Newton Contributory Retirement System

Actuarial Valuation and Review as of January 1, 2023

This report has been prepared at the request of the Retirement Board to assist in administering the Newton Contributory Retirement System. This valuation report may not otherwise be copied or reproduced in any form without the consent of the Retirement Board and may only be provided to other parties in its entirety, unless expressly authorized by Segal. The measurements shown in this actuarial valuation may not be applicable for other purposes.

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August 18, 2023

Retirement Board
Newton Contributory Retirement System
1000 Commonwealth Ave
Newton Centre, Ma 02459-1449

Dear Board Members:

We are pleased to submit this Actuarial Valuation and Review as of January 1, 2023. It summarizes the actuarial data used in the valuation, analyzes the preceding year's experience, shows the revised funding requirement for fiscal 2023, and establishes the funding requirements for fiscal 2024 and later years.

This report was prepared in accordance with generally accepted actuarial principles and practices at the request of the Board of Trustees to assist in administering the Retirement System. The census information and financial information on which our calculations were based was prepared by the staff of the Retirement System. That assistance is gratefully acknowledged.

Segal does not audit the data provided. The accuracy and comprehensiveness of the data is the responsibility of those supplying the data. To the extent we can, however, Segal does review the data for reasonableness and consistency. Based on our review of the data, we have no reason to doubt the substantial accuracy of the information on which we have based this report and we have no reason to believe there are facts or circumstances that would affect the validity of these results.

The measurements shown in this actuarial valuation may not be applicable for other purposes. 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; and changes in plan provisions or applicable law.

The actuarial calculations were directed under my supervision. I am a member of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the best of my knowledge, the information supplied in this actuarial valuation is complete and accurate. The assumptions used in this actuarial valuation were selected by the Board based upon our analysis and recommendations. In my opinion, the assumptions are reasonable and take into account the experience of the Newton Contributory Retirement System and reasonable expectations.

We look forward to reviewing this report with you and to answering any questions.

Sincerely,
Segal

Kathleen A. Riley, FSA, MAAA, EA
Senior Vice President and Chief Actuary

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Section 1: Actuarial Valuation Summary

Purpose and basis

This report has been prepared by Segal to present a valuation of the Newton Contributory Retirement System as of January 1, 2023. The valuation was performed to determine whether the assets and contributions are sufficient to provide the prescribed benefits.

The contribution requirements presented in this report are based on:

- The benefit provisions of Massachusetts General Law Chapter 32;
- The characteristics of covered active participants, inactive participants, and retired participants and beneficiaries as of December 31, 2022, provided by the staff of the Retirement System;
- The assets of the System as of December 31, 2022, provided by the staff of the Retirement System;
- Economic assumptions regarding future salary increases and investment earnings; and
- Other actuarial assumptions regarding employee terminations, retirement, death, etc.

Certain disclosure information required by GASB Statements No. 67 and 68 as of December 31, 2022 for the Retirement System is provided in a separate report.

Valuation highlights

1. Segal strongly recommends an actuarial funding method that targets 100% funding of the actuarial accrued liability. Generally, this implies payments that are ultimately at least enough to cover normal cost, interest on the unfunded actuarial accrued liability and the principal balance. The funding policy adopted by the Newton Contributory Retirement System meets this standard and funds the unfunded actuarial accrued liability by June 30, 2032.
2. The rate of return on the market value of assets was -10.75% for the year ending December 31, 2022. The return on the actuarial value of assets was 5.04% for the same period. This resulted in an actuarial loss when measured against the assumed rate of return of 6.90%.
3. The actuarial value of assets is 105.58% of the market value of assets. The investment experience in the past years has only been partially recognized in the actuarial value of assets. As the deferred net loss is recognized in future years, the cost of the Plan is likely to increase unless the net loss is offset by future experience. The recognition of the market losses of $26.5 million will also have an impact on the future funded ratio.

Changes from prior valuation

4. The following actuarial assumptions were approved by the Board and changed with this valuation:
   - The administrative expense assumption was lowered from $450,000 for 2022 to $410,000 for 2023.
   - The allowance for net 3(8)(c) payments was increased from $145,000 for 2022 to $228,000 for 2023.
5. The following plan change is included for the first time in this valuation:
   - The COLA base was increased from $12,000 to $13,000 effective July 1, 2023, and will increase to $14,000 effective July 1, 2024 and to $15,000 effective July 1, 2025

   As a result of the plan change, the employer normal cost increased by $0.2 million and the actuarial accrued liability increased by $9.6 million.
6. In the funding schedule included in this report, the fiscal 2024 appropriation has been lowered from the previously budgeted amount of $44,768,560 to $43,543,143, as approved by the Board. The funding schedule fully funds the System by June 30, 2032, if all assumptions are met and there are no changes in the plan of benefits or actuarial assumptions. The appropriation increases 6.60% per year with a smaller appropriation in fiscal 2032.
7. The funded ratio (the ratio of the actuarial value of assets to actuarial accrued liability) is 61.93%, compared to the prior year funded ratio of 61.05%. This ratio is one measure of funding status, and its history is a measure of funding progress. Using the

market value of assets, the funded ratio is 58.66%, compared to 68.07% as of the prior valuation date. These measurements are not necessarily appropriate for assessing the sufficiency of the plan assets to cover the estimated cost of settling the System's benefit obligation or the need for or the amount of future contributions.

8. The unfunded actuarial accrued liability was expected to decrease by $13.8 million from $301.2 million as of January 1, 2022 to $287.4 million as of January 1, 2023. The actual unfunded actuarial accrued liability of $307.5 million reflects the experience loss during the year and the plan change discussed above.

Risk

9. It is important to note that this actuarial valuation is based on plan assets as of December 31, 2022. The Plan’s funded status does not reflect short-term fluctuations of the market, but rather is based on the market values on the last day of the plan year. Moreover, this actuarial valuation does not include any possible short-term or long-term impacts on mortality of the covered population that may emerge after December 31, 2022 due to COVID-19. Segal is available to prepare projections of potential outcomes of market conditions and other demographic experience upon request.

10. Since the actuarial valuation results are dependent on a given set of assumptions, there is a risk that emerging results may differ significantly as actual experience proves to be different from the assumptions. We have not been engaged to perform a detailed analysis of the potential range of the impact of risk relative to the System’s future financial condition, but have included a brief discussion of some risks that may affect the System in *Section 2*. A more detailed assessment would provide the System with a better understanding of the inherent risks.

Summary of key valuation results

		2023	2022
Contributions for fiscal year beginning July 1:	• Actuarially determined contributions for fiscal years 2024 and 2023	$43,543,143	$40,847,226
	• Actuarially determined contributions for fiscal years 2025 and 2024	46,416,990	44,768,560
Actuarial accrued liability for plan year beginning January 1:	• Retired participants and beneficiaries	$464,867,003	$435,041,641
	• Inactive vested participants	7,055,623	6,566,626
	• Inactive participants due a refund of employee contributions	5,374,828	4,943,100
	• Active participants	330,505,840	326,669,355
	• Total	807,803,294	773,220,722
	• Normal cost including administrative expenses and allowance for net 3(8)(c) payments for plan year beginning January 1	18,677,022	17,808,280
Assets for plan year beginning January 1:	• Market value of assets (MVA)	$473,820,818	$526,328,950
	• Actuarial value of assets (AVA)	500,276,612	472,061,348
	• Actuarial value of assets as a percentage of market value of assets	105.58%	89.69%
Funded status for plan year beginning January 1:	• Unfunded actuarial accrued liability on market value of assets	$333,982,476	$246,891,772
	• Funded percentage on MVA basis	58.66%	68.07%
	• Unfunded actuarial accrued liability on actuarial value of assets	$307,526,682	$301,159,374
	• Funded percentage on AVA basis	61.93%	61.05%
Key assumptions:	• Net investment return	6.90%	6.90%
	• Inflation rate	2.75%	2.75%
Demographic data for plan year beginning January 1:	• Number of retired participants and beneficiaries	1,362	1,334
	• Number of inactive vested participants	50	49
	• Number of inactive participants due a refund of employee contributions	550	526
	• Number of active participants	1,629	1,555
	• Average compensation[1]	$71,744	$72,020

[1] Compensation figures are for the prior year and reflect annualized salaries for participants hired during the year.
Calendar year 2022 compensation was increased by 14.2% for parking control clerks to reflect unsettled bargaining contracts. Compensation was decreased by 9.8% for superior officers, 3.4% for patrolmen, 7.1% for engineers and Local 2443 foremen to reflect retroactive payments.
Calendar year 2021 compensation was increased by 10.9% for superior officers and patrolmen, 9.8% for parking control clerks, 6.6% for engineers and Local 2443 foremen and 4.5% for inspectors to reflect unsettled bargaining contracts. Compensation was decreased by 4.3% for Local 3092 City Hall associates and 1.5% for Local 25 Teamsters to reflect retroactive payments.

Important information about actuarial valuations

An actuarial valuation is a budgeting tool with respect to the financing of future projected obligations of a pension plan. It is an estimated forecast – the actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.

In order to prepare a valuation, Segal relies on a number of input items. These include:

Plan provisions	Plan provisions define the rules that will be used to determine benefit payments, and those rules, or the interpretation of them, may change over time. Even where they appear precise, outside factors may change how they operate. It is important to keep Segal informed with respect to plan provisions and administrative procedures, and to review the plan summary included in our report to confirm that Segal has correctly interpreted the plan of benefits.
Participant information	An actuarial valuation for a plan is based on data provided to the actuary by the System. Segal does not audit such data for completeness or accuracy, other than reviewing it for obvious inconsistencies compared to prior data and other information that appears unreasonable. It is important for Segal to receive the best possible data and to be informed about any known incomplete or inaccurate data.
Financial information	Part of the cost of a plan will be paid from existing assets — the balance will need to come from future contributions and investment income. The valuation is based on the asset values as of the valuation date, typically reported by the System. A snapshot as of a single date may not be an appropriate value for determining a single year's contribution requirement, especially in volatile markets. Plan sponsors often use an "actuarial value of assets" that differs from market value to gradually reflect year-to-year changes in the market value of assets in determining the contribution requirements.
Actuarial assumptions	In preparing an actuarial valuation, Segal starts by developing a forecast of the benefits to be paid to existing plan participants for the rest of their lives and the lives of their beneficiaries. This requires actuarial assumptions as to the probability of death, disability, withdrawal, and retirement of participants in each year, as well as forecasts of the plan's benefits for each of those events. In addition, the benefits forecasted for each of those events in each future year reflect actuarial assumptions as to salary increases and cost-of-living adjustments. The forecasted benefits are then discounted to a present value, typically based on an estimate of the rate of return that will be achieved on the plan's assets. All of these factors are uncertain and unknowable. Thus, there will be a range of reasonable assumptions, and the results may vary materially based on which assumptions are selected within that range. That is, there is no right answer (except with hindsight). It is important for any user of an actuarial valuation to understand and accept this constraint. The actuarial model may use approximations and estimates that will have an immaterial impact on our results. In addition, the actuarial assumptions may change over time, and while this can have a significant impact on the reported results, it does not mean that the previous assumptions or results were unreasonable or wrong.

