WATERTOWN
CONTRIBUTORY RETIREMENT SYSTEM

Actuarial Valuation Report

January 1, 2019

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Report Summary:

Highlights	**January 1, 2018**	**January 1, 2019**
Contributions		
Funding Schedule FY 2020	$8,300,956	$8,300,956
Funding Schedule FY 2021	810,596	14,745,742
Funded Ratios		
GAS No. 25	88.2%	89.0%
Participants		
Actives	523	512
Retirees and Beneficiaries	363	362
Vested	0	0
Inactives	165	183
Disabled	62	64
Total	1,113	1,121
Payroll		
Payroll of Active Members	$33,501,993	$33,927,238
Average Payroll	64,057	66,264
Normal Cost		
Employer	338,017	594,417
Employee	2,967,979	3,033,932
Administrative Expenses	320,000	340,000
Total	3,625,996	3,968,349
Actuarial Accrued Liabilities		
Actives	87,337,108	94,399,638
Retirees, Beneficiaries, Disabilities and Inactives	118,671,859	129,192,385
Total	206,008,967	223,592,023
Actuarial Value of Assets	181,766,705	199,018,792
Unfunded Actuarial Accrued Liabilities	$24,242,262	$24,573,231

Introduction

The purpose of this report is to present the findings of an actuarial valuation as of January 1, 2019, of Watertown 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 Watertown 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 10.5% to $24,573,231. The increase is the result of changes in the actuarial assumptions (investment return and mortality) and by net unfavorable actuarial experience during the preceding year, partially offset by a payment against the unfunded accrued liability. The sources of (Gain) and Loss are as follows:

Asset	(1,152,224)
Salary Increase	735,128
New Participants	(1,976,267)
Active – Retirement	(36,243)
Active – Termination	(114,261)
Active – Mortality	(526,044)
Active – Disability	2,393,747
Inactive - Mortality and Data Adjustment	(53,855)
Other, including data, contribution interest, etc	(1,152,224)
Benefit Payments	(649,633)
Total (Gain) / Loss	5,063,285
Changes in Actuarial Assumptions	14,139,836

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	$1,921,203	$2,286,995
Termination	734,647	790,197
Death	215,377	99,468
Disability	434,769	451,689
Administrative Expenses	320,000	340,000
Total Normal Cost	3,625,996	3,968,349
% of Pay	10.8%	11.7%
Employee Contributions	2,967,979	3,033,932
% of Pay	8.9%	8.9%
Employer Normal Cost	$658,017	$934,417
% of Pay	2.0%	2.8%

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	$77,507,008	$86,456,379
Termination	2,861,920	2,854,007
Death	3,466,999	1,302,803
Disability	3,501,181	3,786,449
Retirees and Inactives		
Retirees and Beneficiaries	91,029,912	99,510,565
Vested	0	0
Terminated (Refund)	2,270,951	2,247,468
Disabled	25,370,996	27,434,352
Total	$206,008,967	$223,592,023

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	$90,303,533	$101,901,853
Termination	5,726,909	5,902,792
Death	4,806,849	1,967,737
Disability	6,559,788	7,045,661
Retirees and Inactives		
Retirees and Beneficiaries	91,029,912	99,510,565
Vested	0	0
Terminated (Refund)	2,270,951	2,247,468
Disabled	25,370,996	27,434,352
Total	$226,068,938	$246,010,428

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	$941,511	$1,085,215
Short term investments	0	0
Fixed income securities	42,120,231	43,944,661
Equities	65,595,558	61,717,181
International	38,293,204	33,478,666
Real Estate	18,810,083	20,566,940
Venture Capital	0	0
Other	19,430,527	22,228,444
Accounts receivable	513,766	535,872
Accounts payable	(47,529)	(61,236)
Accrued income	0	1,226
Total Market Value	$185,657,351	$183,496,969
Total Actuarial Value	$181,766,705	$199,018,792

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 (7.9%) 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 10%. 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	$185,657,351
(2)	2018 Contributions	$23,524,870
(3)	2018 Payments	($15,717,950)
(4)	Net interest adjustment at 7.9% on (1), (2), and (3) to December 31, 2018	$14,975,304
(5)	Expected market value on January 1, 2019 (1) + (2) + (3) + (4)	$208,439,575
(6)	Actual market value on January 1, 2019	$183,061,061
(7)	2018 (Gain) / Loss	$25,378,514
(8)	80% of 2018 (Gain) / Loss	$20,302,811
(9)	2017 (Gain) / Loss	($12,140,022)
(10)	60% of 2017 (Gain) / Loss	($7,284,013)
(11)	2016 (Gain) / Loss	$2,633,095
(12)	40% of 2016 (Gain) / Loss	$1,053,238
(13)	2015 (Gain) / Loss	$9,428,473
(14)	20% of 2015 (Gain) / Loss	$1,885,695
(15)	Actuarial value on January 1, 2019, (6) + (8) + (10) + (12) + (14) but not less than 90% nor greater than 110% of (6)	$199,018,792
(16)	Ratio of actuarial value to market value	108.72%
(17)	Market Value Return for 2017	15.6%
(18)	Actuarial Value Return for 2017	8.3%
(19)	Market Value Return for 2018	-5.5%
(20)	Actuarial Value Return for 2018	5.1%

