City of Taunton Contributory Retirement System

Actuarial Valuation Report

Plan Year: January 1, 2022

October 2022

Contents

Section I - Overview

The City of Taunton Retirement Board has engaged Buck to prepare an actuarial valuation of the Retirement System as of January 1, 2022. Employee data and asset information used in the valuation were provided by the Retirement Board.

The valuation was prepared pursuant to Chapter 32 of the Massachusetts General Laws, based upon the acceptance of Section 22D.

The purposes of the valuation are to:

1) analyze the current funded position of the System and determine the level of contributions necessary to assure sound funding; and

2) update the Section 22D funding schedule currently in place for the Retirement System.

Use of this report for any other purpose may not be appropriate and may result in mistaken conclusions due to failure to understand applicable assumptions, methodologies, or inapplicability of the report for that purpose. Buck should be asked to review any statement to be made on the basis of the information presented in this report. Buck will not accept any liability for any such statement made without prior review by Buck.

Schedule A of this report outlines the actuarial assumptions and methods used in the valuation. All assumptions are the same as those used in the previous valuation, except that the mortality assumption was updated to reflect more recently available information and the assumed plan expenses included in the normal cost was updated to better reflect actual plan experience. The economic assumptions are based upon a review of the current portfolio structure and economic environment and represent expectations with respect to future experience.

Schedule B of this report outlines the principal plan provisions reflected in the valuation. All provisions are the same as those reflected in the previous valuation.

Section II provides a summary of the principal valuation results. Section V provides a projection of the Section 22D funding amounts and funded status reflecting the plan sponsor's funding policy of compliance with Section 22D of MGL Chapter 31 and the expectation of no future gains or losses.

Where presented, references to "funded percentage" and "unfunded accrued liability" typically are measured on an actuarial value of assets basis. It should be noted that the same measurements using market value of assets would result in different funded percentages and unfunded accrued liabilities. Also, the "net pension liability" and "plan fiduciary net position as a percentage of the total pension liability" are measured on a market value of assets basis. These items presented may be appropriate for evaluating the need and level of future contributions but make no assessment regarding the cost to settle (i.e., purchase annuities to cover) any portion of the Fund's liabilities.

Actuarial Standard of Practice No. 56 ("ASOP 56") provides guidance to actuaries when performing actuarial services with respect to designing, developing, selecting, modifying, using, reviewing, or evaluating models. Buck uses third-party software in the performance of annual actuarial valuations and projections. The model is intended to calculate the liabilities associated with the provisions of the plan using data and assumptions as of the measurement date under the funding methods specified in this report. The output from the third-party vendor software is used as input to an internally developed model that applies applicable funding methods and policies to the liabilities derived and other inputs, such as plan assets and contributions, to generate many of the exhibits found in this report. Buck has an extensive review process whereby the results of the liability calculations are checked using detailed sample output, changes from year to year are summarized by source, and significant deviations from expectations are investigated. Other funding outputs and the internal model are similarly reviewed in detail and at a high level for accuracy, reasonability and consistency with prior results. Buck also reviews the third-party model when significant changes are made to the software. The review is performed by experts within the company who are familiar with applicable funding methods as well as the manner in which the model generates its output. If significant changes are made to the internal model, extra checking and review are completed. Significant changes to the internal model that are applicable to multiple clients are generally developed, checked and reviewed by multiple experts within the company who are familiar with the details of the required changes.

Actuarial Standards of Practice (ASOPs) 27 and 35 require the actuary to identify the economic and demographic assumptions that have a significant effect on the measurement and, for those that are prescribed by another party, to provide the information and analysis the actuary performed to determine that the assumption does not significantly differ from what the actuary deems reasonable for the purpose of the measurement.

The mortality assumption used in this valuation reflects the Society of Actuaries' most recently published tables of public sector pension plan rates. Other significant demographic assumptions were based on an analysis of plan experience. A gain/loss analysis is performed each year, itemized by assumption source, which the actuary uses either to help ascertain that assumed rates are still appropriate, or to indicate possible modifications.

In the case of the Retirement Board's selection of the long-term expected rate of return (EROA), the signing actuary has used economic information and tools provided by Buck's Financial Risk Management ("FRM") practice. A spreadsheet tool created by the FRM team converts averages, standard deviations, and correlations from Buck's Capital Markets Assumptions ("CMA") that are used for stochastic forecasting into approximate percentile ranges for the arithmetic and geometric average returns. Percentiles are based on standard matrix multiplication and normal approximations. This simplified model (disclosed here in compliance with ASOP 56) ignores inter-period dependence and the skewed nature of single year returns. As such it is intended to suggest possible reasonable ranges for EROA without attempting to predict or select a specific best estimate rate of return. However, it does take into account the duration (horizon) of investment and the approximate allocation of assets in the portfolio to various asset classes with different expected returns, standard deviations, and correlations to other asset classes. Under current calibrations, the EROA tool will tend to show higher expected returns for longer durations and will show a greater divergence between arithmetic and geometric average returns the higher the standard deviation of portfolio return. Based on the actuary's analysis, including consistency with other assumptions used in the valuation, and the percentiles generated by the spreadsheet described above, the actuary believes the EROA does not significantly conflict with what, in the actuary's professional judgment, is reasonable for the purpose of the measurement.

Future actuarial measurements may differ significantly from current measurements due to plan experience differing from that anticipated by the economic and demographic assumptions, changes expected as part of the natural operation of the methodology used for these measurements, and changes in plan provisions, applicable law or regulations. An analysis of the potential range of such future differences is beyond the scope of this valuation.