Section 1: Actuarial Valuation Summary

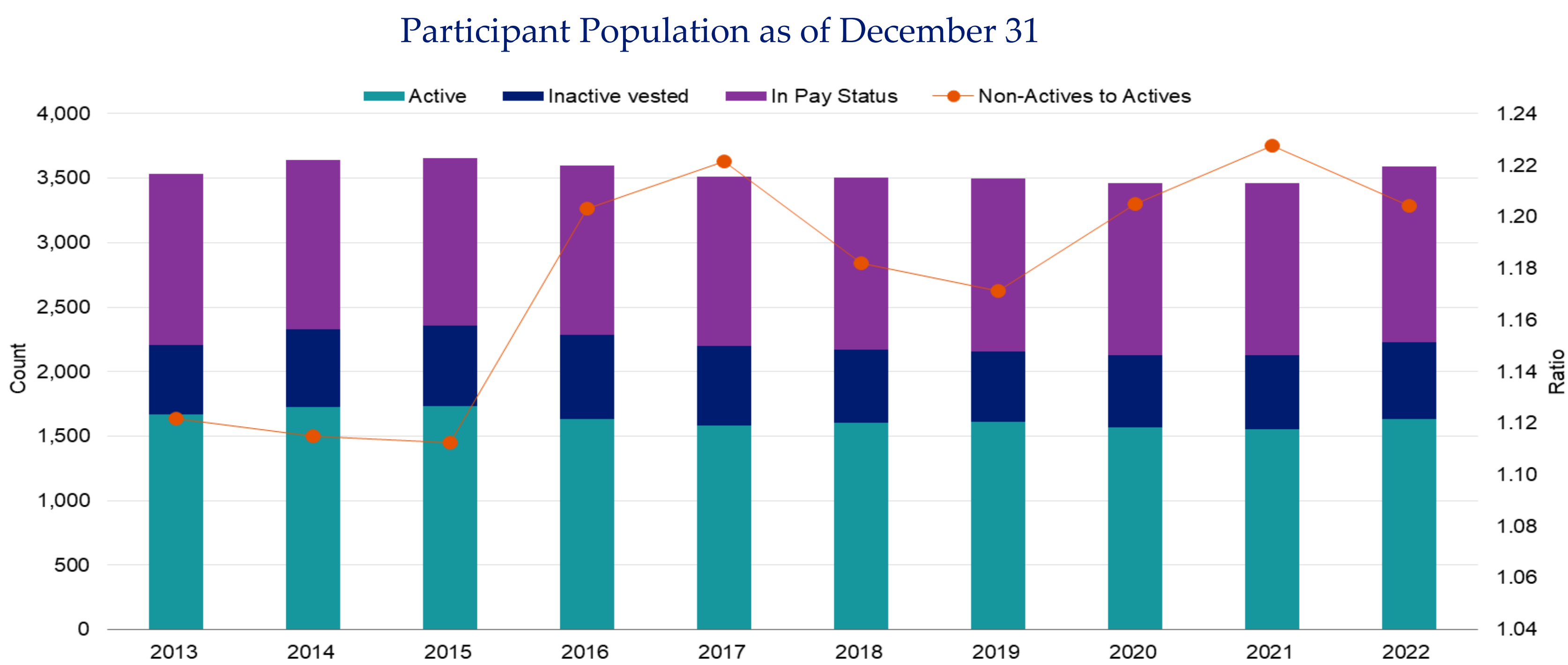
The user of Segal's actuarial valuation (or other actuarial calculations) should keep the following in mind:

The actuarial valuation is prepared at the request of the Retirement Board. Segal is not responsible for the use or misuse of its report, particularly by any other party.
An actuarial valuation is a measurement at a specific date — it is not a prediction of a plan's future financial condition. Accordingly, Segal did not perform an analysis of the potential range of financial measurements, except where otherwise noted.
If the Retirement Board is aware of any event or trend that was not considered in this valuation that may materially change the results of the valuation, Segal should be advised, so that we can evaluate it.
Segal does not provide investment, legal, accounting, or tax advice. Segal's valuation is based on our understanding of applicable guidance in these areas and of the plan provisions, but they may be subject to alternative interpretations. The Retirement Board should look to their other advisors for expertise in these areas.
While Segal maintains extensive quality assurance procedures, an actuarial valuation involves complex computer models and numerous inputs. In the event that an inaccuracy is discovered after presentation of Segal's valuation, Segal may revise that valuation or make an appropriate adjustment in the next valuation.
Segal's report shall be deemed to be final and accepted by the Retirement Board upon delivery and review. The Retirement Board should notify Segal immediately of any questions or concerns about the final content.

As Segal has no discretionary authority with respect to the management or assets of the System, it is not a fiduciary in its capacity as actuaries and consultants with respect to the System.

Section 2: Actuarial Valuation Results

Participant information



In Pay Status	1,327	1,317	1,305	1,310	1,315	1,332	1,339	1,337	1,334	1,362
Inactive Vested[1]	542	604	622	655	616	565	548	555	575	600
Active	1,666	1,723	1,732	1,633	1,581	1,605	1,611	1,570	1,555	1,629
Ratio	1.12	1.11	1.11	1.20	1.22	1.18	1.17	1.21	1.23	1.20

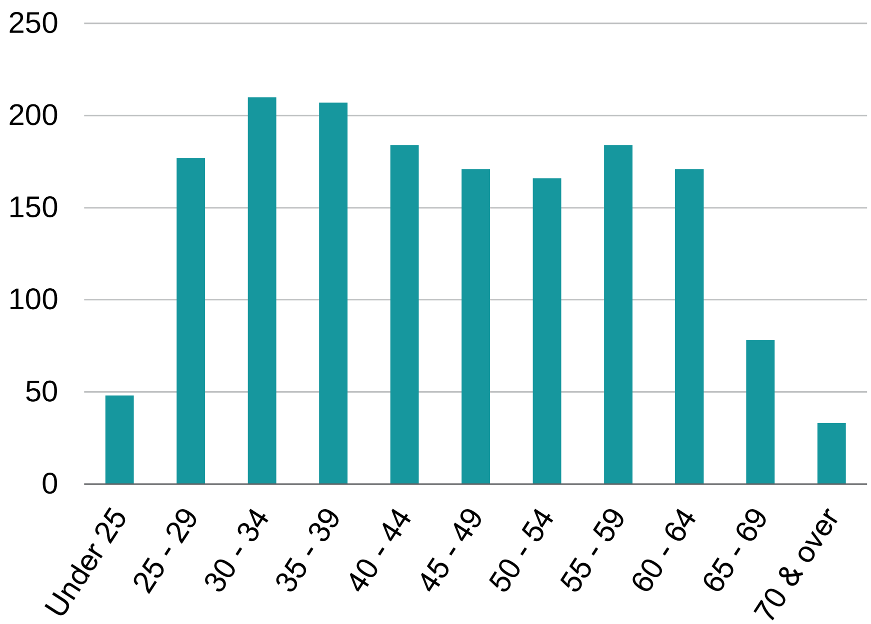
[1] Includes terminated participants due a refund of employee contributions

Active participants

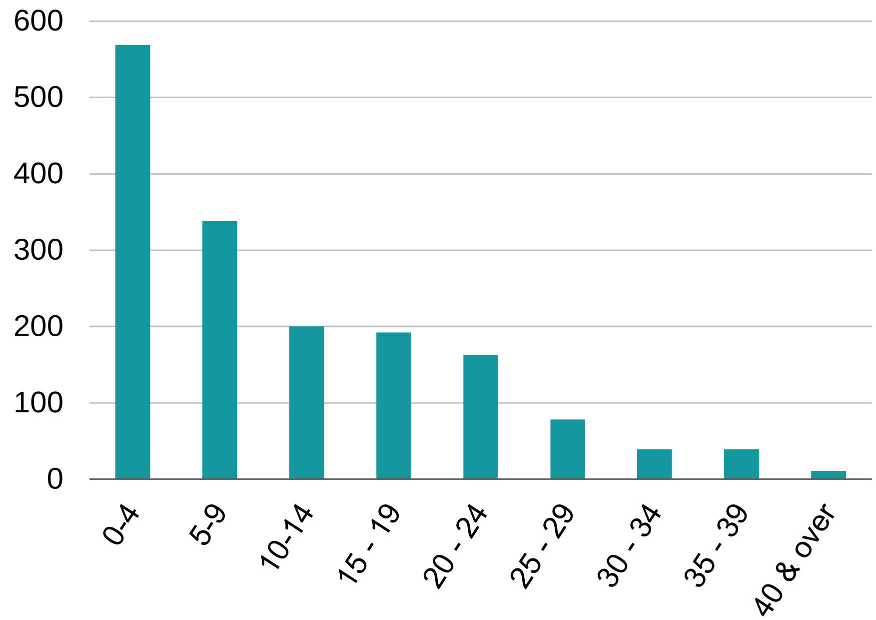
As of December 31,	2022	2021	Change
Active participants	1,629	1,555	4.8%
Average age	45.6	46.4	-0.8
Average years of service	11.2	12.1	-0.9
Average compensation	$71,744	$72,020	-0.4%