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, 2018	January 1, 2019
Actuarial Accrued Liability	$206,008,967	$223,592,023
Actuarial Assets	181,766,705	199,018,792
Unfunded Actuarial Accrued Liability	$24,242,262	$24,573,231
Funded Status	88.2%	89.0%

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, 2028, 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, 2021
  $ 13,772,422 by 2021
- Increasing amortization of the Housing Authority liability by June 30, 2023
  $ 812,992 over 4 years with 4.0% increasing payments
- Interest adjustment for payments deposited at the beginning of the fiscal year.

The pension appropriation is shown in Table VII.

Table VII

	January 1, 2018	January 1, 2019
Normal cost	$658,017	$934,417
Amortization payment of the accrued liability	23,282,442	12,064,785
Amortization payment of Housing Authority liability	206,351	214,316
Total cost	$24,146,810	$13,213,518
% of Pay	72.1%	38.9%
Fiscal 2020 cost	$8,300,956	$8,300,956
Fiscal 2021 cost	$810,596	$14,745,742

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 4.0% 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 decrease next year until the unfunded liabilities are completely paid off, at which time only the normal cost will remain. The total cost represents about 42% of payroll, leaving only a normal cost of initially 2%, decreasing to 1% thereafter. The decrease in the cost as a percentage of payroll is a result of the increase in member deductions.

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 Accrued Liability	Funded Ratio %**
2020	$3,033,932	$970,175	$7,330,781	$8,300,956	24.5	$24,573,231	86.6
2021	$3,189,637	$973,320	$13,772,422	$14,745,742	41.8	$13,703,907	94.0
2022	$3,352,944	$975,164	$240,675	$1,215,839	3.3	$455,438	99.8
2023	$3,524,213	$975,598	$250,302	$1,225,900	3.2	$241,077	99.9
2024	$3,703,818	$974,507	$0	$974,507	2.5	$0	100.0
2025	$3,892,153	$971,767	$0	$971,767	2.4	$0	100.0
2026	$4,089,628	$967,250	$0	$967,250	2.3	$0	100.0
2027	$4,296,674	$960,815	$0	$960,815	2.2	$0	100.0
2028	$4,513,741	$952,319	$0	$952,319	2.1	$0	100.0
2029	$4,741,298	$941,606	$0	$941,606	1.9	$0	100.0
2030	$4,979,837	$928,511	$0	$928,511	1.8	$0	100.0
2031	$5,229,874	$912,863	$0	$912,863	1.7	$0	100.0
2032	$5,491,946	$894,477	$0	$894,477	1.6	$0	100.0
2033	$5,766,615	$873,160	$0	$873,160	1.5	$0	100.0
2034	$6,054,472	$848,706	$0	$848,706	1.4	$0	100.0
2035	$6,356,130	$820,899	$0	$820,899	1.3	$0	100.0
2036	$6,672,233	$789,509	$0	$789,509	1.2	$0	100.0
2037	$6,939,123	$821,089	$0	$821,089	1.2	$0	100.0
2038	$7,216,688	$853,933	$0	$853,933	1.2	$0	100.0
2039	$7,505,355	$888,090	$0	$888,090	1.2	$0	100.0
2040	$7,805,569	$923,614	$0	$923,614	1.2	$0	100.0
2041	$8,117,792	$960,558	$0	$960,558	1.2	$0	100.0
2042	$8,442,504	$998,981	$0	$998,981	1.2	$0	100.0
2043	$8,780,204	$1,038,940	$0	$1,038,940	1.2	$0	100.0
2044	$9,131,412	$1,080,498	$0	$1,080,498	1.2	$0	100.0
2045	$9,496,669	$1,123,717	$0	$1,123,717	1.2	$0	100.0
2046	$9,876,535	$1,168,666	$0	$1,168,666	1.2	$0	100.0
2047	$10,271,597	$1,215,413	$0	$1,215,413	1.2	$0	100.0
2048	$10,682,461	$1,264,029	$0	$1,264,029	1.2	$0	100.0
2049	$11,109,759	$1,314,591	$0	$1,314,591	1.2	$0	100.0
2050	$11,554,150	$1,367,174	$0	$1,367,174	1.2	$0	100.0
2051	$12,016,316	$1,421,861	$0	$1,421,861	1.2	$0	100.0