This report fairly represents the actuarial position of the Taunton Contributory Retirement System as of January 1, 2022, in accordance with generally accepted actuarial principles applied consistently with the preceding valuation. In my opinion, the actuarial assumptions used to compute actuarial accrued liability and normal cost are reasonably related to plan experience and to reasonable expectations and represent my best estimate of anticipated plan experience. The valuation was performed by, and under the supervision of, actuaries who have experience in performing valuations for public retirement systems. I am a Member of the American Academy of Actuaries and meet the Academy's Qualification Standards to issue this Statement of Actuarial Opinion and am available to answer any questions regarding the results.

Respectfully Submitted,

Buck Global, LLC (Buck)

10/19/2022

Jason Fine, EA, MAAA, FCA
Principal, Retirement

Date

10/19/2022

Hilja Viidemann, FSA, MAAA, EA
Director, Retirement

Date

HV/jac
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Section II - Summary Of Principal Results

1. For convenience of reference, the principal results of the valuation as of January 1, 2022 are summarized below along with a comparison with the amounts in the previous valuation as of January 1, 2020[1].

Valuation Date	January 1, 2020	January 1, 2022
a) Active Members:		
Number	1,061	1,054
Annual compensation	$ 67,239,674	$ 67,958,858
Average age	49.0	48.1
Average service	13.5	12.4
Average compensation	$ 63,374	$ 64,477
b) Pensioners and beneficiaries:		
Number	907	975
Annual benefit payments	$ 27,825,729	$ 31,934,267
Average benefit	$ 30,679	$ 32,753
c) Inactive employees:		
Number	239	231
Accumulated employee contributions	$ 3,041,201	$ 2,822,026
d) Actuarial accrued liability	$ 465,010,765	$ 518,813,930
e) Market value of assets	$ 360,862,895	$ 454,211,519
f) Assets for valuation purposes	$ 346,384,426	$ 411,393,175
g) Unfunded actuarial accrued liability (d. – f.)	$ 118,626,339	$ 107,420,755
h) Funded percentage (f. ÷ d.)	74.49%	79.29%
i) Section 22D funding for fiscal 2023	$ 19,563,845	$ 19,563,845
j) Section 22D funding for fiscal 2024	$ 20,364,462	$ 20,118,228

A projection of Section 22D costs is presented in Section V. Schedule A of this report outlines the actuarial assumptions and methods employed. The provisions of the System are summarized in Schedule B. The valuation includes additional liabilities resulting from Chapter 17 COLA legislation.

[1] All results prior to January 1, 2022 were developed by the prior actuary.

Section III - Membership Data

In order to calculate the aggregate liabilities and assets on account of members of the System as of January 1, 2022, data was needed with respect to each active and retired member and beneficiary of the System. The data with respect to active, retired and terminated members and beneficiaries were furnished to the actuary by the Retirement Board.

From the data, tabulations were made showing, as of January, 2022, the number and annual compensation of active members classified by age and years of service and the number and annual retirement allowances of retired members and beneficiaries as of January 1, 2022, classified by age. These tables are presented in Schedule C.

The following tables show the number of active and retired members of the Retirement System as of January 1, 2022.

Table I - The Number and Annual Compensation of Active Members as of January 1, 2022

Group	Number	Compensation
General employees	770	$ 38,870,826
Police and Fire	284	$ 29,088,032
Total	1,054	$ 67,958,858

Table II - The Number and Annual Retirement Allowances of Retired Members and Beneficiaries as of January 1, 2022

	Annual Retirement Allowance	
Group	Number	Pension[1]
Service Retirements	773	$ 25,961,465
Disability Retirements	80	$ 3,272,648
Beneficiaries of Deceased Members	122	$ 2,700,154
Grand Total	975	$ 31,934,267

In addition, there are 231 members with accumulated contributions valued at $2,822,026.

[1] Pension amounts exclude cost-of-living adjustments applied after July 1, 1981, and prior to July 1, 1998, which are funded by the Commonwealth of Massachusetts.

Section IV - Assets

The amount of assets taken into account in this valuation is based on financial information reported by the Retirement Board. As of January 1, 2022, the reported market value of Retirement System assets amounted to $454,211,519. The actuarial value of assets for valuation funding purposes is $411,393,175. Valuation assets are developed using a smoothing method (described in Schedule A of this report) in order to smooth the year-to-year fluctuations due to deviations of investment returns from expected levels.

Year Ending	December 31, 2020	December 31, 2021
1. Market value of plan assets, prior year end	$ 360,862,895	$ 393,799,728
2. Employer and employee contributions, net transfers and reimbursements	$ 25,250,873	$ 27,578,786
3. Expenses	$ (579,386)	$ (553,331)
4. Benefits and refunds	$ (30,430,329)	$ (32,860,899)
5. Expected interest during the year	$ 27,725,123	$ 30,274,512
6. Expected market value of plan assets, current year	$ 382,829,176	$ 418,238,796
7. Actual market value of plan assets, current year	$ 393,799,728	$ 454,211,519
8. Investment gain/(loss) during prior year [7. – 6.]	$ 10,970,552	$ 35,972,723
9. Investment gain/(loss) during second prior year	$ 37,977,862	$ 10,970,552
10. Investment gain/(loss) during third prior year	$ (38,666,553)	$ 37,977,862
11. Investment gain/(loss) during fourth prior year	$ 20,460,422	$ (38,666,553)
12. Tentative Valuation Assets before reflecting 80% - 120% corridor = [7. – 80% x 8. – 60% x 9. – 40% x 10. – 20% x 11.]	$ 373,611,106	$ 411,393,175
13. 80% of actual market value = 80% x 7.	$ 315,039,783	$ 363,369,216
14. 120% of actual market value = 120% x 7.	$ 472,559,673	$ 545,053,823
15. Valuation Assets = 12. But not less the 13. or greater than 14.	$ 373,611,106	$ 411,393,175
16. Ratio of actuarial value to market value	94.87%	90.57%
17. Actuarial Value Return for prior year	9.60%	11.77%
18. Market Value Return for prior year	10.81%	16.95%

Section V - Contributions Payable Under the System

Section 22D of MGL Chapter 32 outlines various requirements of a funding schedule that will amortize the unfunded actuarial liability and cover normal costs. The normal cost and unfunded actuarial liability are to be calculated in accordance with the individual entry-age-normal actuarial cost method. The contribution toward amortization of the unfunded actuarial liability may increase by up to 4½% each year.

