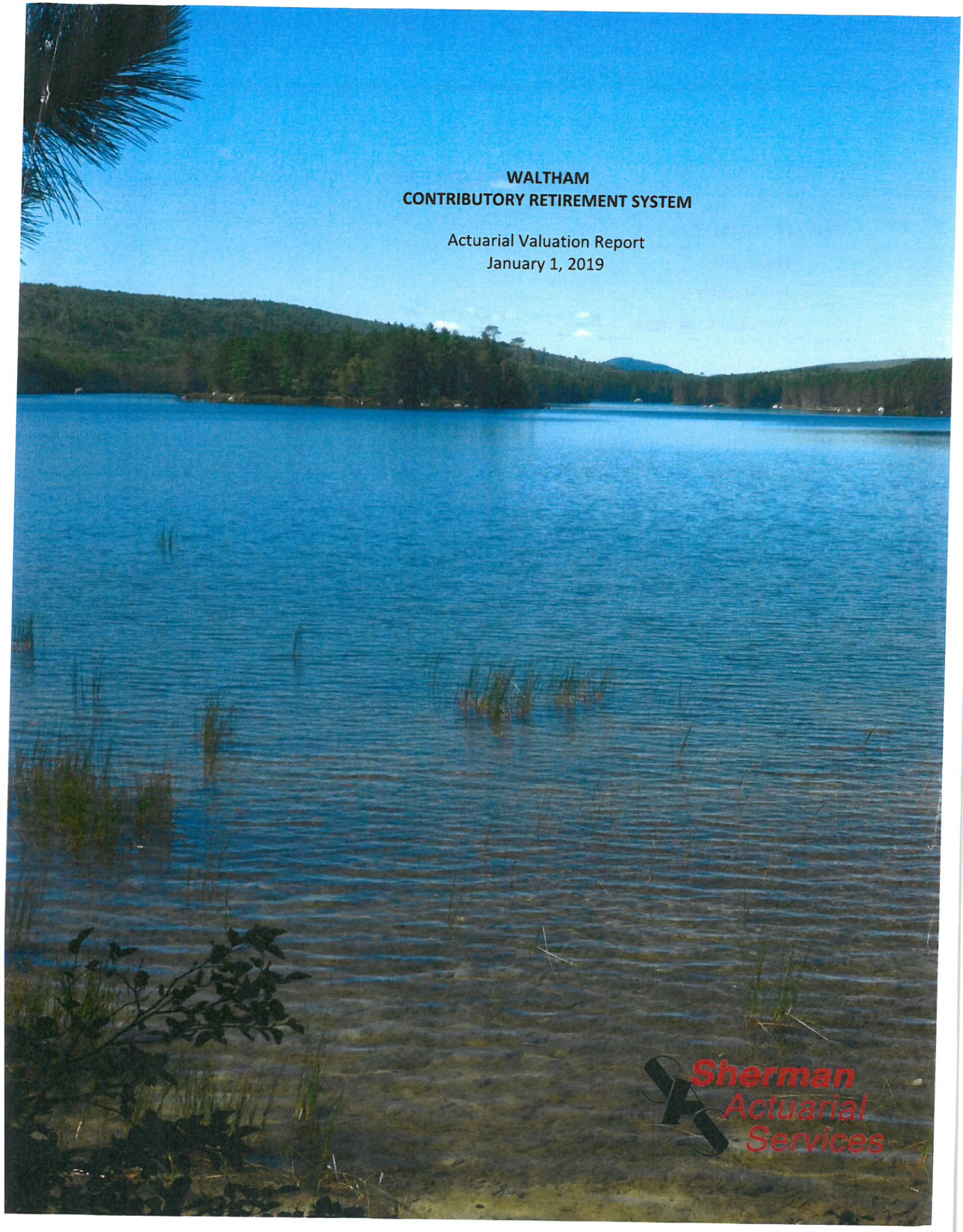
WALTHAM
CONTRIBUTORY RETIREMENT SYSTEM

Actuarial Valuation Report
January 1, 2019



Sherman Actuarial Services

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Report Summary:

Highlights

	January 1, 2017	January 1, 2019
Contributions		
Funding Schedule FY 2020	$18,335,000	$18,335,000
Funding Schedule FY 2021	18,885,000	18,985,000
Funded Ratios		
GAS No. 25	57.7%	56.8%
Participants		
Actives	910	937
Retirees and Beneficiaries	661	677
Inactives	130	156
Disabled	105	100
Total	1,806	1,870
Payroll		
Payroll of Active Members	$61,634,166	$66,327,801
Average Payroll	67,730	70,787
Normal Cost		
Employer	$1,409,505	$1,468,592
Employee	5,471,450	5,958,080
Administrative Expenses	625,000	525,000
Total	$7,505,955	$7,951,672
Actuarial Accrued Liabilities		
Actives	$179,235,714	$200,774,781
Retirees, Beneficiaries, Disabilities and Inactives	208,567,438	242,248,977
Total	$387,803,152	$443,023,758
Actuarial Value of Assets	223,584,317	251,664,228
Unfunded Actuarial Accrued Liabilities	$164,218,835	$191,359,530

Introduction

This report presents the findings of an actuarial valuation as of January 1, 2019, of Waltham Contributory Retirement System.