** Beginning of Fiscal Year

EXHIBITS

C:\Users\Dan Sherman\OneDrive - Sherman Actuarial Services, LLC\Recovered Data\Watertown\Val19\Report\[ACT1.xls]Actives

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	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0
20-24	13	0	0	0	0	0	0	0	0	13
	49,172	0	0	0	0	0	0	0	0	49,172
25-29	52	3	0	0	0	0	0	0	0	55
	51,515	48,235	0	0	0	0	0	0	0	51,336
30-34	34	15	5	0	0	0	0	0	0	54
	58,478	68,362	80,461	0	0	0	0	0	0	63,259
35-39	22	7	17	4	0	0	0	0	0	50
	52,280	60,251	82,274	91,862	0	0	0	0	0	66,760
40-44	10	2	10	16	5	0	0	0	0	43
	41,991	44,458	67,442	91,929	87,411	0	0	0	0	71,887
45-49	12	9	11	13	14	4	0	0	0	63
	60,103	51,107	59,649	84,795	97,072	108,377	0	0	0	75,114
50-54	14	5	9	9	5	6	2	0	0	50
	33,565	50,032	46,796	66,359	104,180	109,139	87,917	0	0	61,801
55-59	8	9	12	17	13	12	14	3	0	88
	46,265	46,950	59,697	51,415	72,099	81,270	95,403	147,959	0	69,036
60-64	6	4	8	9	11	11	10	3	1	63
	45,424	40,947	47,209	44,925	50,002	65,369	78,966	79,435	114,660	57,619
65-69	6	3	1	3	4	5	1	0	1	24
	48,979	50,212	50,858	33,412	64,468	63,360	61,761	0	218,454	60,437
70+	0	0	0	4	0	1	1	0	1	7
	0	0	0	28,274	0	58,994	61,785	0	51,484	45,784
Total Employees	177	57	73	75	52	39	28	6	3	510
Average Salary	50,870	54,875	64,350	67,061	78,118	80,985	86,596	113,697	128,199	63,934

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	0	0	0	0	0
35-39	0	0	0	0	0	0
40-44	0	0	0	0	0	0
45-49	0	0	0	0	0	0
50-54	0	3	3	0	196,146	196,146
55-59	7	4	11	109,606	212,284	321,890
60-64	11	24	35	264,991	1,329,797	1,594,788
65-69	25	34	59	549,330	1,552,460	2,101,790
70-74	34	46	80	895,581	1,956,676	2,852,256
75-79	30	24	54	612,394	749,464	1,361,858
80-84	11	19	30	197,633	600,957	798,590
85-89	19	29	48	368,610	767,320	1,135,931
90-94	10	18	28	127,294	450,903	578,197
95+	5	10	15	61,877	117,482	179,358
Total	152	211	363	3,187,316	7,933,487	11,120,803
Average (Age/Payment)	75.98	76.42	76.23	20,969	37,599	30,636
Frequency Percent	41.9	58.1	100	28.7	71.3	100