The following table presents a projection of contributions that satisfy the Section 22D requirements. The forecast is based upon an assumption of a stable population in which the total payroll and normal cost of the system are 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%. The unfunded accrued liability contribution is also based on a 4.5% annual increase and is assumed to be paid quarterly over the fiscal year. This schedule incorporates the funding required to provide annual COLAs under Chapter 17 of the Acts of 1997.

Please note that the amounts shown in the following schedule for the 2023 fiscal year represent the actual amounts already appropriated by the City for the 2023 fiscal year.

The 2024 appropriation is approximately $20.1 million, or about 1.2% lower than the amount shown in the 2020 valuation report. This is the result of generally favorable actuarial experience. The primary factors leading to the increase are the following:

1. There was a gain on the actuarial value of assets because the greater-than-expected return of 16.95% on the market value of assets. The effective return on the actuarial value of assets was 11.57%. This accounted for a decrease of approximately $4.1 million.
2. The demographic experience over the past two years was unfavorable. The primary sources of the loss were pay increases that were greater than expected and retirement experience exceeding expectations. This accounted for an increase of about $0.8 million.
3. The valuation interest rate changed from 7.75% to 7.60%, the mortality improvement assumption was updated to Scale MP-2021 to reflect more recently available information, and the salary scale was updated from 3.5% to 4.0%. In addition, the assumption of plan expenses was updated to better reflect actual plan experience. These assumption changes increased the appropriation by about $2.6 million.
4. The plan provisions were updated to reflect the increase in the maximum amount of pension benefit subject to a COLA from $15,000 to $16,000. This accounted for an increase of about $0.4 million.

Amortization Schedule

Description	Outstanding Balance as of January 1, 2022	Amortization Payment as of January 1, 2022	Remaining Period as of January 1, 2022
Unfunded Actuarial Liability	$ 106,709,236	$ 14,742,602	8
FY 2004 Appropriation Deferral	711,519	185,754	4
Total	$ 107,420,755	$ 14,928,356	

Section V - Contributions Payable Under the System (continued)

Pension Reform Act - Section 22D Funding Requirements

Fiscal Year Ending	Payroll[1]	Unfunded Accrued Liability[2]	Employee Contribution	Employer Normal Cost with Interest	Amortization Payments with Interest	Employer Total Cost with Interest	Employer Total Cost % of Payroll	Funded Ratio %[2]
2023	67,958,858	107,420,755	6,247,162	3,555,384	16,008,461	19,563,845	28.8%	79.3%
2024	71,017,007	99,300,097	6,599,708	3,523,484	16,594,744	20,118,228	28.3%	81.7%
2025	74,212,772	90,098,304	6,971,332	3,602,480	17,341,507	20,943,987	28.2%	84.4%
2026	77,552,347	79,443,489	7,363,037	3,681,451	18,121,874	21,803,325	28.1%	86.8%
2027	81,042,203	67,191,305	7,775,880	3,760,233	18,701,231	22,461,464	27.7%	89.3%
2028	84,689,102	53,423,260	8,210,968	3,838,651	19,542,786	23,381,437	27.6%	91.7%
2029	88,500,112	37,759,488	8,669,468	3,916,512	20,422,212	24,338,724	27.5%	94.3%
2030	92,482,617	20,017,691	9,152,605	3,993,608	21,341,210	25,334,818	27.4%	97.1%
2031	96,644,335	0	9,661,670	4,069,711	0	4,069,711	4.2%	100.0%
2032	100,993,330	0	10,198,016	4,144,577	0	4,144,577	4.1%	100.0%
2033	105,538,030	0	10,763,068	4,217,940	0	4,217,940	4.0%	100.0%
2034	110,287,241	0	11,358,324	4,289,513	0	4,289,513	3.9%	100.0%
2035	115,250,167	0	11,985,358	4,358,985	0	4,358,985	3.8%	100.0%
2036	120,436,425	0	12,645,825	4,426,023	0	4,426,023	3.7%	100.0%
2037	125,856,064	0	13,214,887	4,625,194	0	4,625,194	3.7%	100.0%
2038	131,519,587	0	13,809,557	4,833,327	0	4,833,327	3.7%	100.0%
2039	137,437,968	0	14,430,987	5,050,827	0	5,050,827	3.7%	100.0%
2040	143,622,677	0	15,080,381	5,278,115	0	5,278,115	3.7%	100.0%
2041	150,085,697	0	15,758,998	5,515,631	0	5,515,631	3.7%	100.0%
2042	156,839,553	0	16,468,153	5,763,834	0	5,763,834	3.7%	100.0%
2043	163,897,333	0	17,209,220	6,023,206	0	6,023,206	3.7%	100.0%
2044	171,272,713	0	17,983,635	6,294,250	0	6,294,250	3.7%	100.0%
2045	178,979,985	0	18,792,898	6,577,492	0	6,577,492	3.7%	100.0%
2046	187,034,084	0	19,638,579	6,873,478	0	6,873,478	3.7%	100.0%
2047	195,450,618	0	20,522,315	7,182,784	0	7,182,784	3.7%	100.0%
2048	204,245,896	0	21,445,819	7,506,010	0	7,506,010	3.7%	100.0%
2049	213,436,961	0	22,410,881	7,843,780	0	7,843,780	3.7%	100.0%
2050	223,041,624	0	23,419,371	8,196,750	0	8,196,750	3.7%	100.0%
2051	233,078,497	0	24,473,242	8,565,604	0	8,565,604	3.7%	100.0%
2052	243,567,029	0	25,574,538	8,951,056	0	8,951,056	3.7%	100.0%
2053	254,527,545	0	26,725,392	9,353,854	0	9,353,854	3.7%	100.0%

