SOMERVILLE CONTRIBUTORY RETIREMENT SYSTEM

Actuarial Valuation Report

January 1, 2017

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Report Summary:

Highlights	**January 1, 2015**	**January 1, 2017**
Contributions		
Funding Schedule FY 2018	$15,111,919	$15,111,919
Funding Schedule FY 2019	15,432,193	14,372,667
Funded Ratios		
GAS No. 25	62.5%	66.4%
Participants		
Actives	1,181	1,195
Retirees and Beneficiaries	775	777
Vested	0	0
Inactives	318	420
Disabled	136	129
Total	2,410	2,521
Payroll		
Payroll of Active Members	$66,506,738	$71,454,475
Average Payroll	56,314	59,795
Normal Cost		
Employer	2,208,213	1,741,163
Employee	5,799,541	6,284,686
Administrative Expenses	400,000	450,000
Total	8,407,754	8,475,849
Actuarial Accrued Liabilities		
Actives	159,058,588	165,944,570
Retirees, Beneficiaries, Disabilities and Inactives	211,913,633	226,711,522
Total	370,972,221	392,656,092
Actuarial Value of Assets	231,832,144	260,620,819
Unfunded Actuarial Accrued Liabilities	$139,140,077	$132,035,273

Introduction

The purpose of this report is to present the findings of an actuarial valuation as of January 1, 2017, of Somerville Contributory Retirement System.

The actuarial valuation is based on:

- Provisions Chapter 32 of the Massachusetts General Laws, "M.G.L", as of January 1, 2017.
- Employee data provided by the Retirement Board
- Asset information reported to the Public Employee Retirement Administration Commission by the Somerville 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, 2017. The report also includes results under GASB Statements #25 and #27.

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 two years, the total unfunded actuarial accrued liability decreased by 7.2% to $129,228,533 based on the 2015 plan provisions and actuarial assumptions. The decrease is the result of net favorable actuarial experience during the preceding years and payments against the unfunded liability. The sources of change are as follows:

Assets	287,934
Salary Increases	(1,615,961)
New Participants	1,521,494
Active - Retirements	(6,719,860)
Active - Terminations	1,495,664
Active - Mortality	747,750
Active - Disabilities	1,158,640
Inactive - Mortality and data adjustments	3,761,348
Other	75,415
Benefit Payments	(3,984,334)
Total (Gain) / Loss	(3,271,910)

The City increased the COLA Base amount to $13,000 during the two year period, In addition, the Retirement Board voted to adopt our recommended actuarial assumptions for the 2017 actuarial valuation. The results of these changes increased the unfunded actuarial accrued liability by $2,806,740 and decreased the employer normal cost by $231,168.

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, 2015	January 1, 2017
Superannuation	$4,921,526	$4,823,345
Termination	1,036,590	1,601,429
Death	414,617	624,392
Disability	1,635,021	976,683
Administrative Expenses	400,000	450,000
Total Normal Cost	8,407,754	8,475,849
% of Pay	12.6%	11.9%
Employee Contributions	5,799,541	6,284,686
% of Pay	8.7%	8.8%
Employer Normal Cost	$2,608,213	$2,191,163
% of Pay	3.9%	3.1%

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, 2015	January 1, 2017
Actives		
Superannuations	$149,049,051	$158,082,008
Termination	(2,082,101)	(3,009,071)
Death	4,020,638	5,754,569
Disability	8,071,000	5,117,064
Retirees and Inactives		
Retirees and Beneficiaries	163,251,222	172,450,596
Terminated (Refund)	3,989,399	4,652,800
Disabled	44,673,012	49,608,126
Total	$370,972,221	$392,656,092

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, 2015	January 1, 2017
Actives		
Superannuation	$183,990,651	$191,701,166
Termination	5,962,607	8,703,326
Death	6,958,109	9,772,100
Disability	21,194,704	12,731,359
Retirees and Inactives		
Retirees and Beneficiaries	163,251,222	172,450,596
Terminated (Refund)	3,989,399	4,652,800
Disabled	44,673,012	49,608,126
Total	$430,019,704	$449,619,473

