

**SIXTEENTH ANNUAL REPORT OF
THE METROPOLITAN WATER AND
SEWERAGE BOARD; PUBLIC
DOCUMENT NO. 57; FOR THE
YEAR 1916**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649057924

Sixteenth Annual Report of the Metropolitan Water and Sewerage Board; Public Document No. 57; for the Year 1916 by Massachusetts Metropolitan Water and Sewerage Board

Except for use in any review, the reproduction or utilisation of this work in whole or in part in any form by any electronic, mechanical or other means, now known or hereafter invented, including xerography, photocopying and recording, or in any information storage or retrieval system, is forbidden without the permission of the publisher, Trieste Publishing Pty Ltd, PO Box 1576 Collingwood, Victoria 3066 Australia.

All rights reserved.

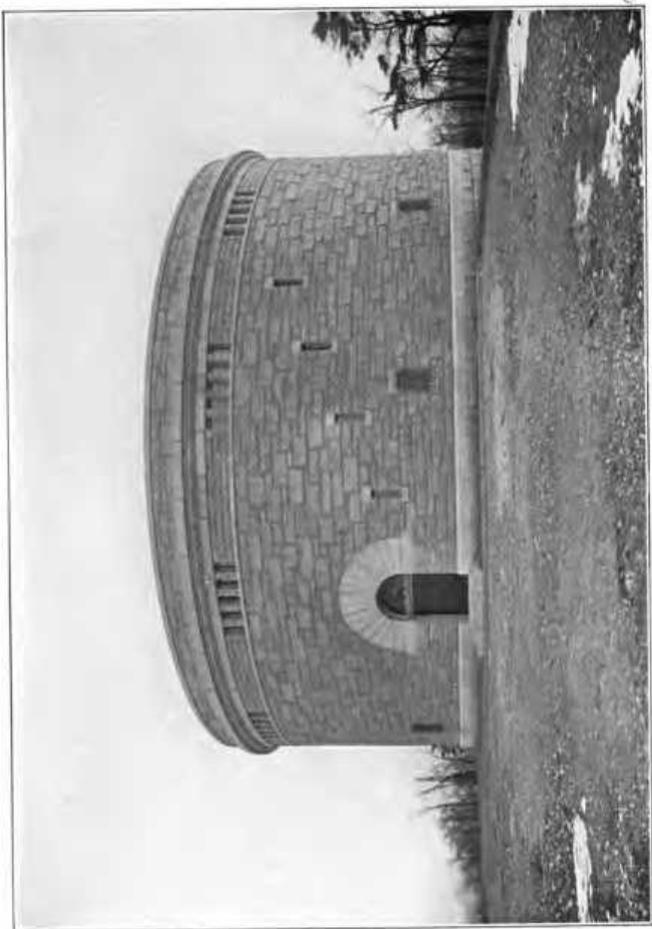
Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form or binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

www.triestepublishing.com

MASSACHUSETTS METROPOLITAN WATER AND SEWERAGE BOARD

**SIXTEENTH ANNUAL REPORT OF
THE METROPOLITAN WATER AND
SEWERAGE BOARD; PUBLIC
DOCUMENT NO. 57;
FOR THE YEAR 1916**



BELLEVUE RESERVOIR.

SIXTEENTH ANNUAL REPORT

OF THE

Massachusetts

METROPOLITAN WATER AND
SEWERAGE BOARD.

FOR THE YEAR 1916.



BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
32 DERNE STREET.
1917.

PUBLICATION OF THIS DOCUMENT
APPROVED BY THE
SUPERVISOR OF ADMINISTRATION.

Doc. - Curr.
Cleveland Pub. Lt.
1-24-31

CONTENTS.