[1]Calendar year basis

[2]As of preceding January 1

Section VI – PERAC Annual Statement

The most recent actuarial valuation of the System was prepared by Buck as of January 1, 2022

The normal cost for employees on that date was:	$6,247,162	9.2% of pay
The normal cost for the employer was:	3,231,436	4.8% of pay
The actuarial liability for active members was:		$190,614,775
The actuarial liability for retired and inactive members was:		328,199,155
Total actuarial accrued liability:		$518,813,930
System assets as of that date:		411,393,175
Unfunded actuarial accrued liability:		$107,420,755
The ratio of system's assets to total actuarial liability was:		79.3%

The principal actuarial assumptions used in the valuation are as follows:

Investment Return:	7.60%
Rate of Salary Increase:	4.00%

Schedule of Funding Progress

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (b)	Unfunded Actuarial Accrued Liability (b - a)	Funded Ratio (a / b)	Covered Payroll (c)	UAAL as a percent of Covered Payroll (b - a) / c
1/1/2022	$411,393,175	$518,813,930	$107,420,755	79.3%	$67,958,858	158.1%
1/1/2020	346,384,426	465,010,765	$118,626,339	74.5%	67,239,674	176.4%
1/1/2018	317,021,969	398,178,738	$81,156,769	79.6%	62,755,282	129.3%

Schedule A - Actuarial Assumptions and Methods

Actuarial Cost Method

Individual entry-age normal cost method.

Asset Valuation Method for Funding Purposes

For funding calculation purposes, assets are valued according to the following general formula, provided such value is within a 20% corridor of the market value:

VA = $MV - .8I_1 - .6I_2 - .4I_3 - .2I_4$ where

VA = Valuation assets.

MV = Market value of assets as of the valuation date.

I_n = Investment gain (loss) during n^{th} year preceding the valuation date.

Valuation Interest Rate

7.60% per annum, compounded annually, net of investment expenses. The long-term expected rate of return on Fund investments was determined using best-estimate ranges of expected future nominal rates of return (expected returns, net of investment expense and inflation) developed for each major asset class using an econometric model that forecasts a variety of economic environments and then calculates asset class returns based on functional relationships between the economic variables and the asset classes.

Interest rate for accounting

7.60% per year, compounded annually. Projected benefit payments that are expected to be paid from available plan assets are discounted at the valuation interest rate of 7.60%. After the point where plan assets are not available to pay benefits, projected benefit payments are discounted at the municipal bond rate. The valuation rate for accounting purposes is the effective rate resulting from this process.

Mortality

Plan liabilities as of January 1, 2022 were valued using rates taken from *Pub-2010 Public Retirement Plans Mortality Tables Report* from the Society of Actuaries dated January 2019. These rates are applied as follows:

Participant Group	Non-disabled	Disabled
General Employees	PubG-2010 Healthy	PubG-2010 Disabled
Police and Fire	PubS-2010 Healthy	PubS-2010 Disabled
Contingent survivors	Contingent survivors table (total dataset)	N/A

All rates are amount-weighted and projected from 2010 to 2025 with Scale MP-2021. Separate annuitant and non-annuitant rate tables were used.

It is assumed that 80% of all active deaths are ordinary (20% are service connected).

Schedule A - Actuarial Assumptions and Methods (continued)

Separations from Active Service

Representative values of the assumed annual rates of withdrawal and vesting, disability and service retirement, all based on an analysis of experience, are as follows:

General Employees-Annual Rates of

Service Retirement							
		Hired before 4/2/2012		Hired on or after 4/2/2012			
Age	Disability	Male	Female	Male	Female	Years of Service	Rates of Withdrawal
25	.010%					0	18.21%
30	.015					1	20.80%
35	.035					2	17.62%
40	.066					3	14.82%
45	.097					4	12.20%
50	.127	3.60%	10.19%			5	10.20%
55	.157	4.77	4.69			10	6.50%
60	.182	10.57	7.74	4.77%	4.69%	15	4.17%
62	.190	14.73	11.68	6.32	5.09	20	4.00%
65	.158	26.15	19.39	10.57	7.74	25	4.00%
69	.140	25.00	20.00	21.36	17.08	30+	0.00%

Police and Fire-Annual Rates of

Service Retirement					
		Hired before 4/2/2012	Hired on or after 4/2/2012		
Age	Disability	Male & Female	Male & Female	Years of Service	Rates of Withdrawal
25	.050%			0	1.50%
30	.097			1	1.50%
35	.204			2	1.50%
40	.250			3	1.50%
45	.401			4	1.50%
50	.763	1.44%	0.72%	5	1.50%
55	.757	8.79	3.89	10	1.50%
60	.650	14.55	14.55	15	1.50%
62	.650	27.41	27.41	20	0.00%
65		100.00	100.00	25	0.00%
69		100.00	100.00	30+	0.00%

It is assumed for the general employees that 30% of all disabilities are ordinary (70% are service connected). For police and fire employees, 5% of all disabilities are assumed to be ordinary (95% are service connected). A load was applied to the accidental disability liability to account for the additional benefit payable for each dependent child upon the member's disability. Loads of approximately 2% and 11.7% were developed for Group 1 and Group 4, respectively, taking into account the higher likelihood of Group 4 accidental disabilities at younger ages, thus the likelihood of Group 4 having more dependent children than Group 1 accidental disability retirees.

Schedule A - Actuarial Assumptions and Methods (continued)

Salary Scale

4.00% per annum.

Cost-of-Living Adjustments

Retirement benefits were assumed to increase annually at the assumed inflation rate of 3.00%, up to the applicable annual maximum.

Form of Payment

Future retirees are assumed to elect a Life Annuity. Future vested terminations are assumed to elect a refund of contributions unless specifically reported by the plan sponsor to be eligible for an annuity benefit.

