277 96
May 1, ".....	1,442 00	1,261 88	731 45	401 70	280 25	331 58	1,080 01	535 93	114 85	227 85	344 75	705 80	2,391 63	9,849 18
June 1, ".....	1,108 90	854 63	514 85	278 75	173 93	338 30	1,417 79	1,003 15	115 50	119 25	315 59	592 94	4,472 45	11,306 03
July 1, ".....	1,165 50	1,930 89	589 60	270 19	290 26	297 91	999 62	663 31	188 67	71 75	293 80	597 97	4,639 55	11,998 82
August 1, ".....	1,149 37	1,029 58	502 86	305 21	240 07	294 69	1,485 18	990 65	326 50	407 25	411 54	505 88	2,118 13	9,767 51
September 1, ".....	1,074 57	891 85	604 03	181 68	251 88	246 01	916 91	1,024 99	165 75	103 25	311 99	544 19	4,335 07	10,702 17
October 1, ".....	1,058 71	929 63	569 78	144 00	279 68	254 22	1,091 76	875 67	207 50	97 50	265 62	539 64	2,030 46	8,404 17
November 1, ".....	1,108 74	1,558 03	729 85	187 08	202 06	333 55	1,224 68	794 78	303 22	265 75	561 26	546 83	2,673 34	10,549 17
December 1, ".....	1,010 55	1,843 41	491 33	362 72	257 15	309 01	1,222 24	738 17	179 08	133 25	320 05	574 97	2,636 70	10,078 63
January 1 and 31, 1898...	1,320 10	1,749 43	1,105 36	314 16	293 67	312 81	1,808 31	922 27	244 65	191 25	368 10	838 29	3,305 73	12,774 13
Total for year.....	\$13,331 76	\$17,151 61	\$7,336 58	\$2,860 65	\$2,620 13	\$3,402 96	\$12,908 32	\$9,251 19	\$2,165 57	\$2,033 95	\$3,993 73	\$6,655 64	\$35,423 07	\$119,195 16

Table of Rainfall at Chestnut-Hill Reservoir for Year ending December 31, 1897.

DATE.	Inches.	Snow or Rain.	Duration.	DATE.	Inches.	Snow or Rain.	Duration.
Jan. 4	1.26	Rain.	6.00 p.m. to	April 5	0.25	Rain.	1.30 a.m. to 4.00 p.m.
" 5			3.30 p.m.	" 7	0.61	"	4.00 p.m. to
" 17	0.32	"	4.30 p.m. to	" 8		"	1.00 a.m.
" 18			7.00 a.m.	" 8	1.69	"	6.00 p.m. to
" 20	0.70	Snow and rain.	7.00 p.m. to	" 9		"	11.30 p.m.
" 21			3.15 p.m.	" 15	0.26	"	1.30 a.m. to 12.30 p.m.
" 22	0.05	Snow.	8.00 p.m. to 11.30 p.m.	" 15	0.10	"	4.15 p.m. to 5.00 p.m.
" 27	1.76	"	7.00 p.m. to	" 17	0.18	"	11.00 a.m. to 3.30 p.m.
" 28			7.00 p.m.	" 26	0.04	"	4.00 a.m. to 6.00 a.m.
Total.	4.09			" 27	0.10	"	3.45 p.m. to 9.00 p.m.
Feb. 6	0.59	Rain.	8.30 p.m. to	Total.	3.23		
" 7			5.30 p.m.	May 2	1.00	Rain.	1.00 a.m. to
" 8	0.02	Snow.	9.00 p.m. to 11.00 p.m.	" 3			"
" 12	1.26	"	1.00 a.m. to	" 3	0.44	"	10.00 p.m. to
" 13			1.30 a.m.	" 4		"	4.00 a.m.
" 16	0.02	Rain and snow.	3.30 a.m. to 9.30 a.m.	" 10	0.64	"	4.35 p.m. to 10.00 p.m.
" 21	0.13	Snow.	12.40 a.m. to 5.00 a.m.	" 12	0.20	"	5.30 a.m. to 2.00 p.m.
" 22	0.77	Rain and snow.	8.00 p.m. to	" 13	0.15	"	4.00 a.m. to 9.00 a.m.
" 23			10.30 a.m.	" 13	0.25	"	3.40 p.m. to 10.00 p.m.
Total.	2.79			" 16	0.08	"	5.00 a.m. to 7.00 a.m.
Mar. 1	0.07	Snow.	4.15 p.m. to 11.30 p.m.	" 21	0.17	"	5.30 p.m. to 8.30 p.m.
" 2	0.18	Rain.	9.00 p.m. to	" 25	0.93	"	12.05 a.m. to 5.30 a.m.
" 3			5.00 p.m.	" 29	0.03	"	3.00 a.m. to 4.00 a.m.
" 5	0.30	Snow and rain.	12.30 p.m. to 11.00 p.m.	" 30	0.51	"	7.45 p.m. to
" 10	0.05	Rain.	8.00 a.m. to 11.00 a.m.	" 31			3.00 p.m.
" 12	0.15	"	1.45 p.m. to 7.30 p.m.	Total.	4.40		
" 14	0.36	Snow and rain.	9.50 a.m. to 5.30 p.m.	June 4	0.41	Rain.	3.45 p.m. to
" 19	0.90	Rain.	11.30 p.m.	" 5			"
" 20			to	" 9	2.14	"	4.00 a.m. to
" 21	8.30 a.m.	" 10	"	6.00 p.m.			
" 24	1.07	"	1.00 a.m. to 7.00 p.m.	" 13	0.31	"	2.00 p.m. to 7.00 p.m.
Total.	3.08			" 15	0.32	"	2.45 p.m. to 4.00 p.m.
				" 20	0.27	"	4.30 a.m. to 8.30 a.m.

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

DATE.	Inches.	Snow or Rain.	Duration.	DATE.	Inches.	Snow or Rain.	Duration.
June 20	0.05	Rain.	10.30 a.m. to 4.30 p.m.	Oct. 12	0.41	Rain.	1.15 p.m. to 5.15 p.m.
“ 25	0.10	“	9.20 a.m. to 10.00 a.m.	“ 21	0.12	“	6.15 a.m. to 4.30 p.m.
“ 30	0.93	“	2.30 a.m. to 10.15 a.m.	Total.	0.53		
Total.	4.53			Nov. 1	2.22	Rain.	1.20 p.m. to
July 1	0.05	Rain.	7.15 p.m. to 7.30 p.m.	“ 2			
“ 11	0.05	“	6.00 a.m. to 11.30 a.m.	“ 5	0.06	“	10.00 p.m. to 10.30 p.m.
“ 13	0.38	“	12.15 a.m. to 7.00 a.m.	“ 8	0.72	“	5.00 p.m. to
“ 13	0.28	“	5.00 p.m. to	“ 9			
“ 14				9.30 a.m.	“ 11	2.04	Rain and snow.
“ 22	1.28	“	4.20 a.m. to 7.00 p.m.	“ 12			
“ 24	0.58	“	2.20 p.m. to 10.00 p.m.	“ 15	0.05	Rain.	6.45 p.m. to 10.00 p.m.
“ 25	0.02	“	6.30 p.m. to 7.30 p.m.	“ 16	0.31	“	9.30 p.m. to
“ 28	1.74	“	11.00 p.m. to	“ 17			
“ 29				10.10 a.m.	“ 19	0.25	Snow.
Total.	4.38			“ 20			
Aug. 4	0.38	Rain.	4.40 p.m. to 5.05 p.m.	“ 22	0.32	“	10.00 p.m. to
“ 4	0.73	“	8.30 p.m. to	“ 23			
“ 5				11.00 a.m.	“ 25	0.04	Rain.
“ 11	0.12	“	2.00 p.m. to 4.45 p.m.	“ 27	0.57	“	3.30 a.m. to 9.15 a.m.
“ 11	0.06	“	10.00 p.m. to	“ 29	0.16	“	2.15 p.m. to 6.45 p.m.
“ 12				11.00 a.m.	Total.	6.74	
“ 15	0.36	“	3.45 p.m. to 5.00 p.m.	Dec. 3	0.05	Snow.	12.45 p.m. to
“ 15				10.30 p.m. to			“ 4
“ 16		“	7.30 a.m.	“ 4	0.37	Rain.	5.00 p.m. to
“ 16	0.14	“	12.20 p.m. to 2.00 p.m.	“ 5			
“ 18	1.00	“	7.00 p.m. to 10.30 p.m.	“ 7	0.13	Snow.	11.45 a.m. to
“ 22	0.62	“	5.15 p.m. to 9.15 p.m.	“ 8			
“ 24	1.27	“	5.00 a.m. to 3.30 p.m.	“ 12	0.42	Rain.	8.30 a.m. to 6.00 p.m.
Total.	4.68			“ 14	2.48	“	11.30 a.m. to
Sept. 2	0.67	Rain.	4.00 a.m. to 4.00 p.m.	“ 15			
“ 11	0.15	“	2.00 p.m. to 2.30 p.m.	“ 17	0.03	“	8.30 p.m. to 11.00 p.m.
“ 13	0.34	“	3.00 p.m. to 5.00 p.m.	“ 20	0.20	Snow.	7.15 p.m. to
“ 16	0.33	“	7.50 p.m. to 10.00 p.m.	“ 21			
“ 20	0.98	“	3.20 p.m. to 8.00 p.m.	“ 26	0.21	“	11.20 a.m. to 9.00 p.m.
“ 23	0.67	“	5.00 p.m. to	“ 29	0.05	“	9.00 p.m. to 11.30 p.m.
“ 24				9.30 a.m.	“ 31	0.56	Snow and rain.
“ 26	0.08	“	7.30 p.m. to 8.30 p.m.	Total.	4.50		
Total.	3.22						

NOTE.— Total Rainfall for the Year, 46.17 inches.

## APPENDIX C.

## REPORT OF THE ENGINEER.

ENGINEERING DEPARTMENT,  
CITY HALL, February 1, 1898.

HON. JOHN R. MURPHY,  
*Water Commissioner:*

SIR: I hereby submit the following report of the work done and records kept, during the past year:

## SOURCES OF SUPPLY.

The rainfall and quantities collected on the several watersheds were as follows:

	Sudbury.	Cochituate.	Mystic.
Rainfall, in inches . . . . .	46.190	44.790	44.350
Rainfall collected, in inches . . . . .	20.815	17.052	17.636
Daily average yield of water- shed, in gallons . . . . . }	74,528,800	15,321,100	22,566,600

*Reservoir No. 1.*

*Grades, H.W., 160.79; Tops of Flash-boards, 159.29 and 158.41; Crest of Dam 157.54; Area, Water Surface, 143 acres; Greatest Depth, 15 ft.; Contents, below 160.79, 365,560,000 gals.; Below 159.29, 288,400,000 gals.*

On January 1, 1897, the surface of this reservoir was at grade 156.37 or 1.17 feet below the crest of the dam; it remained at about this point until March 1, when the reservoir began to fill, and on March 7, water was wasting over the dam, and so continued until April 2, when the flash-boards were placed in position.

From April 8 to 21, from May 3 to 5, May 15 to 18, May 30 to June 28, July 1 to 7, and from July 13 to August 3, water wasted over the flash-boards.

On August 16 the flash-boards were removed from the dam.

The water reached its lowest point on September 17, being at grade 145.90. On January 1, 1898, the water surface was at grade 157.28. Excepting July 30 and August 3 and 4, no water was drawn from this reservoir after May 27.

### *Reservoir No. 2.*

*Grades, H.W., 167.87; Tops of Flash-boards, 167.12 and 166.49; Crest of Dam, 165.87; Area, Water Surface, 134 acres; Greatest depth, 17 ft.; Contents below 167.87, 562,580,000 gals.; Below 167.12, 529,860,000 gals.*

On January 1, 1897, the water surface was at grade 162.63, or 3.24 feet below the crest of the dam. On March 6 the flash-boards were placed on the dam, and on March 7 water began to waste over the flash-boards. Waste continued until May 29, from June 11 to 21 and from July 30 to August 9.

On October 30 the flash-boards were removed from the dam.

On December 1, one set of flash-boards was placed on the dam and removed on December 29. On December 16, water wasted over flash-boards and after flash-boards were removed from the dam wasted over dam up to January 1, 1898. This reservoir has been drawn upon for the supply of the city practically the entire year. Water was run into reservoir from Reservoirs Nos. 4 and 6 during July; from Reservoir No. 4 during September and October, and from Reservoirs Nos. 4 and 6 during a very few days in November and December.

### *Reservoir No. 3.*

*Grades, H.W., 176.74; Crest of Dam (no Flash-boards), 175.24. Area at 177.00, 253 acres; Contents below 176.74, 1,203,180,000 gals. Area at 175.24, 248 acres; Contents below 175.24, 1,081,500,000 gals. Greatest depth, 21 ft.*

On January 1, 1897, the water surface of this reservoir was at grade 174.82 or 42 feet below the crest of the dam.

On January 6 waste began and continued until January 18, again on March 14 water wasted and continued to waste until August 11.

From August 11, the water surface fell slowly, and on September 23 reached its lowest point, being at grade 168.80, or 6.44 feet below the crest of the dam. Filling since that date, the water surface on January 1, 1898, was at grade 174.78.

Since July 13, excepting November 6 to 10, November 12 to December 2 and from December 9 to 27, this reservoir was drawn upon for the supply of the city.



*Reservoir No. 4.*

*Grades, H.W., 215.21; Tops of Flash-boards, 215.21+ and 214.89; Crest of Dam, 214.21. Area, Water Surface, 167 acres; Greatest depth, 49 feet; Contents below 215.21, 1,416,350,000 gals.*

On January 1, 1897, the water surface of this reservoir was at grade 195.11 or 19.12 feet below the crest of the dam, filling gradually, the flash-boards were placed on the dam on April 2.

On April 10 waste began over the flash-boards and continued until July 2. On July 13 the flash-boards were removed from the dam. The reservoir was drawn upon for the supply of the city on July 1, and on November 3 the water surface had fallen to grade 201.13 or 13.10 feet below the crest of the dam. Since that time the reservoir has been gradually filling, and on January 1, 1898, the water surface was at grade 210.08.

*Reservoir No. 5.*

This reservoir under construction by the City of Boston was taken by the Metropolitan Water Board on January 4, 1897.

*Reservoir No. 6.*

*Grades, H.W., 295.00; Top of Flash-boards, 295.00; Crest of Dam, 294.00. Area, 185 acres; Contents, 1,520,900,000 gals.*

On January 1, 1897, the water surface was at grade 266.41 or 27.59 feet below the crest of the dam. The first set of flash-boards was placed on the dam on May 16, and the second set on May 19. On June 8, water began to waste over the flash-boards and continued until July 4.

On December 15 the flash-boards were removed from this dam.

On December 17 water began to waste over the crest of the dam, and continued during the remainder of the month.

On January 1, 1898, the water surface was at grade 294.20.

*Whitehall Pond.*

*Elevation, H.W., 327.91; Bottom of Gates, 317.78. Area at 327.91, 601 acres; Contents between 327.91 and 317.78, 1,256,900,000 gals. H.W. of Temporary Dam, 329.91; Contents at 329.91, 1,654,800,000 gals.*

On January 1, 1897, the water surface of the pond was at grade 324.77 or 3.14 feet below old high water. Filling gradually, the water surface reached grade 328.76 on June 15, and remained above grade 328.00 until September 22. On January 1, 1898, the water surface was at grade 326.48.

Water was drawn from this pond for the supply of the city, from February 2 to March 4, and from July 8 to 24.

Preparations were made early in the season for a drought, should that contingency arise. A new dam at Whitehall pond was built, raising the water line 2 feet, and in Reservoir No. 5, seized by the Metropolitan Water Board, 1,700,000,000 gallons were stored as a reserve. This was rendered possible by the completion of the stripping contracts in the lower portions of the reservoir. The water was raised to within 16 feet of the top of the spillway without interfering with the completion of the remaining sections under contract.

#### *Farm Pond.*

*Grades, H.W., 149.25; Low Water, 146.00. Area at 149.25, 159 acres; Contents between 149.25 and 146.00, 167,520,000 gals.*

No water has been drawn from this pond for the supply of the city during the year 1897. On January 1, 1897, the surface of the pond was at grade 148.78 or .47 feet below high water mark; rising slowly, a grade 149.50 was reached on April 16.

During May and June it remained at about this point and starting to fall very slowly in July was at grade 147.88 on October 24. On January 1, 1898, the water surface was at grade 148.75. The Framingham Water Company has drawn 117,600,000 gallons from the pond during the year.

#### *Lake Cochituate.*

*Grades, H.W., 134.36; Invert Aqueduct, 121.03; Top of Aqueduct, 127.36. Area, Water Surface at 134.36, about 776 acres; Contents between 134.36 and 127.36 1,515,180,000 gals.; Between 134.36 and 125.00, 1,908,200,000 gals.; Approximate Contents between 134.36 and 121.03, 2,447,000,000 gals.; Between 134.36 and 117.03, 2,907,000,000 gals.*

On January 1, 1897, the surface of the lake was at grade 127.43 or 6.93 feet below high water mark; filling gradually, high water mark was reached on April 13. It remained at about this point until the latter part of June when the water surface fell, reaching its lowest point, grade 129.43, on November 1.