The actuarial valuation is based on:

- Provisions Chapter 32 of the Massachusetts General Laws, "M.G.L", as of January 1, 2019.
- Employee data provided by the Retirement Board
- Asset information reported to the Public Employee Retirement Administration Commission by the City of Waltham Contributory Retirement System
- Actuarial assumptions approved by the Retirement Board

The valuation and appropriation forecast are prepared in accordance with Chapter 32 of the M.G.L. as of January 1, 2019.

The valuation and forecast do not account for:

- Any subsequent changes in the law
- Chapter 32 of the M.G.L., Section 3(8)(c) transfers between systems
- State-mandated benefits
- Cost-of-living increases granted to retired members between 1982 and 1997. The cost of these benefits has been assumed by the State under Proposition Two and One-Half.

Actuarial Experience

In performing the actuarial valuation, various assumptions are made regarding such factors as mortality, retirement, disability, and withdrawal rates as well as both payroll, salary increases, and investment returns. A comparison of the current valuation and the prior valuation is made to determine how closely actual experience corresponded to anticipated occurrences. This analysis of the system provides insight into the overall quality of the actuarial assumptions and helps explain any change in the annual appropriation.

During the last year, the total unfunded actuarial accrued liability increased by 16.6% to $191,359,530. The increase is the result of net unfavorable actuarial experience during the preceding years and a change in actuarial assumptions. The sources of actuarial (gains) and losses are as follows:

Assets	3,303,378
Salary Increases	2,542,541
New Participants	2,304,085
Active - Retirements	(5,068,987)
Active - Terminations	2,410,770
Active - Mortality	(202,531)
Active - Disabilities	90,201
Inactive - Mortality and data adjustments	9,228,005
Other, includes data adjustments, buybacks, interest on ASF	412,279
Benefit Payments	1,578,618
Total Actuarial (Gain) / Loss	16,598,359

In addition, the Mortality Assumptions were modified. This increased the unfunded accrued liability by $22,640,210, and the Normal Cost by $122,725.

Actuarial Costs and Liabilities:

Normal Costs

The normal cost is the sum of the individual normal costs determined for each member as if the assumptions underlying the cost determinations had been exactly realized. An individual normal cost represents that part of the cost of a member's future benefits which are assigned to the current year as if the costs are to remain level as a percentage of the member's pay. Benefits payable under all circumstances (i.e., retirement, death, disability and terminations) are included in this calculation. Anticipated employee contributions to be made during the year are subtracted from the total normal cost to determine employer normal cost. The total normal cost is divided by total payroll to determine the normal cost as a percent of pay. The normal cost is shown in Table I.

Table I

	January 1, 2017	January 1, 2019
Superannuation	$4,186,601	$4,719,617
Termination	1,831,361	1,971,260
Death	389,928	197,470
Disability	473,065	538,325
Administrative Expenses	$625,000	$525,000
Total Normal Cost	$7,505,955	$7,951,672
% of Pay	12.2%	12.0%
Employee Contributions	$5,471,450	$5,958,080
% of Pay	8.9%	9.0%
Employer Normal Cost	$2,034,505	$1,993,592
% of Pay	3.3%	3.0%

Present Value of Actuarial Accrued Liabilities

The actuarial accrued liabilities (AAL) represents today's value of all benefits based on the past service of the actives and inactives. The AAL can be compared to the assets to determine the funded status of the Plan. The value of these earned benefits is shown in Table II below.

Table II

	January 1, 2017	January 1, 2019
Actives		
Superannuations	$174,914,382	$200,032,368
Termination	(5,067,623)	(5,497,818)
Death	6,258,816	2,689,660
Disability	3,130,139	3,550,571
Retirees and Inactives		
Retirees and Beneficiaries	$170,944,115	$199,393,794
Terminated (Refund)	1,201,147	1,892,217
Disabled	36,422,176	40,962,966
Total	$387,803,152	$443,023,758

Present Value of Future Benefits

The present value of future benefits represents today's value of all benefits earned by the inactive participants as well as all benefits earned and expected to be earned in the coming years by the active participants. The difference between the present value of future benefits and the present value of actuarial accrued liabilities is the value of benefits to be earned in the coming years. The value of the total expected benefits is shown in Table III.

Table III

	January 1, 2017	January 1, 2019
Actives		
Superannuation	$202,450,815	$230,711,118
Termination	8,432,393	8,983,186
Death	8,715,925	4,017,205
Disability	6,393,402	7,306,645
Retirees and Inactives		
Retirees and Beneficiaries	$170,944,115	$199,393,794
Terminated (Refund)	1,201,147	1,892,217
Disabled	36,422,176	40,962,966
Total	$434,559,973	$493,267,131

Funded Status and Appropriations:

Market Value of Plan Assets

The trust fund composition on a market value basis is shown in Table IV.

Table IV

	January 1, 2017	January 1, 2019
Cash equivalents	$37,766	$16,559
Fixed income securities	26,202,350	42,294,603
Equities	47,258,623	62,072,743
International	19,533,268	55,248,152
Real Estate	11,547,756	19,117,917
Other	8,137,005	11,051,643
PRIT Fund	104,180,688	43,577,412
Accounts receivable	11,442	1,160
Accounts payable	(76,807)	(114,657)
Accrued income	90,501	0
Total Market Value	$216,922,592	$233,265,532
Total Actuarial Value	$223,584,317	$251,664,228

Actuarial Value of Assets

The actuarial value of assets is determined by projecting the market value of assets as of the beginning of the prior plan year with the assumed rate of return during that year (7.75%) and accounting for deposits and disbursements with interest at the assumed rate of return. An adjustment is then applied to recognize the difference between the actual investment return and expected return over a five year period. This preliminary actuarial value is not allowed to differ from the market value of assets by more than 20%. The calculation of the actuarial value of assets as of January 1, 2019 is presented in Table V.