Marital Percentage

80% of participants are assumed to be married at death. Husbands are assumed to be 3 years older than their wives.

Loading or Contingency Reserve

None.

Administrative Expenses

The normal cost is increased by an amount equal to the anticipated administrative expenses for the upcoming fiscal year. The amount for plan year 2022 is $600,000 and is anticipated to increase at 4.0% per year.

Changes in Assumptions Since the Prior Valuation

- The valuation interest rate changed from 7.75% to 7.60%
- The mortality improvement assumption was updated to Scale MP-2021 to reflect more recently available information
- The salary scale was updated from 3.5% to 4.0%.

These assumption changes increased the plan's actuarial accrued liability by approximately $12.4 million.

Schedule B - Summary of System Provisions

Membership

The Retirement System covers all employees of participating units except teachers, elected officials and those employees in service at the time of its establishment who elected not to become members. Eligible employees in the City who enter service on or after the date the System became operative for their classification may become members of the Retirement System on their own application.

Summary of Benefit and Contribution Provisions

A summary of the main benefit and contribution provisions of the Retirement System, as interpreted for the valuation, is presented below.

The terms “Group 1” and “Group 4” are used to denote “general employees” and “police and fire”, respectively.

Benefits

Final Average Salary (FAS)

For those hired prior to April 2, 2012, the average of a member’s three highest consecutive years’ compensation. For those hired on or after April 2, 2012, the average of a member’s five highest consecutive years’ compensation. For those hired on or after January 1, 2011, salary taken into account for benefit purposes is capped at 64% of the IRC Section 401(a)(17) limit (indexed).

Superannuation Retirement

Eligibility

For those hired prior to April 2, 2012: Age 65 for Group 1; Age 55 for Group 4. Maximum retirement age is 70 for Group 1 and 65 for Group 4.

For those hired on or after April 2, 2012: Age 67 for Group1; Age 57 for Group 4 if member has completed 30 years of service, or age 62 otherwise.

Allowance

2.5% per year of service times FAS. Maximum total allowance is 80% of FAS. Veterans receive additional $15 annually per year of service to a maximum of $300 annually.

Early Retirement

Eligibility

For those hired prior to April 2, 2012: 20 years of service, or age 55 with 10 years of service.

For those hired on or after April 2, 2012: age 60 and 10 years of service for Group 1; Age 55 and 10 years for Group 4.

Allowance

Calculated as a superannuation retirement allowance (including veteran’s benefits) except accrual rate is equal to 2.5% reduced by .1% for each year age at retirement is below either 65 for Group 1 or 55 for Group 4. Those hired on or after April 2, 2012 who retire with fewer than 30 years of service, the accrual rate of 2.5% is reduced by .15% for each year age at retirement precedes age 67 for Group 1 or age 57 for Group 4. Those hired on or after April 2, 2012 who retire with at least 30 years of service, the accrual rate of 2.5% is reduced by .15% for each year age at retirement precedes age 62 for Group 1 or age 57 for Group 4.

The minimum allowance after 30 years of service is equal to:

(1) An annuity which is the actuarial equivalent of member’s accumulated deductions; and

(2) A pension equal to 1/3 of FAS and any veteran’s benefits as described under superannuation retirement.

Schedule B - Summary of System Provisions (continued)

Vested Retirement

Eligibility

10 years of service. For certain involuntary terminations, this is reduced to 6 years.

Allowance

A superannuation retirement allowance commencing at age 55 for Group 1 members (age 60 if hired on or after April 2, 2012) and age 45 for Group 4 members (age 55 if hired on or after April 2, 2012) or later, where the accrual rate is determined by the age of the member at the time the allowance commences.

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

Ordinary Disability

Eligibility

10 years of service.

Allowance

An immediate allowance equal to the age 55 rate (age 60 for Group 1 members hired on or after April 2, 2012) per year of service times FAS.

Veterans receive an allowance equal to:

(1) An annuity which is the actuarial equivalent of their accumulated deductions; and

(2) A pension which is the greater of 50% of current salary and the service retirement allowance to which they are eligible, if any.

Accidental Disability

Eligibility

Permanent incapacity for further duty as a result of personal injury sustained while in the performance of duties.

Allowance

An immediate allowance equal to:

(1) An annuity which is the actuarial equivalent of the member's accumulated deductions; and

(2) A pension equal to 72% of current salary; and

(3) A supplement equal to $1,010.28 per year per child who is under 18 at the time of the member's retirement, with no age limitation if the child is mentally or physically incapacitated from earning. The additional pension may continue up to age 22 for any child who is a full-time student at an accredited educational institution.

The maximum total allowance is 100% of current salary.

Accidental Death Benefit

Eligibility

Death due to an occupational injury.

Allowance

An immediate allowance equal to:

(1) A lump sum payment equal to the accumulated deductions at death; and

(2) A pension equal to 72% of current salary and payable to the surviving spouse, dependent children, or the dependent parents; and

(3) A supplement of $1,010.28 per year per child payable to the spouse or legal guardian until all children reach age 18, or 22 if a full-time student, unless mentally or physically incapacitated.

The maximum total allowance is 100% of current salary.

Schedule B - Summary of System Provisions (continued)

Death in Active Service

Eligibility

Death of a member due to a non-occupational injury.

Allowance

An immediate allowance that would have been payable had the member retired and elected the 2/3 joint and survivor option on the day before his death. For death occurring prior to the minimum superannuation retirement age, the age 55 (age 60 if hired on or after April 2, 2012) and age 45 (age 55 if hired on or after April 2, 2012) accrual rates are used, respectively, for Group 1 and Group 4 members. The minimum annual allowance payable to the surviving spouse of a member in service who dies with at least two years of creditable service is $6,000, provided that the member and the spouse were married for at least one year and living together on the member's date of death.