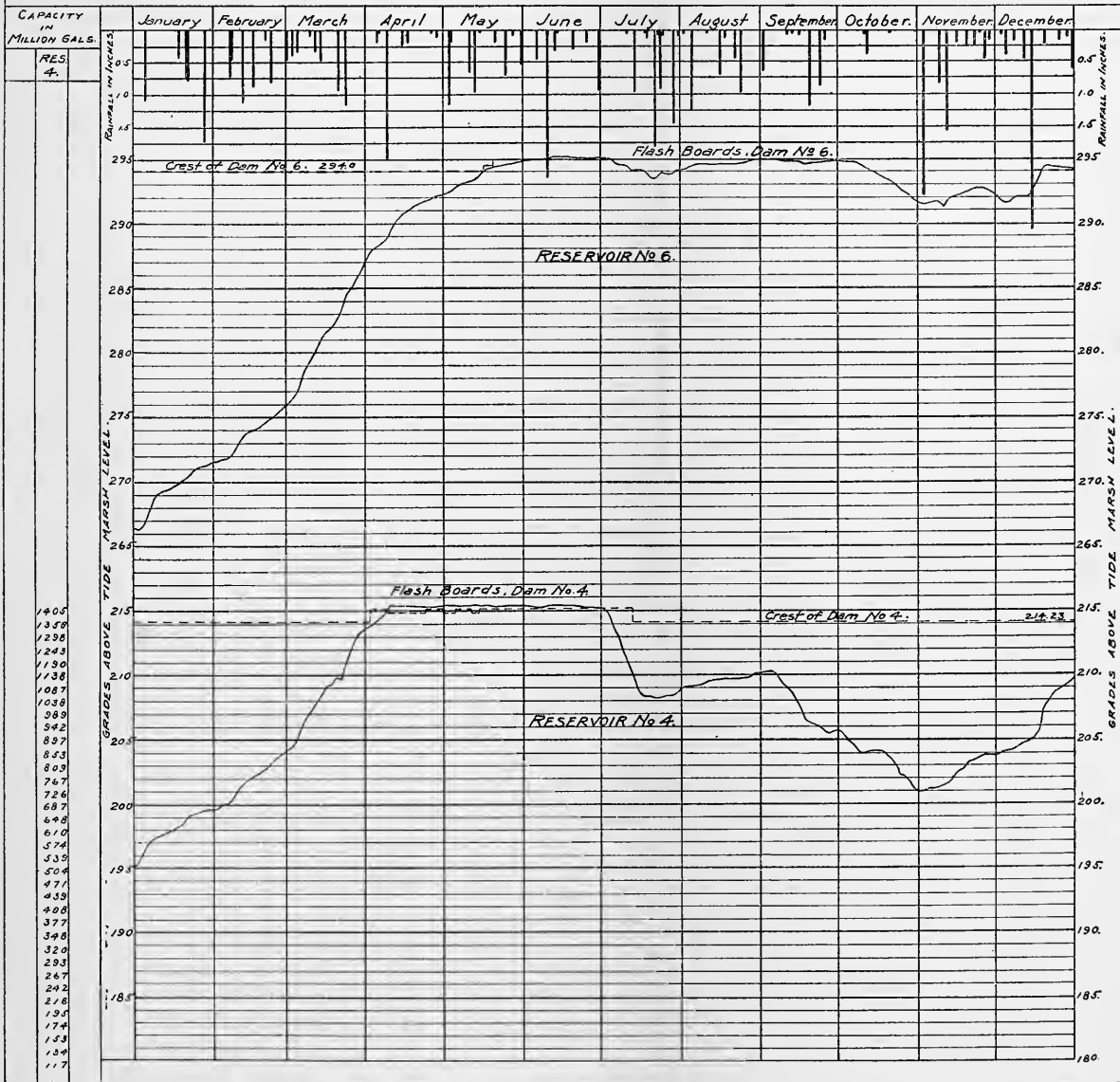
Since that time the lake filled, and on January 1, 1898, it was at grade 130.87. The beds for filtering the water of Pegan brook have been in use almost continuously during the year and 249,965,000 gallons have been pumped upon them. No difficulty has been experienced in their operation during the winter season. Water has been drawn from the different reservoirs as follows:





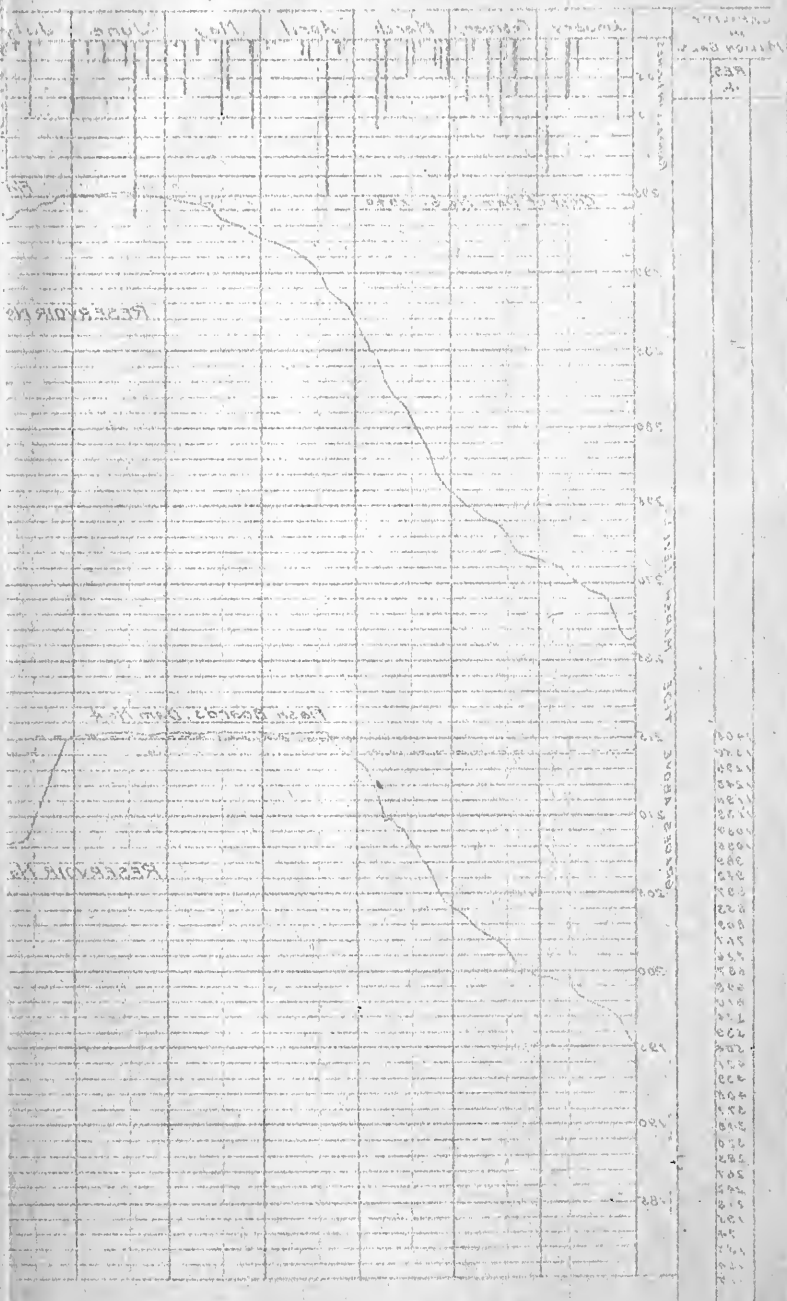
# BOSTON WATER WORKS.

Diagram showing the heights of Sudbury River Reservoirs Nos 4 and 6.,  
and the Rainfall on the Sudbury River Watershed during the Year 1897.



# BOSTON WATER WORKS

Diagram showing the heights of Sudbury Reservoir and the Rainfall on the Sudbury River Waters



From 7 A.M. Jan. 1 to 10 A.M. May 27 from Reservoirs Nos. 1, 2.  
 " 10 A.M. May 27 " 11 A.M. July 13 from Reservoir No. 2.  
 " 11 A.M. July 13 " 7 A.M. July 30 from Reservoirs Nos. 2, 3.  
 " 7 A.M. July 30 " 7 A.M. July 31 from Reservoirs Nos. 1, 3.  
 " 7 A.M. July 31 " 7 A.M. Aug. 3 from Reservoirs Nos. 2, 3.  
 " 7 A.M. Aug. 3 " 12 M. Aug. 4 from Reservoirs Nos. 1, 2.  
 " 12 M. Aug. 4 " 5 P.M. Aug. 29 from Reservoirs Nos. 2, 3.  
 " 5 P.M. Aug. 29 " 5 P.M. Aug. 30 No flow.  
 " 5 P.M. Aug. 30 " 7 P.M. Sept. 13 from Reservoirs Nos. 2, 3.  
 " 7 P.M. Sept. 13 " 1 P.M. Sept. 14 No flow.  
 " 1 P.M. Sept. 14 " 7 P.M. Sept. 19 from Reservoirs Nos. 2, 3.  
 " 7 P.M. Sept. 19 " 8 P.M. Sept. 20 No flow.  
 " 8 P.M. Sept. 20 " 5 A.M. Sept. 27 from Reservoirs Nos. 2, 3.  
 " 5 A.M. Sept. 27 " 8 A.M. Sept. 28 No flow.  
 " 8 A.M. Sept. 28 " 3 P.M. Oct. 24 from Reservoirs Nos. 2, 3.  
 " 3 P.M. Oct. 24 " 11 A.M. Oct. 26 from Reservoir No. 3.  
 " 11 A.M. Oct. 26 " 7 P.M. Nov. 6 from Reservoirs Nos. 2, 3.  
 " 7 P.M. Nov. 6 " 11 A.M. Nov. 10 from Reservoir No. 2.  
 " 11 A.M. Nov. 10 " 11 A.M. Nov. 12 from Reservoirs Nos. 2, 3.  
 " 11 A.M. Nov. 12 " 11 A.M. Dec. 2 from Reservoir No. 2.  
 " 11 A.M. Dec. 2 " 11 A.M. Dec. 9 from Reservoirs Nos. 2, 3.  
 " 11 A.M. Dec. 9 " 12 M. Dec. 27 from Reservoir No. 2.  
 " 12 M. Dec. 27 " 12 M. Dec. 28 No flow.  
 " 12 M. Dec. 28 " 7 A.M. Jan. 1 from Reservoirs Nos. 2, 3.

The height of the water in the various storage reservoirs on the first day of each month is as follows :

	RESERVOIRS.					FARM POND.	WHITE-HALL POND	LAKE CO-CHITUATE.
	No. 1.	No. 2.	No. 3.	No. 4.	No. 6.			
	Top of Flash-boards.	Top of Flash-boards.	Crest of Dam.	Top of Flash-boards.	Top of Flash-boards.			
	159.29	167.12	175.24	215.21	295.00	149.25	327.91	134.36
January 1, 1897....	156.37	162.63	174.82	195.11	266.41	148.78	324.77	127.43
February 1, " ....	156.13	161.37	173.31	199.80	271.59	149.00	325.45	128.75
March 1, " ....	156.13	162.50	174.44	204.19	276.04	149.21	325.18	129.26
April 1, " ....	157.94	167.21	175.29	213.70	287.63	149.45	326.88	133.86
May 1, " ....	157.71	167.66	176.45	215.38	292.31	149.40	327.79	134.27
June 1, " ....	159.53	166.86	176.56	215.38	294.83	149.37	328.35	134.24
July 1, " ....	159.41	162.90	176.76	215.34	295.09	149.32	328.73	133.92
August 1, " ....	159.43	167.77	176.50	209.04	294.23	149.14	328.52	133.16
September 1, " ....	148.25	163.54	172.82	210.23	294.89	149.11	328.65	132.61
October 1, " ....	148.02	162.89	169.12	205.65	294.77	148.39	327.53	131.09
November 1, " ...	149.16	162.70	169.70	200.97	291.65	148.33	326.58	129.43
December 1, " ....	149.93	163.42	170.53	203.94	292.06	147.84	326.58	129.86
January 1, 1898....	157.28	166.05	174.78	210.08	294.20	148.75	326.48	130.87

## AQUEDUCTS AND DISTRIBUTING RESERVOIRS.

The Sudbury-river aqueduct has been in use 355.25 days, and has delivered 15,442,562,400 gallons to Chestnut-Hill Reservoir and 948,000,000 gallons to Lake Cochituate.

The Cochituate aqueduct has been used 361.5 days and delivered 5,738,703,800 gallons. Both aqueducts have been cleaned during the year, and all necessary repairs made.

## HIGH-SERVICE PUMPING-STATIONS.

The daily average quantity pumped at the Chestnut-Hill pumping station was 1.6 per cent. more than in 1896.

Engine No. 1 was run 1,762 hours, 50 minutes, pumping . . . . .	657,146,425 gallons.
Engine No. 2 was run 1,650 hours, pumping . . . . .	625,815,950 "
Engine No. 3 was run 6,478 hours, 20 minutes, pumping . . . . .	3,967,101,600 "
Total amount pumped . . . . .	<u>5,246,063,975</u> "

Amount of coal used by Engines Nos. 1 and 2 . . . . .	1,621,185 lbs.
Amount of coal used by Engine No. 3 . . . . .	<u>3,536,754</u> "

Total amount of coal used . . . . .	<u>5,157,939</u> "
Percentage of ashes and clinkers . . . . .	9.2
Quantity pumped per lb. of coal by Engines Nos. 1 and 2 . . . . .	791.4 gallons.
Quantity pumped per lb. of coal by Engine No. 3 . . . . .	1,121.7 "
Average lift in feet, Engines Nos. 1 and 2 . . . . .	122.53
Average lift in feet, Engine No. 3, Daily average amount pumped . . . . .	<u>122.67</u> 14,372,800 gallons.

Table VII., on pages 174 and 175 show in detail the work done by the engines and boilers.

## COST OF PUMPING.

Salaries . . . . .	\$14,389 66
Fuel . . . . .	<u>6,961 33</u>
<i>Carried forward</i> . . . . .	\$21,350 99



<i>Brought forward</i> . . . . .	\$21,350 99
Repairs . . . . .	7,286 37
Oil, waste and packing . . . . .	877 95
Small supplies . . . . .	389 94
	<hr/>
Total . . . . .	\$29,905 25
Cost per million gallons raised one foot high . . . . .	\$0.0465
Cost per million gallons pumped to reservoir . . . . .	\$5.706

At the West Roxbury pumping-station the daily average quantity pumped was 283,300 gallons, an increase of 11.9 per cent. over the amount pumped in the previous year. At the East Boston pumping-station 447,200 gallons have been pumped for the supply of the high-service district, and 61,800 gallons per day for the Breed's Island high service. Owing to the non-completion of the 36-inch high-service line through Roxbury, it has been necessary to maintain the pumping plant on Blue Hill avenue and Wayne street during the year, and to keep it in constant service.

#### MYSTIC LAKE.

On January 1, 1897, the water surface was 1.66 feet below high water. Water wasted over the dam from January 5 to 12, January 22 to 25, February 7 to 10, February 13 to 19, February 23 to April 24, from April 28 to May 20, May 25 to June 22, from June 25 to 26, and from June 30 to July 3, inclusive, when waste stopped.

The water surface which on July 3 was at grade 6.77 gradually fell, reaching its lowest point—0.90 on November 2.

Filling gradually since that date it reached grade 6.04 on December 19. Waste occurred over the stop-planks from December 16 to 24, and on December 27, 28 and 31. On January 1, 1898, the water surface was at grade 5.75. The fish-way was opened on April 10, and kept open until June 25, when it was closed and remained so during the remainder of the year.

#### MYSTIC CONDUIT AND RESERVOIR.

The conduit was cleaned several times during the year.

#### MYSTIC PUMPING-STATION.

The daily average quantity pumped at the Mystic Station was 4.8 per cent. more than in 1896.

Engine No. 1 was run 2,392 hours, 50 minutes, pumping . . . . .	536,515,500	gals.
Engine No. 2 was run 1,523 hours, 30 minutes, pumping . . . . .	320,785,788	"
Engine No. 3 was run 1,391 hours, pumping . . . . .	470,195,300	"
Engine No. 4 was run 7,321 hours, 30 minutes, pumping . . . . .	3,244,729,020	"
Total amount pumped . . . . .	4,572,225,608	"
Amount of coal used by Engines Nos. 1, 2 and 3 . . . . .	3,769,676	lbs.
Amount of coal used by Engine No. 4, . . . . .	3,651,427	"
Total amount of coal used . . . . .	7,421,103	"
Percentage of ashes and clinkers . . . . .	11.4	
Quantity pumped per lb. of coal by Engines Nos. 1, 2 and 3 . . . . .	350.2	gals.
Quantity pumped per lb. of coal by Engine No. 4 . . . . .	888.6	"
Average lift in feet, Engines Nos. 1, 2 and 3 . . . . .	147.08	
Average lift in feet, Engine No. 4 . . . . .	149.24	
Daily average amount pumped . . . . .	12,526,700	gals.

## COST OF PUMPING.

Salaries . . . . .	\$12,372	46
Fuel . . . . .	11,242	51
Repairs . . . . .	3,426	92
Oil, waste and packing . . . . .	726	89
Small supplies . . . . .	221	18
Total . . . . .	\$27,989	96
Cost per million gallons raised one foot high, . . . . .	\$0.0412	
Cost per million gallons pumped to reservoir, . . . . .	\$6.122	

Table VIII., on pages 176 and 177, shows in detail the work done by the engines during the year.

## CONSUMPTION.

The daily average consumption for the year was as follows:

Sudbury and Cochrane Works . . . . .	57,867,300	gals.
Mystic Works . . . . .	12,518,900	"
Total for the combined supplies . . . . .	70,386,200	"

an increase of 2,146,900 gallons, or 3.1 per cent. over that of the previous year. During the year, Charlestown has been supplied from the Mystic Works, excepting the periods between September 28 and December 1, when the supply was from the Cochituate Works.

The following table shows the consumption per inhabitant for the past two years :

MONTH.	Cochituate.		Mystic.		Combined Supplies.	
	Consumption in Gallons per Capita.		Consumption in Gallons per Capita.		Consumption in Gallons per Capita.	
	1896.	1897.	1896.	1897.	1896.	1897.
January .....	128.1	127.5	96.9	100.4	121.0	121.2
February .....	134.8	123.2	102.5	101.3	127.4	118.2
March .....	134.5	121.9	96.9	98.9	125.9	116.6
April .....	118.3	117.1	87.3	94.1	111.3	111.7
May .....	106.9	110.1	85.8	89.4	102.1	105.2
June .....	113.2	112.3	88.4	82.2	107.2	105.4
July .....	116.0	125.0	85.9	85.7	110.1	115.8
August .....	112.9	123.9	85.4	80.3	107.9	113.7
September .....	107.1	124.9	83.1	79.9	102.7	114.4
October .....	106.4	114.2	78.8	81.3	100.1	108.1
November.....	107.3	104.0	76.5	75.2	100.2	98.6
December .....	118.6	111.4	90.6	82.7	112.1	104.7
Average .....	116.8	117.8	88.3	87.8	110.6	111.1

#### CORROSION OF PIPES BY ELECTROLYSIS.

A general and marked improvement has been observed during the past year, in the electrical conditions of the water-pipes throughout the city; this result has been attained largely by reason of the work done by the Boston Elevated Railway Company, for the improvement of its return circuits. While the danger districts in the city have been apparently reduced in number, yet sections still remain in which the conditions are far from satisfactory, and systematic and frequent observations are necessary to guard against damage in the future.

The electrical investigations have been carried on during

the year by Messrs. Stone & Webster; details of their work is given in the following report:

STONE & WEBSTER, ELECTRICAL EXPERTS AND ENGINEERS.  
4 POST OFFICE SQUARE, BOSTON, MARCH 7, 1898.

WILLIAM JACKSON, ESQ.,  
*City Engineer, Boston, Mass.:*

DEAR SIR: At your request in the autumn of last year, 1897, we continued our investigation of the electrical conditions of the water-pipes in the City of Boston and beg to report as follows:

We first made an examination throughout the entire city to find whether there was any general improvement in conditions over the previous years, and also to find whether there were any places that needed special investigation.

We found that the electrical conditions of the piping in nearly all sections of the city were such as to indicate less liability to corrosion from electrolysis than in the year 1896.

We did not take as many readings in the general survey of the city as in former years, because we have found that there is in no case a serious danger district local to two or three hydrants. We therefore took only about 600 hydrant readings, while in 1896 we took about 1,000. The improvement in general conditions is shown by the small number of danger districts, and by the decrease in the percentage of positive readings, and by the decrease in the average size of the negative readings. This is shown approximately in the following table which is based upon readings taken in the same localities each year. The figures are not exact as some of the readings are unreliable, and were therefore not taken into account in making up the averages:

	1896.	1897.
Per cent. of Positive readings . . . . .	28	19
Average size of Positive readings in volts, . . . . .	.009	.009
Average size of Negative readings in volts, . . . . .	.023	.006

Negative readings indicate safety to the pipes at the points at which the readings are taken, because they show that the current is flowing on to the pipes at these places. It is important, however, to reduce the size of the negative readings as well as that of the positive, because high negative readings show that there is a strong tendency for the current to flow on to the pipes, and any current which flows on must pass through the joints to be taken off at other points. The size

of the readings must not, however, be considered as a very accurate indication of the average conditions for the two years, because a change in the amount of moisture in the earth might make a very decided change in the size of the readings.

One exception to the general improvement was found in the Dorchester district. Here the new power station on Freeport street was started by the West End Street Railway Company about a year ago, and in the neighborhood of the station we found many places where there were indications of current flowing off the service pipes sufficient, probably, to do them decided injury in the course of a few years. We had excavations made on Park and Freeport streets and found signs of corrosion in four out of six places examined, and in one of these places the pipe had been badly attacked. We think, therefore, that this district should be carefully watched so long as there are indications of general or large local flow of current from the pipes to the ground. In the part of Park street where the indications of danger were most decided there are no car tracks, but the feeder and return wires are laid under the street in a wooden conduit, the feeders being, we are told, encased in tubing, and the returns laid in a bed of cement. Between the outside of the wooden conduit, which was damp, and the service pipes, we found a difference of potential as high as .3 of a volt, a sufficient indication that a considerable current might be flowing between them.

In addition to the general survey we have made a special investigation on the boundary lines of the city and find that there is a tendency for the current to flow between the piping system of Boston and those of the surrounding towns. In general the flow of current is from other piping systems to that of Boston, but four places were found where the current flowed first in one direction and then in the other, though apparently not in very large quantities. These four places were between Newton and Boston on Tremont street; between Brookline and Boston on Huntington avenue; between Cambridge and Boston on Western avenue, and between Hyde Park and Boston on River street. The danger around the boundary lines is, therefore, in most cases, to the pipes of surrounding towns, but as the current flowing into the Boston piping system must leave it again and must flow through the joints, there is a chance that electrolytic action may be produced.