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, 2015	January 1, 2017
Cash equivalents	$4,755,841	$5,423,120
Short term investments	0	0
Fixed income securities	67,818,227	65,233,177
Equities	137,589,672	138,137,222
International	13,811,249	11,971,177
Real Estate	18,704,830	22,144,293
Venture Capital	0	0
Other	0	0
Accounts receivable	491,320	23,003
Accounts payable	(126,072)	(133,542)
Accrued income	2,800	2,838
Total Market Value	$243,047,867	$242,801,288
Total Actuarial Value	$231,832,144	$260,620,819

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Actuarial Value of Assets

The actuarial value of assets is determined by projecting the actuarial value of assets as of the beginning of the prior plan year with the assumed rate of return during that year (8.25%) 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, 2017 is presented in Table V.

Table V

		January 1, 2017
(1)	Market value at January 1, 2016	$239,494,134
(2)	2016 Contributions	$23,123,619
(3)	2016 Benefit Payments	($28,648,310)
(4)	Net interest adjustment at 8.25% on (1), (2), and (3) to December 31, 2016	$19,530,373
(5)	Expected market value on January 1, 2017 (1) + (2) + (3) + (4)	$253,499,816
(6)	Actual market value on January 1, 2017	$242,801,289
(7)	2016 (Gain) / Loss	$10,698,527
(8)	80% of 2016 (Gain) / Loss	$8,558,821
(9)	2015 (Gain) / Loss	$18,977,497
(10)	60% of 2015 (Gain) / Loss	$11,386,498
(11)	2014 (Gain) / Loss	$5,730,206
(12)	40% of 2014 (Gain) / Loss	$2,292,082
(13)	2013 (Gain) / Loss	($22,089,360)
(14)	20% of 2013 (Gain) / Loss	($4,417,872)
(15)	Actuarial value on January 1, 2017, (6) + (8) + (10) + (12) + (14)	$260,620,819
(16)	but not less than 80% nor greater than 120% of (6)	$260,620,819
	Ratio of actuarial value to market value	107.34%
(17)	Actuarial Value Return for 2015	8.49%
(18)	Actuarial Value Return for 2016	7.89%
(19)	Market Value Return for 2015	0.37%
(20)	Market Value Return for 2016	3.73%

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, 2015	January 1, 2017
Actuarial Accrued Liability	$370,972,221	$392,656,092
Actuarial Assets	231,832,144	260,620,819
Unfunded Actuarial Accrued Liability	$139,140,077	$132,035,273
Funded Status	62.5%	66.4%
Market Value of Assets	243,047,867	242,801,288
Funded Status for Chapter 68 of the 2007 MGL*	65.5%	66.4%

* (Greater of Actuarial and Market Value, divided by Actuarial Accrued Liability)

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Appropriations

The pension appropriation for the upcoming fiscal years have been calculated in accordance with the requirements set forth in Section 22D 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, 2033
  $ 131,221,893 over 16 years with 3.50% increasing payments
- Level amortization of the 2002 Early Retirement Incentive by June 30, 2019
  $ 1,154,532 over 2 years
- Increasing amortization of the 2003 Early Retirement Incentive by June 30, 2020
  $ 1,006,113 over 3 years
- Interest adjustment for payments deposited at the beginning of the fiscal year.

In June of 2017, the City of Somerville increased the COLA base to $14,000. The Board elected to adopt a funding schedule that included this increase. The amounts shown below, on page 12 and on page 19 reflect the modification. All other pages are based on the $13,000 COLA base.

The pension appropriation is shown in Table VII.