For members with at least 2 years of service at death, the surviving spouse receives an additional allowance equal to the sum of $1,440 per year for the first child and $1,080 per year for each additional child until all dependent children reach age 18 or 22 if a full-time student, unless mentally or physically incapacitated. 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 $3,000 per year plus $1,440 for the first child and $1,080 for each additional child.

The maximum total allowance is 100% of salary at the date of death.

Normal Form of Benefit

Reduced modified cash refund annuity.

Optional Forms of Benefit

(1) Option A — Life annuity.

(2) Option B — Modified cash refund annuity.

(3) Option C — 66-2/3% joint and survivor allowance. If the beneficiary predeceases the retiree, the benefit payable increases based on the factor used to determine the Option C benefit at retirement.

Return of Contribution

If no other benefit is payable upon termination, the member's accumulated deductions are returned.

Post-Retirement Adjustments

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 $16,000. 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:

Schedule B - Summary of System Provisions (continued)

Member Contributions

Members contribute a percentage of annual regular compensation in accordance with their respective dates of hire, as shown below:

Date of Hire	Rate of Contribution
Prior to January 1, 1975	5%
On or after January 1, 1975	7%
On or after January 1, 1984	8%
On or after July 1, 1996	9%

Members hired on or after January 1, 1979 contribute an additional 2% of compensation in excess of $30,000.

The contribution rate for Group 1 participants hired on or after April 2, 2012 and who attain 30 years of service is reduced by three percentage points.

Schedule C - Membership Tables

Table 1 – Age/Service Distribution with Salary as of January 1, 2022

Attained Age	Average Salary	< 5	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40+	Total
Under 25	32										32
	22,840										22,840
25-29	53	16									69
	35,479	72,988									44,176
30-34	53	45	3								101
	49,398	74,594	110,609								62,442
35-39	45	28	13	8	1						95
	51,031	76,137	79,664	95,021	30,548						65,838
40-44	28	18	17	30	7						100
	41,359	73,268	81,155	87,171	69,334						69,570
45-49	35	20	10	22	17	12					116
	29,526	56,831	67,503	84,906	102,104	129,731					69,013
50-54	30	34	17	16	25	33	11	1			167
	46,632	60,172	58,520	61,457	96,567	113,581	137,835	57,037			78,794
55-59	33	21	24	31	28	22	25	10			194
	37,616	49,272	67,716	53,912	59,601	91,356	112,183	103,186			67,462
60-64	14	19	15	17	27	10	10	10	2		124
	40,977	54,398	48,268	47,548	59,557	58,541	67,391	107,401	81,055		58,412
65-69	3	5	3	4	12	10	4	1	1		43
	15,305	63,025	42,983	52,197	56,718	67,735	40,900	163,510	56,132		56,744
70+	2	1	2	1	1	1	4	1			13
	61,415	27,550	39,693	6,983	133,480	56,631	53,463	86,186			55,915
Total Employees	328	207	104	129	118	88	54	23	3		1,054
Average Salary	39,939	65,549	67,063	69,162	74,210	98,116	99,484	104,896	72,748		64,477

Schedule C - Membership Tables (continued)

Table 2 - The Number and Annual Pensions of Retired Members Distributed by Age as of January 1, 2022

	Service Retirements		Disability Retirements		Beneficiaries	
Age	Number	Annual Pension	Number	Annual Pension	Number	Annual Pension
Under 20	0	0	0	0	1	53,267
20 - 24	0	0	0	0	2	48,722
25 - 29	0	0	0	0	1	41,129
30 - 34	0	0	0	0	0	0
35 - 39	0	0	0	0	1	42,180
40 – 44	2	54,518	1	23,264	1	16,050
45 - 49	2	98,790	1	29,804	1	49,612
50 - 54	3	119,802	8	462,163	3	95,332
55 - 59	44	1,823,368	11	486,134	8	220,328
60 - 64	117	4,977,065	11	413,133	7	297,105
65 - 69	185	6,700,611	16	602,167	10	223,543
70 - 74	184	5,920,070	14	566,277	15	281,181
75 - 79	111	3,325,886	14	519,810	26	594,268
80 - 84	62	1,575,065	3	151,067	16	308,170
85 - 89	39	926,731	1	18,829	16	229,560
90 - 94	16	358,610	0	0	8	114,021
95 - 99	5	55,275	0	0	3	42,360
100 and over	3	25,674	0	0	3	43,326
Total	773	25,961,465	80	3,272,648	122	2,700,154

Schedule D - Projection of Expected Pension Payments

Year	Amount	Year	Amount
2022	$ 36,989,386	2047	$ 51,167,940
2023	35,657,720	2048	50,350,753
2024	37,119,116	2049	49,428,150
2025	38,678,014	2050	48,547,069
2026	40,300,903	2051	47,474,682
2027	41,915,520	2052	46,395,932
2028	43,596,619	2053	45,221,754
2029	45,063,477	2054	44,095,047
2030	46,518,477	2055	42,746,101
2031	47,931,697	2056	41,346,048
2032	49,290,949	2057	39,989,946
2033	50,473,612	2058	38,426,590
2034	51,506,916	2059	36,662,189
2035	52,339,473	2060	34,888,597
2036	53,109,813	2061	33,180,239
2037	53,605,198	2062	31,404,995
2038	53,935,360	2063	29,702,693
2039	54,160,119	2064	27,973,759
2040	54,261,811	2065	26,307,207
2041	54,189,426	2066	24,681,553
2042	54,067,351	2067	23,098,584
2043	53,668,998	2068	21,557,089
2044	53,194,587	2069	20,057,182
2045	52,587,174	2070	18,603,294
2046	51,995,461	2071	17,199,184

Schedule E – ASOP 51 Disclosures

Funding future retirement benefits prior to when those benefits become due involves assumptions regarding future economic and demographic experience. These assumptions are applied to calculate actuarial liabilities and the corresponding funded status of the Plan. However, to the extent future experience deviates from the assumptions used, variations will occur in these calculated values. These variations create risk to the Plan. Understanding the risks to the funding of the Plan is important. Actuarial Standard of Practice No. 51 ("ASOP 51") requires certain disclosures of potential risks to the Plan and provides useful information for intended users of actuarial reports that determine Plan contributions or evaluate the adequacy of specified contribution levels to support benefit provisions.