Distribution of Active Participants as of December 31, 2022

Actives by Age



Actives by Years of Service



Inactive participants

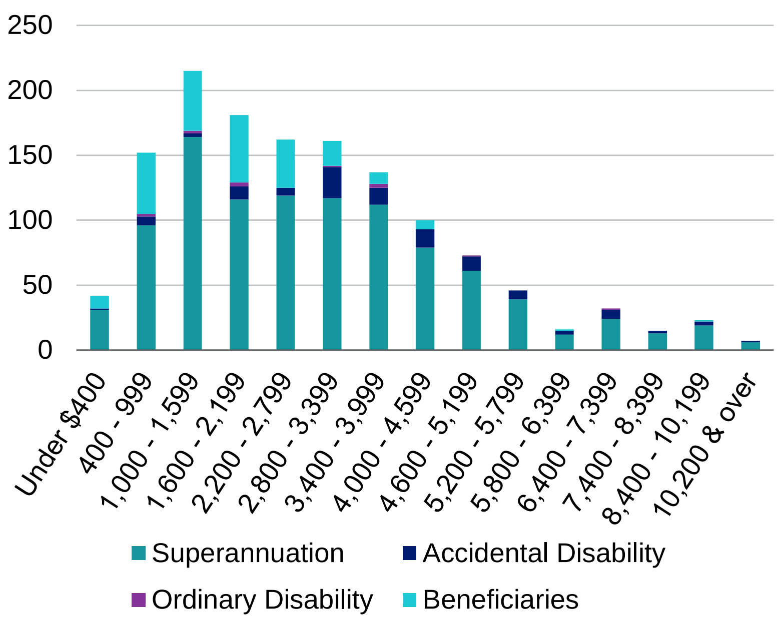
In this year’s valuation, there were 50 inactive participants with a vested right to a deferred or immediate vested benefit. In addition, there were 550 inactive participants entitled to a return of their employee contributions.

Retired participants and beneficiaries

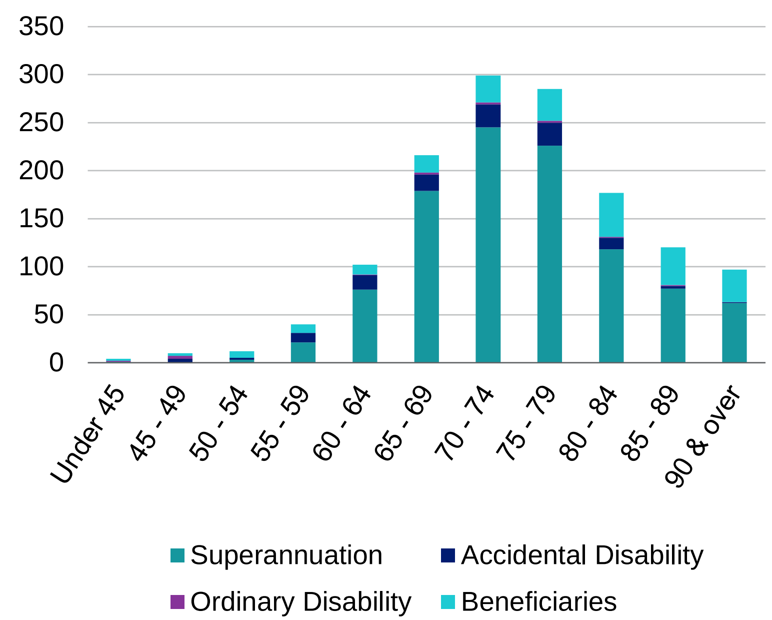
As of December 31,	2022	2021	Change
Retired participants	1,133	1,105	2.5%
Beneficiaries	229	229	0.0%
Average age	74.8	74.9	-0.1
Average amount[1]	$2,875	$2,783	3.3%
Total monthly amount[1]	3,915,158	3,712,136	5.5%

Distribution of Retired Participants and Beneficiaries as of December 31, 2022

By Type and Monthly Amount



By Type and Age

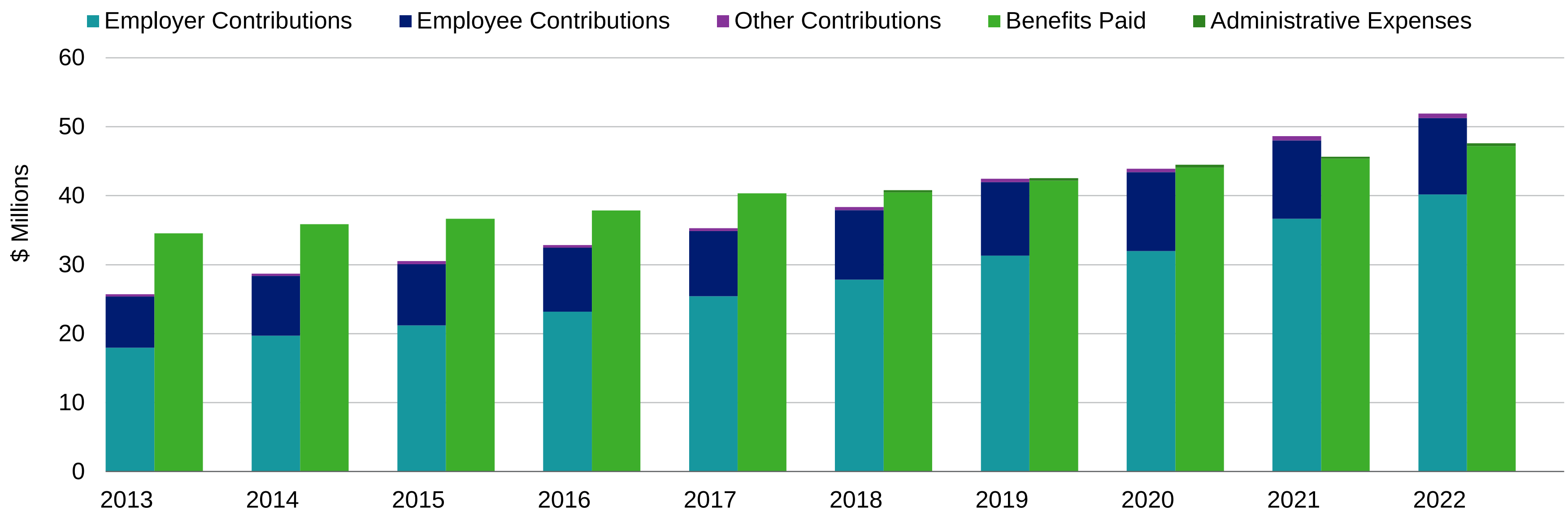


[1] Excluding COLAs reimbursed by the Commonwealth.

Financial information

Retirement plan funding anticipates that, over the long term, both contributions (less administrative expenses) and investment earnings (less investment fees) will be needed to cover benefit payments. Retirement plan assets change as a result of the net impact of these income and expense components.

Comparison of Contributions with Benefits and Expenses for Years Ended December 31



Note:
Excludes administrative expenses and administrative expense appropriation prior to 2018.

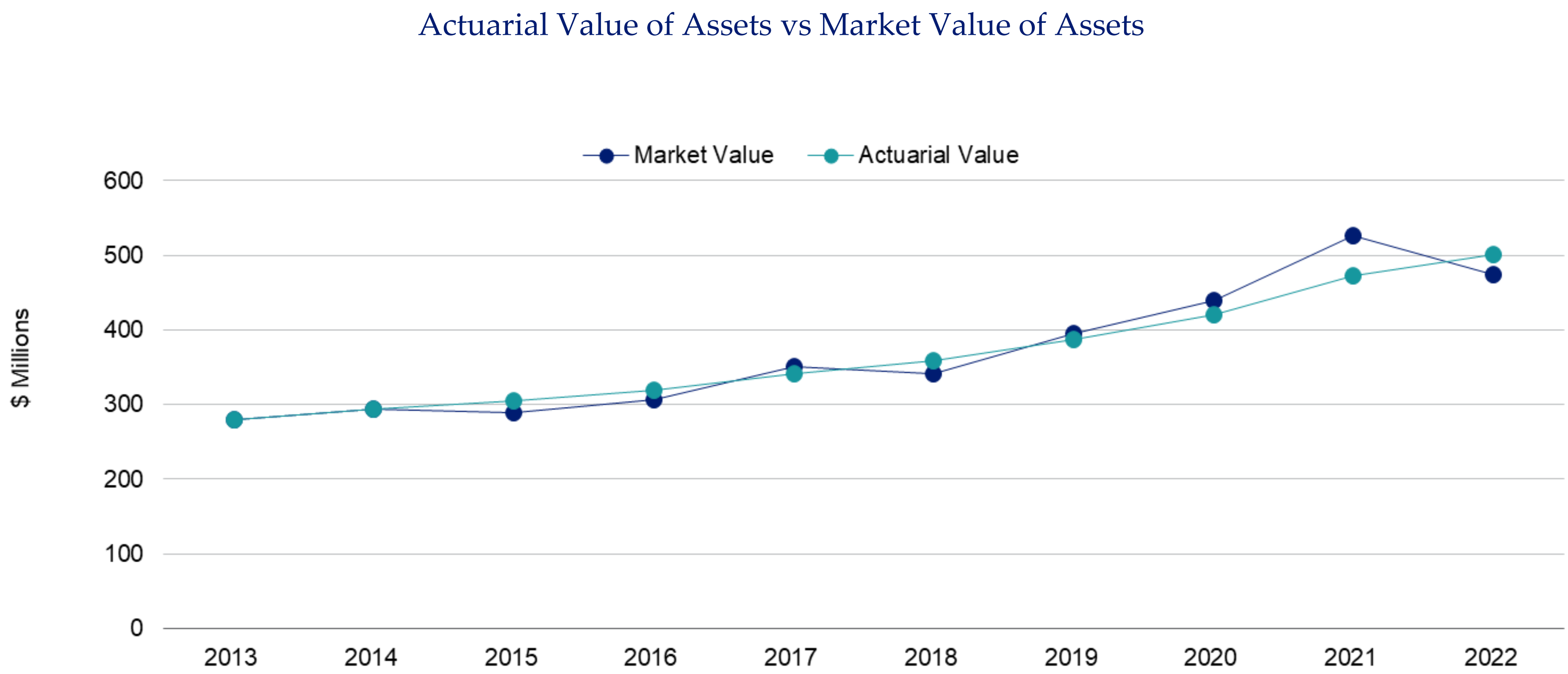
Section 2: Actuarial Valuation Results

It is desirable to have level and predictable plan costs from one year to the next. For this reason, the Board has approved an asset valuation method that gradually adjusts to market value. Under this valuation method, the full value of market fluctuations is not recognized in a single year and, as a result, the asset value and the plan costs are more stable. The amount of the adjustment to recognize market value is treated as income, which may be positive or negative. Realized and unrealized gains and losses are treated equally and, therefore, the sale of assets has no immediate effect on the actuarial value.