	PAGE
I. Organisation and Administration,	1
Board, Officers and Employees,	1
II. Metropolitan Water District,	3
III. Metropolitan Water Works — Construction,	3
IV. Water Works — Maintenance,	5
(1) Storage Reservoirs,	5
(2) Aqueducts,	6
(3) Pumping Stations,	6
(3) Protection of Water Supply,	7
(5) Clinton Sewerage Works,	8
(6) Forestry,	9
(7) Wachusett Power Plant,	10
(8) Sudbury Power Plant,	10
(9) Rainfall and Water Supply,	10
(10) Water Consumption,	11
V. Water Works — Financial Statement,	11
(1) Water Loans — Receipts and Payments,	12
(2) Total Water Debt, December 31, 1916,	12
(3) Metropolitan Water Loan and Sinking Fund,	13
(4) Water Assessment, 1916,	13
(5) Supplying Water to Cities and Towns outside of District and to Water Companies,	14
(6) Expenditures for the Different Works,	15
(7) Detailed Financial Statement under Metropolitan Water Act,	17
(a) Expenditures and Disbursements,	17
(b) Receipts,	22
(c) Assets,	23
(d) Liabilities,	23
VI. Metropolitan Sewerage Works,	24
(1) North Metropolitan Sewerage System — Construction,	25
(2) North Metropolitan Sewerage System — Maintenance,	25
Sewers and Pumping Stations,	25
(3) South Metropolitan Sewerage System — Construction,	26
(4) South Metropolitan Sewerage System — Maintenance,	28
Sewers and Pumping Stations,	28
VII. Sewerage Works — Financial Statement,	29
(1) Metropolitan Sewerage Loans, Receipts and Payments,	29
North Metropolitan System,	30
South Metropolitan System,	30
(2) Total Sewerage Debt, December 31, 1916,	31
North Metropolitan System,	31
South Metropolitan System,	31
(3) North and South Metropolitan Loan and Sinking Funds, December 31, 1916,	32
(4) Annual Appropriations, Receipts and Expenditures,	33
(5) Sewer Assessments, 1916,	33
(6) Expenditures for the Different Works,	35
(7) Detailed Financial Statement,	36
(a) Expenditures and Disbursements,	36
(b) Receipts,	41
(c) Assets,	42
(d) Liabilities,	42
VIII. Recommendations for Legislation,	43

AUG 17 1929

	PAGE
Report of Chief Engineer of Water Works,	47
Organisation,	47
Construction,	48
Completion of 60-inch Weston Aqueduct Supply Main,	48
Improvement of Beaver Dam Brook,	48
Additional 24-inch Main from Dorchester Lower Mills to Quincy,	49
Bellevue Reservoir,	49
Sudbury Power Plant,	50
Wachusett-Sudbury Transmission Line,	53
Additional Northern Extra High-service Pipe Line and Pumping Machinery,	53
Southern Extra High-service Pipe Line,	54
Meters and Connections,	55
Engineering,	56
Maintenance,	56
Rainfall and Yield of Watersheds,	56
Storage Reservoirs,	57
Wachusett Reservoir,	57
Sudbury Reservoir,	60
Framingham Reservoir No. 3,	61
Framingham Reservoirs Nos. 1 and 2, Ashland, Hopkinton and Whitehall Reservoirs,	62
Farm Pond,	63
Lake Cochituate,	63
Dudley Pond,	64
Aqueducts,	64
Wachusett Aqueduct,	64
Sudbury Aqueduct,	65
Weston Aqueduct,	66
Cochituate Aqueduct,	67
Sanitary Inspection of Watersheds,	69
Wachusett Watershed,	69
Sudbury Watershed,	72
Cochituate Watershed,	72
Protection of the Water Supply,	72
Filtration and Chlorination,	72
Improvement of Swamps and Brooks,	73
Acquisition of Land,	74
Clinton Sewage Disposal Works,	74
Forestry,	77
Wachusett Department,	77
Sudbury Department,	79
Distribution Department,	80
Hydro-electric Service,	81
Wachusett Power Station,	81
Sudbury Power Station,	82
Distribution Pumping Service,	84
Chestnut Hill Pumping Stations,	85
Spot Pond Pumping Station,	85
Arlington Pumping Station,	89
Hyde Park Pumping Station,	90
Distribution Reservoirs,	91
Weston Reservoir,	92
Chestnut Hill, Fisher Hill and Waban Hill Reservoirs,	93
Spot Pond, Fells and Bear Hill Reservoirs,	94
Arlington, Bellevue, Forbes Hill and Mystic Reservoirs,	94
Mystic Lake, Conduit and Pumping Station and Grounds at Arlington and Hyde Park Pumping Stations,	95
Distribution Pipe Lines,	96
Pipe Bridges,	97
Pipe Yards,	97
Meters, Regulating Valves and Recording Pressure Gages,	97
Brooks and Leaks,	98
Emergency Pipe Line Service,	98
Consumption of Water,	99
Installation of Meters on Service Pipes,	102