Under ASOP 51, risk is defined as the potential of actual future measurements deviating from expected future measurements resulting from actual future experience deviating from actuarially assumed experience. It is important to note that not all risk is negative, but all risk should be understood and accepted based on knowledge, judgment and educated decisions. Future measurements may deviate in ways that produce positive or negative financial effects on the Plan.

In the actuary's professional judgment, the following risks may reasonably be anticipated to significantly affect the Plan's future financial condition.

- Investment risk – the risk that assets will not return as expected
- Longevity and other demographic risk – the risk that mortality or other demographic experience will be different from expected
- Contribution risk —the risk that actual future contributions deviate from expected future contributions, e.g., that actual contributions are not made in accordance with the plan's funding policy

The following information is provided to comply with ASOP 51 and furnish beneficial information on potential risks to the Plan. This list is not all-inclusive; it is an attempt to identify the most significant risks and how those risks might affect the results shown in this report.

Note that ASOP 51 does not require the actuary to evaluate the ability or willingness of the plan sponsor to make contributions to the plan when due, or to assess the likelihood or consequences of potential future changes in law. In addition, this valuation report is not intended to provide investment advice or to provide guidance on the management or reduction of risk. Buck welcomes the opportunity to assist in such matters as part of a separate project or projects utilizing the appropriate staff and resources for those objectives.

Investment Risk

Plan costs are very sensitive to the market return. Lower than assumed asset returns will increase costs:

- The lower market return will cause the market value of assets to be lower than expected.
- The plan uses an actuarial value of assets that smooths gains and losses on market returns over a five-year period to help control some of the volatility in costs due to investment risk.

Longevity and Other Demographic Risk

Plan costs will be increased as participants are expected to live longer. This is because:

- Benefits are paid over a longer lifetime when life expectancy is expected to increase. The longer duration of payments leads to higher liabilities.
- Health care has been improving which increases the life expectancy of participants. As health care improves, costs to the plan will increase.
- The mortality assumption for the Plan does assume future improvement in mortality. Any improvement in future mortality greater than that expected by the current mortality assumption would lead to increased costs for the Plan.

Schedule E – ASOP 51 Disclosures (continued)

Contribution Risk

There is a risk associated with the employer's contribution when the actual amount and actuarially determined amount differ.

- When the actual contribution is lower than the actuarially determined contribution, the Plan may not be sustainable in the long term.
- Any underpayment of the contribution will increase future contribution amounts to help pay off the additional Unfunded Actuarial Accrued Liability associated with the underpayment.
- This risk is mitigated by the City's compliance with Section 22D of MGL Chapter 32, which outlines various requirements of a funding schedule that will amortize the unfunded actuarial liability and cover normal costs.

Historical Information

The following shows selected historical values of key valuation measures. These items illustrate how actual volatility has impacted the Plan in recent years and gives additional context to the risks described above. Further information can be found in the actuarial valuation reports for each year.

Valuation Date	01/01/18	01/01/20	Current Valuation 01/01/22
Liabilities and Assets at Valuation Date			
• Actuarial Accrued Liability (AAL)	398,178,738	465,010,465	518,813,930
- Normal Cost	3,128,502	3,181,557	3,231,436
• Actuarial Value of Assets (AVA)	317,021,969	346,384,426	411,393,175
- Funded Percent (AVA)	80%	74%	79%
• Market Value of Assets (MVA)	321,973,735	360,862,895	454,211,519
- Funded Percent (MVA)	81%	78%	88%
Contributions and Disbursements for Plan Year Ended	2017	2019	2021
• Actuarially Determined Contribution (ADC)	15,875,047	16,598,250	18,794,418
• Actual Contribution	15,875,047	16,598,250	18,794,418
• Disbursements	25,840,542	28,429,026	32,378,928
Rates of Return for Plan Year Ended	2017	2019	2021
• Assumed	7.75%	7.75%	7.75%
• AVA	8.28%	6.91%	11.77%
• MVA	15.02%	20.33%	16.95%
Maturity Measures at Valuation Date			
• Payroll	62,755,282	67,239,674	67,958,858
- Asset Volatility Ratio (MVA / Payroll)	5.1	5.4	6.7
- Liability Volatilty Ratio (AAL / Payroll)	6.3	6.9	7.6
• Retiree and Beneficiary (In-pay) Liability	231,752,902	272,106,771	325,377,129
- Percent of Total Liability	58%	59%	63%
• Contributions minus Disbursements in Prior Year	(9,965,495)	(11,830,776)	(13,584,510)
- Percent Average Market Value of Assets	-3.4%	-3.5%	-3.3%

Schedule E – ASOP 51 Disclosures (continued)

Plan Maturity Measures

There are certain measures that may aid in understanding the significant risks to the plan.

Contribution Volatility

Asset Volatility Ratio: Plans that have higher asset-to-payroll ratios experience more volatile employer contributions (as a percentage of payroll) due to investment return. For example, a plan with an asset-to-payroll ratio of 10 may experience twice the contribution volatility due to investment return volatility than a plan with an asset-to-payroll ratio of 5.

Liability Volatility Ratio: Plans that have higher liability-to-payroll ratios experience more volatile employer contributions (as a percentage of payroll) due to changes in liability. For example, if an assumption change increases the liability of two plans by the same percent the plan with a liability-to-payroll ratio of 10 may experience twice the contribution volatility than a plan with a liability-to-payroll ratio of 5.