Table V

		January 1, 2019
(1)	Market value at January 1, 2018	$248,330,358
(2)	2018 Contributions	$25,366,363
(3)	2018 Payments	($27,984,013)
(4)	Net interest adjustment at 7.75% on (1), (2) and (3) to December 31, 2018	$19,144,169
(5)	Expected market value on January 1, 2019 (1) + (2) + (3) + (4)	$264,856,877
(6)	Actual market value on January 1, 2019	$233,265,532
(7)	2018 (Gain) / Loss	$31,591,345
(8)	80% of 2018 (Gain) / Loss	$25,273,076
(9)	2017 (Gain) / Loss	($16,358,969)
(10)	60% of 2017 (Gain) / Loss	($9,815,382)
(11)	2016 (Gain) / Loss	($57,881)
(12)	40% of 2016 (Gain) / Loss	($23,152)
(13)	2015 (Gain) / Loss	$14,820,773
(14)	20% of 2015 (Gain) / Loss	$2,964,155
(15)	Actuarial value on January 1, 2019, (6) + (8) + (10) + (12) + (14) but not less than 80% nor greater than 120% of (6)	$251,664,228
(16)	Ratio of actuarial value to market value	107.89%
(17)	Actuarial Value Return for 2017	8.64%
(18)	Actuarial Value Return for 2018	5.48%
(19)	Market Value Return for 2017	15.32%
(20)	Market Value Return for 2018	-5.04%

Unfunded Actuarial Accrued Liabilities

Under the Entry Age Normal Actuarial Cost Method, the Actuarial Accrued Liability represents what the accumulated assets would have been as of the valuation date if:

- current plan provisions and assumptions had always been in effect,
- experience conformed exactly to assumptions, and
- the normal cost had been contributed each year since inception.

The actuarial value of the Fund's assets as of the end of the prior year are subtracted from the Actuarial Accrued Liability (AAL) to determine the Unfunded Actuarial Accrued Liability (UAAL) as of the valuation date. Over time, annual pension contributions will accumulate Plan assets equal to the AAL, and the UAAL will be eliminated. Thereafter, annual contributions equal to the normal cost will keep the Plan's assets and liabilities in balance. The UAAL is developed in Table VI.

Table VI

	January 1, 2017	January 1, 2019
Actuarial Accrued Liability	$387,803,152	$443,023,758
Actuarial Assets	223,584,317	251,664,228
Unfunded Actuarial Accrued Liability	$164,218,835	$191,359,530
Funded Status	57.7%	56.8%

Appropriations

The pension appropriation for the upcoming fiscal years have been calculated in accordance with the requirements set forth in Sections 22D and 22F of Chapter 32 of the Massachusetts General Laws. These amounts were calculated to comply with the June 30, 2040, full funding mandate for all accrued liabilities. The pension appropriation is the sum of the:

- Employer normal cost,
- Increasing amortization of the unfunded actuarial accrued liability by June 30, 2032
  $ 190,549,579 over 18 years with increasing payments
- Level amortization of the 2011 Early Retirement Incentive by June 30, 2021
  $ 809,951 over 2 years
- Interest adjustment for payments deposited at the beginning of the fiscal year.

The pension appropriation is shown in Table VII.

Table VII

	January 1, 2017	January 1, 2019
Normal cost	$2,034,505	$1,993,592
Amortization payment of the accrued liability	13,005,548	14,790,445
Amortization payment of 2002 ERI liability	1,035,971	0
Amortization payment of 2011 ERI liability	420,083	420,083
Total cost	$16,496,107	$17,204,120
% of Pay	26.8%	25.9%
Fiscal 2020 cost	$18,335,000	$18,335,000
Fiscal 2021 cost	$18,885,000	$18,985,000

Appropriation Forecast

The following exhibit forecasts employer and employee contributions over the next 32 years under the adopted funding schedule.

Note that the forecast is based upon an "open group" method. This method assumes that sufficient employees will be hired each year to keep the number constant. The total payroll of the system is expected to increase 3.5% per year. The employee contribution rate is expected to increase to 10.5% by 2035 as members contributing base percentages 5%, 7%, and 8% are replaced by new members, whose base contribution is 9%. Payments are assumed to be made at the beginning of the year.

The employer total cost is expected to decrease during the next 12 years until the unfunded liabilities are completely paid off, at which time only the normal cost will remain. The total cost represents about 27.7% of payroll, increasing to about 40% by the time the unfunded liabilities are fully paid off, leaving only a long term normal cost of 1.5% thereafter. The decrease in the cost as a percentage of payroll is a result of the increase in member deductions.