It is probable that the amount of current flowing in this way is not sufficient to do any serious damage, but we think that the matter should be examined into more carefully to

make sure that this is the case. We had hoped to obtain more complete information on the subject during the fall, and had prepared a special testing outfit for the work, but were able to use it only a few times owing to the setting in of the cold weather.

It seems to us advisable to continue investigation along the boundaries more carefully in the spring, and to take measurements from time to time in the Dorchester district and certain other localities.

The accompanying blue prints show the location of positive readings of .005 volt or higher for 1896 and 1897.

At your request we have secured the following detailed information regarding the work done by the Boston Elevated Railway Company to improve its return circuit:

“The company has complete records of the electrical conditions in the different parts of its system and examinations and tests are made often enough to show any material changes that may occur. For each part of the track a diagram is prepared showing the difference of potential between the track and water-pipes and also the current that will flow when these two points are connected.

“On many of these diagrams the resistances of the rail joints are also plotted. These diagrams are on uniform sheets, which are bound together so that the data for all parts of the system can be readily inspected at any time.

“In the last three years a large amount of copper has been put in to increase the efficiency of the return circuit. This copper is in the form of 500,000 circular mil. cable. The following table shows the increase in the amount installed:

“Return circuit copper in 1895	.	.	.	644,000 lbs.
“ “ “ “ 1896	.	.	.	902,000 “
“ “ “ “ 1897	.	.	.	1,370,000 “

“This last amount is 4,680 lbs. per mile of track.

“The efficiency of the rail bonds has been greatly increased, and all new track is now bonded with two No. 0000 copper bonds.

“A large amount of reconstruction has been done, and in all this work modern methods of bonding have been employed.”

Very truly yours,

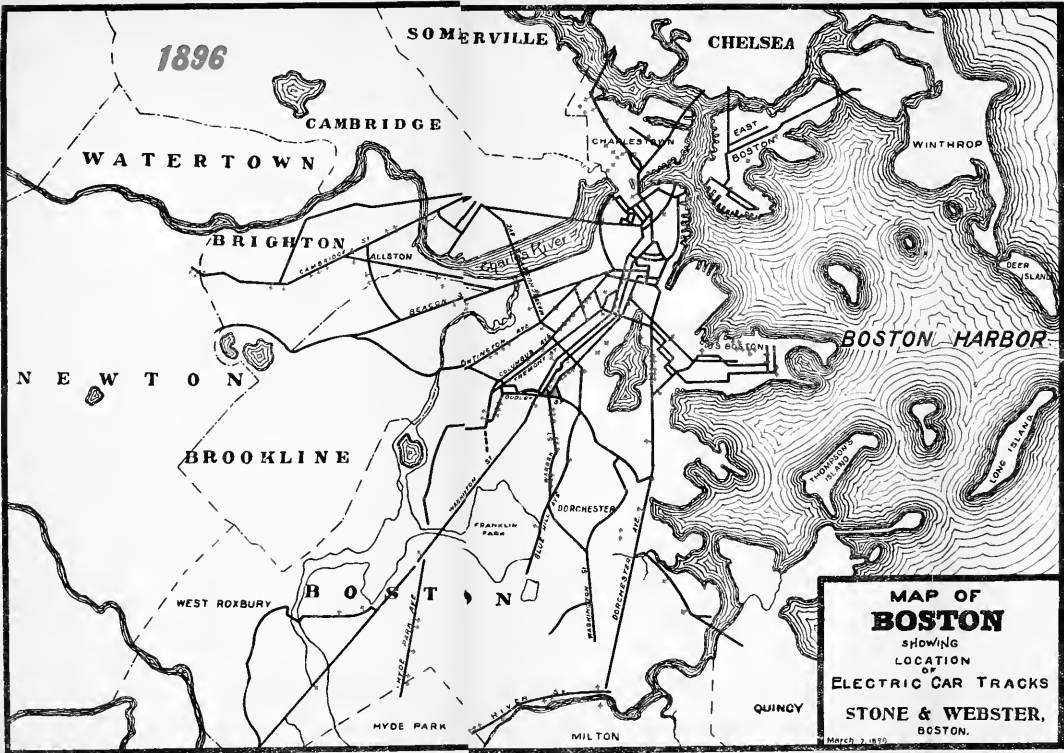
(Signed)

STONE & WEBSTER.

#### DISTRIBUTION.

On the Cochituate Works 26.6 miles of pipe were laid and 7.5 miles were abandoned, making a net increase of 19.1 miles and a total length of 627.1 miles.

1896



**MAP OF  
BOSTON**  
showing  
LOCATION  
OF  
ELECTRIC CAR TRACKS  
**STONE & WEBSTER,**  
BOSTON.  
March 7, 1896

1838

1838

CAMBRIDGE

WATER TOWN

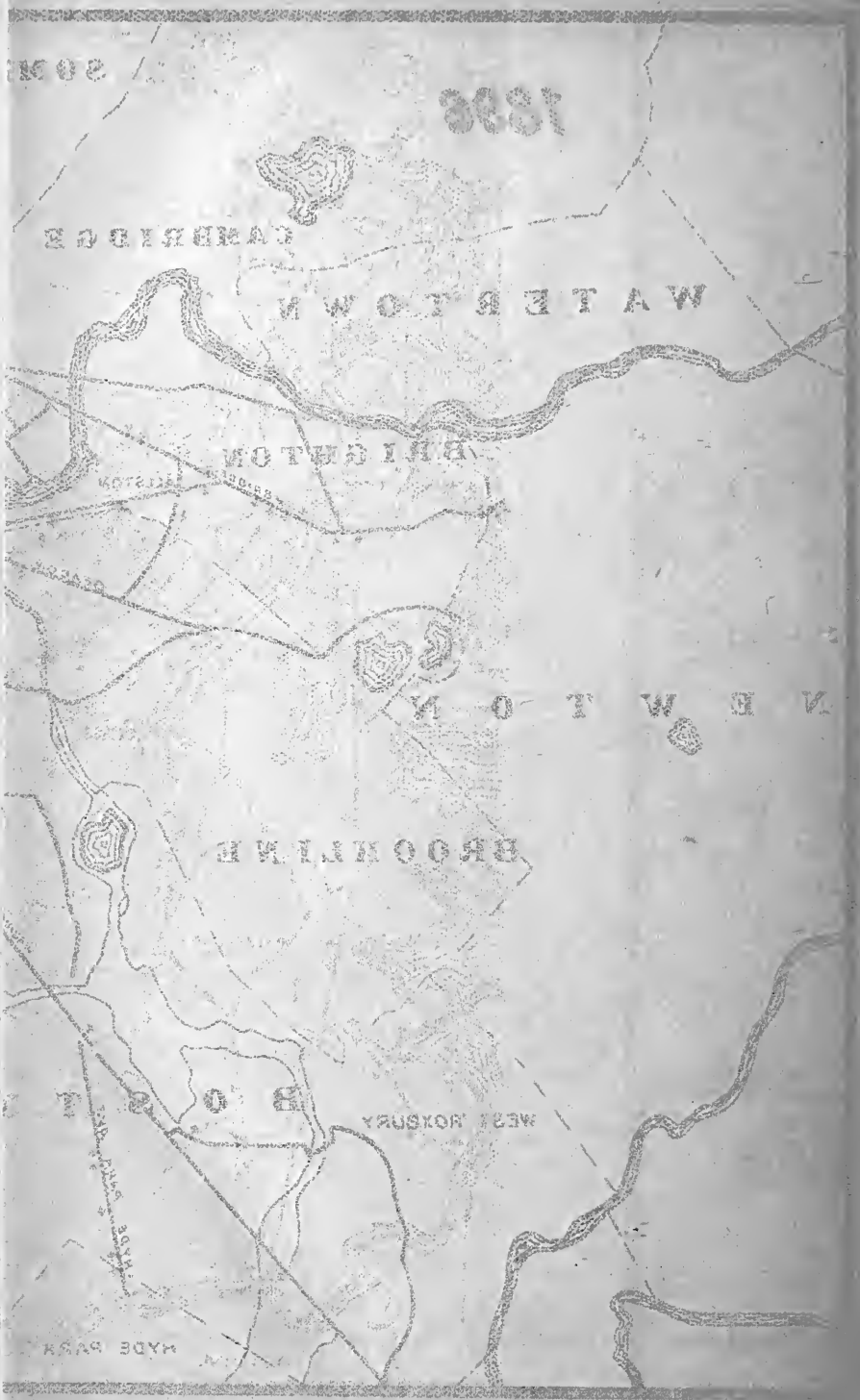
PHILMONT

NEWTON

BROOKLINE

WEST FOXBURY

MADE PARK





1897

SOMERVILLE

CHELSEA

CAMBRIDGE

WATERTOWN

CHARLESTOWN

EAST BOSTON

WINTHROP

BRIGHTON

ALLSTON

Charles River

DEEP ISLAND

NEWTON

BOSTON HARBOR

BROOKLINE

WEST ROXBURY

BOSTON

DORCHESTER

**MAP OF  
BOSTON**  
 showing  
 LOCATION  
 OF  
**ELECTRIC CAR TRACKS**  
**STONE & WEBSTER,**  
 BOSTON.

QUINCY

HYDE PARK

MILTON

March 7, 1898



A statement of the larger sizes of mains laid during the past year is as follows :

In Fisher avenue, Brookline, between Boylston street and Fisher-Hill Reservoir, a 42-inch pipe was laid for a distance of 1,108 feet, giving a second line where the high-service supply for the city has been dependent upon a single 30-inch pipe; the Dorchester high service has been advanced by laying 5,100 linear feet of 36-inch pipe in Columbus avenue, Walnut park and Georgia street, and 1,506 linear feet in Blue Hill avenue, Geneva avenue and Bowdoin street, making the 36-inch line continuous as far as Grove Hall, with the exception of a short gap at the crossing of Stony brook which can be filled up early in the coming season. Owing to the fact that Congress street is about to be raised over the tracks of the N. E. R.R., it was necessary to lay 1,520 linear feet of 30-inch and 24-inch pipe in Danby and C streets, abandoning at the same time 1,464 linear feet of 30-inch and 24-inch pipe in D and Congress streets, the latter work being done by contract; in South street and the roadway of Arnold arboretum, 1,500 linear feet of 24-inch pipe was laid (about 840 feet of it by contract) forming part of the West Roxbury high service. The 24-inch low service in Dorchester was extended, by laying a 20-inch main in Adams street for a distance of 5,474 feet, making a needed improvement in the service at Neponset and Milton Lower Mills. For better fire protection a 20-inch pipe was laid in Canton street, from Albany to Tremont street, a distance of 2,554 feet, connecting with the large supply mains in the latter street. In East Boston, 1,500 linear feet of 20-inch pipe was laid in Border street, from Maverick street to Central square in extension of the 20-inch line laid last season.

An unusually large amount of relaying has been done during the year; among the important pieces of work of this class are the following: Washington street, Kneeland street to Dover street relaid with 16-inch; State street, Washington street to Commercial street, relaid with 16-inch; Maverick street, New street to Chelsea street, relaid with 16-inch; Boylston street, Tremont street to Park square, relaid with 12-inch; Tremont street, Boylston street to Warrenton street, relaid with 12-inch.

The necessity for relaying must become more urgent each successive year. Up to 1853 about 73½ miles of water-pipes, less than twelve inches in diameter, had been laid in the streets of the city, and during the succeeding twenty years 163 additional miles of these smaller pipes were laid; a large part of this pipe is still in service, dangerously weak in places,

and everywhere badly tuberculated and filled up; two pieces of pipe have been recently taken out while relaying, in which the sound iron remaining represented in one case but 51 per cent. and in the other but 59 per cent. of the original section, the unsound parts being soft enough to be readily cut with a knife and extending in places almost through the pipe; the destruction of the iron in these two cases was not caused by the action of electricity generated for street railway purposes, electric lighting, etc., but was due to the soil in which the pipe was laid. In relaying the older pipes opportunity is taken in almost every case to increase the sizes, largely for the purpose of affording better fire protection. How important this action is, can be fully realized when it is remembered that the "hand tubs" of 1850 have given place to the modern steam fire-engines, some of which, now in commission in Boston, have a capacity of 1,350 gallons per minute.

On the Mystic Works the distributing mains have been extended 3.2 miles, and 4.9 miles have been relaid; the total length now connected with the system is 187.2 miles.

There has been an increase of 178 in the number of hydrants connected with the Cochituate Works, making a total number of 6,842.

On the Mystic Works 78 hydrants have been added, and the total number in service is 1,718.

During the year all main-pipe and other castings have been carefully inspected at the foundries; plans have been made for all pipe laid and lines and grades given when required; 217 petitions for main pipe have been reported upon and 68 contracts for rock excavation have been made. The large number of patterns of special castings, valves, hydrants, etc., have been marked with brass numbers, catalogued and systematically arranged in a storeroom. Various studies have been made, and a large amount of general routine work has been done.

Appended to this report will be found the usual tables of rainfall, consumption, etc., for the past year, and in addition, tables are given of the rainfall, rainfall collected, and percentage collected on the Cochituate water-shed since 1863, on the Sudbury-river water-shed since 1875, and on the Mystic water-shed since 1878. These will be found valuable for future reference.

Yours respectfully,

WILLIAM JACKSON,  
*City Engineer.*

GENERAL STATISTICS.

SUDBURY AND COCHITUATE WORKS.	1894.	1895.	1896.	1897.
Daily average consumption in gallons,	46,560,000	50,801,100	56,288,200	57,867,300
Daily average consumption in gallons per inhabitant .....	99.8	104.3	116.85	117.8
Daily average amount used through meters, gallons.....	11,170,400	12,084,500	13,125,700	13,459,300
Percentage of total consumption metered .....	24.0	23.8	23.3	23.3
Number of services.....	68,556	70,879	73,230	75,685
Number of meters and motors.....	4,877	4,910	4,788	5,061
Length of supply and distributing mains, in miles.....	572.8	595.9	619.9	627.1
Number of fire-hydrants in use .....	6,217	6,458	6,711	6,842
Yearly revenue from water-rates.....	\$1,657,701 23	\$1,741,049 05	\$1,991,136 93	\$2,082,536 98
Yearly revenue from metered water...	\$672,474 17	\$711,467 39	\$775,354 91	\$795,910 07
Percentage of total revenue from metered water .....	40.5	40.9	38.0	38.2
Cost of works on February 1.....	\$23,583,967 89	\$25,052,227 53	<sup>2</sup> \$24,608,500 60	<sup>4</sup> \$25,025,436 42
Yearly expense of maintenance .....	\$440,840 63	\$420,907 09	<sup>3</sup> \$617,566 53	<sup>3</sup> \$623,476 51
<b>MYSTIC WORKS.</b>				
Daily average consumption in gallons,	10,282,100	9,467,000	11,951,100	12,518,900
Daily average consumption in gallons per inhabitant .....	87.6	83.3	88.26	87.8
Daily average amount used through meters, gallons.....	2,014,000	2,105,800	2,144,300	2,264,200
Percentage of total consumption metered .....	19.6	22.2	17.9	18.1
Number of services.....	23,257	24,120	24,870	25,776
Number of meters and motors.....	515	525	536	522
Length of supply and distributing mains, in miles.....	173.7	178.6	184.0	187.2
Number of fire-hydrants in use.....	1,446	1,543	1,639	1,718
Yearly revenue from water-rates.....	\$453,627 50	\$471,188 47	\$501,755 05	\$521,262 68
Yearly revenue from metered water ...	\$115,811 32	\$121,436 10	\$122,050 66	\$127,439 76
Percentage of total revenue from metered water .....	25.6	25.8	24.3	24.5
Cost of works on February 1.....	<sup>1</sup> \$1,676,471 94	\$1,803,775 29	\$1,806,316 72	\$1,806,316 72
Yearly expense of maintenance .....	\$156,214 05	\$189,194 61		

<sup>1</sup> \$52,637.00 credited on account of sale of portion of Mystic sewer.

<sup>2</sup> \$1,118,975.74 credited by amount paid by State.

<sup>3</sup> Mystic department combined with Cochituate.

<sup>4</sup> \$1,154,766.84 credited by amount paid by State.

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

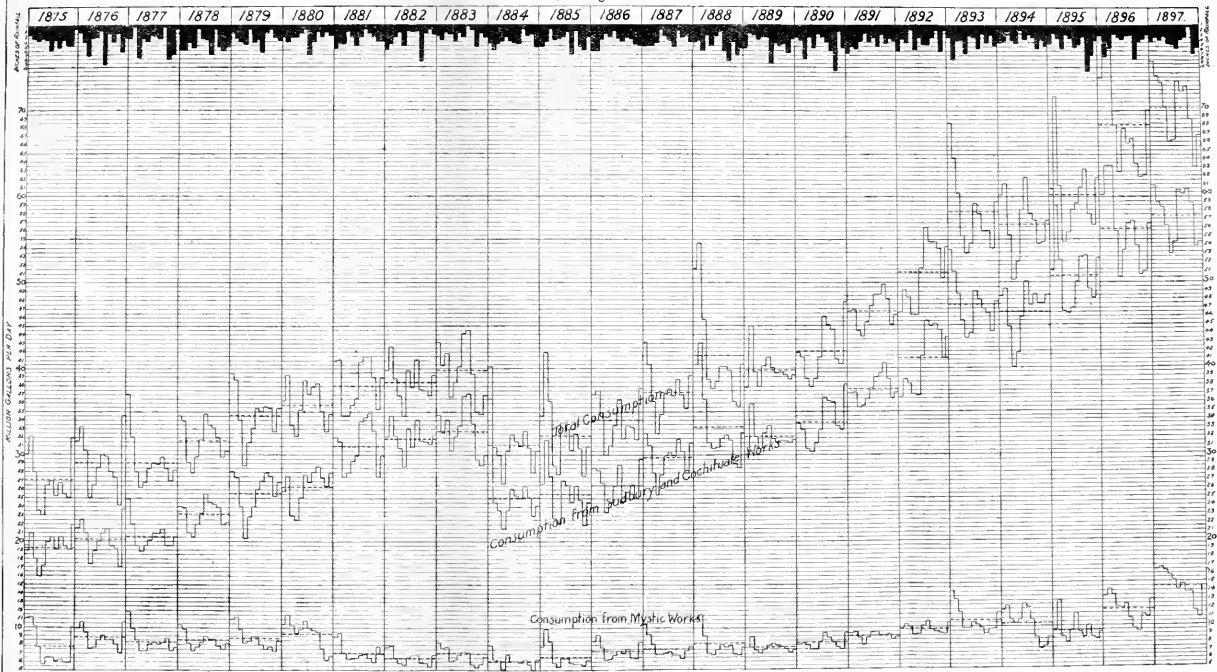
MONTH.	COCHITUATE WORKS.												MYSTIC WORKS.											
	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1891.	1892.	1893.	1894.	1895.	1896.	1897.										
January.....	37,230,100	36,756,400	53,847,100	48,395,000	51,476,100	60,284,800	61,331,300	9,389,300	9,878,200	14,129,700	11,823,500	9,528,100	13,402,300	14,516,500										
February.....	37,280,700	38,881,600	51,299,400	49,207,500	58,905,100	63,226,700	59,401,300	9,466,900	10,332,200	13,174,700	12,295,000	12,953,200	14,290,700	14,712,200										
March.....	35,533,400	38,395,100	48,700,200	44,844,300	52,706,700	63,513,300	58,846,900	8,811,000	9,970,500	11,692,700	10,720,800	8,712,200	13,552,300	14,415,200										
April.....	35,751,600	37,171,000	45,573,100	40,070,200	46,614,200	56,902,300	56,630,300	8,045,800	9,145,000	9,812,500	10,236,200	8,098,000	12,262,100	13,770,200										
May.....	36,580,700	37,055,900	43,451,500	41,827,700	46,470,500	50,684,500	53,340,700	8,841,300	9,204,900	9,817,400	10,661,000	9,426,500	12,087,100	13,121,300										
June.....	37,801,900	41,564,000	44,125,100	45,906,430	47,089,500	53,757,900	54,564,100	9,478,400	10,146,300	10,460,000	12,552,300	11,509,200	12,467,800	12,420,700										
July.....	39,062,600	45,738,100	48,986,900	50,044,000	50,064,800	56,937,700	60,782,000	9,581,700	10,702,900	10,167,000	12,172,000	9,265,900	10,908,600	12,680,900										
August.....	39,460,400	45,031,600	48,062,000	47,288,500	53,095,100	57,215,700	60,365,400	9,122,300	9,751,500	9,826,200	10,696,700	8,117,400	9,620,200	11,922,100										
September.....	40,677,700	45,261,900	46,926,500	48,558,700	53,246,900	54,345,200	60,980,600	9,128,700	9,549,400	9,115,000	28,703,600	9,987,900	9,403,300	11,910,800										
October.....	53,884,600	44,636,700	46,416,600	47,072,500	49,278,000	50,947,600	59,328,900	9,259,100	9,340,500	9,630,400	7,421,200	8,667,300	11,302,700	9,694,600										
November.....	36,640,800	41,847,800	44,328,900	47,101,500	48,258,600	51,441,700	54,109,500	8,585,200	9,230,000	9,569,700	7,563,100	8,453,400	11,003,700	8,997,500										
December.....	37,342,500	43,766,400	47,807,800	48,511,600	52,934,800	56,367,700	54,707,500	8,960,600	10,473,700	11,620,800	8,067,800	9,276,700	13,088,400	12,470,500										
Yearly average	37,686,900	41,312,400	47,453,200	46,560,000	50,801,100	56,388,200	57,867,300	9,055,200	9,810,800	10,742,500	10,282,100	9,457,000	11,951,100	12,518,900										