Table VII

	January 1, 2015	January 1, 2017
Normal cost	$2,608,213	$2,214,510
Amortization payment of the accrued liability	9,980,661	11,070,976
Amortization payment of 2002 ERI liability	600,135	599,468
Amortization payment of 2003 ERI liability	362,280	361,487
Total cost	$13,551,289	$14,246,441
% of Pay	20.4%	19.9%
Fiscal 2018 cost	$15,111,919	$14,805,336
Fiscal 2019 cost	$15,432,193	$15,226,941

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 4.5% per year. The employee contribution rate is expected to increase to 10.5% by 2036 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 increase during the next 16 years until the unfunded liabilities are completely paid off, at which time only the normal cost will remain. The total cost represents about 21% of payroll until the time the unfunded liabilities are fully paid off, leaving only a normal cost of 1.6% 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	Funded Ratio %**	Unfunded Liability
2018	$6,284,686	$2,301,386	$12,503,950	$14,805,336	20.7	66.1	$133,382,538
2019	$6,606,449	$2,320,306	$12,906,635	$15,226,941	20.5	67.2	$131,058,655
2020	$6,877,129	$2,314,585	$12,700,429	$15,015,014	19.6	68.7	$128,021,994
2021	$7,158,104	$2,306,432	$12,756,127	$15,062,559	19.1	70.1	$124,952,681
2022	$7,449,748	$2,295,707	$13,202,592	$15,498,299	19.1	71.4	$121,716,638
2023	$7,752,448	$2,282,263	$13,664,683	$15,946,946	19.1	72.9	$117,758,582
2024	$8,066,606	$2,265,946	$14,142,947	$16,408,893	19.0	74.5	$113,004,544
2025	$8,392,636	$2,246,596	$14,637,950	$16,884,546	19.0	76.3	$107,374,066
2026	$8,730,968	$2,224,046	$15,150,278	$17,374,324	19.0	78.1	$100,779,672
2027	$9,082,046	$2,198,120	$15,680,538	$17,878,658	19.0	80.2	$93,126,274
2028	$9,446,331	$2,168,638	$16,229,356	$18,397,994	19.0	82.4	$84,310,553
2029	$9,824,300	$2,135,408	$16,797,384	$18,932,792	19.0	84.9	$74,220,270
2030	$10,216,445	$2,098,233	$17,385,292	$19,483,525	18.9	87.5	$62,733,534
2031	$10,623,276	$2,056,905	$17,993,778	$20,050,683	18.9	90.3	$49,718,008
2032	$11,045,323	$2,011,209	$18,623,560	$20,634,769	18.9	93.4	$35,030,042
2033	$11,483,132	$1,960,921	$19,275,384	$21,236,305	18.9	96.6	$18,513,750
2034	$11,937,268	$1,905,805	$0	$1,905,805	1.6	100.0	($0)
2035	$12,408,318	$1,845,617	$0	$1,845,617	1.5	100.0	($0)
2036	$12,896,887	$1,780,102	$0	$1,780,102	1.4	100.0	($0)
2037	$13,283,793	$1,833,505	$0	$1,833,505	1.4	100.0	($0)
2038	$13,682,307	$1,888,510	$0	$1,888,510	1.4	100.0	($0)
2039	$14,092,777	$1,945,166	$0	$1,945,166	1.4	100.0	($0)
2040	$14,515,560	$2,003,521	$0	$2,003,521	1.4	100.0	($0)
2041	$14,951,027	$2,063,626	$0	$2,063,626	1.4	100.0	($0)
2042	$15,399,557	$2,125,535	$0	$2,125,535	1.4	100.0	($0)
2043	$15,861,544	$2,189,301	$0	$2,189,301	1.4	100.0	($0)
2044	$16,337,390	$2,254,980	$0	$2,254,980	1.4	100.0	($0)
2045	$16,827,512	$2,322,630	$0	$2,322,630	1.4	100.0	($0)
2046	$17,332,338	$2,392,308	$0	$2,392,308	1.4	100.0	($0)
2047	$17,852,308	$2,464,078	$0	$2,464,078	1.4	100.0	($0)
2048	$18,387,877	$2,538,000	$0	$2,538,000	1.4	100.0	($0)
2049	$18,939,513	$2,614,140	$0	$2,614,140	1.4	100.0	($0)