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Appropriation Forecast

Fiscal Year Ending	Employee Contribution	Employer Normal Cost with Interest	Amortization Payments with Interest	Employer Total Cost with Interest	Employer Total Cost % of Payroll	Unfunded Liability**	Funded Ratio %**
2020	$5,958,080	$2,069,402	$16,265,598	$18,335,000	27.6	$191,359,530	56.8
2021	6,231,710	2,074,258	16,910,742	18,985,000	27.7	189,286,949	58.9
2022	6,517,196	2,076,919	17,723,081	19,800,000	27.9	186,404,585	61.1
2023	6,815,032	2,077,226	19,047,774	21,125,000	28.7	182,453,904	63.5
2024	7,125,733	2,075,009	20,484,991	22,560,000	29.6	176,821,978	66.0
2025	7,449,835	2,070,093	22,029,907	24,100,000	30.6	169,261,708	68.8
2026	7,787,894	2,062,290	23,687,710	25,750,000	31.6	159,511,853	71.8
2027	8,140,492	2,051,406	25,478,594	27,530,000	32.6	147,285,539	75.0
2028	8,508,232	2,037,234	27,402,766	29,440,000	33.7	132,252,701	78.5
2029	8,891,741	2,019,556	29,465,444	31,485,000	34.8	114,057,475	82.2
2030	9,291,673	1,998,145	31,701,855	33,700,000	36.0	92,311,003	86.2
2031	9,708,708	1,972,762	34,077,238	36,050,000	37.2	66,557,726	90.5
2032	10,143,554	1,943,154	37,724,866	39,668,020	39.6	36,342,857	95.0
2033	10,596,945	1,909,057	0	1,909,057	1.8	(0)	100.0
2034	11,069,648	1,870,193	0	1,870,193	1.7	(0)	100.0
2035	11,562,458	1,826,269	0	1,826,269	1.6	(0)	100.0
2036	12,076,206	1,776,980	0	1,776,980	1.5	(0)	100.0
2037	12,498,873	1,839,175	0	1,839,175	1.5	0	100.0
2038	12,936,333	1,903,546	0	1,903,546	1.5	0	100.0
2039	13,389,105	1,970,170	0	1,970,170	1.5	0	100.0
2040	13,857,724	2,039,126	0	2,039,126	1.5	0	100.0
2041	14,342,744	2,110,495	0	2,110,495	1.5	0	100.0
2042	14,844,740	2,184,363	0	2,184,363	1.5	0	100.0
2043	15,364,306	2,260,815	0	2,260,815	1.5	0	100.0
2044	15,902,057	2,339,944	0	2,339,944	1.5	0	100.0
2045	16,458,629	2,421,842	0	2,421,842	1.5	0	100.0
2046	17,034,681	2,506,606	0	2,506,606	1.5	0	100.0
2047	17,630,894	2,594,338	0	2,594,338	1.5	0	100.0
2048	18,247,976	2,685,139	0	2,685,139	1.5	0	100.0
2049	18,886,655	2,779,119	0	2,779,119	1.5	0	100.0
2050	19,547,688	2,876,389	0	2,876,389	1.5	0	100.0
2051	20,231,857	2,977,062	0	2,977,062	1.5	0	100.0

** Beginning of Fiscal Year

EXHIBITS

Exhibit 1 - Age/Service Distribution with Salary as of January 1, 2019

Attained Age	Average Salary <5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40+	Total
< 20	1	0	0	0	0	0	0	0	0	1
	42,167	0	0	0	0	0	0	0	0	42,167
20-24	23	0	0	0	0	0	0	0	0	23
	41,322	0	0	0	0	0	0	0	0	41,322
25-29	61	9	0	0	0	0	0	0	0	70
	54,659	61,234	0	0	0	0	0	0	0	55,505
30-34	43	22	6	1	0	0	0	0	0	72
	55,659	68,238	69,742	0	0	0	0	0	0	60,689
35-39	25	25	25	14	0	0	0	0	0	89
	50,367	71,669	82,356	79,313	0	0	0	0	0	69,889
40-44	17	9	15	23	16	0	0	0	0	80
	43,136	63,735	84,728	86,370	97,982	0	0	0	0	76,651
45-49	28	17	13	27	32	6	0	0	0	123
	44,043	51,359	64,517	83,719	86,863	92,952	0	0	0	69,454
50-54	25	28	28	32	23	24	18	0	0	178
	43,818	47,963	51,862	65,196	94,899	89,139	101,371	0	0	68,110
55-59	19	15	12	30	22	19	34	3	0	154
	42,926	51,341	54,023	59,084	84,961	96,426	89,085	115,873	0	71,976
60-64	8	7	15	24	12	11	24	8	1	110
	47,751	53,511	60,218	64,791	72,062	71,044	93,664	123,605	73,229	74,282
65-69	0	2	4	9	7	1	1	0	2	26
	0	44,125	47,982	64,171	73,351	37,228	134,423	0	141,245	70,204
70+	0	0	0	4	2	3	2	0	0	11
	0	0	0	93,788	47,691	74,513	22,065	0	0	67,110
Total Employees	250	134	118	164	114	64	79	11	3	937
Average Salary	48,955	58,707	65,954	71,486	86,603	87,053	92,153	121,496	118,573	68,394

https://shermanactuary-my.sharepoint.com/personal/dan_shermanactuary_com/Documents/Recovered Data/Waltham/Val19/Report/[RET1.xls]Retirees