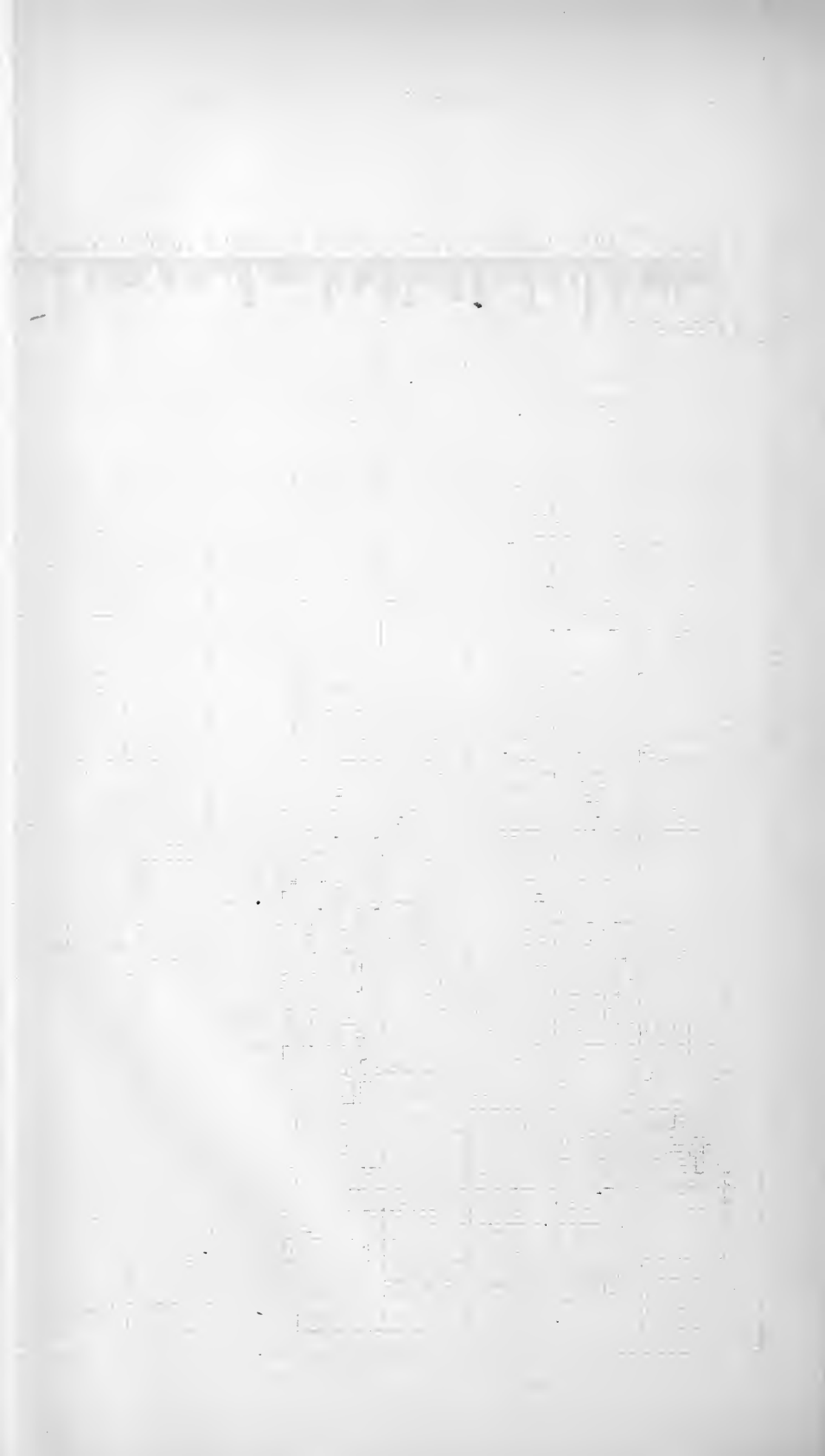
1 From June 7 to July 29 about 3,000,000 gallons per day were wasted from a blow-off.  
 2 After September 12, Charlestown was supplied with Cochituate water.  
 3 Charlestown was supplied with Cochituate water from January 1 to February 6, February 21 to May 18, and July 13 to January 1, 1896.  
 4 Charlestown was supplied with Cochituate water from January 1 to 7, July 13 to September 28.  
 5 In October 2,542,000 gallons were wasted from 48-inch line in Brockline. In November 2,064,400 gallons were wasted from 48-inch line in Brookline.  
 6 Charlestown was supplied with Cochituate water from September 28 to December 1 and in December Metropolitan Water Works used about 2,766,500 gallons.  
 7 From November 1 to 4 about 11,000,000 gallons were wasted from a blow-off, and during November and December, Metropolitan Water Works used about 8,537,400 gallons. Between June and December, Revere was supplied with 34,351,400 gallons from the Cochituate supply.

# BOSTON WATER WORKS.

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

—Yearly Averages shown thus—







WATER DEPARTMENT.

TABLE II.  
 Diversion of Sudbury River Water, 1890-1897.

MONTH.	1892.		1893.		1894.		1895.		1896.		1897.	
	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.	To Lake Cochituate.	To Chestnut Hill Res'r.	To Lake Cochituate.	To Chestnut Hill Res'r.	To Lake Cochituate.
January	Gallons.	630,800,000	Gallons.	1,325,900,000	Gallons.	1,012,000,000	Gallons.	1,300,000	Gallons.	1,367,300,000	Gallons.	1,393,000,000
February		610,400,000		987,600,000		944,000,000		1,318,400,000		1,346,900,000		1,242,500,000
March		45,100,000		1,023,900,000		947,100,000		1,115,800,000		1,502,700,000		1,317,500,000
April		545,000,000		917,000,000		134,100,000		982,300,000		1,282,800,000		1,284,100,000
May		690,490,000		858,000,000		826,500,000		931,500,000		1,101,300,000		1,181,600,000
June		114,700,000		856,700,000		80,700,000		941,100,000		1,128,800,000		1,147,000,000
July		197,500,000		1,040,800,000		1,064,600,000		1,061,900,000		1,285,900,000		1,385,700,000
August				994,100,000		951,600,000		1,147,600,000		1,291,500,000		1,377,700,000
September				948,300,000		987,100,000		1,142,800,000		1,163,500,000		1,365,800,000
October				908,500,000		1,100,000		6,600,000		1,086,000,000		1,367,300,000
November				788,000,000		400,000		1,021,000,000		1,070,700,000		1,159,681,000
December				1,216,100,000		1,000,000		1,137,100,000		1,250,900,000		1,220,681,600
Totals		902,300,000		11,737,900,000		11,450,600,000		896,800,000		14,887,300,000		15,442,562,600
Total divers'n from Sudbury river,		10,535,500,000		11,737,900,000		12,412,800,000		13,805,300,000		14,892,800,000		16,390,562,600
Average daily diversion for whole year.		28,800,000		32,158,600		34,907,700		37,822,700		40,690,700		44,905,700

TABLE III.

Statement showing Amount of Water 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 1897; 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.	Percentage of Rainfall collected.
	Gallons.	Gallons.	Gallons.	Gain.	Loss.			Inches.	Per cent.
1852 <sup>1</sup>	2,974,042,800	4,020,566,900	.....	.....	261,360,000	6,733,249,700	18,396,900	47.93	20.61
1853	3,117,939,500	3,166,417,500	.....	239,580,000	.....	6,523,937,000	17,873,800	55.73	19.51
1854	3,614,230,000	4,187,733,000	.....	.....	217,800,000	7,584,163,000	20,778,500	43.15	22.87
1855	3,776,399,500	No acc't kept.	.....	.....	326,700,000	.....	.....	34.96	.....
1856	4,409,737,600	"	.....	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
1858	4,689,155,000	1,934,500,000	.....	.....	141,570,000	6,482,085,000	17,759,000	48.66	19.46
1859*	4,808,875,000	7,569,000,000	.....	283,140,000	.....	12,661,015,000	34,687,700	49.02	38.24
1860	6,309,108,000	None.	.....	174,240,000	.....	6,483,348,000	17,714,100	55.44	19.40
1861	6,639,095,900	3,377,559,000	.....	.....	1,459,260,000	8,557,394,900	23,444,900	45.44	25.45
1862	6,059,000,000	33,200,000	.....	1,306,800,000	.....	7,393,000,000	20,271,200	49.69	22.36
1863	5,927,052,500	2,165,696,500	.....	763,300,000	.....	8,855,049,000	24,290,400	69.30	26.88

WATER DEPARTMENT.

1864.....	6,105,806,700	1,368,746,000	.....	.....	1,848,577,000	5,625,475,700	15,370,200	42.60	18.35	43.
1865.....	4,621,630,000	1,688,120,700	.....	743,242,500	.....	7,052,993,200	19,323,300	49.46	20.50	41.
1866.....	4,463,585,000	None.	.....	743,242,500	.....	5,206,827,500	14,265,300	62.32	16.01	26.
1867.....	4,951,225,000	2,482,041,000	.....	.....	698,811,000	6,734,455,000	18,450,600	56.25	21.80	39.
1868.....	5,405,515,000	2,507,684,000	.....	346,371,000	.....	8,259,570,000	22,567,200	49.71	24.98	50.
1869.....	5,503,751,000	1,635,570,000	.....	480,882,000	.....	7,630,203,000	20,877,300	64.34	21.99	34.
1870.....	5,477,810,000	4,818,971,000	.....	.....	1,736,085,000	8,560,696,000	23,453,900	55.89	26.08	47.
1871.....	5,225,500,000	None.	.....	.....	250,983,000	4,972,567,000	13,623,500	45.39	15.16	33.
1872.....	5,775,151,200	None.	.....	1,543,995,500	.....	5,612,480,300	15,416,600	48.47	17.22	35.
1873.....	6,511,826,900	2,917,977,000	.....	.....	515,132,000	8,914,671,900	24,423,800	45.43	27.13	60.
1874.....	6,623,972,900	1,145,851,700	.....	.....	1,367,715,000	6,402,109,600	17,540,000	35.98	19.52	54.
1875.....	7,092,555,500	None.	.....	1,222,885,000	.....	5,760,040,500	15,780,900	45.49	17.57	39.
1876.....	7,277,175,200	1,619,243,800	.....	43,438,000	.....	6,411,557,000	17,517,900	48.49	19.54	40.
1877.....	7,626,889,200	1,484,978,600	.....	378,727,000	.....	7,596,244,800	20,811,600	43.80	23.17	53.
1878.....	437,904,700	3,341,875,000	.....	219,789,000	.....	8,637,268,700	23,663,700	53.58	26.34	49.
1879.....	6,051,828,900	1,523,361,400	.....	.....	1,622,697,300	5,841,203,000	16,003,300	38.01	17.81	47.
1880.....	4,284,147,100	65,677,700	.....	.....	146,265,000	3,376,759,800	9,226,100	35.83	10.30	29.
1881.....	2,846,453,700	2,231,016,700	.....	468,089,400	.....	5,357,965,800	14,679,400	41.09	16.34	40.
1882.....	3,835,490,600	1,358,543,700	.....	.....	357,334,700	4,386,639,600	13,525,200	40.29	15.05	37.
1883.....	4,731,227,700	162,361,800	.....	.....	334,400,000	3,314,089,500	9,079,700	31.20	10.11	32.
1884.....	4,533,156,450	1,842,837,100	.....	1,340,436,700	.....	6,300,130,250	17,213,450	45.57	19.21	42.
1885.....	4,091,674,900	1,006,622,800	.....	8,594,800	.....	5,106,892,500	13,991,500	48.66	15.57	36.

<sup>1</sup> Observations of rainfall at Lake Cochituate commenced 1852, and these observations are assumed as correct for the whole district.

<sup>2</sup> Lake raised two feet.

TABLE III.—*Concluded.*

Statement showing Amount of Water drawn from Lake Cochituate; Amount wasted; Amount of Rainfall collected in Lake; Amount received into Lake from Sudbury River; Percentage of Rainfall collected, etc., 1882 to 1897; Watershed 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.		Percentage of Rainfall collected.
				Gain.	Loss.			Inches.	Inches.	
	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Inches.	Inches.	Per cent.
1886.....	4,432,536,100	3,116,283,200	.....	.....	360,662,000	7,188,157,300	19,695,600	46.97	21.92	47.
1887.....	4,802,120,700	3,638,652,900	.....	.....	763,205,000	7,697,568,600	21,089,200	41.58	23.47	56.
1888.....	4,968,503,100	4,229,200,000	.....	.....	959,309,000	10,157,012,100	27,751,400	56.93	30.97	54.
1889.....	5,570,423,600	3,373,929,000	233,400,000	454,766,800	.....	9,165,719,400	25,111,600	50.23	27.95	56.
1890.....	5,722,170,800	2,380,441,200	.....	.....	64,166,300	8,038,445,700	22,023,100	51.23	24.51	48.
1891.....	5,508,178,900	6,064,000,000	.....	.....	1,056,057,800	10,516,121,100	28,811,300	46.42	32.07	69.
1892.....	5,464,791,300	281,000,000	902,300,000	200,284,300	.....	5,033,775,600	13,753,500	39.04	15.35	39.
1893.....	5,623,532,500	255,300,000	.....	.....	89,200,000	5,789,632,500	15,862,000	45.28	17.65	39.
1894.....	5,520,092,100	None.	962,200,000	.....	296,900,000	4,260,992,100	11,674,000	39.08	12.99	33.
1895.....	5,654,765,700	657,600,000	896,800,000	1,200,400,000	.....	6,615,965,700	18,125,900	48.96	20.17	41.
1896.....	5,731,790,000	1,907,000,000	35,500,000	.....	998,000,000	6,605,290,000	18,047,200	42.78	20.14	47.
1897.....	5,738,703,800	117,000,000	948,000,000	684,500,000	.....	5,692,203,800	15,321,100	44.79	17.05	38.

TABLE IV.

Statement showing Amount of Water diverted, from Sudbury River to Lake Cochituate and Chestnut Hill Reservoir; Amount wasted; Amount of Flow in River; Percentage of Rainfall collected, etc., 1875 to 1897.

(Water-shed from 1875 to 1878, inclusive=77,764 sq. miles; in 1879 and 1880=78,228 sq. miles; and from 1881 to 1897, inclusive=75.2 sq. miles.)

YEAR.	Amount of Water diverted to Lake Cochituate and Chestnut Hill Reservoir.	Amount of Water used by Framingham Water Co.	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 Rainfall collected.
	Gallons.	Gallons.	Gallons.	Gain.	Loss.					
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	94,309,200	44.018	25.847	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	18.775	45.33
1880.....	6,230,200,000	.....	11,290,000,000	.....	958,600,000	16,561,600,000	42,250,300	38.177	12.182	31.91
1881.....	8,845,300,000	.....	17,279,000,000	751,700,000	.....	26,876,000,000	73,633,900	44.160	20.565	46.56
1882.....	7,755,200,000	.....	16,273,900,000	.....	352,600,000	23,655,600,000	64,812,300	39.394	18.102	45.95
1883.....	8,455,000,000	.....	7,251,900,000	.....	1,086,400,000	14,620,500,000	40,056,200	32.780	11.188	34.13
1884.....	6,110,600,000	.....	23,228,900,000	1,744,600,000	.....	31,084,100,000	84,929,200	47.135	23.784	50.46
1885.....	5,224,700,000	61,800,000	19,878,800,000	.....	446,900,000	24,773,400,000	67,721,600	43.545	18.916	43.44
1886.....	5,206,600,000	76,600,000	23,023,000,000	1,464,500,000	.....	23,831,700,000	81,730,700	46.065	22.825	49.55
1887.....	6,124,100,000	87,500,000	25,334,500,000	117,400,000	.....	31,663,500,000	86,749,300	42.705	24.227	56.73

TABLE IV. — Concluded.

Statement showing Amount of Water diverted from Sudbury River to Lake Cochituate and Chestnut-Hill Reservoir; Amount wasted; Amount of Flow in River; Percentage of Rainfall collected, etc., 1875 to 1897.

(Water-shed from 1875 to 1878, inclusive=77,764 sq. miles; in 1879 and 1880=78,238 sq. miles; and from 1881 to 1897, inclusive=75.2 sq. miles.)

YEAR	Amount of Water diverted to Lake Cochituate and Chestnut Hill Reservoir.	Amount of Water used by Framingham Water Co.	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 Rainfall collected.
				Gain.	Loss.					
	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Gallons.	Inches.	Inches.	Per cent.
1888	7,224,700,000	61,500,000	39,040,500,000	390,600,000	.....	46,717,300,000	127,642,900	57.465	35.749	62.21
1889	6,363,900,000	69,500,000	31,550,400,000	.....	2,800,000	37,971,000,000	104,030,100	49.95	29.056	58.17
1890	6,596,000,000	74,500,000	28,687,100,000	.....	57,400,000	35,280,200,000	96,658,100	53.00	28.998	50.94
1891	8,306,600,000	80,500,000	28,799,600,000	.....	1,100,800,000	36,085,900,000	98,865,500	49.52	27.612	55.76
1892	10,535,500,000	82,800,000	11,143,000,000	.....	257,700,000	21,568,600,000	58,753,000	41.83	16.456	39.34
1893	11,737,900,000	103,000,000	17,405,500,000	.....	789,800,000	28,456,600,000	77,965,300	48.225	21.774	45.15
1894	12,412,800,000	117,000,000	6,715,900,000	1,901,000,000	.....	21,447,300,000	57,937,800	39.740	16.182	40.72
1895	13,805,300,000	132,200,000	15,545,600,000	1,137,920,000	.....	31,621,000,000	86,632,900	50.62	24.196	47.80
1896	14,832,800,000	139,300,000	15,528,600,000	.....	2,522,500,000	28,038,200,000	76,607,100	43.70	21.453	49.09
1897	16,390,562,000	117,600,000	6,325,937,600	4,368,900,000	.....	27,203,000,000	74,528,800	46.19	20.815	45.06

TABLE V.