CONTENTS.

v

	PAGE
Report of Chief Engineer of Water Works — Concluded.	
Maintenance — Concluded.	
Water supplied outside of Metropolitan Water District.	102
Quality of the Water.	103
Engineering.	103
Report of Chief Engineer of Sewerage Works.	104
Organization.	104
Metropolitan Sewerage Districts.	105
Areas and Populations.	105
Metropolitan Sewers.	106
Sewers purchased and constructed and their Connections.	106
Construction.	109
North Metropolitan System.	109
Deer Island Outfall Extension.	109
Section 1, Deer Island Outfall Extension.	110
Section 19, Malden River Siphon.	110
Removal of Old Malden River Siphon.	111
Extension to Reading.	111
South Metropolitan System.	112
Wellesley Extension.	112
Section 98, Wellesley Extension.	112
Section 99, Wellesley Extension.	113
Sections 100 and 101, Wellesley Extension.	113
Section 102, Wellesley Extension.	114
Section 103, Wellesley Extension.	114
Section 104, Wellesley Extension.	115
Maintenance.	115
Scope of Work and Force employed.	115
Deer Island Pumping Station.	116
East Boston Pumping Station.	116
Ward Street Pumping Station.	110
Nut Island Screen-house.	117
Gasoline in Public Sewers.	117
Drainage from Tanneries, Gelatine and Glue Works in Winchester, Woburn and Stoneham.	119
Data relating to Areas and Populations contributing Sewage to Metropolitan Sewerage System.	121
North Metropolitan System.	121
South Metropolitan System.	122
Whole Metropolitan System.	123
Pumping Stations.	124
Capacity and Results.	124
North Metropolitan System.	124
Deer Island Pumping Station.	124
East Boston Pumping Station.	126
Charlestown Pumping Station.	127
Alewife Brook Pumping Station.	129
South Metropolitan System.	130
Ward Street Pumping Station.	130
Quincy Pumping Station.	132
Nut Island Screen-house.	133
Quincy Sewage Lifting Station.	133
Metropolitan Sewerage Outfalls.	135
Material intercepted at the Screens.	136
<hr style="width: 20%; margin: auto;"/>	
Appendix No. 1. — Contracts relating to the Metropolitan Water Works made and pending during the Year 1916.	138
Appendix No. 2. — Tables relating to the Maintenance of the Metropolitan Water Works.	145
Table No. 1. — Monthly Rainfall in Inches at Various Places on the Metropolitan Water Works in 1916.	145
Table No. 2. — Rainfall in Inches at Jefferson, Mass., in 1916.	146