Exhibit 2 - Retiree Distribution as of January 1, 2019

	Number of Employees			Total Payments		
Attained Age	Female	Male	Total	Female	Male	Total
< 20	0	0	0	0	0	0
20-24	0	0	0	0	0	0
25-29	0	0	0	0	0	0
30-34	0	1	1	0	2,164	2,164
35-39	0	0	0	0	0	0
40-44	0	0	0	0	0	0
45-49	0	3	3	0	72,510	72,510
50-54	1	4	5	2,872	93,741	96,613
55-59	11	16	27	147,464	498,845	646,309
60-64	32	51	83	736,484	2,152,770	2,889,254
65-69	45	87	132	1,388,618	4,197,413	5,586,031
70-74	53	78	131	984,851	3,625,337	4,610,188
75-79	39	50	89	956,498	2,108,449	3,064,947
80-84	26	44	70	570,500	1,514,142	2,084,642
85-89	28	30	58	395,577	784,941	1,180,518
90-94	22	34	56	370,404	931,104	1,301,508
95+	8	14	22	131,513	187,094	318,607
Total	265	412	677	5,684,781	16,168,510	21,853,290
Average (Age/Payment)	75.55	74.36	74.83	21,452	39,244	32,280
Frequency Percent	39.1	60.9	100	26.0	74.0	100

https://shermanactuary-my.sharepoint.com/personal/dan_shermanactuary_com/Documents/Recovered Data/Waltham/Val19/Report/[DIS1.xls]Disabled

Exhibit 3 - Disabled Retiree Distribution as of January 1, 2019

	Number of Employees			Total Payments		
Attained Age	Female	Male	Total	Female	Male	Total
< 20	0	0	0	0	0	0
20-24	0	0	0	0	0	0
25-29	0	0	0	0	0	0
30-34	0	0	0	0	0	0
35-39	0	0	0	0	0	0
40-44	0	0	0	0	0	0
45-49	0	3	3	0	119,019	119,019
50-54	1	9	10	28,971	373,395	402,366
55-59	1	8	9	14,293	341,017	355,310
60-64	2	8	10	49,986	297,813	347,799
65-69	3	18	21	85,265	982,897	1,068,162
70-74	3	12	15	73,547	512,393	585,939
75-79	0	16	16	0	580,900	580,900
80-84	0	9	9	0	278,864	278,864
85-89	0	6	6	0	176,328	176,328
90-94	0	1	1	0	33,305	33,305
95-99	0	0	0	0	0	0
Total	10	90	100	252,061	3,695,932	3,947,993
Average (Age/Payment)	65.8	69.48	69.11	25,206	41,066	39,480
Frequency Percent	10.0	90.0	100	6.4	93.6	100

EXHIBIT 4 - CASHFLOW FORECAST:

The following is a 30 year forecast of benefit payments net of state reimbursable COLA payments, Contribution Income and Investment Returns.

Plan Year Ending	Benefit Payments	Employee Contributions	Employer Contributions	Investment Returns	Net change in plan assets
2019	$24,171,706	$5,958,080	$18,335,000	$19,196,905	$19,318,279
2020	23,987,401	6,231,710	18,985,000	20,706,686	21,935,995
2021	24,830,703	6,517,196	19,800,000	22,408,986	23,895,479
2022	25,669,136	6,815,032	21,125,000	24,281,261	26,552,157
2023	26,564,376	7,125,733	22,560,000	26,361,706	29,483,063
2024	27,490,423	7,449,835	24,100,000	28,672,388	32,731,800
2025	28,484,719	7,787,894	25,750,000	31,236,722	36,289,897
2026	29,499,937	8,140,492	27,530,000	34,081,260	40,251,815
2027	30,587,241	8,508,232	29,440,000	37,235,369	44,596,361
2028	31,638,225	8,891,741	31,485,000	40,733,037	49,471,553
2029	32,644,802	9,291,673	33,700,000	44,617,047	54,963,918
2030	33,683,402	9,708,708	36,050,000	48,931,010	61,006,316
2031	34,755,046	10,143,554	39,668,020	53,760,625	68,817,153
2032	35,860,785	10,596,945	1,909,057	57,621,267	34,266,485
2033	37,001,703	11,069,648	1,870,193	60,237,726	36,175,864
2034	38,178,919	11,562,458	1,826,269	63,001,064	38,210,872
2035	39,393,589	12,076,206	1,776,980	65,920,987	40,380,584
2036	40,646,903	12,498,873	1,839,175	69,003,612	42,694,757
2037	41,940,093	12,936,333	1,903,546	72,264,098	45,163,884
2038	43,274,425	13,389,105	1,970,170	75,714,405	47,799,256
2039	44,651,209	13,857,724	2,039,126	79,367,369	50,613,010
2040	46,071,796	14,342,744	2,110,495	83,236,764	53,618,207
2041	47,537,579	14,844,740	2,184,363	87,337,374	56,828,898
2042	49,049,997	15,364,306	2,260,815	91,685,074	60,260,198
2043	50,610,532	15,902,057	2,339,944	96,296,902	63,928,371
2044	52,220,716	16,458,629	2,421,842	101,191,161	67,850,916
2045	53,882,128	17,034,681	2,506,606	106,387,506	72,046,665
2046	55,596,398	17,630,894	2,594,338	111,907,048	76,535,882
2047	57,365,209	18,247,976	2,685,139	117,772,472	81,340,378
2048	58,864,551	18,886,655	2,779,119	124,020,530	86,821,752

EXHIBIT 5 – SUMMARY OF PLAN PROVISIONS:

This summary is prepared in accordance with Chapter 32 as of January 1, 2019, and does not take into account any subsequent changes.

1. Administration

Each of the 104 contributory retirement systems for public employees of the Commonwealth of Massachusetts are guided by the applicable provisions of Chapter 32 of the Massachusetts General Laws and other applicable statutes. Although these boards operate semi-independently, there is a uniform set of rules governing benefits, eligibility, contributions, financing, and accounting.