Statement showing Amount of Water drawn from Mystic Lake; Amount wasted; Amount of Rainfall collected in Lake; Percentage of Rainfall collected, etc., 1876 to 1897; 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.		Percentage of Rainfall collected.
	Gallons.	Gallons.	Gallons.	Gallons.	Gain.	Loss.			Inches.	Inches.	
1876	3,230,101,300	6,369,774,700	32,683,000	32,683,000	.....	.....	9,667,293,000	26,140,100	47.00	20.49	43.6
1877	3,069,554,500	7,250,223,600	.....	.....	.....	16,291,400	10,303,486,900	28,228,700	43.065	22.06	51.2
1878	3,367,490,400	8,718,647,600	.....	.....	.....	26,000,000	12,060,038,000	33,041,200	64.065	25.82	47.8
1879	3,490,848,200	4,625,631,800	.....	.....	.....	203,000,000	7,913,540,000	21,680,900	35.30	16.94	48.0
1880	3,692,195,700	2,158,761,200	.....	.....	.....	113,500,000	5,703,756,900	15,584,000	34.42	12.21	35.5
1881	2,815,679,900	5,534,300,000	.....	.....	.....	371,200,000	8,721,079,900	23,893,400	41.91	18.67	44.5
1882	2,670,896,700	4,444,668,000	.....	.....	.....	15,000,000	7,030,564,700	19,261,800	39.165	15.05	38.4
1883	2,664,514,200	2,034,702,600	.....	.....	.....	347,679,000	4,351,637,800	11,922,300	31.22	9.32	29.84
1884	2,469,761,000	6,674,003,800	.....	.....	.....	380,600,000	9,424,264,800	25,749,600	44.39	20.18	45.46
1885	2,639,278,800	5,558,860,500	.....	.....	.....	.....	8,194,939,300	22,451,900	44.50	17.55	39.43
1886	2,862,047,500	7,743,258,900	.....	.....	.....	.....	10,577,806,400	28,980,300	45.56	22.65	49.71
1887	2,954,267,500	7,414,213,000	.....	.....	.....	.....	10,357,470,500	28,376,600	46.42	22.17	47.77
1888	3,206,121,100	11,334,593,100	.....	.....	.....	.....	14,533,714,200	39,709,600	56.745	31.12	54.84
1889	3,007,539,800	8,879,787,500	.....	.....	.....	12,000,000	11,899,327,300	32,600,300	50.395	25.48	50.56

TABLE V. — Concluded.

Statement showing Amount of Water drawn from Mystic Lake; Amount wasted; Amount of Rainfall collected in Lake; Percentage of Rainfall collected, etc., 1876 to 1897; 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.		Percentage of Rainfall collected.
	Gallons.	Gallons.	Gain.	Loss.	Gallons.	Gallons.			Inches.	Inches.	
1890	3,212,284,500	8,953,727,900	.....	3,000,000	.....	12,163,012,400	33,323,300	49.37	26.04	52.75	
1891	3,500,817,500	10,027,714,400	.....	171,000,000	.....	13,357,531,900	36,600,000	47.40	28.60	60.34	
1892	3,811,766,200	3,474,213,200	177,000,000	.....	.....	7,462,979,400	20,390,700	39.115	15.98	40.85	
1893	4,831,743,200	4,958,323,500	.....	95,000,000	.....	9,195,271,700	25,192,500	44.20	19.69	44.54	
1894	3,996,805,100	2,752,964,200	.....	23,000,000	.....	6,726,769,300	18,429,500	39.24	14.40	36.70	
1895	3,682,843,300	4,523,156,200	156,000,000	.....	.....	8,367,004,500	22,923,300	48.73	17.91	36.76	
1896	4,617,704,600	4,559,437,400	.....	45,000,000	.....	9,132,142,000	24,951,200	39.90	19.55	49.00	
1897	4,569,393,100	3,650,425,200	17,000,000	.....	.....	8,236,818,300	22,566,600	44.35	17.64	39.77	



**T A B L E V I .**

*Average Maximum and Minimum Monthly and Yearly Heights, in Feet, above Tide Marsh Level, to which Water would rise at different Stations on the Boston Water Works.*

1897.	Boston Common.		Engine-house No. 2, Salem street.		Engine-house No. 7, East street.		Engine-house No. 32, Congress street, So. Boston.		Engine-house No. 2, Fourth street, So. Boston.		Engine-house No. 9, Paris street, East Boston.		Engine-house No. 16, River street, Dorchester.		Engine-house No. 32, Bunker Hill street, Charlestown. Myrtle supply.		710 Albany street.		Engine-house No. 18, Harvard street, Dorchester.		High service.		City Hall. High service.			
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
January	112.0	91.3	108.9	90.0	108.8	90.5	109.4	92.2	108.6	89.2	105.9	80.8	110.7	92.3	123.7	111.8	112.5	95.4	223.8	202.8	223.9	202.8	233.8	202.8	233.9	233.8
February	113.1	94.0	110.2	92.4	111.9	92.4	112.2	94.2	111.9	91.1	108.2	81.6	112.7	94.2	125.8	111.5	113.9	96.6	239.9	205.6	231.7	205.6	239.8	205.6	239.9	231.8
March	115.0	95.2	113.0	95.2	113.3	94.4	114.2	95.3	114.7	92.5	111.7	84.9	114.0	95.3	127.2	112.4	115.2	98.0	239.8	206.2	233.8	206.2	239.8	206.2	239.8	233.1
April	117.3	97.6	114.7	96.5	115.8	96.1	115.6	96.7	115.4	94.0	114.7	87.5	116.5	96.9	130.0	113.1	117.4	99.6	240.0	205.1	235.6	205.1	240.0	205.1	240.0	232.0
May	118.7	99.0	116.6	97.2	117.0	97.0	116.3	97.6	115.5	95.6	115.4	86.0	117.3	98.2	131.1	113.0	118.3	100.8	233.0	199.1	233.7	199.1	240.0	199.1	240.0	233.0
June	118.4	98.9	116.3	97.2	116.7	96.3	115.6	97.5	115.4	94.9	114.3	88.6	115.8	92.8	133.7	115.2	117.7	99.8	231.9	199.4	232.4	199.4	240.1	199.4	240.1	231.9
July	117.1	93.5	114.5	94.9	115.0	93.7	115.6	97.0	115.7	92.2	112.8	83.2	116.8	96.5	133.8	113.9	117.4	97.0	232.5	230.2	230.2	191.7	239.7	230.2	239.7	232.5
August	116.6	96.3	114.1	93.9	115.1	94.3	115.6	95.0	115.1	91.3	112.7	81.9	116.2	93.7	134.5	111.5	117.0	97.4	232.2	192.8	225.4	192.8	239.6	192.8	239.6	232.2
September	116.7	92.9	114.2	91.9	115.2	92.9	115.6	95.6	115.5	92.1	112.7	82.0	116.2	93.4	140.8	120.4	117.1	97.1	230.0	187.1	227.0	187.1	239.5	187.1	239.5	230.0
October	116.6	93.5	114.5	88.7	115.3	93.5	115.6	94.2	116.2	91.2	112.9	78.6	115.6	92.3	113.8	81.9	116.7	96.4	229.6	186.6	227.7	186.6	240.2	186.6	240.2	229.6
November	116.4	94.8	114.9	91.6	115.6	94.5	115.1	95.4	115.9	92.9	113.1	80.5	116.4	95.1	113.5	84.8	117.4	97.3	231.3	193.7	228.2	193.7	240.2	193.7	240.2	231.3
December	115.5	96.3	114.5	93.0	115.1	96.4	114.2	95.4	114.3	93.3	110.8	80.5	114.9	95.8	139.7	121.1	116.3	98.6	231.9	189.2	225.5	189.2	239.8	189.2	239.8	231.9
Averages	116.1	95.3	113.9	93.5	114.6	94.3	114.6	95.5	114.5	93.4	112.1	82.6	115.3	94.7	.....	.....	116.4	97.8	239.9	196.6	230.3	196.6	239.9	196.6	239.9	231.9

**TABLE VII.**  
Statement of Operations at Chestnut Hill Pumping Station for the Year 1897.

1897.	ENGINE NO. 1.		ENGINE NO. 2.		Total amount pumped, 2 per cent. being allowed for slip.	Daily average amount pumped.	Total amount of coal consumed.	Daily average amount of coal consumed.	Total amount of ashes and clinkers.	Per cent. of ashes and clinkers.	Quantity pumped per lb. of coal; no correction for lighting or heating.	Average lift.	Duty in ft.-lbs. per 100 lbs. of coal; no correction for heating or lighting.
	Hrs.	Total pumping time.	Gallons.	Amount pumped.									
January.....	213	20	78,499,500	78,203,025	156,702,525	9,217,800	217,113	12,771	17,895	8.2	721.3	123.50	73,756,200
February.....	268	00	99,947,475	136,325,400	236,272,875	13,126,300	298,716	16,595	27,420	9.2	791.0	123.70	80,696,500
March.....	238	30	81,337,400	33,805,575	115,142,975	11,676,200	244,372	16,291	22,076	9.0	716.7	121.03	72,200,100
April.....	582	50	223,020,000	187,925,325	410,945,325	13,698,200	475,353	15,845	46,892	9.9	864.5	121.31	86,997,300
May.....	126	15	48,580,500	34,231,800	82,812,400	9,201,400	91,194	10,133	10,876	11.7	908.1	121.90	91,707,200
June.....	117	45	45,511,125	40,770,475	86,281,600	14,380,300	117,980	19,663	10,817	9.2	731.3	122.67	74,160,700
July.....	102	30	40,920,925	35,369,025	76,289,950	12,715,000	94,655	15,778	8,725	9.2	806.0	123.58	83,109,200
September.....													
October.....													
November.....													
December.....	103	40	39,329,400	19,185,325	58,514,725	11,702,900	81,802	16,360	7,658	9.4	715.3	.....	{ No data kept.
Totals and averages.....	1,762	50	657,146,425	625,815,950	1,282,962,375	12,103,400	1,624,185	15,294	152,159	9.4	791.4	122.53	

TABLE VII. — Concluded.  
Statement of Operations at Chestnut Hill Pumping Station for the Year 1897.

1897.	ENGINE NO. 3.										SUMMARY, ENGINES 1, 2 and 3.		Remarks.
	Month.	Total pumping time.		Amount pumped.	Daily average pumped.	Amount of Coal consumed.	Daily average amount consumed.	Amount of ashes and clinkers.	Per cent. of ashes and clinkers.	Quantity pumped per lb. of coal; hearth or lightg.	Average lift of water.	Duty in ft.-lbs. per 100 lbs. of coal; No correction for heating or lighting.	
	Hrs.	Min.	Gallons.	Gallons.	Lbs.	Lbs.	Lbs.	Per cent.	Gall's.	Feet.	Fl.-Lbs.	Gallons.	Gallons.
January.....	436	00	310,825,200	14,128,400	302,945	13,770	28,770	9.5	1,026.0	122.11	104,488,800	467,627,725	15,081,500
February....	283	35	166,605,600	12,815,800	168,705	12,977	15,730	9.3	987.6	122.24	100,679,500	402,878,475	14,388,500
March.....	400	40	245,708,400	13,650,500	208,290	11,572	21,077	10.1	1,179.7	121.42	119,456,000	420,851,375	13,875,000
April.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	410,945,325	13,698,200
May.....	576	00	342,977,600	12,702,900	330,658	12,246	32,272	9.8	1,037.3	121.87	105,426,500	425,790,000	13,735,200
June.....	702	40	413,256,200	13,775,200	353,004	11,767	33,730	9.6	1,170.7	121.44	118,568,000	413,256,200	13,775,200
July.....	598	30	365,873,200	14,072,000	302,480	11,634	31,126	10.3	1,309.6	121.78	122,850,200	452,154,800	14,485,600
August.....	616	30	366,945,600	14,113,300	309,154	11,891	28,788	9.3	1,186.9	121.43	120,204,000	443,235,550	14,297,900
September..	716	30	449,929,200	14,997,600	375,811	12,527	30,136	8.0	1,197.2	121.73	121,545,400	449,929,200	14,997,600
October.....	741	30	462,728,000	14,926,700	399,309	12,881	33,385	8.4	1,158.8	122.67	118,555,300	462,728,000	14,926,700
November...	713	45	440,384,000	14,679,500	400,803	13,260	34,213	8.5	1,098.8	122.72	112,455,800	440,384,000	14,679,500
December...	652	40	401,868,600	13,857,500	385,595	12,296	33,236	8.7	1,042.2	123.98	112,978,400	460,383,325	14,851,100
Totals and averages }	6,478	20	3,967,101,600	14,067,700	3,536,754	12,542	322,563	9.1	1,121.7	122.67	114,208,400	5,250,063,975	14,383,700

Engines 1 and 2 did not run.  
Engines 1 and 2 did not run.  
Engines 1 and 2 did not run.  
Engines 1 and 2 did not run.

**TABLE VIII.**  
*Statement of Operations at Mystic Pumping-station for the Year 1897.*

1897.	ENGINE No. 1.		ENGINE No. 2.		ENGINE No. 3.		Total amount pumped.	Gallons.	Daily average amount of coal consumed.	Lbs.	Total amount of ashes and clinkers.	Per cent. of ashes and clinkers.	Quantity pumped per lb. of coal. No cor- rection for heating or lighting.	Gals.	Feet.	Average lift.	Duty in ft.-lbs. per 100 lbs. of coal. No cor- rection for heating or lighting.	
	Hrs.	Total pumping time.	Hrs.	Total pumping time.	Hrs.	Total pumping time.												
January.....	440	15	39,782,900	.....	.....	167	15	59,590,100	159,373,000	5,141,100	426,500	13,758	51,662	12.1	373.7	146.45	45,640,600	
February...	504	30	119,444,000	.....	.....	.....	.....	.....	119,444,000	4,265,900	365,100	13,039	42,842	11.7	327.2	145.36	39,658,300	
March.....	644	45	147,149,500	.....	.....	408	15	144,729,600	291,879,100	9,415,500	698,000	22,516	87,804	12.6	418.2	145.28	50,666,400	
April.....	59	45	12,757,700	453	15	98,223,100	250	15	85,397,000	6,545,900	494,945	16,498	62,213	12.6	336.7	144.39	47,779,200	
May.....	136	00	30,884,000	307	15	65,135,700	81	15	28,022,400	4,134,700	335,500	11,183	44,658	13.3	369.7	145.27	44,793,900	
June.....	231	20	52,209,200	2	15	571,988	.....	.....	52,781,188	1,820,000	165,350	5,702	17,827	10.7	319.2	143.50	38,202,600	
July.....	82	45	16,336,100	303	30	62,219,900	4	45	1,324,000	79,880,000	2,576,800	8,310	23,217	9.0	310.1	147.48	38,140,900	
August.....	49	00	8,927,100	142	15	26,737,900	41	15	11,947,500	47,612,500	1,535,900	6,024	15,358	8.2	255.0	149.87	31,870,200	
September.....	.....	00	.....	189	30	38,942,900	69	15	19,698,700	58,641,600	2,171,900	7,944	20,714	9.7	273.4	149.93	34,184,800	
October.....	37	00	6,028,100	45	45	9,900,200	147	15	44,194,800	60,123,100	7,515,400	179,500	22,438	10.7	335.0	150.01	41,929,900	
November...	26	30	5,637,100	.....	.....	134	30	43,442,200	49,079,200	4,089,900	188,200	13,183	15,617	9.9	310.2	148.41	38,399,100	
December...	181	00	37,359,800	79	45	19,054,100	87	00	31,849,000	88,262,900	3,043,500	287,750	9,922	38,400	13.3	306.7	149.06	38,132,000
Totals and averages, }	2,292	50	536,515,500	1,623	30	320,785,788	1,391	00	470,195,300	1,327,496,588	4,187,700	3,769,676	11,892	439,557	11.7	352.1	147.08	42,989,100

TABLE VIII.—*Concluded.*  
Statement of Operations at Mystic Pumping Station for the year 1897.

1897.		ENGINE NO. 4.											SUMMARY OF ENGINES 1, 2, 3 AND 4.														
		Hrs.	Min	Total pumping time.	Amount pumped.	Gallons.	Daily average pumped.	Gallons.	Amount of coal consumed.	Lbs.	Daily average consumed.	Lbs.	Amount of ashes and clinkers.	Lbs.	Per cent.	Quantity pumped per lb. of coal. No correction for heating.	Galls.	Average lift.	Feet.	Duty in ft.-lbs. per 100 lbs. of coal. No correction for heating or lighting.	Ft.-Lbs.	Total amount pumped.	Gallons.	Daily average amount pumped.	Gallons.	Remarks.	
Month.																											
January...	653	15	291,174,770	10,040,500	330,000	11,379	42,600	12.9	882.3	149.10	109,719,400	450,547,770	14,533,800														
February..	656	45	292,063,300	10,430,800	329,500	11,768	41,971	12.7	886.4	148.74	109,956,000	411,507,300	14,696,700														
March.....	349	15	155,325,700	9,136,800	175,500	10,324	22,273	12.7	885.0	148.36	109,508,800	447,204,800	14,428,000														
April.....	486	30	216,626,900	9,846,700	247,500	11,250	34,543	14.0	875.3	148.51	108,407,500	413,004,700	13,766,800														
May.....	685	00	281,692,000	9,386,400	314,600	10,487	42,144	13.4	895.1	148.04	110,511,300	405,634,100	13,085,000														
June.....	704	00	312,115,400	10,403,800	352,000	11,733	33,214	9.4	866.7	147.79	109,290,800	364,896,588	12,163,200														
July.....	707	45	313,243,320	10,104,600	354,500	11,436	30,414	8.6	883.6	150.21	110,695,600	333,123,320	12,081,400														
August....	727	15	321,856,786	10,382,500	348,472	11,241	32,494	9.3	923.6	150.48	115,915,000	369,469,286	11,918,400														
September.	676	30	298,959,404	10,308,900	324,750	11,198	31,556	9.7	920.6	150.66	115,671,700	357,601,004	11,920,000														
October....	545	15	240,431,600	8,904,900	269,700	9,989	24,300	9.0	891.5	149.75	111,338,000	300,554,700	9,695,300														
November..	503	15	220,686,640	7,881,700	257,405	9,193	25,177	9.8	857.3	149.39	106,818,500	269,765,940	8,992,200														
December..	676	45	300,653,200	9,695,500	347,500	11,210	45,527	13.1	865.2	149.89	108,155,800	388,916,100	12,545,700														
Totals & averages.	7,321	30	3,244,729,020	9,743,900	3,651,427	10,965	406,153	11.1	888.6	149.24	110,073,400	4,572,225,608	12,526,700														

TABLE IX.

Statement of Operations at the East Boston Pumping Station for the Year 1897.

1897.	ENGINES NOS. 1 AND 2.				ENGINE No. 3.				Total amount of coal consumed.	Per cent. of ashes and clinkers.
	Total pumping time.		Total amount pumped to Reservoir.	Daily average.	Total pumping time.		Total amount pumped to tank.	Daily average.		
Month.	Hrs.	M.	Gallons.	Gallons.	Hrs.	M.	Gallons.	Gallons.	Lbs.	Per cent.
January...	394	30	17,596,200	567,600	110	15	1,689,100	54,500	55,930	20.4
February..	341	45	15,289,100	546,000	102	45	1,549,500	55,300	49,750	20.3
March.....	328	45	14,373,800	463,700	105	00	1,474,600	47,600	43,170	20.5
April.....	304	00	13,392,400	446,400	102	00	1,426,900	47,600	38,050	20.1
May.....	300	00	13,017,600	419,900	124	00	1,824,900	58,900	40,350	20.2
June.....	288	15	12,564,300	418,800	121	30	1,751,300	58,400	39,250	19.7
July.....	313	30	13,415,900	432,800	140	30	2,174,300	70,100	41,320	20.5
August....	299	45	12,762,700	411,700	141	45	2,256,000	72,800	41,000	20.6
September,	293	15	12,512,200	417,100	126	00	2,050,700	68,400	40,660	20.3
October....	321	15	13,699,800	441,900	122	15	1,968,900	63,500	44,810	20.3
November,	284	00	11,593,000	386,400	134	00	2,073,000	69,100	44,530	20.4
December,	324	45	13,027,500	420,200	152	30	2,306,600	74,400	52,900	20.3
Tot's and } averages. }	3,793	45	163,244,500	447,200	1,482	30	22,546,700	61,800	531,720	20.3

TABLE X.

Statement of Operations at the West Roxbury Pumping Station for the Year 1897.

