Town of Wellesley Contributory Retirement System

Actuarial Valuation and Review as of January 1, 2023

This report has been prepared at the request of the Town of Wellesley Contributory Retirement Board to assist in administering the Town of Wellesley Contributory Retirement System. This valuation report may not otherwise be copied or reproduced in any form without the consent of the 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.

Segal

Segal

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August 25, 2023

Retirement Board
Town of Wellesley Contributory Retirement System
525 Washington Street
Wellesley, MA 02482

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 two years' experience, 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 Retirement Board to assist in administering the Town of Wellesley Contributory Retirement System. The census information and financial information on which our calculations were based was prepared by the staff of the Town of Wellesley Retirement System. That assistance is gratefully acknowledged.

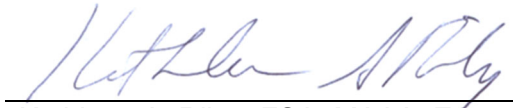
Segal does not audit the data provided. The accuracy and comprehensiveness of the data is the responsibility of those supplying the data. To the extent we can, however, Segal does review the data for reasonableness and consistency. Based on our review of the data, we have no reason to doubt the substantial 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 I 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 my analysis and recommendations. In my opinion, the assumptions are reasonable and take into account the experience of the Town of Wellesley Contributory Retirement System and reasonable expectations.

I look forward to reviewing this report at your next meeting 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 Town of Wellesley Contributory Retirement System as of January 1, 2023. The valuation was performed to determine whether the assets and contribution rates 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 January 1, 2023, provided by the staff of the Retirement System;
- The assets of the Plan 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 Town of Wellesley 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 Town of Wellesley Contributory Retirement System meets this standard and funds the unfunded liability of the plan by June 30, 2029.
2. The rate of return on the market value of assets was -11.20% for the year ending December 31, 2022 and 19.56% for the year ending December 31, 2021. The return on the actuarial value of assets was 5.32% and 8.71% for the corresponding periods. This resulted in an actuarial gain of $4,785,855 when measured against the assumed rate of return of 6.00%.
3. The actuarial value of assets is 107.8% of the market value of assets. The investment experience in the past 2 years has only been partially recognized in the market 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 deferred losses of -$20,090,953 will also have an impact on the future funded ratio. The unrecognized investment losses are not reflected in the funding schedules shown in *Section 2*.

Changes from prior valuation

4. The following actuarial assumptions were changed with this valuation:
   - The mortality projection scale was changed from MP-2016 to MP-2021.
   - The administrative expense assumption was reset to $275,000.

   As a result of these assumption changes, the actuarial accrued liability decreased by $4.56 million (1.5%) and the normal cost decreased by approximately $60,000 (1.5%).
5. The following plan changes are included for the first time in this valuation:
   - Pursuant to Chapter 269 of the Acts of 2022, the Retirement Board approved a one-time increase in the COLA percentage from 3% to 5% effective July 1, 2022.
   - The Retirement Board increased the COLA base from $18,000 to $19,000 effective July 1, 2023, to $20,000 effective July 1, 2024 and to $21,000 effective July 1, 2025.

   As a result of these plan changes, the actuarial accrued liability increased by $4.59 million (1.5%) and the normal cost increased by approximately $80,000 (2.0%).

6. The unfunded liability was expected to decrease by $7.2 million from $43.1 million as of January 1, 2021 to $35.9 million as of January 1, 2023. The actual unfunded liability as of January 1, 2023 is $29.8 million, $6.1 million lower than expected. The decrease is primarily due to the investment gains on an actuarial basis, net demographic gains, and the change in the mortality projection scale, partially offset by the plan changes.
7. In the funding scheduled included in this report, the fiscal 2024 appropriation has been set equal to the previously budgeted amount of $10,338,575. The funding schedule is projected to fully fund the System by June 30, 2029 if all assumptions are met and there are no changes in the plan of benefits or actuarial assumptions. The appropriation increases 3.0% per year with a smaller appropriation in fiscal 2029. The funding schedule included in the prior report fully funded the System by June 30, 2030 with amortization payments that increased by 3.0% per year.
8. The funded ratio (the ratio of the actuarial value of assets to actuarial accrued liability) is 90.27%. 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 83.72%, compared to 84.93% as of the prior valuation date. These measurements are not necessarily appropriate for assessing the sufficiency of the System's assets to cover the estimated cost of settling the System's benefit obligation or the need for or the amount of future contributions.