2. Participation

Participation is mandatory for all full-time employees whose employment commences prior to age 65. Eligibility with respect to part-time, professional, temporary, or intermittent employment is governed by the local board. Membership is optional for certain elected officials, State officials appointed by the Governor, and certain hospital interns.

There are four classes of membership as follows:

(i) Group 1: Most general employees in State and local government

(ii) Group 2: Certain specified hazardous duty positions

(iii) Group 3: State police officers and inspectors

(iv) Group 4: Local police officers, firefighters, and designated employees of the municipal light department.

For members in more than one group, participation will be proportional.

Chapter 176 of the Acts of 2011 created different plan provisions within these groups for those hired on or after April 2, 2012.

3. Salary

Salary is defined as gross regular compensation. Salary does not include bonuses, overtime, severance pay, unused sick leave credit, or other similar compensation.

4. Member Contributions

Member contributions vary depending upon date hired as follows:

Date of Hire	Member Contribution Rate
Prior to 1975	5.0% of Salary
1975 to 1983	7.0% of Salary
1984 to 1996	8.0% of Salary
1996 and Later plus	9.0% of Salary
1979 and Later	2.0% of Salary in excess of $30,000

For Group 1 employees who become members on or after April 2, 2012, the Contribution Rate shall be 6% after the completion of 30 years of service.

5. Average Salary

Average salary is used to determine a participant's benefit. It is defined as the average salary during the three consecutive-year period that produces the highest average. (Alternatively, if a greater amount results, it is the average rate of salary earned during the period or periods, whether or not consecutive, that constitutes the last three years preceding retirement.). For employees who become members on or after April 2, 2012, the averaging period shall be five years.

6. Creditable Service

In general, creditable service is awarded during the period in which a member contributes to the retirement system.

7. Service Retirement

a. Eligibility:

For an employee to be eligible for service retirement (also referred to as superannuation), one of the following conditions must be met:

(i) completion of 20 years of service

(ii) for an employee hired prior to January 1, 1978, attainment of age 55 as an active member

(iii) for an employee hired on or after January 1, 1978, attainment of age 55 as an active member and completion of ten years of service

(iv) for a Group 1 employee hired on or after April 2, 2012, attainment of age 60 and completion of ten years of service

b. Benefit Amount:

The retirement allowance is determined as a product of the participant's Benefit Rate times Average Salary times Creditable Service, where Benefit Rate is determined from the following table for those hired prior to April 2, 2012:

Age at Retirement	Percentage of Average Salary Group 1	Group 2	Group 4
65 or Over	.025	.025	.025
64	.024	.025	.025
63	.023	.025	.025
62	.022	.025	.025
61	.021	.025	.025
60	.020	.025	.025
59	.019	.024	.025
58	.018	.023	.025
57	.017	.022	.025
56	.016	.021	.025
55	.015	.020	.025
54	.014	.014	.024
53	.013	.013	.023
52	.012	.012	.022
51	.011	.011	.021
50	.010	.010	.020
49	.009	.009	.019
48	.008	.008	.018
47	.007	.007	.017
46	.006	.006	.016
45	.005	.005	.015
44	.004	.004	.004
43	.003	.003	.003
42	.002	.002	.002
41	.001	.001	.001

For those hired after April 1, 2012 who retire with less than 30 years of service, the following rates are applied:

Age at Retirement	Percentage of Average Salary Group 1	Group 2	Group 4
67 or Over	.0250	.0250	.0250
66	.0235	.0250	.0250
65	.0220	.0250	.0250
64	.0205	.0250	.0250
63	.0190	.0250	.0250
62	.0175	.0250	.0250
61	.0160	.0235	.0250
60	.0145	.0220	.0250
59		.0205	.0250
58		.0190	.0250
57		.0175	.0250
56		.0160	.0235
55		.0145	.0220
54			.0205
53			.0190
52			.0175
51			.0160
50			.0145

For those hired after April 1, 2012 who retire with at least 30 years of service, the following rates are applied:

Age at Retirement	Percentage of Average Salary Group 1	Group 2	Group 4
67 or Over	.02500	.02500	.02500
66	.02375	.02500	.02500
65	.02250	.02500	.02500
64	.02125	.02500	.02500
63	.02000	.02500	.02500
62	.01875	.02500	.02500
61	.01750	.02375	.02500
60	.01625	.02250	.02500
59		.02125	.02500
58		.02000	.02500
57		.01875	.02500
56		.01750	.02375
55		.01625	.02250
54			.02125
53			.02000
52			.01875
51			.01750
50			.01625

8. Deferred Vested Retirement

a. Eligibility:

A participant who has completed ten or more years of creditable service is eligible for a deferred vested retirement benefit. If termination is involuntary, the participant is vested after six years.

b. Benefit Amount:

The participant's accrued benefit is payable commencing at age 55, or may be deferred until later at the employee's option.

c. Refund of Contributions:

In lieu of the deferred pension benefit, a member may elect to receive a refund of their accumulated contributions, with interest.

9. Accidental Disability

a. Eligibility:

Participants are eligible for an accidental disability benefit, regardless of service or age, if they become permanently and totally incapacitated for further duty as a result of personal injury sustained while in the performance of duties.

b. Benefit Amount:

The accidental disability amount is 72% of annual salary plus $450 per year for each child plus an additional annuity based upon accumulated Member Contributions with credited interest.