Determination of Actuarial Value of Assets for Year Ended December 31, 2022

1	Actuarial value of assets as of December 31, 2021	$472,061,348
2	Contributions less benefit payments and expenses	4,312,836
3	Expected investment income on **(1)** and **(2)**	32,721,026
4	Preliminary actuarial value of assets: **(1) + (2) + (3)**	$509,095,210
5	Market value of assets, December 31, 2022	473,820,818
6	Adjustment toward market value: 25% of **[(5) - (4)]**	-$8,818,598
7	Adjustment to be within 20% corridor	0
8	Final actuarial value of assets as of December 31, 2022: **(4) + (6) + (7)**	500,276,612
9	Actuarial value as a percentage of market value: **(8) ÷ (5)**	105.58%
10	Amount deferred for future recognition: **(5) - (8)**	-$26,455,794

Asset history for years ended December 31

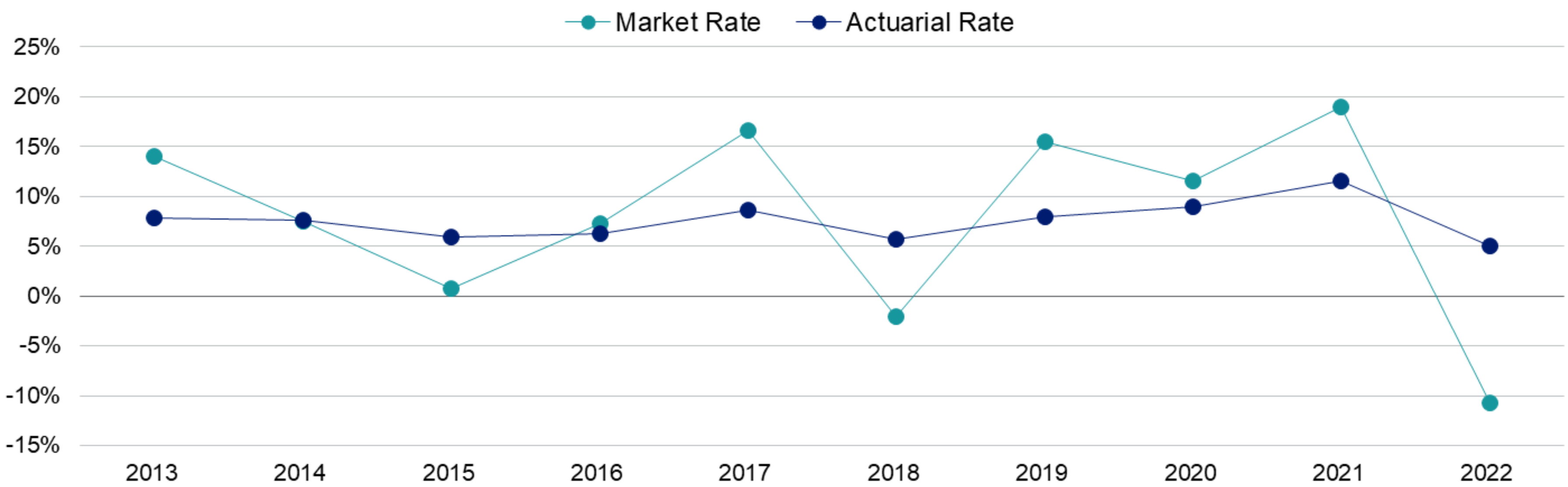


	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Actuarial Value[1]	$279.85	$293.84	$304.94	$318.75	$340.84	$357.99	$386.55	$420.40	$472.06	$500.28
Market Value[1]	280.35	293.92	289.93	305.87	351.18	341.84	394.68	439.66	526.33	473.82

[1] In $ millions

Historical investment returns

Market and Actuarial Rates of Return for Years Ended December 31



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Market rate	14.01%	7.50%	0.74%	7.30%	16.61%	-2.07%	15.49%	11.55%	18.97%	-10.75%
Actuarial rate	7.81%	7.66%	5.93%	6.23%	8.59%	5.67%	8.01%	8.91%	11.54%	5.04%
Assumed rate	7.75%	7.65%	7.65%	7.50%	7.25%	7.25%	7.25%	7.25%	7.25%	6.90%

Average Rates of Return	Actuarial Value	Market Value
Most recent five-year average return:	7.82%	5.75%
Most recent ten-year average return:	7.58%	7.14%

Actuarial experience

Assumptions should consider experience and should be based on reasonable expectations for the future.

Each year actual experience is compared to that projected by the assumptions. Differences are reflected in the actuarial valuation.

Assumptions are not changed if experience is believed to be a short-term development that will not continue over the long term. On the other hand, if experience is expected to continue, assumptions are changed.

Actuarial Experience for Year Ended December 31, 2022

1	Loss from investments	-$8,818,598
2	Net loss from administrative expenses and net 3(8)(c) payments	-7,116
3	Net loss from other experience	-1,697,638
4	Net experience (loss): **1 + 2 + 3**	-$10,523,352

Investment experience

Actuarial planning is long term. The obligations of a pension plan are expected to continue for the lifetime of all its participants.

The assumed long-term rate of return of 6.90% considers past experience, the asset allocation policy of the Board and future expectations.

Investment Experience

		Year Ended December 31, 2022	
		Market Value	**Actuarial Value**
1	Net investment income	-$56,820,968	$23,902,428
2	Average value of assets	528,485,368	474,217,766
3	Rate of return: **1 ÷ 2**	-10.75%	5.04%
4	Assumed rate of return	6.90%	6.90%
5	Expected investment income: **2 x 4**	$36,465,490	$32,721,026
6	Investment gain/(loss): **1 - 5**	-93,286,458	-8,818,598

Non-investment experience

Administrative expenses and net 3(8)(c) allowance

Administrative expenses for the year ended December 31, 2022 totaled $442,922, as compared to the assumption of $450,000. Net 3(8)(c) payments were $158,735 for the year ended December 31, 2022, as compared to the allowance of $145,000.

Other experience

There are other differences between the expected and the actual experience that appear when the new valuation is compared with the projections from the previous valuation. These include:

- Mortality experience (more or fewer than projected deaths)
- The extent of turnover among participants
- Retirement experience (earlier or later than projected)
- The number of disability retirements (more or fewer than projected)
- Salary increases (greater or smaller than projected)

The net loss from this other experience for the year ended December 31, 2022 amounted to $1,697,638, which is 0.2% of the actuarial accrued liability.

Liability Changes Due to Demographic Experience for Year Ended December 31, 2022

Loss due to salaries increasing more than expected for continuing actives	$4,362,463
Gain due to pension and beneficiary mortality experience	-218,149
Miscellaneous experience gain (including changes in data)	-2,445,976
Net gain	$1,697,638

Actuarial assumptions

The assumption changes reflected in this report are:

- The administrative expense assumption was lowered from $450,000 for 2022 to $410,000 for 2023.
- The allowance for net 3(8)(c) payments was increased from $145,000 for 2022 to $228,000 for 2023.

Plan provisions

The COLA base was increased from $12,000 to $13,000 effective July 1, 2023, and will increase to $14,000 effective July 1, 2024 and to $15,000 effective July 1, 2025. This change increased the actuarial accrued liability by $9.6 million and increased the normal cost by $0.2 million.

Unfunded Actuarial Accrued Liability

Development of Unfunded Actuarial Accrued Liability for Year Ended December 31, 2022

1	Unfunded actuarial accrued liability at beginning of year		$301,159,374
2	Normal cost at beginning of year		17,808,280
3	Total contributions		-51,932,743
4	Interest on **1, 2 & 3**		20,386,180
5	Expected unfunded actuarial accrued liability		$287,421,091
6	Changes due to:		
	(a) Net experience loss	$10,523,352	
	(b) Plan provisions	9,582,239	
	Total changes		$20,105,591
7	Unfunded actuarial accrued liability at end of year		$307,526,682

Actuarially determined contribution

The actuarially determined contribution is equal to the employer normal cost payment and a payment on the unfunded actuarial accrued liability. The Board revised the previously budgeted fiscal 2024 Actuarially Determined Contribution from $44,768,560 to $43,543,143. The revised amount represents a 6.60% increase over the fiscal 2024 Actuarially Determined Contribution.

The funding schedule included in this report fully funds the System by June 30, 2032, if all assumptions are met and there are no changes in the plan of benefits or actuarial assumptions, with appropriations that increase 6.60% per year. In the prior year's report, the System was projected to be fully funded by June 30, 2030 and the appropriations increased 9.60% per year.

Actuarially Determined Contribution

		2023		2022	
		Amount	**% of Projected Payroll**	**Amount**	**% of Projected Payroll**
1	Total normal cost	$18,039,022	14.84%	$17,213,280	14.76%
2	Administrative expenses and net 3(8)(c) allowance	638,000	0.52%	595,000	0.51%
3	Expected employee contributions	-12,250,884	-10.08%	-11,713,903	-10.04%
4	Employer normal cost: **(1) + (2) + (3)**	$6,426,138	5.29%	$6,094,377	5.22%
5	Actuarial accrued liability	$807,803,294		$773,220,722	
6	Actuarial value of assets	500,276,612		472,061,348	
7	Unfunded actuarial accrued liability: **(5) - (6)**	$307,526,682		$301,159,374	
8	Employer normal cost projected to July 1, 2023 and 2022, adjusted for timing	$6,550,218	5.32%	$6,212,051	5.25%
9	Projected unfunded actuarial accrued liability	317,959,390		311,376,074	
10	Payment on unfunded actuarial accrued liability, adjusted for timing	36,992,925	30.02%	34,625,175	29.28%
11	Actuarially determined contribution: **(8) + (10)**	$43,543,143	35.34%	$40,847,226	34.54%
12	Projected payroll as of July 1	$123,224,400		$118,245,304	

Notes:
Actuarially Determined Contributions are assumed to be paid August 1.
Actuarially Determined Contributions set equal to the budgeted or revised budgeted amount determined with the prior valuation.