Appendix No. 2 — Continued.	PAGE
Table No. 3. — Rainfall in Inches at Framingham, Mass., in 1916.	147
Table No. 4. — Rainfall in Inches at Chestnut Hill Reservoir in 1916.	148
Table No. 5. — Rainfall in Inches on the Wachusett Watershed, 1897 to 1916.	150
Table No. 6. — Rainfall in Inches on the Sudbury Watershed, 1875 to 1916.	151
Table No. 7. — Yield of the Wachusett Watershed in Gallons per Day per Square Mile from 1897 to 1916.	153
Table No. 8. — Yield of the Sudbury Watershed in Gallons per Day per Square Mile from 1875 to 1916.	155
Table No. 9. — Wachusett System. — Statistics of Flow of Water, Storage and Rainfall in 1916.	159
Table No. 10. — Sudbury System. — Statistics of Flow of Water, Storage and Rainfall in 1916.	160
Table No. 11. — Cochituate System. — Statistics of Flow of Water, Storage and Rainfall in 1916.	161
Table No. 12. — Elevations of Water Surfaces of Reservoirs above Boston City Base at the Beginning of Each Month.	163
Table No. 13. — Sources from which and Periods during which Water has been drawn for the Supply of the Metropolitan Water District.	163
Table No. 14. — Average Daily Quantity of Water flowing through Aqueducts in 1916 by Months.	164
Table No. 15. — Statement of Operation of Engines Nos. 1 and 2 at Chestnut Hill Pumping Station No. 1 for the Year 1916.	165
Table No. 16. — Statement of Operation of Engine No. 3 at Chestnut Hill Pumping Station No. 1 for the Year 1916.	166
Table No. 17. — Statement of Operation of Engine No. 4 at Chestnut Hill Pumping Station No. 1 and Summary for the Station for the Year 1916.	167
Table No. 18. — Statement of Operation of Engines Nos. 5, 6 and 7 at Chestnut Hill Pumping Station No. 2 for the Year 1916.	168
Table No. 19. — Statement of Operation of Engine No. 12 at Chestnut Hill Pumping Station No. 2 for the Year 1916.	169
Table No. 20. — Statement of Operation of Engine No. 8 at Spot Pond Pumping Station for the Year 1916.	170
Table No. 21. — Statement of Operation of Engine No. 9 at Spot Pond Pumping Station for the Year 1916.	171
Table No. 22. — Statement of Operation of Engine No. 10 at Arlington Pumping Station for the Year 1916.	172
Table No. 23. — Statement of Operation of Engine No. 11 at Arlington Pumping Station for the Year 1916.	173
Table No. 24. — Statement of Operation of Engines Nos. 13 and 14 at Hyde Park Pumping Station for the Year 1916.	174
Table No. 25. — (Meter Basis) Average Daily Consumption of Water by Districts in Cities and Towns supplied by the Metropolitan Water Works in 1916.	175
Table No. 26. — (Meter Basis) Average Daily Consumption of Water in Cities and Towns supplied from Metropolitan Works in 1916.	176
Table No. 27. — (Pump Basis) Consumption of Water in the Metropolitan Water District, as constituted in the Year 1916, and a Small Section of the Town of Saugus, from 1893 to 1916.	179
Table No. 28. — Chemical Examinations of Water from the Wachusett Reservoir, Clinton.	181
Table No. 29. — Chemical Examinations of Water from the Sudbury Reservoir.	182
Table No. 30. — Chemical Examinations of Water from Spot Pond, Stoneham.	183
Table No. 31. — Chemical Examinations of Water from Lake Cochituate.	184
Table No. 32. — Chemical Examinations of Water from a Tap at the State House, Boston.	185
Table No. 33. — Averages of Examinations of Water from Various Parts of the Metropolitan Water Works in 1916.	186
Table No. 34. — Chemical Examinations of Water from a Faucet in Boston, from 1892 to 1916.	187
Table No. 35. — Microscopic Organisms in Water from Various Parts of the Metropolitan Water Works, from 1898 to 1916, inclusive.	188
Table No. 36. — Number of Bacteria per Cubic Centimeter in Water from Various Parts of the Metropolitan Water Works, from 1898 to 1916, inclusive.	190
Table No. 37. — Colors of Water from various Parts of the Metropolitan Water Works in 1916.	191