10. Ordinary Disability

a. Eligibility:

An ordinary disability occurs when a member becomes permanently and totally disabled due to sickness or injury that is not job related. In order to be eligible for an ordinary disability benefit, a member must have ten years of service (and be less than age 55 or age 60 if hired on or after April 2, 2012).

b. Benefit Amount:

The ordinary disability amount is equal to the accrued retirement benefit as if the member were age 55 (age 60 if hired on or after April 2, 2012). If the member was a veteran, the benefit is 50% of the member's final rate of Salary during the preceding 12 months, plus an annuity based upon accumulated Member Contributions plus credited interest. If the participant is over age 55 (age 60 if hired on or after April 2, 2012), he will receive not less than the superannuation allowance to which he is entitled.

11. Survivor Benefits

a. Occupational Death:

The survivors of a member who dies due to an occupational injury will be entitled to a lump sum return of contributions plus a pension benefit equal to 72% of the participant's annual Salary.

b. Non-Occupational Death:

Upon the death of a member other than due to an occupational injury, the designated beneficiary will be entitled to a retirement benefit as if Option C had been elected with a minimum of $250 per month to the surviving spouse, plus $120 for the first child, plus $90 for each additional child. If no beneficiary is designated and if the employee worked two years, and is married at least one year, the spouse may elect benefits. If there is no designated beneficiary or surviving spouse, then member contributions are returned. If there are dependent children but no surviving spouse, they may elect minimum survivor benefits of $250 per month plus $120 for the first child and $90 for each additional child.

c. Refund of Contributions:

Upon the death of a member not entitled to survivor benefits, the beneficiary is entitled to a refund of all member contributions with interest.

12. Cost-of-Living Increases

In accordance with the adoption of Chapter 17 of the Acts of 1997, the granting of a cost-of-living adjustment will be determined by an annual vote by the Retirement Board. The amount of increase will be based upon the Consumer Price Index, limited to a maximum of 3.0%, beginning on July 1. All retirees, disabled retirees, and beneficiaries who have been receiving benefits payments for at least one year as of July 1 are eligible for the adjustment. The maximum amount of pension benefit subject to a COLA is $14,000. All COLAs granted to members after 1981 and prior to July 1, 1998 are deemed to be an obligation of the State and are not the liability of the Retirement System.

13. Postretirement Death Benefits

Any benefits following the death of a member after retirement are based upon the form of benefit the participant elected at the time of retirement. There are three available forms as follows:

(i) Option A – Life annuity

(ii) Option B – Life annuity with death benefit equal to excess of member contributions plus credited interest to retirement over annuity benefit paid to member

(iii) Option C – Life annuity with 66-2/3% of benefit continued after death of member to designated joint annuitant

EXHIBIT 6 – ACTUARIAL METHODS AND ASSUMPTIONS:

The actuarial cost method, factors, and assumptions used in determining cost estimates are presented below.

1. **Member Data**

   The member data used in the determination of cost estimates consist of pertinent information with respect to the active, inactive, retired, and disabled members of the employer as supplied by the employer to the actuary.

2. **Valuation Date**

   January 1, 2019.

3. **Actuarial Cost Method**

   The costs of the Plan have been determined in accordance with the individual entry age normal actuarial cost method.

4. **Rate of Investment Return**

   It is assumed that the assets of the fund will accumulate at a compound annual rate of 7.75% per annum.

5. **Salary Scale**

   It is assumed that salaries including longevity will increase at a rate of 3.5% per year.

6. **Cost-of-Living Increases**

   Cost-of-living increases have been assumed to be 3.0% of the lesser of the pension amount and $14,000 per year.

7. **Value of Investments**

   Assets held by the fund are valued at market value as reported by the Public Employees' Retirement Administration Commission (PERAC). The actuarial value of assets is

determined using a four-year smoothing of asset returns greater than or less than the assumed rate of return.

8. Annual Rate of Withdrawal Prior to Retirement

Based on an analysis of experience, the assumed annual rates of withdrawal may best be illustrated by the following rates at the following ages:

Service	General Employees	Police and Fire Employees
0	0.2080	0.1500
5	0.1020	0.1000
10	0.0650	0.0600
15	0.0417	0.0600
20	0.0400	0.0000
30	0.0000	0.0000

9. Annual Rate of Mortality

It is assumed that mortality for is represented by the various SOA Pub-2010 Public Retirement Plans Mortality Tables specific to the Group, Pre-retirement versus Post, Disabled and Beneficiaries, with Scale MP-2019 improvements until 2025.

10. Service Retirement

Based on an analysis of experience, the assumed annual retirement rates are illustrated at the following ages for those hired prior to April 2, 2012:

Age	Male General Employees	Female General Employees	Male and Female Police and Fire Employees
50	0.0360	0.1019	0.0382
51	0.0405	0.0714	0.0351
52	0.0437	0.0562	0.0436
53	0.0366	0.0448	0.0527
54	0.0451	0.0488	0.0999
55	0.0477	0.0469	0.1110
56	0.0574	0.0518	0.1413
57	0.0632	0.0509	0.1292
58	0.0765	0.0552	0.1499
59	0.0917	0.0645	0.1679
60	0.1057	0.0774	0.1871
61	0.1224	0.1038	0.2073
62	0.1473	0.1168	0.2176
63	0.1777	0.1440	0.3338
64	0.2136	0.1708	0.5664
65	0.2615	0.1939	1.00000
66	0.2682	0.1959	1.00000
67	0.2500	0.2000	1.00000
68	0.2500	0.2000	1.00000
69	0.2500	0.2000	1.00000
70 to 76	0.2500	0.2500	1.00000
77 to 79	0.3500	0.2500	1.00000
80	1.0000	1.0000	1.00000