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 Plan's future financial condition, but have included a brief discussion of some risks that may affect the Plan in *Section 2*. A more detailed assessment would provide the Board with a better understanding of the inherent risks.

Summary of key valuation results

		2023	2021
Contributions for fiscal year beginning July 1	• Actuarially determined contributions for fiscal years 2024 and 2022	$10,338,575	$9,756,209
	• Actuarially determined contributions for fiscal years 2025 and 2023	10,648,732	10,034,958
	• Actuarially determined contributions for fiscal years 2025 and 2024	10,968,194	10,338,575
Actuarial accrued liability for plan year beginning January 1	• Retired participants and beneficiaries	$159,935,230	$146,599,664
	• Inactive vested participants	7,995,755	5,108,558
	• Inactive participants due a refund of employee contributions	3,039,272	2,643,079
	• Active participants	135,544,045	131,727,392
	• Total	306,514,302	286,078,693
	• Normal cost including administrative expense assumption for plan year beginning January 1	8,274,682	7,895,841
Assets for plan year beginning January 1	• Market value of assets (MVA)	$256,604,732	$242,973,730
	• Actuarial value of assets (AVA)	276,695,685	242,973,730
	• Actuarial value of assets as a percentage of market value of assets	107.83%	100.00%
Funded status for plan year beginning January 1	• Unfunded actuarial accrued liability on market value of assets	$49,909,570	$43,104,963
	• Unfunded actuarial accrued liability on actuarial value of assets	29,818,617	43,104,963
	• Funded percentage on MVA basis	83.72%	84.93%
	• Funded percentage on AVA basis	90.27%	84.93%
Key assumptions	• Net investment return	6.00%	6.00%
	• Inflation rate	2.75%	2.75%
Demographic data for plan year beginning January 1	• Number of retired participants and beneficiaries	436	426
	• Number of inactive vested participants	40	25
	• Number of inactive participants due a refund of employee contributions	392	332
	• Number of active participants	656	691
	• Average compensation[1]	$65,249	$59,246

[1] Compensation figures are for the prior year and reflect annualized salaries for participants hired during the year.

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

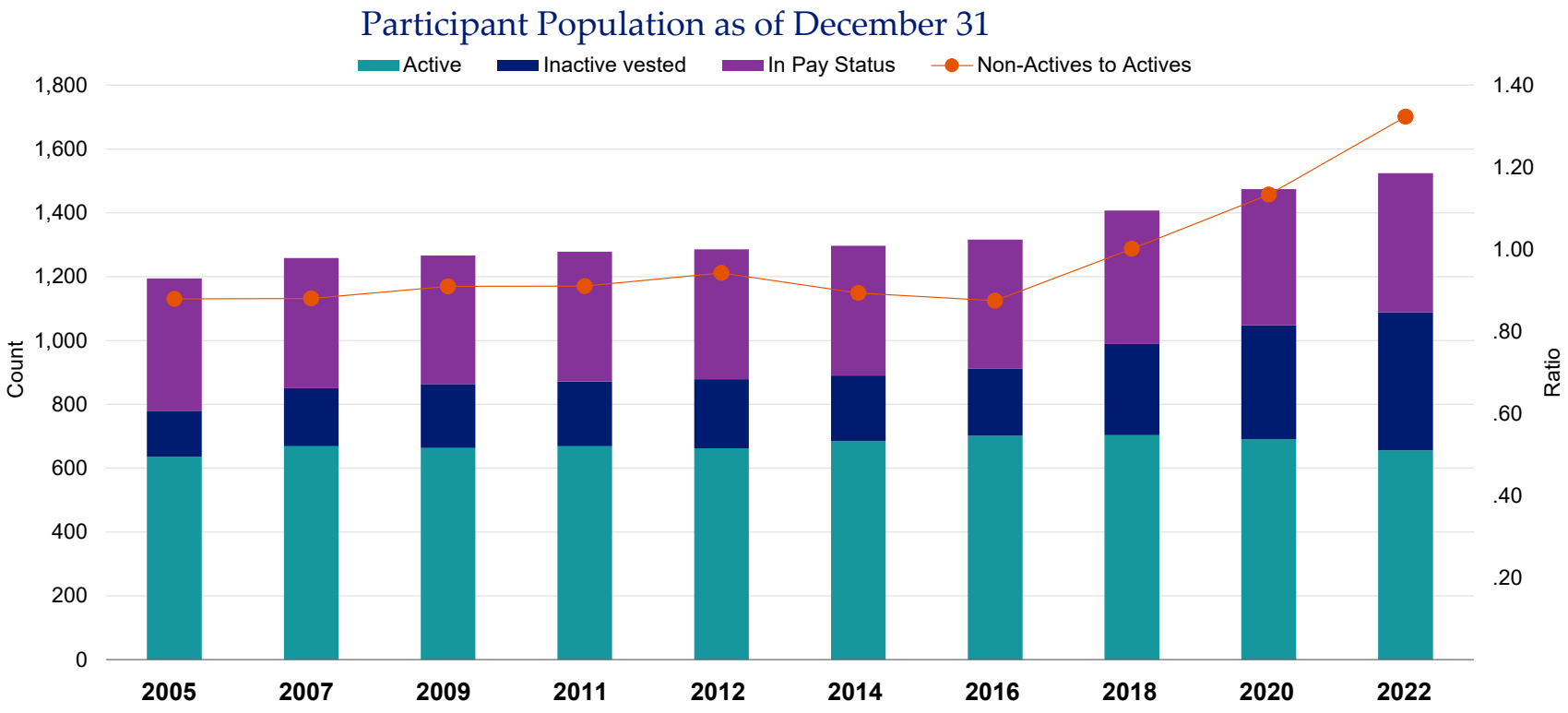
The user of Segal's actuarial valuation (or other actuarial calculations) should keep the following in mind:

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. Trustees 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



	2005	2007	2009	2011	2012	2014	2016	2018	2020	2022
In Pay Status	415	407	402	406	407	407	403	418	426	436
Inactive Vested[1]	144	182	201	203	217	205	211	286	357	432
Active	636	669	663	669	662	685	702	703	691	656
Ratio	0.88	0.88	0.91	0.91	0.94	0.89	0.87	1.00	1.13	1.32

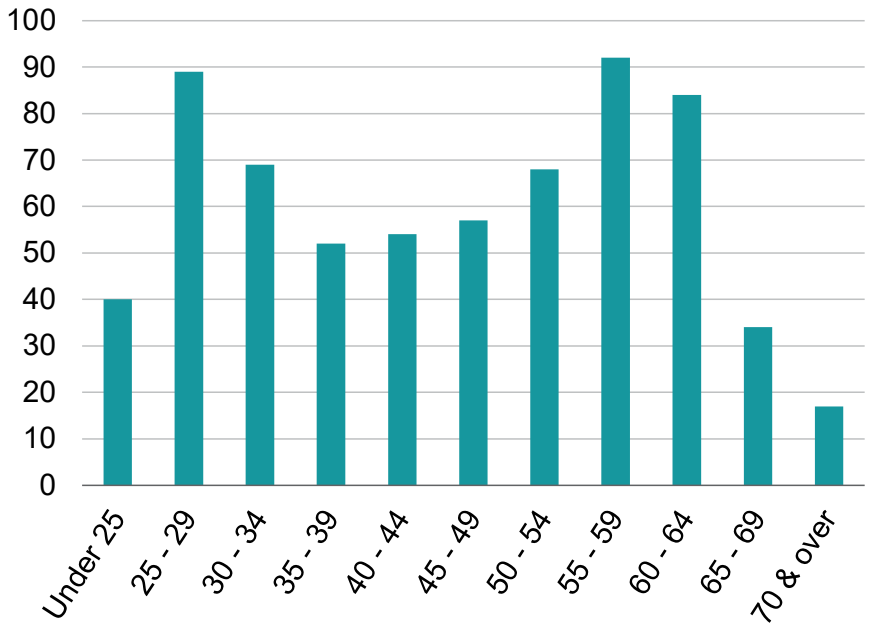
[1] Includes terminated participants due a refund of employee contributions.