Funding schedule

(1) Fiscal Year Ended June 30	(2) Employer Normal Cost	(3) Amortization of Unfunded Liability	(4) Actuarially Determined Contribution (ADC): (2)+(3)	(5) Total Unfunded Actuarial Accrued Liability at Beginning of Fiscal Year	(6) Percent Increase in ADC Over Prior Year
2024	$6,550,218	$36,992,925	$43,543,143	$317,959,390	- -
2025	6,758,689	39,658,301	46,416,990	300,572,426	6.60%
2026	6,973,715	42,506,796	49,480,511	279,152,273	6.60%
2027	7,195,502	45,550,723	52,746,225	253,225,973	6.60%
2028	7,424,260	48,803,216	56,227,476	222,274,843	6.60%
2029	7,660,204	52,278,285	59,938,489	185,730,449	6.60%
2030	7,903,559	55,990,870	63,894,429	142,970,241	6.60%
2031	8,154,558	59,956,903	68,111,461	93,312,832	6.60%
2032	8,413,436	36,213,681	44,627,117	36,012,881	-34.48%
2033	8,680,439	0	8,680,439	0	-80.55%

Notes:
Fiscal 2024 Actuarially Determined Contribution is set equal to the revised budgeted amount.
Actuarially Determined Contributions are assumed to be paid August 1.
Item (2) reflects 2.75% growth in payroll and a 0.15% adjustment to total normal cost to reflect the effect of mortality improvements due to the generational mortality assumption.
Projected normal cost does not reflect the future impact of pension reform for new hires.
Projected unfunded actuarial accrued liability does not reflect the recognition of deferred investment gains or losses.

Risk

The actuarial valuation results are dependent on a single set of assumptions; however, there is a risk that emerging results may differ significantly as actual experience proves to be different from the current assumptions.

We have not been engaged to perform a detailed analysis of the potential range of the impact of risk relative to the System's future financial condition but have included a brief discussion of some risks that may affect the System.

- Economic and Other Related Risks. Potential implications for the Plan due to the following economic effects (that were not reflected as of the valuation date) include:
  - Volatile financial markets and investment returns lower than assumed
  - High inflationary environment impacting salary increases
  - Lingering direct and indirect effects of the COVID-19 pandemic
- Investment Risk (the risk that returns will be different than expected)

  The market value rate of return over the last 10 years has ranged from a low of -10.75% to a high of 18.97%.
- Longevity Risk (the risk that mortality experience will be different than expected)

  The actuarial valuation includes an expectation of future improvement in life expectancy. Emerging plan experience that does not match these expectations will result in either an increase or decrease in the actuarially determined contribution.
- Contribution Risk (the risk that actual contributions will be different from actuarially determined contribution)

  Massachusetts General Law requires payment of the actuarially determined contribution. If future experience matches the current assumptions, we project the unfunded actuarial accrued liability will be paid off in 9 years.
- Demographic Risk (the risk that participant experience will be different than assumed)

  Examples of this risk include:
  - Actual retirements occurring earlier or later than assumed. The value of retirement plan benefits is sensitive to the rate of benefit accruals and any early retirement subsidies that apply.
  - More or less active participant turnover than assumed.
  - Disability experience greater or less than assumed.
  - Salary increases greater or less than assumed.

Section 2: Actuarial Valuation Results

- There are external factors including legislative or financial reporting changes that could impact the System's funding and disclosure requirements. While we do not assume any changes in such external factors, it is important to understand that they could have significant consequences for the System.
- Actual Experience Over the Last Ten Years

  Past experience can help demonstrate the sensitivity of key results to the System's actual experience. Over the past ten years:
  - The non-investment gain(loss) for a year has ranged from a loss of $15.6 million to a gain of $4.1 million.
  - The funded percentage on the actuarial value of assets has ranged from a low of 50.8% to a high of 61.9%.
- Maturity Measures

  As pension plans mature, the cash needed to fulfill benefit obligations will increase over time. Therefore, cash flow projections and analysis should be performed to assure that the Plan's asset allocation is aligned to meet emerging pension liabilities.

  In 2022, contributions received exceeded benefits plus administrative expenses by $4,312,836. While this excess continues, the System is not dependent on investment returns to pay future benefits.

Section 3: Supplemental Information

Exhibit A: Table of Plan Demographics

Category	Year Ended December 31 2022	Year Ended December 31 2021	Change From Prior Year
Active participants in valuation:			
Number	1,629	1,555	4.8%
Average age	45.6	46.4	-0.8
Average years of service	11.2	12.1	-0.9
Average compensation[1]	$71,744	$72,020	-0.4%
Account balances	103,782,404	102,683,049	1.1%
Inactive participants			
Inactive vested participants	50	49	2.0%
Inactive nonvested participants due a refund	550	526	4.6%
Retired participants:			
Number in pay status	1,008	983	2.5%
Average age	74.8	74.6	0.2
Average monthly benefit	$3,000	$2,915	2.9%
Disabled participants:			
Number in pay status	125	122	2.5%
Average age	69.7	69.8	-0.1
Average monthly benefit	$3,774	$3,676	2.7%
Beneficiaries:			
Number in pay status	229	229	0.0%
Average age	77.8	78.8	-1.0
Average monthly benefit	$1,830	$1,740	5.2%

[1] Compensation figures are for the prior year and reflect annualized salaries for participants hired during the year.
Calendar year 2022 compensation was increased by 14.2% for parking control clerks to reflect unsettled bargaining contracts. Compensation was decreased by 9.8% for superior officers, 3.4% for patrolmen, 7.1% for engineers and Local 2443 foremen to reflect retroactive payments.
Calendar year 2021 compensation was increased by 10.9% for superior officers and patrolmen, 9.8% for parking control clerks, 6.6% for engineers and Local 2443 foremen and 4.5% for inspectors to reflect unsettled bargaining contracts. Compensation was decreased by 4.3% for Local 3092 City Hall associates and 1.5% for Local 25 Teamsters to reflect retroactive payments.

Exhibit B: Participants in Active Service as of December 31, 2022 by Age, Years of Service, and Average Compensation

		Years of Service								
Age	Total	0-4	5-9	10-14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 & over
Under 25	48	47	1	- -	- -	- -	- -	- -	- -	- -
	$41,704	$41,309	$60,290	- -	- -	- -	- -	- -	- -	- -
25 - 29	177	167	10	- -	- -	- -	- -	- -	- -	- -
	$50,387	$49,365	$67,455	- -	- -	- -	- -	- -	- -	- -
30 - 34	210	112	84	14	- -	- -	- -	- -	- -	- -
	$63,467	$53,742	$70,837	$97,052	- -	- -	- -	- -	- -	- -
35 - 39	207	55	68	70	14	- -	- -	- -	- -	- -
	$80,233	$58,637	$82,498	$91,882	$95,826	- -	- -	- -	- -	- -
40 - 44	184	47	38	28	51	20	- -	- -	- -	- -
	$78,983	$53,997	$75,245	$85,757	$93,439	$98,460	- -	- -	- -	- -
45 - 49	171	35	33	18	35	45	5	- -	- -	- -
	$80,895	$52,795	$62,303	$69,492	$95,453	$107,197	$102,738	- -	- -	- -
50 - 54	166	45	26	18	21	34	20	2	- -	- -
	$75,903	$50,158	$62,293	$62,338	$76,658	$101,460	$118,294	$87,892	- -	- -
55 - 59	184	30	28	20	24	28	28	15	11	- -
	$79,387	$50,824	$67,944	$74,166	$77,393	$86,278	$101,731	$99,260	$98,743	- -
60 - 64	171	21	35	19	21	23	14	16	18	4
	$76,136	$56,709	$62,030	$81,036	$72,400	$67,688	$98,257	$94,567	$98,337	$95,410
65 - 69	78	8	12	10	18	12	8	2	6	2
	$70,675	$43,055	$58,482	$84,401	$68,833	$77,615	$89,263	$88,798	$69,107	$72,849
70 & over	33	2	3	3	8	1	3	4	4	5
	$57,863	$39,390	$61,235	$50,302	$58,158	$68,123	$51,227	$40,506	$58,693	$82,447
Total	1,629	569	338	200	192	163	78	39	39	11
	$71,744	$51,338	$70,381	$82,913	$84,061	$93,342	$102,198	$90,189	$89,889	$85,416

Exhibit C: Summary Statement of Income and Expenses on a Market Value Basis

	Year Ended December 31, 2022		Year Ended December 31, 2021	
Net assets at market value at the beginning of the year		$526,328,950		$439,660,969
Contribution and other income:				
Employer contributions	$40,188,045		$36,660,386	
Employee contributions	11,085,517		11,357,250	
Federal Grant Reimbursement and Other contributions	659,181		608,981	
Total contribution income		*$51,932,743*		*$48,626,617*
Investment income:				
Investment income	-$54,492,752		$85,974,297	
Less investment fees	-2,328,216		-2,295,400	
Net investment income		*-$56,820,968*		*$83,678,897*
Total income available for benefits		**-$4,888,225**		**$132,305,514**
Less benefit payments and administrative expenses:				
Administrative expenses	-$442,922		-$255,503	
Pensions	-47,018,250		-45,244,594	
Net 3(8)© reimbursements	-158,735		-137,436	
Net benefit payments and administrative expenses		*-$47,619,907*		*-$45,637,533*
Change in reserve for future benefits		**-$52,508,132**		**$86,667,981**
Net assets at market value at the end of the year		**$473,820,818**		**$526,328,950**