1897.	Total pumping time.		Total amount pumped.	Daily average amount pumped.	Quantity pumped per lb. of coal.	Total amount of coal consumed.	Per cent. of ashes and clinkers.	Average lift.
	Month.	Hours.	Min.	Gallons.	Gallons.	Gallons.	Lbs.	Per cent.
January....	694	00	8,317,200	268,300	165.3	50,325	18.3	144.18
February ..	641	30	7,630,900	272,500	158.3	48,200	20.7	145.26
March.....	709	00	8,403,200	271,100	161.9	51,900	19.0	146.61
April.....	676	30	8,024,900	267,500	164.7	48,725	19.6	148.32
May.....	713	00	8,528,000	275,100	163.9	52,025	18.8	150.95
June.....	683	30	8,654,500	288,500	163.7	52,875	19.6	153.48
July.....	701	30	10,163,300	327,800	172.7	58,850	17.9	158.13
August....	652	00	9,088,800	293,200	169.8	53,525	17.1	155.49
September..	623	00	9,109,500	303,700	175.5	51,900	16.7	153.91
October ....	658	30	8,849,800	285,500	170.2	52,000	17.1	154.24
November..	627	00	7,987,800	266,300	164.2	48,650	17.9	152.18
December..	655	00	8,640,700	278,700	167.0	51,750	17.5	155.02
Tot'ls and Averages. }	8,034	30	103,398,600	183,300	166.6	620,725	18.3	151.48

TABLE XI.

*Rainfall in Inches and Hundredths on Sudbury River Water-shed for the Year 1897.*

1897.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1.....			0.045									
2.....								0.050	0.635			
3.....			0.380		1.140						2.565	0.055
4.....					0.175							
5.....	1.080		0.330	0.175				1.250				0.380
6.....				0.035		0.440						
7.....		0.740										
8.....		0.045										0.145
9.....				2.005							0.820	
10.....			0.070			2.270						
11.....					0.645		0.045	0.040	0.065	0.060		
12.....		1.120	0.325							0.375	1.565	0.415
13.....					0.940	0.320			0.040			
14.....			0.460			0.040	0.945					
15.....				0.235	0.010							3.070
16.....		0.085						0.660	0.070		0.195	
17.....				0.205							0.100	0.020
18.....	0.410						0.035	0.115				
19.....							0.115					
20.....						0.290			1.145		0.255	0.230
21.....	0.730	0.140	0.910		0.170		0.010			0.025		
22.....	0.075						1.780	0.430				
23.....		0.780					0.065				0.250	
24.....			1.140				0.900	0.965	0.850			
25.....					0.690	0.185	0.045				0.025	
26.....				0.060					0.130			0.180
27.....											0.455	
28.....	1.710			0.105	0.075							
29.....							1.425				0.175	0.110
30.....						0.910						
31.....					0.525		0.080			0.010		0.600
Totals ...	4.005	2.910	3.660	2.820	4.370	4.455	5.445	3.510	2.935	0.470	6.405	5.205

Total rainfall during the year, 46.190 inches, being an average of two gauges located at Framingham and Ashland.



TABLE XII.

*Rainfall in Inches and Hundredths at Lake Cochituate for the Year 1897.*

1897.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1.....												
2.....			0.120						0.540			
3.....			0.280		0.870						2.470	0.060
4.....					0.400							
5.....	1.220		0.360			0.540		0.810			0.110	0.350
6.....				0.200								
7.....		0.660										
8.....		0.030		0.490								0.150
9.....								0.070			0.840	
10.....			0.090	1.410	0.650	1.670						
11.....							0.040	0.050	0.050	0.420		
12.....		1.180	0.320							0.420	1.610	0.370
13.....					0.890	0.250			0.100			
14.....			0.440			0.010	0.820					
15.....				0.270		0.180						2.850
16.....		0.070						0.630	0.220		0.300	
17.....				0.210			0.030					0.040
18.....	0.390							0.150				
19.....												
20.....		0.180	0.850			0.300			0.810		0.240	0.200
21.....	0.700				0.190					0.050		
22.....	0.080						1.540	0.750			0.270	
23.....		0.740					0.130					
24.....			1.140				0.870	0.800	0.750			
25.....				0.060	0.730	0.390	0.020				0.050	0.190
26.....									0.090			
27.....											0.390	
28.....	1.840			0.140								
29.....					0.060		1.280				0.190	0.110
30.....						0.940						
31.....					0.460		0.070					0.490
Totals.	4.230	2.860	3.600	2.780	4.250	4.280	4.800	3.260	2.560	0.890	6.470	4.810

Total rainfall during the year 44.790 inches.

TABLE XIII.

Rainfall in Inches and Hundredths on Mystic Lake Water-shed for the Year 1897.

1897.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1.....												
2.....			0.350				0.050	0.050	0.675			
3.....											2.260	
4.....					1.385	0.235		0.310				
5.....	1.185		0.315	0.235		0.520		0.535			0.080	0.510
6.....				0.060								
7.....		0.550								0.025		
8.....				0.405								0.290
9.....		0.025		1.355							0.840	
10.....			0.085			2.825		0.025				0.015
11.....				0.020	0.700		1.045	0.040	0.040			
12.....			0.310							0.245	1.800	0.230
13.....		1.070			0.690		0.375		0.485			
14.....			0.450			0.390	0.105					
15.....						0.040		0.280				2.255
16.....		0.090		0.410	0.040			0.390	0.165			
17.....				0.220				0.060			0.175	
18.....	0.245		0.010					0.250				0.025
19.....												
20.....						0.405	0.275		1.025		0.245	0.125
21.....	0.615	0.045	0.760		0.195					0.120		
22.....							0.720	0.445				
23.....	0.075	0.715			0.520				0.230		0.390	
24.....			1.020				0.380	1.055	0.265			
25.....					0.470	0.065	0.015					
26.....							0.040		0.220			0.300
27.....											0.435	
28.....	1.760			0.150	0.240							
29.....					0.220						0.090	
30.....						1.205	1.570					0.095
31.....					0.475		0.215					0.515
Totals.	3.880	2.495	3.300	2.855	4.935	5.685	3.790	3.440	3.105	0.390	6.315	4.360

Total rainfall during the year, 4.455 inches, being an average of two gauges located at Mystic Lake and Mystic Reservoir.

**TABLE XIV.**  
*Monthly Rainfall in Inches, during 1897, at Various Places in Eastern Massachusetts.*

PLACE.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Framingham .....	4.14	2.85	3.43	2.85	4.46	4.44	5.34	2.95	2.51	0.41	6.45	5.06	44.89
Dam 4, Ashland .....	3.87	2.97	3.89	2.79	4.28	4.47	5.55	4.07	3.36	0.53	6.36	5.85	47.49
Cordaville .....	3.93	2.93	4.30	2.76	4.43	5.64	4.10	3.96	3.15	0.36	6.77	5.78	48.11
Lake Cochituate .....	4.23	2.86	3.60	2.78	4.25	4.28	4.80	3.26	2.56	0.89	6.47	4.81	44.79
Chestnut Hill .....	4.09	2.79	3.08	3.23	4.40	4.53	4.38	4.68	3.22	0.53	6.74	4.50	46.17
Mystic Lake .....	3.81	2.62	3.34	3.11	5.05	5.82	4.24	3.35	3.26	0.44	6.74	4.80	46.58
Winchester .....	3.95	2.37	3.26	2.60	4.82	5.55	3.34	3.53	2.95	0.34	5.89	3.92	42.52
Mystic Pumping Station .....	3.41	2.56	3.18	3.10	4.84	5.74	3.17	4.05	3.16	0.44	6.90	4.79	45.34
Boston Pipe-yard .....	3.06	2.92	2.64	3.08	3.55	4.20	4.38	4.51	3.29	0.30	6.74	5.14	43.81
Cambridge Observatory .....	4.01	2.53	2.92	2.70	3.78	5.98	4.06	4.47	3.00	0.40	6.45	3.47	43.77
Waltham, Boston Manufacturing Company .....	4.16	2.64	3.44	2.79	4.64	5.18	3.70	3.54	2.45	0.23	6.76	4.33	43.86
Lowell, Locks and Canals Company .....	4.35	2.96	4.14	2.35	4.94	6.11	4.62	5.63	3.04	0.59	6.49	5.32	50.44
Average of above twelve places .....	3.92	2.75	3.44	2.84	4.45	5.16	4.31	4.00	3.00	0.45	6.56	4.77	45.65

TABLE XV.

Table Showing the Temperature of Air and Water of Various Stations on the Water-works.

1897.	TEMPERATURE OF AIR.						TEMPERATURE OF WATER.	
	Chestnut Hill Reservoir.			Framingham.			Brookline Reservoir.	Mystic Engine-House.
	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Mean.	Mean.
January .....	58.0	0.5	27.5	56.0	-3.0	27.1	37.1	37.0
February .....	50.0	1.0	28.7	49.0	-2.0	28.4	37.1	36.8
March.....	57.0	3.5	35.9	62.0	3.0	37.2	38.3	36.7
April.....	83.0	19.0	49.4	84.0	20.0	51.0	48.3	45.1
May .....	80.5	36.5	58.5	83.0	35.0	60.2	59.3	59.1
June .....	87.0	42.5	62.6	87.0	43.0	63.6	64.8	64.3
July .....	94.0	52.0	72.5	94.0	53.0	73.9	73.8	73.9
August .....	87.0	47.0	69.1	85.0	45.0	68.1	72.3	72.6
September.....	93.0	35.0	62.6	92.0	35.0	62.3	68.3	67.7
October.....	87.0	23.5	53.3	87.0	21.0	51.9	58.1	56.6
November .....	67.5	6.5	40.5	65.0	8.0	40.2	46.3	46.4
December.....	62.0	-1.0	31.8	60.0	-3.0	32.0	38.2	38.6

**TABLE XVI.**  
*Rainfall, in Inches, on Cochituate Water-shed, 1863 to 1897.*

YEAR.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.	4 months, July-Oct.
1863.....	4.10	4.38	3.57	11.34	2.66	1.98	14.12	5.61	3.30	4.56	8.54	5.05	69.30	27.68
1864.....	3.37	0.98	8.44	4.02	2.84	0.58	1.06	3.56	1.52	6.50	5.45	4.28	42.60	12.64
1865.....	4.99	4.45	5.48	2.18	8.25	0.91	3.10	3.36	1.66	6.99	4.78	3.31	49.46	15.11
1866.....	1.44	5.80	3.92	1.94	6.46	4.80	13.35	3.98	8.36	3.43	4.52	4.32	62.32	29.12
1867.....	2.76	5.40	5.65	2.43	6.46	2.95	5.36	12.36	1.08	7.27	2.63	1.90	56.25	26.07
1868.....	3.70	1.18	2.51	5.61	8.12	2.95	2.16	7.38	7.69	1.19	6.77	0.45	49.71	18.42
1869.....	3.71	7.07	7.52	2.57	7.59	3.68	2.63	2.34	8.49	9.50	3.26	5.98	64.34	22.96
1870.....	7.85	4.68	6.04	8.81	3.14	4.05	3.10	2.03	0.64	7.96	4.40	3.19	55.89	13.73
1871.....	1.81	2.30	5.02	2.29	5.66	5.96	2.20	3.56	1.46	5.38	7.01	3.24	45.89	12.00
1872.....	1.86	1.37	3.06	1.74	3.24	4.27	5.55	9.76	6.29	3.69	4.22	3.42	48.47	25.29
1873.....	4.24	2.43	3.98	2.69	3.24	0.38	4.08	7.17	2.62	6.11	4.54	3.95	45.43	19.98
1874.....	2.96	2.90	1.19	6.36	3.40	4.79	3.16	4.83	1.55	1.04	2.05	1.70	35.93	10.58
1875.....	2.42	3.15	3.74	3.23	3.56	6.24	3.57	5.53	3.43	4.85	4.83	0.94	45.49	17.38
1876.....	1.83	4.21	7.43	3.24	2.80	1.60	9.49	2.19	3.98	2.00	6.59	3.13	48.49	17.66
1877.....	3.19	0.53	7.79	3.24	3.73	2.64	2.77	3.35	0.46	8.14	6.94	1.02	43.80	14.72
1878.....	5.77	5.93	4.20	5.63	0.83	3.33	3.47	6.94	1.12	5.15	6.09	5.12	53.58	16.68
1879.....	2.00	3.05	3.90	4.69	1.20	4.14	3.38	6.43	1.74	0.90	2.98	3.60	38.01	12.45
1880.....	3.07	5.05	2.83	2.94	1.98	1.25	7.00	3.81	1.69	2.95	1.70	2.56	35.83	15.45

TABLE XVI. — *Concluded.*  
*Rainfall collected, in Inches, on Cochituate Water-shed, 1863 to 1897.*

YEAR.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.	4 months, July-Oct.
1881.....	5.56	4.43	4.79	1.71	3.18	4.83	2.78	1.13	2.13	2.87	3.85	3.83	41.09	8.91
1882.....	5.93	3.96	2.76	1.89	4.73	1.87	3.49	1.14	9.20	2.22	0.93	2.17	40.29	16.95
1883.....	2.88	3.59	1.76	2.27	3.95	1.81	2.88	0.39	1.31	5.16	2.06	3.14	31.20	9.74
1884.....	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	12.40
1885.....	5.25	3.98	1.09	3.71	3.46	2.96	1.73	7.01	1.63	5.26	5.26	2.32	43.66	15.63
1886.....	6.53	6.86	3.46	2.00	2.97	1.21	3.30	3.75	3.20	3.16	4.76	5.77	46.97	13.41
1887.....	5.29	5.94	5.10	4.45	1.02	2.58	3.77	3.70	1.28	2.49	2.76	3.80	41.58	11.24
1888.....	4.13	3.55	5.60	2.51	4.63	2.07	1.67	6.32	8.81	4.95	7.03	5.66	56.93	21.75
1889.....	5.46	1.56	2.28	3.19	3.64	3.17	9.10	4.57	4.92	3.85	5.79	2.70	50.23	22.44
1890.....	2.34	3.21	7.35	2.51	5.31	1.78	2.31	3.34	6.47	10.11	1.24	5.26	51.23	22.23
1891.....	6.67	5.02	5.49	3.62	1.67	3.78	2.99	4.91	2.12	4.14	2.84	3.17	46.42	14.16
1892.....	4.78	2.80	4.12	0.78	5.46	3.23	3.47	3.79	2.87	1.42	5.14	1.18	39.04	11.55
1893.....	2.61	7.26	3.13	3.21	5.45	2.75	2.40	5.86	1.76	3.74	2.08	5.03	45.28	13.76
1894.....	3.95	3.89	1.16	3.27	3.70	1.61	3.61	2.57	2.27	5.14	3.53	4.38	39.08	13.59
1895.....	3.93	1.70	3.11	5.03	2.03	3.12	4.71	3.96	2.77	9.57	6.32	2.71	48.96	21.01
1896.....	2.43	6.70	5.20	1.60	2.27	3.04	2.22	2.43	8.21	3.53	3.00	2.15	42.78	16.39
1897.....	4.23	2.86	3.60	2.78	4.25	4.28	4.80	3.26	2.56	0.89	6.47	4.81	44.79	11.51
Totals.....	136.93	136.61	150.77	123.28	135.80	104.47	149.20	156.81	119.58	158.70	152.69	120.55	1,645.39	584.29
Averages....	3.91	3.90	4.31	3.52	3.88	2.98	4.26	4.48	3.42	4.53	4.36	3.44	47.01	16.69

**TABLE XVII.**  
*Rainfall collected, in Inches, on Cochituate Water-shed, 1863 to 1897.*

YEAR.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.	4 months, July-Oct.
1863	1.93	3.11	3.71	4.42	1.44	0.67	2.97	1.51	0.98	1.32	2.65	2.17	26.88	6.78
1864	2.39	1.56	4.05	2.65	1.62	0.49	0.41	0.68	0.49	1.43	1.25	1.33	18.35	3.01
1865	2.15	1.74	4.66	2.70	4.70	0.34	0.46	0.47	0.45	0.70	1.00	1.13	20.50	2.08
1866	0.73	2.84	1.76	1.63	1.29	1.10	1.20	0.64	1.34	0.93	0.99	1.56	16.01	4.11
1867	1.10	6.24	3.50	2.87	2.20	0.65	0.59	2.10	0.31	1.02	1.10	1.12	21.80	4.02
1868	1.22	1.12	3.84	3.48	6.17	1.59	0.45	1.18	1.85	0.95	1.96	1.17	24.98	4.43
1869	1.82	1.84	3.31	2.49	2.20	1.07	0.74	0.58	1.10	2.37	1.30	3.17	21.99	4.79
1870	4.71	3.93	3.38	6.87	1.66	0.97	0.53	0.41	0.86	1.11	0.88	0.77	26.08	2.91
1871	1.03	2.28	2.53	1.58	2.00	0.87	0.43	0.85	0.39	0.69	1.30	1.21	15.16	2.36
1872	1.15	0.93	1.41	3.08	1.10	1.49	0.14	1.32	1.70	1.69	2.00	1.21	17.22	4.85
1873	3.09	1.57	3.89	6.09	2.66	0.45	0.62	1.40	0.78	2.04	1.86	2.63	27.13	4.84
1874	3.55	2.19	1.84	3.19	2.78	1.96	0.95	0.92	0.53	0.52	0.58	0.51	19.52	2.92
1875	0.13	1.92	2.66	3.15	1.39	1.48	0.25	0.62	0.60	1.19	1.96	1.22	17.57	2.66
1876	1.09	1.78	5.19	4.20	1.43	0.51	0.84	0.29	0.88	0.49	1.85	0.99	19.54	2.50
1877	1.20	1.37	6.81	3.24	2.04	0.92	0.65	0.67	0.46	1.16	2.69	1.96	23.17	2.94
1878	3.25	3.97	5.40	2.86	1.66	0.76	0.47	0.84	0.29	0.73	2.07	4.04	26.34	2.33
1879	1.29	2.32	3.30	4.48	1.40	0.77	0.33	0.95	0.61	0.60	0.72	1.04	17.81	2.49
1880	1.47	2.24	1.79	1.57	0.44	0.06	0.33	0.32	0.24	0.49	0.83	0.61	10.30	1.29

**TABLE XVII.**—*Concluded.*  
*Rainfall collected, in Inches, on Cochituate Water-shed, 1863 to 1897.*

YEAR.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.	4 months, July-Oct.
1861	1.19	2.23	5.66	1.79	1.26	1.31	0.16	0.09	0.23	0.18	0.84	1.40	16.34	0.66
1862	1.84	3.00	3.67	0.93	1.55	0.62	0.06	0.07	0.97	0.84	0.58	0.92	15.05	1.94
1863	0.84	1.59	2.04	1.66	1.26	0.07	0.02	0.07	0.62	0.59	0.41	0.94	10.11	1.30
1864	1.84	2.86	4.67	4.00	1.39	0.67	0.26	0.61	0.13	0.34	0.62	1.82	19.21	1.34
1865	1.90	2.00	2.21	2.36	1.61	0.43	0.00	0.33	0.25	0.79	2.05	1.64	15.57	1.37
1866	2.28	7.93	3.51	2.52	1.09	0.18	0.25	0.14	0.30	0.42	1.20	2.10	21.92	1.11
1867	4.06	4.34	4.70	3.36	1.85	0.82	0.72	1.33	0.64	0.49	0.70	0.96	23.47	3.18
1868	1.13	2.77	4.76	3.45	2.37	0.53	0.47	0.94	2.31	2.57	4.21	5.46	30.97	6.29
1869	4.50	1.85	2.08	2.17	1.20	1.18	1.63	3.43	1.79	1.91	2.95	3.26	27.95	8.76
1870	1.92	2.04	5.87	2.23	1.85	1.41	0.33	0.46	1.40	3.40	1.49	2.11	24.51	5.59
1871	6.26	6.62	8.03	4.31	0.88	0.77	0.50	0.72	0.76	0.79	0.83	1.60	32.07	2.77
1872	3.18	1.64	3.12	0.90	2.03	0.49	0.33	0.56	0.60	0.57	1.09	0.84	15.35	2.06
1873	0.64	2.55	4.12	2.42	1.83	0.75	0.38	0.77	0.42	1.09	1.00	1.68	17.65	2.66
1874	1.27	1.69	2.55	2.15	0.91	0.45	0.38	0.41	0.46	0.66	0.92	1.14	12.99	1.91
1875	1.58	0.75	3.50	3.35	0.97	0.40	0.55	0.50	0.69	1.97	3.51	2.40	20.17	3.71
1876	1.72	3.69	5.52	2.01	0.62	0.71	0.37	0.47	1.03	1.28	1.39	1.30	20.14	3.15
1877	1.64	1.65	3.22	1.85	1.39	1.19	0.75	0.63	0.46	0.43	1.69	2.16	17.05	2.27
Totals.....	71.09	92.15	132.26	102.01	61.74	28.14	19.52	27.19	26.92	37.75	52.47	59.62	710.37	111.38
Averages.....	2.03	2.63	3.78	2.91	1.76	1.80	0.56	0.78	0.77	1.08	1.50	1.70	20.31	3.18



TABLE XVIII.