Active participants

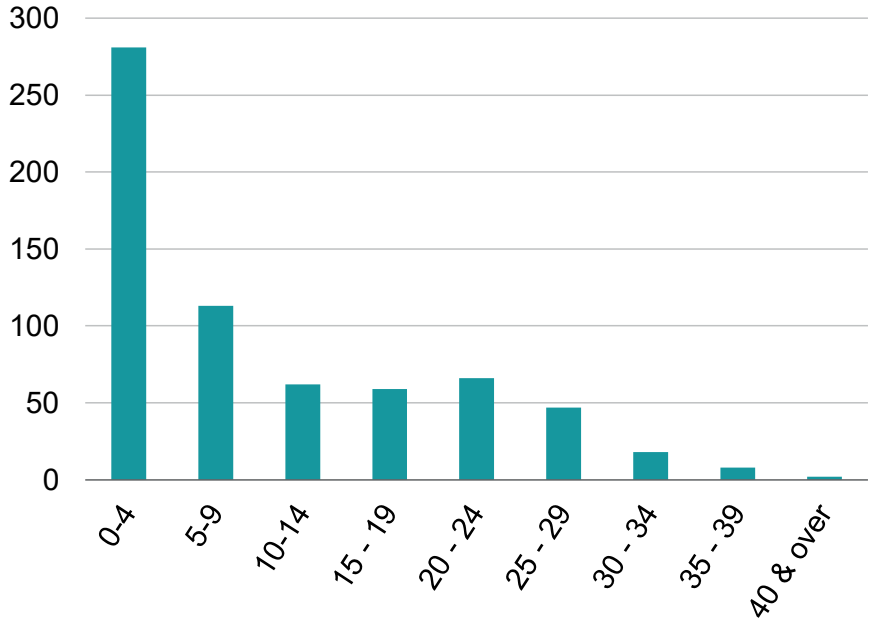
As of December 31,	2022	2020	Change
Active participants	656	691	-5.1%
Average age	46.1	46.0	0.1
Average years of service	10.5	10.5	–
Average compensation	$65,249	$59,246	10.13%

Distribution of Active Participants as of December 31, 2022

Actives by Age



Actives by Years of Service



Inactive participants

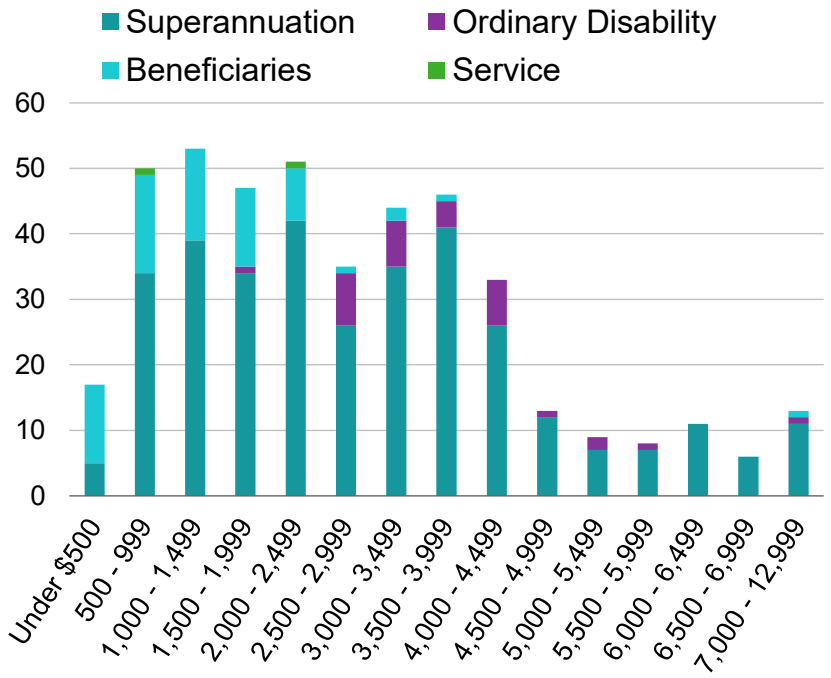
In this year's valuation, there were 40 inactive participants with a vested right to a deferred or immediate vested benefit. In addition, there were 392 inactive participants entitled to a return of their employee contributions.