Exhibit D: Department Breakouts

Department Code	Category	Active participants in valuation	Projected payroll for fiscal 2024	Fiscal year ending 2025: Normal Cost, including 3(8)c reimbursements	Fiscal year ending 2025: Amortization of Unfunded Actuarial Accrued Liability	Fiscal year ending 2025: Total Appropriation
001	Information Technology	10	$1,065,035	$25,734	$243,674	$269,408
002	Human Resources	6	549,579	16,319	214,879	231,198
003	Senior Services	5	432,879	8,690	112,046	120,736
004	Financial Information Systems	7	560,224	7,048	121,783	128,831
005	Jackson Homestead	2	183,320	16,895	38,392	55,287
006	Executive	8	946,522	51,564	264,209	315,773
007	Comptroller’s	6	543,703	10,044	296,032	306,076
008	Retirement	3	302,222	12,000	143,502	155,502
009	Assessing	12	1,073,969	46,193	449,317	495,510
010	Purchasing	5	443,705	25,899	165,293	191,192
011	Treasury	9	728,564	14,717	188,585	203,302
012	Law	13	1,304,514	37,983	485,964	523,947
013	City Clerk	13	859,386	30,559	132,453	163,012
014	Clerk of the Board	2	181,531	4,101	94,854	98,955
015	City Council	16	262,582	23,771	84,550	108,321
016	Building	33	2,653,729	158,578	781,034	939,612
017	Elections	0	0	1,123	107,286	108,409
018	Planning	20	1,702,663	72,550	277,244	349,794
018F	Planni–g - Federally Funded	6	445,377	12,048	184,857	196,905
018P	Community Preservation (Planning)	1	83,758	520	33,838	34,358
019	Fire (Group 2 & 4)	184	20,695,260	2,218,644	8,566,849	10,785,493

Department Code	Category	Active participants in valuation	Projected payroll for fiscal 2024	Fiscal year ending 2025 Normal Cost, including 3(8)c reimbursements	Fiscal year ending 2025 Amortization of Unfunded Actuarial Accrued Liability	Fiscal year ending 2025 Total Appropriation
019A	Fire (Civilian Personnel)	6	623,671	24,594	188,550	213,144
019S	Fire (Retired under "Starck" Bill)	0	0	3,251	310,735	313,986
020	Police (Group 2 & 4)	100	11,291,034	1,166,911	5,490,134	6,657,045
020A	Police (Civilian Personnel)	30	2,286,009	42,241	593,091	635,332
020S	Police Superior Officers (Group 4)	35	5,690,688	541,289	2,260,741	2,802,030
021	Police School Traffic Supervisors	9	541,452	43,389	272,371	315,760
022	Sealer/Weights & Measures	0	0	242	23,096	23,338
023	Inspectional Services	17	1,563,713	94,234	370,454	464,688
025	Health & Human Services	46	3,458,198	118,573	869,864	988,437
026	Veterans	1	88,980	2,611	68,119	70,730
027	Library	50	3,317,210	85,579	1,366,768	1,452,347
028	School Custodian	91	5,889,471	206,174	1,904,025	2,110,199
029	School Cafeteria	0	0	2,055	196,368	198,423
030	School Teacher Aides	523	24,889,540	740,259	3,404,571	4,144,830
031	School Clerical	120	10,131,556	332,179	2,918,494	3,250,673
031A	School Committee	4	32,605	14,823	14,623	29,446
031B	School Use of Building (revolving)	1	80,953	4,860	53,416	58,276
031C	School Community Ed. / Summer School (revolving)	7	585,052	42,260	110,346	152,606
031E	School Ed Ctr Preschool (revolving)	10	347,843	16,003	35,581	51,584
031N	School NSHS Preschool (revolving)	0	0	0	27	27
032	Recreation	45	3,720,760	92,531	1,313,636	1,406,167

Department Code	Category	Active participants in valuation	Projected payroll for fiscal 2024	Fiscal year ending 2025 Normal Cost, including 3(8)c reimbursements	Amortization of Unfunded Actuarial Accrued Liability	Total Appropriation
033	Engineering	0	0	2,604	274,534	277,138
034	DPW	101	7,916,022	266,823	2,724,106	2,990,929
034A	DPW-Storm Water Management	7	491,163	13,481	91,708	105,189
035	Water/Sewer (General Personnel)	0	0	842	81,815	82,657
035S	Sewer Personnel	22	1,763,127	40,772	642,840	683,612
035W	Water Personnel	16	1,245,841	20,705	552,803	573,508
036	Newton Housing Authority	27	2,250,990	44,424	538,844	583,268
	TOTAL	**1629**	$123,224,400	$6,758,689	$39,658,301	$46,416,990

Exhibit E: Cashflow Forecast

Plan Year	MVA BOY	Administrative Expenses	Net 3(8)(c) Payments	Benefit Payments	Employee Contributions	Employer Contributions	Investment Returns	MVA EOY	Net Change in Plan Assets
2023	$473,820,818	$410,000	$228,000	$52,684,845	$12,250,884	$43,543,143	$32,756,881	$509,048,881	$35,228,063
2024	509,048,881	421,275	234,270	54,444,627	12,587,783	46,416,990	35,236,465	548,189,948	39,141,067
2025	548,189,948	432,860	240,712	56,434,214	12,933,947	49,480,511	37,984,948	591,481,568	43,291,620
2026	591,481,568	444,764	247,332	58,373,662	13,289,631	52,746,225	41,028,819	639,480,485	47,998,917
2027	639,480,485	456,995	254,134	60,003,120	13,655,096	56,227,476	44,415,927	693,064,736	53,584,250
2028	693,064,736	469,562	261,122	61,646,756	14,030,611	59,938,489	48,196,170	752,852,565	59,787,830
2029	752,852,565	482,475	268,303	63,084,535	14,416,453	63,894,429	52,420,332	819,748,466	66,895,901
2030	819,748,466	495,743	275,682	64,421,390	14,812,905	68,111,461	57,147,769	894,627,786	74,879,320
2031	894,627,786	509,376	283,263	65,435,959	15,220,260	44,627,117	61,481,819	949,728,385	55,100,598
2032	949,728,385	523,384	291,052	66,361,209	15,638,817	8,680,439	64,024,615	970,896,610	21,168,226
2033	970,896,610	537,777	299,056	67,317,234	16,068,885	8,955,819	65,475,032	993,242,279	22,345,669
2034	993,242,279	552,566	307,280	68,105,679	16,510,779	9,239,838	67,013,138	1,017,040,509	23,798,230
2035	1,017,040,509	567,761	315,731	68,908,983	16,964,825	9,532,762	68,651,641	1,042,397,262	25,356,753
2036	1,042,397,262	583,375	324,413	69,659,545	17,431,358	9,834,869	70,400,204	1,069,496,361	27,099,098
2037	1,069,496,361	599,418	333,335	70,329,879	17,910,720	10,146,446	72,272,480	1,098,563,376	29,067,016
2038	1,098,563,376	615,902	342,501	70,967,539	18,403,265	10,467,784	74,282,414	1,129,790,898	31,227,522
2039	1,129,790,898	632,839	351,920	71,643,504	18,909,355	10,799,186	76,440,867	1,163,312,043	33,521,145
2040	1,163,312,043	650,242	361,598	72,346,472	19,429,362	11,140,968	78,757,437	1,199,281,499	35,969,456
2041	1,199,281,499	668,124	371,542	73,113,960	19,963,670	11,493,452	81,241,526	1,237,826,521	38,545,022
2042	1,237,826,521	686,497	381,759	73,896,716	20,512,671	11,856,965	83,903,636	1,279,134,820	41,308,299
2043	1,279,134,820	705,376	392,258	74,649,353	21,076,769	12,231,854	86,758,311	1,323,454,767	44,319,947
2044	1,323,454,767	724,773	403,045	75,253,219	21,656,380	12,618,470	89,826,806	1,371,175,386	47,720,619
2045	1,371,175,386	744,705	414,128	75,851,657	22,251,931	13,017,177	93,131,044	1,422,565,048	51,389,662
2046	1,422,565,048	765,184	425,517	76,463,332	22,863,859	13,428,349	96,688,926	1,477,892,149	55,327,101
2047	1,477,892,149	786,227	437,219	77,075,344	23,492,615	13,852,374	100,519,443	1,537,457,792	59,565,643
2048	1,537,457,792	807,848	449,242	77,442,612	24,138,662	14,289,648	104,651,855	1,601,838,254	64,380,463
2049	1,601,838,254	830,064	461,596	77,849,148	24,802,475	14,740,585	109,116,155	1,671,356,661	69,518,407
2050	1,671,356,661	852,891	474,290	78,153,082	25,484,543	15,205,605	113,939,563	1,746,506,109	75,149,448
2051	1,746,506,109	876,345	487,333	78,194,845	26,185,368	15,685,147	119,161,638	1,827,979,739	81,473,630
2052	1,827,979,739	900,444	500,735	78,101,427	26,905,466	16,179,658	124,825,858	1,916,388,115	88,408,375

Notes:
Projected benefit payments are based on a closed group projection and do not include return of employee money for inactive non-vested participants.
Employee contributions, administrative expenses and net (3)(8)(c) payments are projected to increase at the 2.75% inflation assumption.
Employer contributions are as shown in the Funding Schedule in Section 2.

Section 4: Actuarial Valuation Basis

Exhibit I: Actuarial Assumptions, Methods and Models

Net Investment Return:

6.90%

The net investment return assumption is a long-term estimate derived from historical data, current and recent market expectations, and professional judgment. As part of the analysis, a building block approach was used that reflects inflation expectations and anticipated risk premiums for each of the portfolio's asset classes, as well as the System's target asset allocation.

Salary Increases:

Years of Service	Groups 1 and 2	Group 4
0	7.00%	8.00%
1	6.50%	7.50%
2	6.00%	7.00%
3	5.50%	6.50%
4	5.25%	6.00%
5	5.00%	5.50%
6	4.75%	5.25%
7	4.50%	5.00%
8	4.25%	4.75%
9	4.00%	4.50%
10	3.75%	4.25%
11+	3.50%	4.00%

Includes allowance for wage inflation of 2.75%.

The salary increase assumption is a long-term estimate derived from historical data, current and recent market expectations, and professional judgement.

Interest on Employee Contributions:

3.5%

Section 4: Actuarial Valuation Basis

Administrative Expenses:	$410,000 for calendar 2023, increasing 2.75% per year (previously, $450,000 for calendar 2022, increasing 2.75% per year). The administrative expense assumption is based on information on expected expenses provided by the Retirement System.
Allowance for Net 3(8)(c) Payments:	$228,000 for calendar year 2023, increasing 2.75% per year (previously, $145,000 for calendar year 2022, increasing 2.75% per year).
Mortality Rates:	*Pre-Retirement:* RP-2014 Blue Collar Employee Mortality Table projected generationally with Scale MP-2021 *Healthy Retiree:* RP-2014 Blue Collar Healthy Annuitant Mortality Table projected generationally with Scale MP-2021 *Disabled Retiree:* RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year and projected generationally with Scale MP-2021 The mortality tables, including the generation projection to the measurement date, reasonably reflect the projected mortality experience of the Plan as of the measurement date based on historical and current demographic data. As part of the analysis, a comparison was made between the actual number of retiree deaths and the projected number based on the prior years' assumptions over the five most recent valuations. The mortality tables were then adjusted to future years using generational projection under Scale MP-2021 to reflect future mortality improvement.