Ratio of Retiree and Beneficiary Liability to Total Liability

A mature plan will often have a ratio above 60 - 65 percent. An increasing percentage may indicate a need for a less risky asset allocation which may lead to a lower long-term return on assets assumption and increased costs.

Ratio of Cash Flow to Assets (Contributions minus Disbursements)

When this cash flow ratio is negative more cash is being paid out than deposited in the fund. Negative cash flow means the fund needs to rely on investment returns to cover benefit payments and at the same time may need to invest in more liquid assets to cover the benefit payments. More liquid assets may not garner the same returns as less liquid assets and therefore increase the investment risk.

Schedule F – Breakouts

	Non-Light Subtotal	Total	City	GATRA	Landfill	Sewer	Water	Nursing Home	Light	Housing
1. Participants										
a. Actives	912	1,054	794	35	1	0	30	0	142	52
b. Inactives	225	231	125	15	1	0	7	74	6	3
c. Retirees and Beneficiaries	726	895	638	4	0	5	25	38	169	16
d. Disabled Retirees	71	80	57	0	0	0	3	10	9	1
e. Total	1,934	2,260	1,614	54	2	5	65	122	326	72
2. Payroll of Active Participants	$52,570,376	$67,757,310	$44,842,984	$1,810,940	$72,398	$0	$1,840,374	$0	$15,186,934	$4,003,680
Percent of Total Payroll	77.59%	100.00%	66.18%	2.67%	0.11%	0.00%	2.72%	0.00%	22.41%	5.91%
3. Normal Cost										
a. Total Normal Cost	$6,731,603	$8,878,598	$5,914,297	$207,160	$6,870	$0	$197,104	$0	$2,146,995	$406,172
b. Expected Employee Contributions	4,799,704	6,247,162	4,094,180	163,284	6,739	0	165,924	0	1,447,458	369,577
c. Administrative Expenses	465,518	600,000	397,091	16,036	641	0	16,297	0	134,482	35,453
d. Net Employer Normal Cost [a. - b. + c.]	$2,397,417	$3,231,436	$2,217,208	$59,912	$772	$0	$47,477	$0	$834,019	$72,048
4. Actuarial Accrued Liability	$382,623,391	$518,813,930	$338,561,821	$5,023,165	$177,549	$618,901	$13,038,955	$10,924,503	$136,190,539	$14,278,497
5. Assets*	303,400,974	411,393,175	268,462,380	3,983,115	140,787	490,757	10,339,231	8,662,578	107,992,201	11,322,125
6. Unfunded Actuarial Accrued Liability [4. - 5.]	$79,222,417	$107,420,755	$70,099,441	$1,040,050	$36,762	$128,144	$2,699,724	$2,261,925	$28,198,338	$2,956,372
7. Amortizations										
a. Unfunded Actuarial Accrued Liability	$10,872,615	$14,742,602	$9,620,563	$142,738	$5,045	$17,587	$370,515	$310,430	$3,869,987	$405,737
b. Early Retirement Incentive	0	0	0	0	0	0	0	0	0	0
c. Holiday	135,109	185,754	125,901	0	66	230	4,849	4,063	50,645	0
8. Total Required Employer Contributions [3.d. + 7.]	$13,405,141	$18,159,792	$11,963,672	$202,650	$5,883	$17,817	$422,841	$314,493	$4,754,651	$477,785
9. Fiscal 2023 Cost	$14,407,915	$19,563,845	$12,867,992	$183,405	$11,460	$38,437	$471,705	$387,543	$5,155,930	$447,373
Percentage of total	73.65%	100.00%	65.77%	0.94%	0.06%	0.20%	2.41%	1.98%	26.35%	2.29%
10. Fiscal 2024 Cost	$14,823,270	$20,118,228	$13,271,561	$217,417	$5,858	$19,807	$459,014	$349,597	$5,294,958	$500,016
Percentage of total	73.68%	100.00%	65.97%	1.08%	0.03%	0.10%	2.28%	1.74%	26.32%	2.49%
11. Fiscal 2025 Cost	$15,431,907	$20,943,987	$13,813,750	$225,875	$6,117	$20,698	$478,727	$365,329	$5,512,080	$521,411
12. Fiscal 2026 Cost	$16,065,303	$21,803,325	$14,377,862	$234,653	$6,387	$21,629	$499,284	$381,769	$5,738,022	$543,719
13. Fiscal 2027 Cost	$16,552,707	$22,461,464	$14,804,724	$243,764	$6,588	$22,309	$514,559	$393,785	$5,908,757	$566,978
14. Fiscal 2028 Cost	$17,230,923	$23,381,437	$15,408,138	$253,220	$6,879	$23,313	$536,638	$411,506	$6,150,514	$591,229

* Allocation is based on the ratio of the Actuarial Accrued Liability

Schedule F – Breakouts (continued)

Appropriation Forecast for Municipal Light Plan

Fiscal Year Ending	Employer Normal Cost with Interest	Amortization Payments with Interest	Amortization Holiday Amortization	Employer Total Cost with Interest
2024	936,678	4,301,865	56,415	5,294,958
2025	957,678	4,495,447	58,955	5,512,080
2026	978,672	4,697,742	61,608	5,738,022
2027	999,615	4,909,142	0	5,908,757
2028	1,020,461	5,130,053	0	6,150,514
2029	1,041,160	5,360,906	0	6,402,066
2030	1,061,655	5,602,147	0	6,663,802
2031	1,081,886	0	0	1,081,886
2032	1,101,788	0	0	1,101,788
2033	1,121,291	0	0	1,121,291
2034	1,140,318	0	0	1,140,318
2035	1,158,786	0	0	1,158,786
2036	1,176,607	0	0	1,176,607
2037	1,229,555	0	0	1,229,555
2038	1,284,884	0	0	1,284,884
2039	1,342,705	0	0	1,342,705