Based on an analysis of experience, the assumed annual retirement rates are illustrated at the following ages for those hired on or after April 2, 2012:

Age	Male General Employees	Female General Employees	Male and Female Police and Fire Employees
50	0.0000	0.0000	0.0191
51	0.0000	0.0000	0.0176
52	0.0000	0.0000	0.0436
53	0.0000	0.0000	0.0211
54	0.0000	0.0000	0.0266
55	0.0000	0.0000	0.0370
56	0.0000	0.0000	0.1060
57	0.0000	0.0000	0.1938
58	0.0000	0.0000	0.1499
59	0.0000	0.0000	0.1119
60	0.0477	0.0469	0.0936
61	0.0574	0.0518	0.1555
62	0.0632	0.0509	0.1741
63	0.0765	0.0552	0.2670
64	0.0917	0.0645	0.4720
65	0.1057	0.0774	0.2500
66	0.1224	0.1038	0.3000
67	0.1473	0.1168	1.0000
68	0.1777	0.1440	1.0000
69	0.2136	0.1708	1.0000
70 to 76	0.2615	0.1939	1.0000
77 to 79	0.2682	0.1959	1.0000
80	0.2500	0.2000	1.0000

12. Annual Rate of Disability Prior to Retirement

Based on an analysis of experience, the assumed annual rates of disability may best be illustrated by the following probabilities at the following ages:

Attained Age	General Employees	Police and Fire Employees
20	0.000100	0.000500
30	0.000152	0.000967
40	0.000663	0.002500
50	0.001271	0.007634

In addition, it is assumed for the general employees that 20% of all disabilities are ordinary (80% are service connected). For police and fire employees, 10% of all disabilities are assumed to be ordinary (90% are service connected).

13. Family Composition

It is assumed that 80% of all members will be survived by a spouse and that females (males) are three years younger (older) than members.

14. Administrative Expenses

The normal cost is increased by an amount equal to the anticipated administrative expenses for the upcoming fiscal year. The amount for fiscal year 2019 is $525,000 and is anticipated to increase at 3.5% per year.

EXHIBIT 7 – GLOSSARY OF TERMS:

This glossary summarizes the technical terms contained in this report.

1. **Actuarial Accrued Liability**

   That portion of the Actuarial Present Value of plan benefits that is not provided for by future employer Normal Costs or employee contributions.

2. **Actuarial Assumptions**

   Assumptions as to the occurrence of future events affecting the Retirement System such as:

   - Rates of investment returns
   - Increases in a member's salary
   - Inflation
   - The probability of mortality, turnover, disablement
   - Retirement at each age and other relevant items

3. **Actuarial Cost Method**

   A procedure for allocating the Actuarial Present Value of pension plan benefits between Normal Cost and Actuarial Accrued Liability.

4. **Actuarial Present Value**

   The single sum amount required at the valuation date that is required to provide for anticipated future events based upon the terms of the plan and the Actuarial Assumptions.

5. **Forecast**

   A projection of future benefit payments or contribution requirements based upon the terms of the plan, the current asset amounts, the Actuarial Assumptions, and additional assumptions as to the replacement of terminating employees with new employees.

6. **Normal Cost**

That portion of the Actuarial Present Value of future benefits that is assigned to the current year.

7. **Unfunded Actuarial Accrued Liability**

That portion of the Actuarial Accrued Liability that is not provided for by current actuarial value of assets.

8. **Valuation Method**

The method used to divide the cost of future benefits among the Actuarial Accrued Liability, the current year's Normal Costs, and future years' Normal Costs. The resulting current funding requirement is then determined as the current year's Normal Cost plus the payment necessary to amortize the Unfunded Actuarial Liability.

9. **Vested Liability**

That portion of the Actuarial Present Value of Accrued Benefits that a member would be entitled to if the member terminated employment with the employer as of the valuation date.

CERTIFICATION:

This report fairly represents the actuarial position of the City of Waltham Retirement System contributing as of January 1, 2019, in accordance with generally accepted actuarial principles applied consistently with the preceding valuation. In our opinion, the actuarial assumptions used to compute actuarial accrued liability and normal cost are reasonably related to plan experience and to reasonable expectations, and represents our best estimate of anticipated plan experience.

The funded status measure is appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations. The funded status measure is appropriate for assessing the need for or the amount of future contributions. The funded status measure would be different if the measure reflected the market value of assets rather than the actuarial value of assets.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of our assignment, we did not perform an analysis of the potential range of such future measurements.

The report was prepared under the supervision of Daniel Sherman, an Associate of the Society of Actuaries and a Member of the American Academy of Actuaries, who takes responsibility for the overall appropriateness of the analysis, assumptions and results. Daniel Sherman is deemed to meet the General Qualification Standard and the basic education and experience requirement in the pension area. Based on over thirty years of performing valuations of similar complexity, Mr. Sherman is qualified by experience. Daniel Sherman has met the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Sherman Actuarial Services, LLC

Daniel W. Sherman

Daniel W. Sherman, ASA, MAAA

August, 2019