Percentage of Rainfall collected on Cochituate Water-shed, 1863 to 1897.

YEAR.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly.	4 months, July-Oct.
1863	47.0	71.0	104.0	39.0	54.0	34.0	21.0	27.0	29.0	29.0	31.0	43.0	38.8	24.5
1864	71.0	159.0	48.0	66.0	57.0	84.0	39.0	19.0	32.0	22.0	23.0	31.0	43.0	23.8
1865	43.0	39.0	85.0	124.0	57.0	37.0	15.0	14.0	27.0	10.0	21.0	34.0	41.4	13.8
1866	51.0	49.0	45.0	84.0	20.0	23.0	9.0	16.0	16.0	27.0	22.0	36.0	25.7	14.1
1867	40.0	97.0	62.0	118.0	34.0	22.0	11.0	17.0	29.0	14.0	42.0	59.0	38.7	15.4
1868	33.0	95.0	153.0	62.0	76.0	54.0	21.0	16.0	24.0	80.0	29.0	261.0	50.2	24.9
1869	49.0	26.0	44.0	97.0	29.0	29.0	28.0	25.0	13.0	25.0	40.0	53.0	34.2	20.9
1870	60.0	84.0	56.0	78.0	53.0	24.0	17.0	20.0	134.0	14.0	20.0	24.0	46.7	21.2
1871	79.0	99.0	50.4	68.8	35.3	14.6	19.6	23.8	26.8	12.8	18.5	37.4	33.4	18.7
1872	61.8	67.8	46.0	177.3	33.8	34.8	2.6	13.5	27.0	45.7	47.4	35.3	35.5	19.2
1873	72.9	64.8	97.8	236.4	82.2	119.1	15.1	19.5	29.8	33.4	40.9	67.9	59.8	24.2
1874	120.0	75.5	154.7	50.2	81.7	40.8	30.0	19.1	34.3	50.3	28.4	29.9	54.3	27.6
1875	5.5	92.8	71.2	97.5	39.9	23.7	7.1	11.2	17.4	24.6	40.5	129.8	38.6	15.3
1876	59.3	42.4	69.9	129.7	50.9	31.6	8.9	13.3	22.2	24.3	28.1	31.5	40.3	14.2
1877	37.6	258.9	87.4	100.0	54.6	34.8	23.3	19.6	99.8	14.3	38.8	192.6	52.9	20.0
1878	56.3	66.9	128.6	50.7	200.0	23.2	13.5	12.0	25.8	14.3	34.0	78.8	49.2	14.0
1879	64.4	76.3	84.5	95.6	117.0	18.6	9.7	14.7	35.0	66.5	24.2	28.9	46.9	20.0
1880	47.9	55.3	63.3	53.3	22.2	4.5	4.7	6.1	14.3	16.6	48.9	23.8	28.7	8.3

**TABLE XVIII.**—*Concluded.*  
*Percentage of Rainfall collected on Cochituate Water-shed, 1863 to 1897.*

YEAR.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.	4 months, July-Oct.
1881.....	21.5	50.3	118.1	104.8	39.6	27.0	5.8	7.6	10.8	6.4	21.8	36.7	39.8	7.4
1882.....	31.0	75.9	133.0	49.3	32.8	33.1	1.7	6.2	10.5	37.9	62.4	42.3	37.4	12.1
1883.....	29.2	44.3	115.8	73.1	31.9	3.7	0.6	18.6	47.4	11.5	20.0	29.8	32.4	13.3
1884.....	41.8	47.4	103.9	105.1	47.5	17.3	5.0	13.6	14.9	13.1	26.7	34.2	42.2	10.8
1885.....	36.1	50.2	202.7	63.6	46.7	14.4	0.0	4.8	15.5	15.0	39.0	70.7	35.7	8.8
1886.....	36.6	107.3	101.9	154.3	43.0	35.5	11.1	7.8	10.7	13.4	21.7	29.7	49.7	8.3
1887.....	60.2	80.8	72.0	81.3	112.0	47.3	13.2	27.1	32.0	18.7	23.4	25.6	47.8	23.3
1888.....	27.5	78.0	85.0	137.3	51.2	25.8	28.1	14.9	26.2	51.9	59.9	96.4	54.4	28.9
1889.....	82.5	118.7	91.5	68.1	32.9	37.1	17.9	75.0	36.4	49.6	50.9	120.9	55.6	39.0
1890.....	82.0	63.4	79.9	88.9	34.9	79.1	14.2	13.9	21.6	33.7	120.0	40.2	47.9	25.1
1891.....	93.8	131.9	146.3	119.1	52.8	20.4	16.7	14.7	35.9	19.0	29.2	50.5	69.1	19.6
1892.....	66.6	58.5	75.7	115.5	37.1	15.3	9.5	14.7	21.1	40.2	21.2	71.1	39.3	17.8
1893.....	24.5	35.1	131.7	75.7	33.5	27.2	15.9	13.2	23.9	28.8	48.4	33.4	30.0	19.3
1894.....	32.3	43.5	219.7	65.8	24.6	27.9	10.4	16.1	20.0	12.8	26.1	26.1	33.3	14.1
1895.....	40.1	44.2	112.4	66.5	47.8	13.0	11.8	12.6	25.0	20.6	55.5	88.6	41.2	17.5
1896.....	70.9	55.0	106.2	125.8	27.5	23.5	16.9	19.4	12.5	36.4	46.5	60.6	47.1	21.3
1897.....	38.7	57.8	89.4	66.5	32.8	27.8	15.7	19.2	17.8	48.6	26.0	44.8	38.1	25.3
<b>Totals.....</b>	<b>1,814.0</b>	<b>2,662.0</b>	<b>3,436.0</b>	<b>3,278.2</b>	<b>1,826.2</b>	<b>1,128.1</b>	<b>490.9</b>	<b>606.2</b>	<b>1,018.6</b>	<b>981.4</b>	<b>1,276.4</b>	<b>2,098.5</b>	<b>1,508.3</b>	<b>656.1</b>
<b>Averages.....</b>	<b>51.8</b>	<b>76.1</b>	<b>98.2</b>	<b>93.7</b>	<b>52.2</b>	<b>32.2</b>	<b>14.0</b>	<b>17.3</b>	<b>29.1</b>	<b>28.0</b>	<b>36.5</b>	<b>60.0</b>	<b>43.1</b>	<b>18.7</b>

WATER DEPARTMENT.

TABLE XIX.

Rainfall, in Inches, on Sudbury-river Water-shed, 1875 to 1897.

YEAR.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.	4 months, July-Oct.
1875.....	2.420	3.150	3.740	3.230	3.560	6.240	3.570	5.530	3.430	4.850	4.830	0.940	45.490	17.380
1876.....	1.830	4.210	7.430	4.197	2.763	2.040	9.134	1.720	4.614	2.241	5.764	3.620	49.663	17.709
1877.....	3.916	0.759	3.435	3.435	3.792	2.435	2.951	3.682	0.323	8.515	5.803	0.870	44.018	15.471
1878.....	5.632	5.973	4.059	5.730	0.956	3.864	2.571	6.937	1.291	6.417	7.024	6.367	57.331	17.616
1879.....	2.478	3.562	5.140	4.716	1.579	3.789	3.353	6.509	1.878	0.809	2.682	4.344	41.419	13.129
1880.....	3.666	3.980	3.315	3.105	1.836	2.138	3.273	4.008	1.603	3.740	1.785	2.828	38.177	15.624
1881.....	5.558	4.646	5.730	2.000	3.511	5.395	2.350	1.358	2.617	2.955	4.091	3.958	44.169	9.280
1882.....	5.951	4.546	2.649	1.824	5.066	1.664	1.769	1.667	8.741	2.074	1.147	2.296	39.394	14.251
1883.....	2.810	3.865	1.780	1.845	4.185	2.400	2.680	0.735	1.520	5.000	1.810	3.550	32.780	10.535
1884.....	5.085	6.545	4.720	4.405	3.470	3.445	3.665	4.650	0.855	2.480	2.645	5.170	47.135	11.650
1885.....	4.710	3.865	1.070	3.005	3.485	2.865	1.425	7.185	1.425	5.095	6.095	4.720	43.545	15.130
1886.....	6.365	6.280	3.610	2.224	2.995	1.465	3.265	4.100	2.905	3.235	6.645	4.975	46.065	13.505
1887.....	5.200	4.780	4.900	4.265	1.165	2.650	3.760	5.280	1.320	2.835	2.670	3.880	42.705	13.195
1888.....	4.150	3.685	6.020	2.425	4.825	2.535	1.405	6.225	8.585	4.990	7.224	5.395	57.465	21.205
1889.....	5.370	1.635	2.365	3.410	2.945	2.800	8.640	4.175	6.005	4.255	6.290	3.140	49.050	21.975
1890.....	7.530	3.505	7.735	2.645	5.210	2.030	2.460	3.865	6.000	10.510	1.200	5.310	53.000	22.835
1891.....	7.020	5.235	6.475	3.905	2.010	3.770	3.295	4.725	2.380	3.830	3.090	3.685	49.530	14.330
1892.....	5.850	3.140	4.060	0.830	5.585	2.760	4.230	4.440	2.840	1.170	5.800	1.125	41.830	12.680
1893.....	2.925	8.195	3.670	3.605	6.610	2.380	2.570	5.415	1.735	4.065	2.135	4.860	48.225	13.785
1894.....	4.090	3.910	1.435	3.415	2.335	1.155	3.235	2.030	2.635	5.345	3.425	4.810	39.740	13.265
1895.....	4.060	1.395	2.980	5.250	2.020	2.770	5.040	4.150	2.300	10.680	6.625	3.350	50.620	22.170
1896.....	2.390	7.180	5.235	1.570	2.575	3.220	2.510	2.395	7.720	3.765	3.020	2.125	43.705	16.390
1897.....	4.005	2.910	3.660	2.820	4.370	4.455	5.445	3.510	2.935	0.470	6.405	5.205	46.190	12.360
Totals.....	97.211	96.951	100.765	74.517	78.638	68.275	86.996	94.291	74.257	99.926	96.266	84.523	1,052.636	355.470
Averages.....	4.227	4.215	4.381	3.240	3.420	2.968	3.782	4.100	3.239	4.344	4.185	3.675	45.767	15.455

TABLE XX.

Rainfall collected, in Inches, on Sudbury-river Water-shed, 1875 to 1897.

YEARS.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.	4 months, July-Oct.
1875.....	0.184	2.411	2.862	5.263	2.119	1.501	0.573	0.706	0.358	1.152	2.248	1.041	20.418	2 789
1876.....	1.147	2.282	7.911	5.683	2.031	0.383	0.326	0.723	0.318	0.417	1.878	0.809	23.908	1.764
1877.....	1.174	1.529	8.586	4.132	2.482	1.031	0.360	0.216	0.103	1.127	2.447	2.300	25.487	1.806
1878.....	3.228	3.972	6.256	2.807	2.487	0.873	0.229	0.848	0.277	0.921	2.922	5.667	30.487	2.275
1879.....	1.249	2.756	4.156	5.379	1.987	0.713	0.281	0.705	0.243	0.126	0.355	0.823	18.775	1.355
1880.....	2.000	2.982	2.451	2.017	1.987	3.303	0.315	0.212	0.138	0.181	0.854	0.312	18.775	0.846
1881.....	0.740	3.871	7.142	2.669	1.721	2.309	0.493	0.264	0.340	0.331	0.682	1.383	20.565	1.428
1882.....	2.213	3.872	5.064	1.497	2.304	0.913	0.303	0.099	0.529	0.534	0.362	0.561	18.102	1.316
1883.....	0.597	1.664	2.873	2.330	1.673	0.518	0.206	0.140	0.157	0.381	0.354	0.345	11.188	0.345
1884.....	1.775	4.743	6.752	4.925	1.838	0.719	0.309	0.458	0.076	0.148	0.302	1.650	23.784	1.081
1885.....	2.202	2.182	2.805	3.133	2.383	0.735	0.111	0.429	0.209	0.589	2.033	2.094	18.316	0.845
1886.....	2.606	7.734	3.672	3.361	1.285	0.350	0.206	0.168	0.203	0.260	1.161	1.819	22.825	0.887
1887.....	4.619	4.358	5.116	4.522	1.799	0.714	0.204	0.382	0.191	0.353	0.636	1.147	24.227	1.116
1888.....	1.878	3.255	5.775	4.566	2.912	0.728	0.209	0.677	1.994	3.566	4.761	5.428	35.749	6.446
1889.....	4.963	1.926	2.388	2.434	1.569	1.128	1.130	2.554	1.422	2.194	3.351	3.997	29.093	7.800
1890.....	2.237	2.463	6.498	3.236	2.437	0.980	0.191	0.235	0.790	4.053	2.097	1.776	26.993	5.269
1891.....	5.383	5.616	7.944	4.138	1.039	0.714	0.266	0.290	0.350	0.375	0.526	0.971	27.612	1.281
1892.....	3.335	1.574	3.488	1.504	2.245	0.739	0.382	0.500	0.396	0.224	1.204	0.865	16.456	1.502
1893.....	0.773	2.485	5.789	3.068	5.148	0.759	0.282	0.322	0.187	0.395	0.550	1.421	21.774	1.186
1894.....	1.236	1.596	3.992	2.832	1.498	0.722	0.287	0.373	0.258	0.668	1.442	1.277	16.182	1.586
1895.....	1.844	0.871	4.299	4.841	1.134	0.301	0.411	0.409	0.153	2.460	4.794	3.179	24.196	3.433
1896.....	1.833	4.466	6.841	2.579	0.641	0.689	0.170	0.102	0.669	1.055	1.137	1.171	21.453	1.996
1897.....	1.507	1.718	4.575	2.615	1.632	1.661	1.174	1.053	0.315	0.168	1.570	2.827	20.845	2.710
Totals.....	48.824	69.145	117.235	79.631	45.276	19.484	8.359	11.865	9.676	21.624	37.166	42.865	511.150	51.524
Averages.....	2.123	3.006	50.97	3.462	1.968	0.847	0.363	0.516	0.421	0.940	1.616	1.864	22.224	2.240

TABLE XXI.

Percentage of Rainfall collected on Sudbury-river Water-shed,  
1875 to 1897.

YEAR.	January.	February.	March.	April.	May.	June.	July.	August.	Septem <sup>r</sup> er.	October.	November.	December.	Yearly.	4 months, July-Oct.
1875 .....	7.6	76.5	76.5	162.9	59.5	24.0	16.0	12.8	10.4	23.8	46.5	110.7	44.9	16.0
1876 .....	62.7	54.2	106.5	135.4	73.5	18.8	3.6	42.0	6.9	18.6	32.6	22.3	48.2	10.1
1877 .....	36.5	206.9	102.7	120.3	67.0	42.5	12.2	5.9	31.9	13.2	42.2	264.4	57.9	11.7
1878 .....	57.3	66.5	133.4	48.5	260.2	22.5	7.7	12.2	21.5	14.3	41.6	89.0	52.6	12.9
1879 .....	50.4	77.4	80.9	114.1	125.8	18.8	7.1	10.8	12.9	15.6	13.2	19.0	45.3	10.3
1880 .....	56.0	74.9	73.9	65.0	50.0	14.2	5.0	5.3	8.6	4.8	19.9	11.0	31.9	5.4
1881 .....	13.3	53.6	124.6	133.4	49.0	42.8	21.0	19.4	13.0	11.2	16.7	34.9	46.6	15.4
1882 .....	37.2	85.2	191.2	82.1	45.5	54.9	8.7	5.9	6.0	25.7	31.5	24.5	45.9	9.2
1883 .....	21.2	43.0	161.4	126.3	40.0	21.6	7.7	19.1	10.4	5.9	19.5	9.7	34.1	7.9
1884 .....	34.9	72.5	143.1	111.8	53.0	20.9	10.9	9.8	8.9	6.0	11.4	31.9	50.5	9.3
1885 .....	46.8	56.4	262.1	86.9	68.4	25.7	7.8	6.0	14.7	11.8	33.3	77.0	43.4	8.9
1886 .....	40.9	123.2	101.7	151.1	42.9	23.9	6.3	4.1	7.0	8.0	25.0	36.6	49.5	6.2
1887 .....	88.8	95.3	104.4	106.0	154.5	26.9	5.5	7.2	14.5	12.0	23.8	29.6	56.7	8.5
1888 .....	45.3	88.3	95.9	188.3	60.3	28.7	14.9	10.9	23.2	71.4	65.9	100.6	62.2	30.4
1889 .....	92.4	116.4	100.9	71.4	53.3	40.3	12.6	61.2	30.9	51.6	53.3	127.3	58.2	33.2
1890 .....	88.4	70.3	84.0	122.3	46.8	48.3	7.8	6.1	13.2	38.6	174.7	33.5	50.9	23.1
1891 .....	76.7	107.3	122.7	106.0	51.7	18.9	7.8	6.1	14.7	9.8	17.0	26.3	55.8	8.9
1892 .....	57.0	50.1	85.9	181.1	40.2	26.8	9.0	11.3	13.9	19.2	20.7	76.9	39.3	11.8
1893 .....	26.4	30.3	157.7	101.7	77.8	31.9	11.0	5.9	10.8	9.7	25.1	29.2	45.2	8.6
1894 .....	30.2	40.8	278.2	82.9	35.4	62.6	8.8	18.4	9.8	12.5	42.1	26.5	40.7	12.0
1895 .....	45.4	62.5	144.2	82.7	56.1	10.8	8.2	9.9	6.7	23.0	72.4	94.9	47.8	15.5
1896 . ...	80.9	62.2	130.7	164.3	24.9	21.4	6.8	4.3	8.7	28.0	37.7	55.1	49.1	11.9
1897 .....	37.6	59.0	125.0	92.7	37.3	37.3	21.6	30.0	10.7	35.7	24.5	54.3	45.1	21.9
Totals.	1133.9	1772.8	2987.6	2637.2	1573.1	684.5	228.0	324.6	309.3	470.4	890.6	1385.2	1101.8	309.1
Aver's.	49.3	77.1	129.9	114.7	68.4	29.8	9.9	14.1	13.4	20.5	39.0	60.2	47.9	13.5

**TABLE XXII.**  
*Rainfall, in Inches, on Mystic Water-shed, 1878 to 1897.*

YEAR.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.	4 months, July-Oct.
1878.....	5.67	5.74	3.93	5.73	0.67	2.62	3.52	7.51	3.19	4.95	5.69	4.845	54.065	19.17
1879.....	1.82	2.73	3.52	4.65	1.86	3.93	2.39	5.48	1.60	0.77	2.76	3.74	35.30	10.34
1880.....	2.62	4.23	2.49	2.18	2.02	1.49	7.23	3.64	1.42	2.70	1.90	2.50	34.42	14.99
1881.....	5.82	3.63	6.69	1.54	2.98	6.84	2.00	0.67	2.17	2.16	3.52	3.29	41.91	7.00
1882.....	5.545	4.68	2.49	2.11	4.58	2.09	2.34	1.065	8.35	1.94	1.745	2.23	39.165	13.695
1883.....	2.07	3.065	2.22	2.47	3.585	1.635	2.785	0.87	1.495	5.45	1.98	2.995	31.22	10.60
1884.....	4.745	6.085	4.255	3.18	2.95	4.635	3.72	4.865	0.70	2.70	2.005	4.56	44.39	11.975
1885.....	4.83	3.40	1.175	3.445	3.945	4.41	2.04	5.90	1.425	5.52	6.31	2.10	44.50	14.885
1886.....	6.315	7.175	3.84	2.10	2.945	1.54	3.71	3.24	2.955	2.85	4.065	4.825	45.360	12.755
1887.....	5.245	4.47	5.00	4.605	1.69	2.695	6.585	4.965	1.50	3.04	3.05	3.575	46.42	16.090
1888.....	4.05	3.28	5.185	2.84	5.095	2.20	2.23	6.23	8.56	4.955	6.85	5.27	56.745	21.975
1889.....	5.505	1.86	2.285	3.61	4.64	3.315	8.455	3.92	4.705	3.89	5.65	2.86	50.395	20.67
1890.....	2.725	3.38	6.68	2.405	6.30	3.38	2.265	3.64	3.70	8.84	1.385	4.67	49.37	18.445
1891.....	6.245	5.075	6.07	3.15	2.46	4.43	3.18	3.88	2.16	4.735	2.605	3.41	47.40	13.955
1892.....	4.515	3.015	4.005	0.815	5.585	4.15	2.575	4.82	2.005	1.835	4.645	1.15	39.115	11.235
1893.....	2.26	7.50	2.55	3.37	6.26	2.10	2.04	5.41	2.01	4.10	2.25	4.35	44.20	13.56
1894.....	3.93	3.31	1.09	3.48	5.18	0.72	3.45	2.52	2.52	5.58	3.49	3.97	39.24	14.07

1895.....	3.535	0.655	3.00	4.185	3.150	3.630	4.345	5.435	2.040	10.195	7.260	2.300	48.73	22.015
1896.....	2.365	5.085	4.550	1.775	2.010	2.345	2.420	2.610	7.885	3.220	3.320	2.330	29.90	16.135
1897.....	3.880	2.405	3.300	2.855	4.935	5.685	3.790	3.440	3.105	0.390	6.315	4.360	44.350	10.725
Total.....	84.280	80.800	74.325	60.495	72.840	63.890	71.670	80.100	63.495	79.520	75.795	69.330	876.395	294.785
Averages.....	4.214	4.043	3.716	3.025	3.642	3.195	3.584	4.005	3.175	3.976	3.790	3.467	43.820	14.739

TABLE XXIII.