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	1	1	0	56,624	56,624
40-44	3	2	5	147,095	129,008	276,103
45-49	0	1	1	0	18,454	18,454
50-54	1	4	5	29,942	210,570	240,512
55-59	1	0	1	58,576	0	58,576
60-64	0	11	11	0	670,326	670,326
65-69	2	3	5	50,331	94,419	144,750
70-74	1	12	13	32,391	472,019	504,410
75-79	0	8	8	0	321,740	321,740
80-84	2	5	7	39,804	131,812	171,617
85-89	0	3	3	0	96,317	96,317
90-94	1	3	4	5,290	98,885	104,174
95-99	0	0	0	0	0	0
Total	11	53	64	363,429	2,300,174	2,663,604
Average (Age/Payment)	63.69	70.25	69.13	33,039	43,400	41,619
Frequency Percent	17.2	82.8	100	13.6	86.4	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	$17,636,248	$3,033,932	$8,300,956	$25,629,288	$19,327,927
2020	16,015,244	3,189,637	14,745,742	16,445,366	18,365,501
2021	16,630,912	3,352,944	1,215,839	17,316,133	5,254,004
2022	17,226,050	3,524,213	1,225,900	17,701,058	5,225,121
2023	17,827,345	3,703,818	974,507	18,073,505	4,924,484
2024	18,490,697	3,892,153	971,767	18,429,664	4,802,887
2025	19,060,089	4,089,628	967,250	18,779,892	4,776,681
2026	19,574,839	4,296,674	960,815	19,130,129	4,812,778
2027	20,084,012	4,513,741	952,319	19,483,353	4,865,401
2028	20,528,801	4,741,298	941,606	19,843,108	4,997,211
2029	20,909,798	4,979,837	928,511	20,215,550	5,214,100
2030	21,261,420	5,229,874	912,863	20,605,996	5,487,312
2031	21,618,955	5,491,946	894,477	21,017,492	5,784,960
2032	21,982,503	5,766,615	873,160	21,451,943	6,109,215
2033	22,352,164	6,054,472	848,706	21,911,421	6,462,436
2034	22,728,041	6,356,130	820,899	22,398,185	6,847,173
2035	23,110,239	6,672,233	789,509	22,914,690	7,266,193
2036	23,498,864	6,939,123	821,089	23,461,148	7,722,497
2037	23,894,024	7,216,688	853,933	24,042,730	8,219,327
2038	24,295,829	7,505,355	888,090	24,662,584	8,760,200
2039	24,704,391	7,805,569	923,614	25,324,133	9,348,925
2040	25,119,824	8,117,792	960,558	26,031,095	9,989,622
2041	25,542,242	8,442,504	998,981	26,787,510	10,686,752
2042	25,971,764	8,780,204	1,038,940	27,597,764	11,445,144
2043	26,408,509	9,131,412	1,080,498	28,466,622	12,270,023
2044	26,852,599	9,496,669	1,123,717	29,399,254	13,167,042
2045	27,304,156	9,876,535	1,168,666	30,401,269	14,142,315
2046	27,763,306	10,271,597	1,215,413	31,478,756	15,202,460
2047	28,230,178	10,682,461	1,264,029	32,638,317	16,354,629
2048	29,072,918	11,109,759	1,314,591	33,873,029	17,224,461

amounts in thousands

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	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. **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 7.80% per annum, net of investment expenses. The previous valuation used 7.90%

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 $13,000 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 five-year smoothing of asset returns greater than or less than the assumed rate of return, with a 10% 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	0.1500
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-2018 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	0.2615	0.1939	1.0000
70 to 76	0.2682	0.1959	1.0000
77 to 79	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 $340,000 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. Actuarial Accrued Liability

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. 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 projected 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. 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 Town of Watertown Retirement System contributing as of January 1, 2019, in accordance with generally accepted actuarial principles applied consistently with the preceding valuation. The economic assumptions were selected by the Retirement Board. 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
October, 2019

BREAKOUTS

C:\Users\Dan Sherman\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.MSO\[Copy of RET1.xls]Retirees

Breakouts

	Total	All Others	Housing
(1) Participants			
(a) Actives	512	499	13
(b) Retirees	362	354	8
(c) Inactives	183	183	0
(d) Disabled Retirees	64	64	0
(e) Total	1121	1100	21
(2) Payroll of Active Participants	$33,927,238	$33,025,822	$901,416
(3) Normal Cost			
(a) Total Normal Cost	3,968,349	3,872,374	95,975
(b) Expected Employee Contributions	3,033,932	2,955,620	78,312
(c) Administrative Expenses	340,000	331,777	8,223
(d) Net Employer Normal Cost (a) - (b)	934,417	916,754	17,663
(4) Actuarial Accrued Liability	223,592,023	217,720,008	5,872,015
(5) Assets*	199,018,792	193,792,123	5,226,668
(6) Unfunded Actuarial Accrued Liability (4) - (5)	24,573,231	23,927,885	645,347
(7) Amortizations*	12,279,101	12,064,785	214,316
(8) Total Required Employer Contributions (3d) + (7)	13,213,518	12,981,539	231,979
(9) Fiscal 2020 Cost	$8,300,956	$8,093,393	$207,563
(10) Fiscal 2021 Cost	$14,745,742	$14,538,179	$207,563
(11) Fiscal 2022 Cost	$1,215,839	$1,008,276	$207,563
(12) Fiscal 2023 Cost	$1,225,900	$1,018,337	$207,563
(13) Fiscal 2024 Cost	$974,507	$766,944	$207,563
(14) Fiscal 2025 Cost	$971,767	$900,628	$71,139
Percentage of Total Cost	100.0%	98.6%	1.4%

* Allocation is based on the ratio of the Unfunded Actuarial Accrued Liability
The Housing Authority's Unfunded Liability is amortized to 2023