** Beginning of Fiscal Year

EXHIBITS

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Exhibit 1 - Age/Service Distribution with Salary as of January 1, 2017

Attained Age	Average Salary <5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40+	Total
< 20	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0
20-24	39	0	0	0	0	0	0	0	0	39
	31,624	0	0	0	0	0	0	0	0	31,624
25-29	94	17	1	0	0	0	0	0	0	112
	44,878	61,562	0	0	0	0	0	0	0	47,480
30-34	73	50	13	1	0	0	0	0	0	137
	50,046	73,312	65,085	0	0	0	0	0	0	59,778
35-39	57	39	26	8	0	0	0	0	0	130
	48,285	71,496	62,212	79,256	0	0	0	0	0	59,940
40-44	36	21	12	23	3	0	0	0	0	95
	48,591	57,139	73,009	78,868	72,453	0	0	0	0	61,649
45-49	32	19	15	30	27	11	2	0	0	136
	43,275	54,424	71,534	72,915	84,524	70,473	0	0	0	64,985
50-54	27	24	32	28	30	29	8	0	0	178
	47,457	51,753	46,896	58,491	70,663	88,085	111,951	0	0	63,100
55-59	22	19	13	41	23	22	29	2	0	171
	42,897	40,496	44,394	54,528	65,322	75,088	85,832	101,021	0	60,652
60-64	10	9	16	22	22	15	15	18	4	131
	47,295	45,554	42,651	46,186	53,732	50,351	70,646	85,406	73,167	56,553
65-69	3	3	9	13	8	8	3	1	2	50
	36,845	41,581	50,222	43,811	46,902	66,646	47,192	75,402	68,643	50,389
70+	3	0	3	4	1	1	2	0	2	16
	0	0	49,107	18,810	55,851	45,315	43,524	0	65,493	38,422
Total Employees	396	201	140	170	114	86	59	21	8	1,195
Average Salary	44,950	61,098	55,516	59,822	67,851	73,434	79,204	86,417	70,118	58,053

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Exhibit 2 - Retiree Distribution as of January 1, 2017

	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	2	4	6	52,927	184,827	237,755
50-54	2	5	7	41,099	155,779	196,878
55-59	11	18	29	200,608	814,090	1,014,699
60-64	44	34	78	784,891	1,709,610	2,494,501
65-69	69	98	167	1,447,615	4,074,719	5,522,335
70-74	71	59	130	1,427,840	2,458,543	3,886,383
75-79	62	42	104	1,176,054	1,306,941	2,482,996
80-84	58	27	85	998,717	787,689	1,786,406
85-89	58	35	93	884,509	1,006,190	1,890,699
90-94	38	20	58	500,737	412,292	913,030
95+	18	2	20	180,869	25,574	206,442
Total	433	344	777	7,695,867	12,936,255	20,632,122
Average (Age/Payment)	77.1	73.0	75.3	17,773	37,605	26,554
Frequency Percent	55.7	44.3	100	37.3	62.7	100

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Exhibit 3 - Disabled Retiree Distribution as of January 1, 2017

	Number of Employees			Total Payments		
Attained Age	Male	Female	Total	Male	Female	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	1	0	1	39,948	0	39,948
40-44	0	0	0	0	0	0
45-49	4	0	4	432,506	0	432,506
50-54	3	1	4	88,422	55,891	144,313
55-59	5	0	5	241,602	0	241,602
60-64	23	3	26	934,636	95,341	1,029,977
65-69	31	1	32	1,338,726	57,524	1,396,249
70-74	21	1	22	906,717	13,286	920,003
75-79	15	0	15	396,945	0	396,945
80-84	9	0	9	258,927	0	258,927
85-89	9	0	9	241,062	0	241,062
90-94	2	0	2	65,202	0	65,202
95-99	0	0	0	0	0	0
Total	123	6	129	4,944,694	222,042	5,166,735
Average (Age/Payment)	69.77	62.60	69.44	40,201	37,007	40,052
Frequency Percent	95.3	4.7	100	95.7	4.3	100