*Rainfall collected, in Inches, on Mystic Water-shed, 1878 to 1897.*

YEAR.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Totals.	4 months, July-Oct.
1878 .....	3.55	3.97	4.91	2.21	2.16	0.78	0.48	1.11	0.56	0.71	1.75	3.63	25.82	2.86
1879 .....	1.21	2.33	3.31	3.97	1.95	0.97	0.54	0.70	0.48	0.34	0.45	0.69	16.94	2.06
1880 .....	1.70	2.54	1.95	1.50	0.96	0.51	0.67	0.54	0.45	0.36	0.44	0.59	12.21	2.02
1881 .....	0.82	2.14	6.79	2.17	1.51	2.05	0.87	0.35	0.31	0.29	0.50	0.87	18.67	1.82
1882 .....	1.37	3.03	4.19	1.16	1.85	0.81	0.35	0.22	0.53	0.58	0.39	0.57	15.05	1.68
1883 .....	0.70	1.43	1.88	1.63	1.20	0.52	0.30	0.22	0.18	0.39	0.42	0.44	9.31	1.09
1884 .....	1.49	3.89	5.42	3.85	1.48	0.85	0.58	0.60	0.23	0.27	0.35	1.17	20.18	1.68
1885 .....	1.79	1.81	2.05	2.03	2.18	0.86	0.47	0.54	0.34	0.68	2.41	2.39	17.55	2.03
1886 .....	2.31	7.70	3.91	3.24	1.27	0.55	0.41	0.25	0.32	0.38	0.88	1.43	22.65	1.36
1887 .....	3.16	3.61	3.60	3.75	1.89	1.27	0.87	1.35	0.48	0.57	0.71	0.91	22.17	3.27
1888 .....	1.43	3.32	4.28	3.27	2.88	0.84	0.39	0.54	1.31	2.74	5.04	5.08	31.12	4.98
1889 .....	4.51	1.83	1.60	2.27	2.18	1.89	1.33	2.05	1.06	1.21	2.49	3.06	25.48	5.65
1890 .....	2.07	2.23	5.37	2.93	3.00	1.92	0.43	0.46	0.58	2.61	1.95	2.49	26.04	4.08
1891 .....	6.29	5.97	7.21	3.43	1.40	1.01	0.42	0.44	0.42	0.58	0.56	0.87	28.60	1.86
1892 .....	2.49	1.76	3.03	1.33	2.10	1.17	0.66	0.49	0.56	0.45	1.07	0.87	15.98	2.16
1893 .....	0.75	2.14	4.52	2.72	4.42	1.04	0.47	0.69	0.41	0.55	0.71	1.27	19.69	2.12
1894 .....	1.37	1.87	3.05	2.27	1.31	0.91	0.49	0.38	0.36	0.58	0.91	0.90	14.40	1.81
1895 .....	1.55	0.87	3.16	2.95	1.14	0.54	0.60	0.80	0.36	1.46	2.37	2.12	17.91	3.22
1896 .....	1.85	3.40	4.50	3.26	0.77	0.75	0.39	0.34	1.06	0.89	1.11	1.24	19.55	2.68
1897 .....	1.40	1.40	3.46	2.15	1.83	2.19	0.50	0.95	0.41	0.39	1.02	1.96	17.64	2.25
Totals.	41.81	57.24	78.19	52.09	37.48	21.43	11.22	13.02	10.41	16.03	25.53	32.55	396.96	50.68
Averages,	2.09	2.86	3.91	2.60	1.87	1.07	0.56	0.65	0.52	0.80	1.28	1.63	19.85	2.53



TABLE XXIV.

*Percentage of Rainfall collected at Mystic Water-shed, 1878 to 1897.*

YEAR.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Yearly.	4 months. July-Oct.
1878.....	62.6	69.2	125.0	38.6	322.9	29.6	13.5	14.8	17.7	14.3	30.8	74.9	47.8	14.9
1879.....	66.6	85.4	93.9	85.3	104.9	24.5	22.6	12.8	29.7	44.2	16.2	18.6	48.0	20.1
1880.....	64.9	60.1	78.4	68.8	47.3	34.3	9.2	14.7	31.7	13.5	22.9	23.8	35.5	13.5
1881.....	14.2	58.9	101.5	141.1	50.7	29.9	33.3	51.9	14.1	13.6	14.3	26.3	44.5	23.9
1882.....	24.8	64.8	168.4	55.0	40.4	38.6	14.9	20.8	6.3	30.0	22.2	25.5	38.4	12.3
1883.....	26.1	46.7	84.8	65.9	33.5	31.8	10.8	23.7	12.1	7.2	21.1	14.7	29.8	10.3
1884.....	31.5	63.9	127.3	121.2	50.2	18.3	15.5	12.4	33.5	9.9	17.4	25.6	45.5	14.0
1885.....	37.1	53.3	174.5	58.8	55.3	19.6	22.8	9.2	23.7	12.2	38.2	113.6	39.4	13.6
1886.....	36.6	107.3	101.9	154.3	43.0	35.5	11.1	7.8	10.7	13.4	21.7	29.7	49.7	10.7
1887.....	60.2	80.8	72.0	81.3	112.0	47.3	13.2	27.1	32.0	18.7	23.4	25.6	47.8	20.3
1888.....	35.2	101.3	82.5	115.2	56.6	38.1	17.5	8.8	15.3	55.3	73.6	96.4	54.8	22.7
1889.....	81.8	98.2	70.2	63.0	46.9	57.0	15.8	22.2	22.5	33.7	44.1	107.0	50.6	27.3
1890.....	75.6	66.0	80.4	121.8	47.6	56.9	19.0	12.7	15.6	29.5	141.2	53.5	52.8	22.1
1891.....	100.7	117.6	118.7	109.0	57.0	22.8	13.3	11.3	19.3	12.1	21.7	25.6	60.3	13.3
1892.....	55.0	58.5	75.7	163.6	37.5	28.3	25.7	10.2	27.7	24.3	23.1	75.2	40.9	19.2
1893.....	33.3	28.6	177.3	80.7	70.6	49.5	23.2	12.6	20.5	13.4	31.5	29.1	44.5	15.6
1894.....	34.8	56.5	280.1	65.4	25.3	125.8	14.2	15.1	14.3	10.5	26.0	22.7	36.7	12.9
1895.....	43.7	132.2	105.2	70.6	36.0	15.0	13.8	14.7	17.6	14.4	37.8	92.2	36.8	15.1
1896.....	78.7	66.8	98.9	183.5	38.5	31.9	16.2	12.9	13.5	27.5	33.4	53.1	49.0	17.5
1897.....	36.0	56.1	104.7	75.1	37.0	38.5	13.1	27.6	13.1	99.2	16.2	47.1	39.8	20.9
Totals..	999.4	1472.2	2321.4	1918.2	1313.2	773.2	338.7	373.3	391.0	496.9	676.8	980.2	892.6	340.2
Averages,	49.97	73.61	116.07	95.91	65.66	38.66	16.94	18.77	19.55	24.85	33.84	49.01	44.63	17.01

**TABLE XXV.**

*Yield of Sudbury-river Water-shed, 1875-1897. Area of Water-shed used includes water surfaces.*

YEAR.	Rain-fall.		Daily Average Yield for Year.		Yield per Square Mile per Day.		Rain-fall.		Daily Average Yield July-Oct.		Yield per Square Mile per Day.		Minimum Monthly Yield.				Minimum Yield in any Week.				
	Inches.	Gallons.	Daily Average Yield for Year.	Gallons.	Yield per Square Mile per Day.	Rain-fall. July-Oct.	Gallons.	Daily Average Yield July-Oct.	Gallons.	Yield per Square Mile per Day.	Rain-fall. July-Oct.	Gallons.	Yield per Square Mile per Day.	Month.	Inches.	Daily Average Yield for Month.	Gallons.	Yield per Square Mile per Day.	Week.	Daily Average Yield for Week.	Gallons.
1875.....	45.490	75,599,200	75,599,200	30,650,400	394,100	17.380	30,650,400	30,650,400	394,100	2.420	8,000,000	102,900	January.....	2.420	8,000,000	102,900	.....	.....	.....	4,000,000	51,400
1876.....	49.563	88,278,400	1,135,200	19,603,300	252,100	17.709	19,603,300	252,100	.....	9.134	14,229,000	183,000	July.....	9.134	14,229,000	183,000	.....	.....	.....	1,800,000	23,100
1877.....	44.018	94,369,200	1,213,500	19,832,100	255,000	15.471	19,832,100	255,000	.....	0.323	4,633,300	59,600	September...	0.323	4,633,300	59,600	.....	.....	.....	5,300,000	68,200
1878.....	57.931	112,882,200	1,451,600	25,001,600	321,500	17.616	25,001,600	321,500	.....	2.971	9,983,900	128,400	July.....	2.971	9,983,900	128,400	.....	.....	.....	.....	.....
1879.....	41.419	69,942,200	894,000	14,974,000	191,400	13.129	14,974,000	191,400	.....	0.809	5,532,300	70,700	October.....	0.809	5,532,300	70,700	.....	.....	.....	.....	.....
1880.....	38.177	45,250,300	578,400	9,356,100	119,600	15.624	9,356,100	119,600	.....	1.603	6,280,000	80,300	September....	1.603	6,280,000	80,300	.....	.....	.....	.....	.....
1881.....	44.169	73,633,900	979,200	15,178,900	201,300	9.280	15,178,900	201,300	.....	1.358	11,135,500	148,100	August.....	1.358	11,135,500	148,100	.....	.....	.....	.....	.....
1882.....	39.394	64,812,300	861,900	13,977,200	185,900	14.251	13,977,200	185,900	.....	1.667	4,188,100	55,300	August.....	1.667	4,188,100	55,300	.....	.....	Aug. 20-26	2,604,000	34,600
1883.....	32.730	40,056,200	532,700	8,870,700	118,000	10.535	8,870,700	118,000	.....	0.735	5,906,500	78,500	August.....	0.735	5,906,500	78,500	.....	.....	.....	.....	.....
1884.....	47.135	84,929,200	1,129,400	11,457,000	152,800	11.650	11,457,000	152,800	.....	0.855	3,303,300	43,900	September....	0.855	3,303,300	43,900	.....	.....	Sept. 14-20	51,300	700
1885.....	43.545	67,721,600	900,600	14,313,000	190,300	15.130	14,313,000	190,300	.....	1.428	4,667,700	62,100	July.....	1.428	4,667,700	62,100	.....	.....	.....	.....	.....
1886.....	46.065	81,730,700	1,086,300	8,891,900	118,200	13.505	8,891,900	118,200	.....	4.100	7,077,400	94,100	August.....	4.100	7,077,400	94,100	.....	.....	.....	.....	.....
1887.....	42.705	86,749,300	1,153,600	11,874,800	157,900	13.195	11,874,800	157,900	.....	1.320	8,346,700	111,000	September....	1.320	8,346,700	111,000	.....	.....	Sept. 13-24	6,162,900	82,000
1888.....	57.465	127,642,900	1,697,400	68,478,000	910,600	21.205	68,478,000	910,600	.....	1.405	8,825,800	117,400	July.....	1.405	8,825,800	117,400	.....	.....	.....	.....	.....

WATER DEPARTMENT.

1889.....	49.950	104,080,100	1,383,400	21.975	77,563,400	1,031,400	July.....	8.940	47,645,200	633,600		
1890.....	53.000	96,650,400	1,285,200	22.835	55,975,600	744,400	July.....	2.460	8,064,500	107,200		
1891.....	49.520	98,865,500	1,314,700	14.330	13,608,900	181,000	July.....	3.395	11,212,900	149,100		3,446,800
1892.....	41.830	58,753,000	781,300	12.680	15,957,700	212,200	October.....	1.170	9,461,300	125,800		
1893.....	48.225	77,963,300	1,036,700	13.785	12,602,400	167,600	September....	1.735	8,126,700	108,100		
1894.....	39.740	57,937,800	770,400	13.265	16,856,900	224,200	September....	2.635	11,243,300	149,500		
1895.....	50.620	86,632,900	1,152,000	22.170	36,477,200	485,100	September....	2.300	6,673,300	88,700		
1896.....	43.705	76,607,100	1,018,700	16.390	21,214,600	282,100	August.....	2.395	4,312,900	57,400		
1897.....	46.190	74,528,800	991,100	12.360	28,787,800	382,800	October.....	0.470	7,061,500	93,900		
Averages,	45.767	80,111,600	1,057,400	15.455	23,979,700	316,500						

45,800

## SUMMARY OF STATISTICS.

## REPORT FOR 1897.

Boston Water Works, Suffolk County, Massachusetts, supplies also the cities of Somerville, Chelsea and Everett.

## Population by census of 1895 :

Boston . . . . .	496,920
Chelsea . . . . .	31,264
Somerville . . . . .	52,200
Everett . . . . .	18,573
Total . . . . .	598,957

## Date of Construction :

Cochituate Works . . . . .	1848
Mystic . . . . .	1864

*By whom owned.* — City of Boston.

*Sources of supply.* — Lake Cochituate, Sudbury river, and Mystic lake.

*Mode of supply.* — Sixty-five per cent. from gravity works.  
Thirty-five “ “ pumping “

## PUMPING.

	COCHITUATE.	MYSTIC.
Builder of pumping machinery . . . . .	Holly Mfg. Co. and Quintard Iron Works.	H. R. Worthington and G. F. Blake Mfg. Co.
Description of coal used :		
<i>a</i> Kind . . . . .	Bituminous.	Bituminous.
<i>c</i> Size . . . . .	Broken.	Broken.
<i>e</i> Price per gross ton, in bins . . . . .	\$3.47-\$3.57	\$3.18
<i>f</i> Per cent. of ash . . . . .	9.2	11.4
Coal consumed for year, in lbs. . . . .	5,157,939	7,421,103
Total pumpage for year, in gallons . . . . .	5,250,063,975	4,572,225,608
Gallons pumped per lb. of coal . . . . .	1017.9	616.1
Cost of pumping figured on pumping-station expenses, viz. : . . . . .	\$29,905 25	\$27,989 96
Cost per million gallons raised to reservoir . . . . .	\$5.706	\$6.122

	COCHITUATE.	MYSTIC.
Estimated population . . . . .	491,100	142,600
Estimated number of consumers,	488,100	141,600
Total consumption, gallons . . . . .	21,121,552,400	4,569,393,100
Passed through meters . . . . .	4,911,650,000	826,417,500
Percentage metered . . . . .	23.3	18.9
Average daily consumption, gal- lons . . . . .	57,867,300	12,518,900
Gallons per day, each inhabi- tant . . . . .	117.8	87.8
Gallons per day, each consumer,	118.5	88.4

## DISTRIBUTION.

*Mains.*

	COCHITUATE.	MYSTIC.
Kind of pipe used . . . . .	{ Cast Iron.	Cast Iron, Wrought Iron and Cement.
Sizes . . . . .	. 48 in. to 4 in.	36 in. to 3 in.
Extended, miles . . . . .	19.5	2.6
Total now in use . . . . .	627.1	187.2
Distribution-pipe less than 4 in., length, miles . . . . .	2.2	4.0
Hydrants added . . . . .	178	79
Hydrants now in use . . . . .	6,547	1,718
Stop-gates added . . . . .	323	128
Stop-gates now in use . . . . .	7,410	2,519

*Services.*

	Lead.	Lead and Wrought Iron.
Kind of pipe used . . . . .	{	
Sizes . . . . .	. $\frac{5}{8}$ in. to 6 in.	$\frac{1}{2}$ in. to 4 in.
Extended, feet . . . . .	56,075	23,369
Service-taps added . . . . .	2,465	906
Total now in use . . . . .	75,785	25,848
Meters now in use . . . . .	4,436	501
Motors and elevators in use . . . . .	625	21

<sup>1</sup> 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.<sup>2</sup>
- ALBERT STANWOOD, from July 31, 1876, to May 7, 1883.<sup>2</sup>
- FRANCIS THOMPSON, from May 5, 1879, to May 1, 1882.<sup>2</sup>
- WILLIAM A. SIMMONS, from May 7, 1883, to August 18, 1885.
- GEORGE M. HOBBS, from May 4, 1883, to May 4, 1885.
- JOHN G. BLAKE, from May 4, 1883, to August 18, 1885.
- WILLIAM B. SMART, from May 4, 1885, to March 18, 1889.
- HORACE T. ROCKWELL, from August 25, 1885, to April 25, 1888.
- THOMAS F. DOHERTY, from August 26, 1885, to May 5, 1890; and from May 4, 1891, to July 1, 1895.
- ROBERT GRANT, from April 25, 1888, to July 18, 1893.
- PHILIP J. DOHERTY, from March 18, 1889, to May 4, 1891.
- JOHN W. LEIGHTON, from May 5, 1890, to July 1, 1895.<sup>2</sup>
- WILLIAM S. McNARY, from August 15, 1893, to November 5, 1894.
- CHARLES W. SMITH, from January 23, 1895, to July 1, 1895.

<sup>1</sup> *Water Commissioners.*

- CHARLES W. SMITH, from July 1, 1895, to January 20, 1896.<sup>3</sup>
- JEREMIAH J. MCCARTHY (Acting), from January 20, to February 1, 1896.
- JOHN R. MURPHY, from February 1, 1896, to present time.

*Assistant Water Commissioners.*

- JEREMIAH J. MCCARTHY, from July 1, 1895, to January 20, 1896.
- EDWARD C. ELLIS, from February 17, 1896, to present time.

*Chief Clerk and Secretary.*

WALTER E. SWAN.

*General Superintendent Income Division.*

JOS. H. CALDWELL.

*General Superintendent Distribution Division.*

HUGH McNULTY.

*General Superintendent Western Division.*DESMOND FITZGERALD (to January 1, 1898.)<sup>4</sup>*City Engineer and Engineer of the Department.*

WILLIAM JACKSON.

<sup>1</sup> Under Chap. 449 of the Acts of 1895, the Boston Water Board was abolished, and the Water-Supply and Water-Income Departments consolidated and placed under the charge of one Water Commissioner.

<sup>2</sup> Deceased.

<sup>3</sup> Resigned.

<sup>4</sup> Office abolished.

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