Termination Rates before Retirement:

	Groups 1 and–2 - Rate (%)		
	Mortality		
Age	Male	Female	Disability
20	0.05	0.02	0.01
25	0.06	0.02	0.02
30	0.06	0.02	0.03
35	0.07	0.03	0.06
40	0.08	0.04	0.10
45	0.13	0.07	0.15
50	0.22	0.12	0.19
55	0.36	0.19	0.24
60	0.61	0.27	0.28

Notes:
Mortality rates do not reflect generational projection.
70% of the disability rates shown represent accidental disability.
20% of the accidental disabilities will die from the same cause as the disability.
70% of the death rates shown represent accidental death.

	Group–4 - Rate (%)		
	Mortality		
Age	Male	Female	Disability
20	0.05	0.02	0.10
25	0.06	0.02	0.20
30	0.06	0.02	0.30
35	0.07	0.03	0.30
40	0.08	0.04	0.30
45	0.13	0.07	1.00
50	0.22	0.12	1.25
55	0.36	0.19	1.20
60	0.61	0.27	0.85

Notes:
Mortality rates do not reflect generational projection.
90% of the disability rates shown represent accidental disability.
60% of the accidental disabilities will die from the same cause as the disability.
90% of the death rates shown represent accidental death.

Withdrawal Rates:

Rate per year (%)			
Years of Service	**Groups 1 and 2**	**Years of Service**	**Group 4**
0	15.0	0 – 10	1.5
1	12.0	11+	0.0
2	10.0		
3	9.0		
4	8.0		
5	7.6		
6	7.5		
7	6.7		
8	6.3		
9	5.9		
10	5.4		
11	5.0		
12	4.6		
13	4.1		
14	3.7		
15	3.3		
16 – 20	2.0		
21 – 29	1.0		
30+	0.0		

The termination rates and disability rates were based on historical and current demographic data, adjusted to reflect economic conditions of the area and estimated future experience and professional judgment. As part of the analysis, a comparison was made between the actual number of terminations and disability retirements and the projected number based on the prior years' assumptions over the five most recent valuations.

Retirement Rates:

	Rate per year (%)		
	Groups 1 and 2		
Age	Male	Female	Group 4
45 – 49	- -	- -	1.0
50 – 51	1.0	1.5	2.0
52	1.0	2.0	2.0
53	1.0	2.5	5.0
54	2.0	2.5	7.5
55	2.0	5.5	30.0[1]
56 – 57	2.5	6.5	10.0
58	5.0	6.5	10.0
59	6.5	6.5	15.0
60	20.0[2]	5.0	20.0
61	20.0	13.0	20.0
62	30.0	15.0	25.0
63	25.0	12.5	25.0
64	22.0	18.0	30.0
65	40.0	15.0	100.0
66 – 67	25.0	20.0	- -
68	30.0	25.0	- -
69	30.0	20.0	- -
70	100.0	100.0	- -

Retirement rates are 0.0% if the employee is not eligible to retire.

The retirement rates were based on historical and current demographic data, adjusted to reflect economic conditions of the area and estimated future experience and professional judgment. As part of the analysis, a comparison was made between the actual number of retirements by age and the projected number based on the prior year’s assumptions over the five most recent valuations.

[1] Rate is 15.0% for employees hired prior to April 2, 2012 and 30.0% for employees hired on or after April 2, 2012

[2] Rate is 12% for employees hired prior to April 2, 2012 and 20.0% for employees hired on or after April 2, 2012

Section 4: Actuarial Valuation Basis

Retirement Rates for Inactive Vested Participants:	55 for participants hired prior to April 2, 2012. For participants hired April 2, 2012 or later, 60 for Group 1, 55 for Group 2, and 50 for Group 4. The retirement age for inactive vested participants was based on historical and current demographic data, adjusted to reflect economic conditions of the area and estimated future experience and professional judgment.
Unknown Data for Participants:	Same as those exhibited by participants with similar known characteristics.
Family Composition:	80% of participants are assumed to be married. None are assumed to have dependent children. Females are assumed to be three years younger than their spouses.
Benefit Election:	All participants are assumed to elect Option A. The benefit election reflects the fact that all benefit options are actuarially equivalent.
Total Service:	Total creditable service reported in the data
2022 Salaries:	2022 salaries are equal to salaries provided in the data, annualized for new hires, and increased by 14.2% for Parking Control Clerks to reflect unsettled bargaining contracts. Salaries were decreased by 7.1% for engineers and Local 2443 foreman, 3.4% for patrolmen and 9.8% for superior officers to reflect retroactive payments.
Actuarial Value of Assets:	A preliminary actuarial value is first determined by taking the actuarial value of assets at the beginning of the year and adding assumed investment earnings (at the assumed actuarial rate of return) and the net new money during the year (contributions less benefit payments). Twenty-five percent of the difference between the market value of assets as reported in the System's Annual Statement and the preliminary actuarial value of assets is added to the preliminary actuarial value. In order that the actuarial value not differ too significantly from the market value of assets, the final actuarial value of assets must be within 20% of the market value of assets.
Actuarial Cost Method:	Entry Age Normal Actuarial Cost Method. Entry Age is the attained age of the participant minus total creditable service. Normal Cost and Actuarial Accrued Liability are calculated on an individual basis and are allocated by salary. Normal Cost is determined using the plan of benefits applicable to each participant.
Models:	Segal valuation results are based on proprietary actuarial modeling software. The actuarial valuation models generate a comprehensive set of liability and cost calculations that are presented to meet regulatory, legislative and client requirements. Deterministic cost projections are based on a proprietary forecasting model. Our Actuarial Technology and Systems unit, comprised of both actuaries and programmers, is responsible for the initial development and maintenance of these models. The models have a modular structure that allows for a high degree of accuracy, flexibility and user control. The client team programs the assumptions and the plan provisions, validates the models, and reviews test lives and results, under the supervision of the responsible actuary.
Justification for Change in Actuarial Assumptions:	Based on past experience and future expectations, the following actuarial assumptions were changed as of January 1, 2023. • The administrative expense assumption was lowered from $450,000 for 2022 to $410,000 for 2023; and • The allowance for net 3(8)(c) payments was increased from $145,000 for 2022 to $228,000 for 2023.

Exhibit II: Summary of Plan Provisions

This exhibit summarizes the major provisions of the Plan included in the valuation. It is not intended to be, nor should it be interpreted as, a complete statement of all plan provisions.

Plan Year: January 1 through December 31

Plan Status: Ongoing

Retirement Benefits:

Employees covered by the Contributory Retirement Law are classified into one of four groups depending on job classification. Group 1 comprises most positions in state and local government. It is the general category of public employees. Group 4 comprises mainly police and firefighters. Group 2 is for other specified hazardous occupations. (Officers and inspectors of the State Police are classified as Group 3.)

For employees hired prior to April 2, 2012, the annual amount of the retirement allowance is based on the member's final three-year average salary multiplied by the number of years and full months of creditable service at the time of retirement and multiplied by a percentage according to the following table based on the age of the member at retirement:

	Age Last Birthday at Date of Retirement		
Percent	**Group 1**	**Group 2**	**Group 4**
2.5	65 or over	60 or over	55 or over
2.4	64	59	54
2.3	63	58	53
2.2	62	57	52
2.1	61	56	51
2.0	60	55	50
1.9	59	--	49
1.8	58	--	48
1.7	57	--	47
1.6	56	--	46
1.5	55	--	45

A member's final three-year average salary is defined as the greater of the highest consecutive three-year average annual rate of regular compensation and the average annual rate of regular compensation received during the last three years of creditable service prior to retirement.

For employees hired on April 2, 2012 or later, the annual amount of the retirement allowance is based on the member's final five-year average salary multiplied by the number of years and full months of creditable service at the time of retirement and multiplied by a percentage according to the following tables based on the age and years of creditable service of the member at retirement:

For members with less than 30 years of creditable service:
Age Last Birthday at Date of Retirement

Percent	Group 1	Group 2	Group 4
2.50	67 or over	62 or over	57 or over
2.35	66	61	56
2.20	65	60	55
2.05	64	59	54
1.90	63	58	53
1.75	62	57	52
1.60	61	56	51
1.45	60	55	50

For members with 30 years of creditable service or greater:
Age Last Birthday at Date of Retirement

Percent	Group 1	Group 2	Group 4
2.500	67 or over	62 or over	57 or over
2.375	66	61	56
2.250	65	60	55
2.125	64	59	54
2.000	63	58	53
1.875	62	57	52
1.750	61	56	51
1.625	60	55	50

	A member's final five-year average salary is defined as the greater of the highest consecutive five-year average annual rate of regular compensation and the average annual rate of regular compensation received during the last five years of creditable service prior to retirement. For employees who became members after January 1, 2011, regular compensation is limited to 64% of the federal limit found in 26 U.S.C. 401(a)(17). In addition, regular compensation for members who retire after April 2, 2012 will be limited to prohibit "spiking" of a member's salary to increase the retirement benefit. For all employees, the maximum annual amount of the retirement allowance is 80 percent of the member's final average salary. Any member who is a veteran also receives an additional yearly retirement allowance of $15 per year of creditable service, not exceeding $300. The veteran allowance is paid in addition to the 80 percent maximum.

Employee Contributions:

Date of Hire	Contribution Rate
Prior to January 1, 1975	5%
January 1, 1975 – December 31, 1983	7%
January 1, 1984 – June 30, 1996	8%
July 1, 1996 onward	9%

In addition, employees hired after December 31, 1978 contribute an additional 2 percent of salary in excess of $30,000.

Employees hired after 1983 who voluntarily withdraw their contributions with less than 10 ten years of credited service receive 3% interest on their contributions.