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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
2017	$33,569,343	$6,284,686	$15,111,919	$21,426,794	$9,254,056
2018	30,450,636	6,606,449	14,511,788	20,991,868	11,659,469
2019	31,828,310	6,877,129	14,330,497	21,870,109	11,249,426
2020	33,023,031	7,158,104	14,022,791	22,702,273	10,860,137
2021	34,055,536	7,449,748	14,480,720	23,555,330	11,430,262
2022	35,005,579	7,752,448	14,954,677	24,458,243	12,159,789
2023	35,817,760	8,066,606	15,445,256	25,425,980	13,120,082
2024	36,551,390	8,392,636	15,953,079	26,474,716	14,269,040
2025	37,209,372	8,730,968	16,478,788	27,619,474	15,619,859
2026	37,788,809	9,082,046	17,023,052	28,876,563	17,192,852
2027	38,261,240	9,446,331	17,586,567	30,264,918	19,036,576
2028	38,657,819	9,824,300	18,170,054	31,805,026	21,141,561
2029	38,971,585	10,216,445	18,774,265	33,518,111	23,537,236
2030	39,236,702	10,623,276	19,399,978	35,426,141	26,212,694
2031	39,402,587	11,045,323	20,048,005	37,553,537	29,244,278
2032	39,519,353	11,483,132	20,719,189	39,926,879	32,609,848
2033	39,557,631	11,937,268	21,414,404	42,574,100	36,368,141
2034	39,478,066	12,408,318	1,845,617	44,752,133	19,528,002
2035	39,311,612	12,896,887	1,780,102	46,333,087	21,698,464
2036	39,041,788	13,283,793	1,833,505	48,087,534	24,163,044
2037	38,725,524	13,682,307	1,888,510	50,041,210	26,886,503
2038	38,394,315	14,092,777	1,945,166	52,213,594	29,857,222
2039	38,067,064	14,515,560	2,003,521	54,623,736	33,075,752
2040	37,722,967	14,951,027	2,063,626	57,292,283	36,583,969
2041	37,357,150	15,399,557	2,125,535	60,242,608	40,410,550
2042	36,928,811	15,861,544	2,189,301	63,501,791	44,623,825
2043	36,477,247	16,337,390	2,254,980	67,099,232	49,214,356
2044	35,961,601	16,827,512	2,322,630	71,066,725	54,255,266
2045	35,402,055	17,332,338	2,392,308	75,439,517	59,762,108
2046	36,458,893	17,852,308	2,464,078	80,189,756	64,047,249

amounts in thousands

EXHIBIT 5 – SUMMARY OF PLAN PROVISIONS:

This summary is prepared in accordance with Chapter 32 as of January 1, 2017, 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. <u>Service Retirement</u>

a. <u>Eligibility</u>:

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	Percentage of Average Salary		
Retirement	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. Members with ten or more years of service are entitled to 100% of the credited interest on their contributions. Members with five to ten years of service are entitled to 50% of the credited interest on their contributions. No credited interest is provided for members with less than five years of service.

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 $13,000. 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. **<u>Member Data</u>**

   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. **<u>Valuation Date</u>**

   January 1, 2017.

3. **<u>Actuarial Cost Method</u>**

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

4. **<u>Rate of Investment Return</u>**

   It is assumed that the assets of the fund will accumulate at a compound annual rate of 8.00% per annum, net of investment expenses. This is a reduction from the previous valuation.

5. **<u>Salary Scale</u>**

   It is assumed that salaries including longevity will increase at a rate of 3% per year.

6. **<u>Cost-of-Living Increases</u>**

   Cost-of-living increases have been assumed to be 2.5% of the lesser of the pension amount and $13,000 per year.

7. **<u>Value of Investments</u>**

   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 five-year smoothing of asset returns greater than or less than the assumed rate of return, with a 20% corridor.

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	0.0150
5	0.1020	0.0150
10	0.0650	0.0150
15	0.0417	0.0150
20	0.0400	0.0000
30	0.0000	0.0000

9. Annual Rate of Mortality

It is assumed that both pre-retirement mortality and beneficiary mortality is represented by the RP-2014 Blue Collar Mortality with Scale MP-2015, fully generational. Mortality for retired members for Group 1 and 2 is represented by the RP-2014 Blue Collar Mortality Table set forward five years for males and three years for females, fully generational. Mortality for retired members for Group 4 is represented by the RP-2014 Blue Collar Mortality Table set forward three years for males, and six years for females, fully generational. Mortality for disabled members for Group 1 and 2 is represented by the RP-2000 Mortality Table set forward six years. Mortality for disabled members for Group 4 is represented by the RP-2000 Mortality Table set forward two years. Generational adjusting is based on Scale MP-2015.

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	0.019964	0.1019	0.01986
51	0.019962	0.0714	0.01985
52	0.019960	0.0562	0.01985
53	0.019956	0.0448	0.04960
54	0.039908	0.0488	0.07435
55	0.039898	0.0469	0.2500
56	0.049858	0.0518	0.2000
57	0.049846	0.0509	0.2500
58	0.099660	0.0552	0.2500
59	0.129518	0.0645	0.3000
60	0.119515	0.0774	0.2500
61	0.120000	0.1038	0.2500
62	0.200000	0.1168	0.2500
63	0.200000	0.1440	0.3000
64	0.200000	0.1708	0.5000
65	0.200000	0.1939	1.00000
66	0.300000	0.1959	1.00000
67	0.300000	0.2000	1.00000
68	0.300000	0.2000	1.00000
69	0.300000	0.2000	1.00000
70 to 76	0.300000	0.2500	1.00000
77 to 79	0.350000	0.2500	1.00000
80	1.000000	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	0.0477	0.0000	0.0072
51	0.0574	0.0000	0.0072
52	0.0632	0.0000	0.0062
53	0.0765	0.0000	0.0105
54	0.0917	0.0000	0.0105
55	0.1057	0.0000	0.0389
56	0.1224	0.0000	0.0631
57	0.1473	0.0000	0.0897
58	0.1777	0.0000	0.0846
59	0.2136	0.0000	0.1022
60	0.2615	0.0469	0.1455
61	0.2682	0.0518	0.1844
62	0.0477	0.0509	0.2741
63	0.0574	0.0552	0.1984
64	0.0632	0.0645	0.4139
65	0.0765	0.0774	1.0000
66	0.0917	0.1038	1.0000
67	0.1057	0.1168	1.0000
68	0.1224	0.1440	1.0000
69	0.1473	0.1708	1.0000
70	0.1777	0.1939	1.0000
71 to 76	0.2136	0.2000	1.0000
77 to 79	0.2500	0.2000	1.0000
80	1.0000	1.0000	1.0000

11. 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	0.0001	0.0005
30	0.0002	0.0010
40	0.0006	0.0025
50	0.0013	0.0076

In addition, it is assumed for the general employees that 40% of all disabilities are ordinary (60% are service connected). For police and fire employees, 10% of all disabilities are assumed to be ordinary (90% are service connected).

12. 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.

13. 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 2017 is $450,000 and is anticipated to increase at 4% per year.

EXHIBIT 7 – GLOSSARY OF TERMS:

This glossary summarizes the technical terms contained in this report.

1. <u>Actuarial Accrued Liability</u>

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

2. <u>Actuarial Assumptions</u>

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. <u>Actuarial Cost Method</u>

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

4. <u>Actuarial Present Value</u>

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. <u>Forecast</u>

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. Actuarial 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 Somerville Retirement System contributing as of January 1, 2017, 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

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Daniel W. Sherman, ASA, MAAA

June 2017