Employees in Group 1 hired on or after April 2, 2012 with 30 years of creditable service or greater will pay a base contribution rate of 6%.

Retirement Benefits (Superannuation):

Members of Group 1, 2 or 4 hired prior to April 2, 2012 may retire upon the attainment of age 55. For retirement at ages below 55, twenty years of creditable service is required.

Members hired prior to April 2, 2012 who terminate before age 55 with ten or more years of creditable service are eligible for a retirement allowance upon the attainment of age 55 (provided they have not withdrawn their accumulated deductions from the Annuity Savings Fund of the System).

Members of Group 1 hired April 2, 2012 or later may retire upon the attainment of age 60. Members of Group 2 or 4 hired April 2, 2012 or later may retire upon the attainment of age 55. Members of Group 4 may retire upon attainment of age 50 with ten years of creditable service.

Members hired April 2, 2012 or later who terminate before age 55 (60 for members of Group 1) with ten or more years of creditable service are eligible for a retirement allowance upon the attainment of age 55 (60 for members of Group 1) provided they have not withdrawn their accumulated deductions from the Annuity Savings Fund of the System.

Ordinary Disability Benefit:	A member who is unable to perform his or her job due to a non-occupational disability will receive a retirement allowance if he or she has ten or more years of creditable service and has not reached age 55. The annual amount of such allowance shall be determined as if the member retired for superannuation at age 55 (age 60 for Group 1 members hired on or after April 2, 2012), based on the amount of creditable service at the date of disability. For veterans, there is a minimum benefit of 50 percent of the member's most recent year's pay plus an annuity based on his or her own contributions.
Accidental Disability Benefit:	For a job-connected disability, the benefit is 72 percent of the member's most recent annual pay plus an annuity based on his or her own contributions, plus additional amounts for surviving children. Benefits are capped at 75 percent of annual rate of regular compensation for employees who become members after January 1, 1988.
Death Benefits:	In general, the beneficiary of an employee who dies in active service will receive a refund of the employee's own contributions. Alternatively, if the employee were eligible to retire on the date of death, a spouse's benefit will be paid equal to the amount the employee would have received under Option C. The surviving spouse of a member who dies with two or more years of credited service has the option of a refund of the employee's contributions or a monthly benefit regardless of eligibility to retire, if they were married for at least one year. There is also a minimum widow's pension of $250 per month, and there are additional amounts for surviving children. If an employee's death is job-connected, the spouse will receive 72 percent of the member's most recent annual pay, in addition to a refund of the member's accumulated deductions, plus additional amounts for surviving children. However, in accordance with Section 100 of Chapter 32, the surviving spouse of a police officer, firefighter or corrections officer is killed in the line of duty will be eligible to receive an annual benefit equal to the maximum salary held by the member at the time of death. Upon the death of a job-connected disability retiree who retired prior to November 7, 1996, and could not elect an Option C benefit, a surviving spouse will receive an allowance of $9,000 per year if the member dies for a reason unrelated to cause of disability"
"Heart And Lung Law" And Cancer Presumption:	Any case of hypertension or heart disease resulting in total or partial disability or death to a uniformed fireman, permanent member of a police department, or certain employees of a county correctional facility is presumed to have been suffered in the line of duty, unless the contrary is shown by competent evidence. Any case of disease of the lungs or respiratory tract resulting in total disability or death to a uniformed fireman is presumed to have been suffered in the line of duty, unless the contrary is shown by competent evidence. There is an additional presumption for uniformed firemen that certain types of cancer are job-related if onset occurs while actively employed or within five years of retirement.
Options:	Members may elect to receive a full retirement allowance payable for life under Option A. Under Option B a member may elect to receive a lower monthly allowance in exchange for a guarantee that at the time of death any contributions not expended for annuity payments will be refunded to the beneficiary. Option C allows the member to take a lesser retirement allowance in exchange for providing a survivor with two-thirds of the lesser amount. Option C pensioners will have benefits converted from a reduced to a full retirement if the beneficiary predeceases the retiree

Section 4: Actuarial Valuation Basis

Post-Retirement Benefits:	The Board has adopted the provisions of Section 51 of Chapter 127 of the Acts of 1999, which provide that the Retirement Board may approve an annual COLA in excess of the Consumer Price Index but not to exceed a 3% COLA on the first $13,000 (previously, $12,000) of retirement allowance. The COLA base will increase to $14,000 effective July 1, 2024 and to $15,000 effective July 1, 2025. Cost-of-living increases granted prior to July 1, 1998, are reimbursed by the Commonwealth and not reflected in this report.
Changes in Plan Provisions:	The COLA base was increased from $12,000 to $13,000 effective July 1, 2023, and will increase to $14,000 effective July 1, 2024 and to $15,000 effective July 1, 2025.

Appendix A: Definition of Pension Terms

The following list defines certain technical terms for the convenience of the reader:

Actuarial Accrued Liability for Actives:	The equivalent of the accumulated normal costs allocated to the years before the valuation date.
Actuarial Accrued Liability for Retirees and Beneficiaries:	Actuarial Present Value of lifetime benefits to existing retirees and beneficiaries. This sum takes account of life expectancies appropriate to the ages of the annuitants and the interest that the sum is expected to earn before it is entirely paid out in benefits.
Actuarial Cost Method:	A procedure allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability that are used to determine the actuarially determined contribution.
Actuarial Gain or Loss:	A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., assets earn more than projected, salary increases are less than assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results yield actuarial liabilities that are larger than projected.
Actuarially Equivalent:	Of equal Actuarial Present Value, determined as of a given date and based on a given set of Actuarial Assumptions.
Actuarial Present Value (APV):	The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. Each such amount or series of amounts is: Adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.) Multiplied by the probability of the occurrence of an event (such as survival, death, disability, withdrawal, etc.) on which the payment is conditioned, and Discounted according to an assumed rate (or rates) of return to reflect the time value of money.
Actuarial Present Value of Future Benefits:	The Actuarial Present Value of benefit amounts expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age, anticipated future compensation, and future service credits. The Actuarial Present Value of Future Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive members entitled to either a refund of member contributions or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.

Appendix A: Definition of Pension Terms

Actuarial Valuation:	The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan, as well as Actuarially Determined Contributions.
Actuarial Value of Assets (AVA):	The value of the Plan's assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly plans use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the Actuarially Determined Contribution.
Actuarially Determined:	Values that have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the Plan.
Actuarially Determined Contribution (ADC):	The employer's contributions, expressed as a dollar amount or a percentage of covered plan compensation, determined under the Plan's funding policy. The ADC consists of the Employer Normal Cost and the Amortization Payment.
Amortization Method:	A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the Unfunded Actuarial Accrued Liability. Under the Level Percentage of Pay method, the Amortization Payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the Unfunded Actuarial Accrued Liability. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.
Amortization Payment:	The portion of the pension plan contribution, or ADC, that is intended to pay off the Unfunded Actuarial Accrued Liability.
Assumptions or Actuarial Assumptions:	The estimates upon which the cost of the Plan is calculated, including: <u>Investment return</u> - the rate of investment yield that the Plan will earn over the long-term future; <u>Mortality rates</u> - the rate or probability of death at a given age for employees and retirees; <u>Retirement rates</u> - the rate or probability of retirement at a given age or service; <u>Disability rates</u> - the rate or probability of disability retirement at a given age; <u>Withdrawal rates</u> - the rate or probability at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement; <u>Salary increase rates</u> - the rates of salary increase due to inflation, real wage growth and merit and promotion increases.
Closed Amortization Period:	A specific number of years that is counted down by one each year, and therefore declines to zero with the passage of time. For example, if the amortization period is initially set at 20 years, it is 19 years at the end of one year, 18 years at the end of two years, etc. See Open Amortization Period.
Decrements:	Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or withdrawal.
Defined Benefit Plan:	A retirement plan in which benefits are defined by a formula based on the member's compensation, age and/or years of service.

Appendix A: Definition of Pension Terms

Defined Contribution Plan:	A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.
Employer Normal Cost:	The portion of the Normal Cost to be paid by the employer. This is equal to the Normal Cost less expected member contributions.
Experience Study:	A periodic review and analysis of the actual experience of the Plan that may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified based on recommendations from the Actuary.
Funded Ratio:	The ratio of the Actuarial Value of Assets (AVA) to the Actuarial Accrued Liability (AAL). Plans sometimes also calculate a market funded ratio, using the Market Value of Assets (MVA), rather than the AVA.
GASB 67 and GASB 68:	Governmental Accounting Standards Board (GASB) Statements No. 67 and No. 68. These are the governmental accounting standards that set the accounting rules for public retirement systems and the employers that sponsor or contribute to them. Statement No. 68 sets the accounting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 67 sets the rules for the systems themselves.
Investment Return:	The rate of earnings of the Plan from its investments, including interest, dividends and capital gain and loss adjustments, computed as a percentage of the average value of the fund. For actuarial purposes, the investment return often reflects a smoothing of the capital gains and losses to avoid significant swings in the value of assets from one year to the next.
Net Pension Liability (NPL):	The Net Pension Liability is equal to the Total Pension Liability minus the Plan Fiduciary Net Position.
Normal Cost:	The portion of the Actuarial Present Value of Future Benefits and expenses, if applicable, allocated to a valuation year by the Actuarial Cost Method. Any payment with respect to an Unfunded Actuarial Accrued Liability is not part of the Normal Cost (see Amortization Payment). For pension plan benefits that are provided in part by employee contributions, Normal Cost refers to the total of member contributions and employer Normal Cost unless otherwise specifically stated.
Open Amortization Period:	An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. If the initial period is set as 30 years, the same 30-year period is used in each future year in determining the Amortization Period.
Plan Fiduciary Net Position:	Market value of assets.
Service Costs:	The portions of the actuarial present value of projected benefit payments that are attributed to valuation years.
Total Pension Liability (TPL):	The actuarial accrued liability under the entry age normal cost method and based on the blended discount rate as described in GASB 67 and 68.

Appendix A: Definition of Pension Terms

Unfunded Actuarial Accrued Liability:	The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative, in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus or an Overfunded Actuarial Accrued Liability.
Valuation Date or Actuarial Valuation Date:	The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Benefits is determined. The expected benefits to be paid in the future are discounted to this date.