Retired participants and beneficiaries

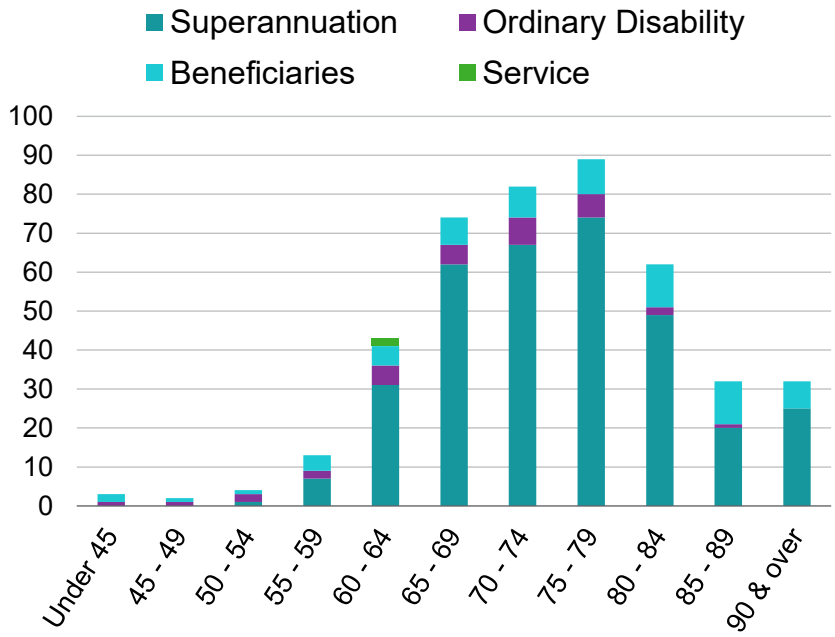
As of December 31,	2022	2020	Change
Retired participants	370	364	1.6%
Beneficiaries	66	62	6.5%
Average age	74.2	73.9	0.3
Average amount[1]	$2,815	$2,595	8.5%
Total monthly amount[1]	1,227,220	1,105,443	11.0%

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

By Type and Monthly Amount



By Type and Age

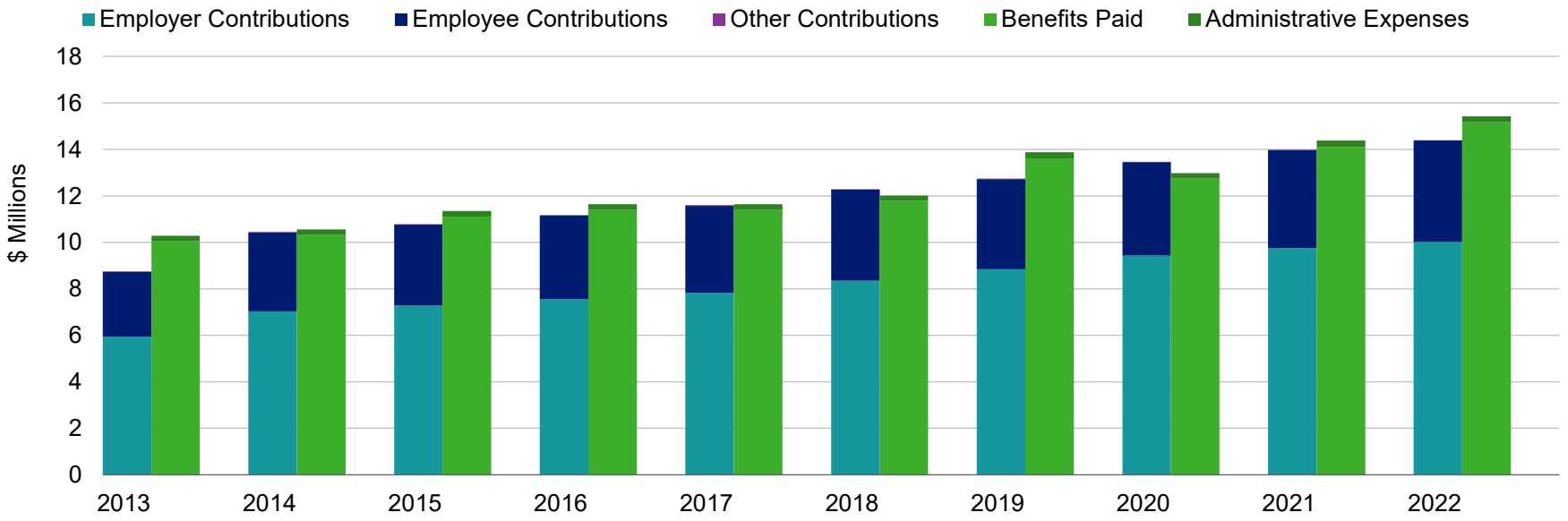


[1] Excluding COLAs reimbursed by the Commonwealth.

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



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.

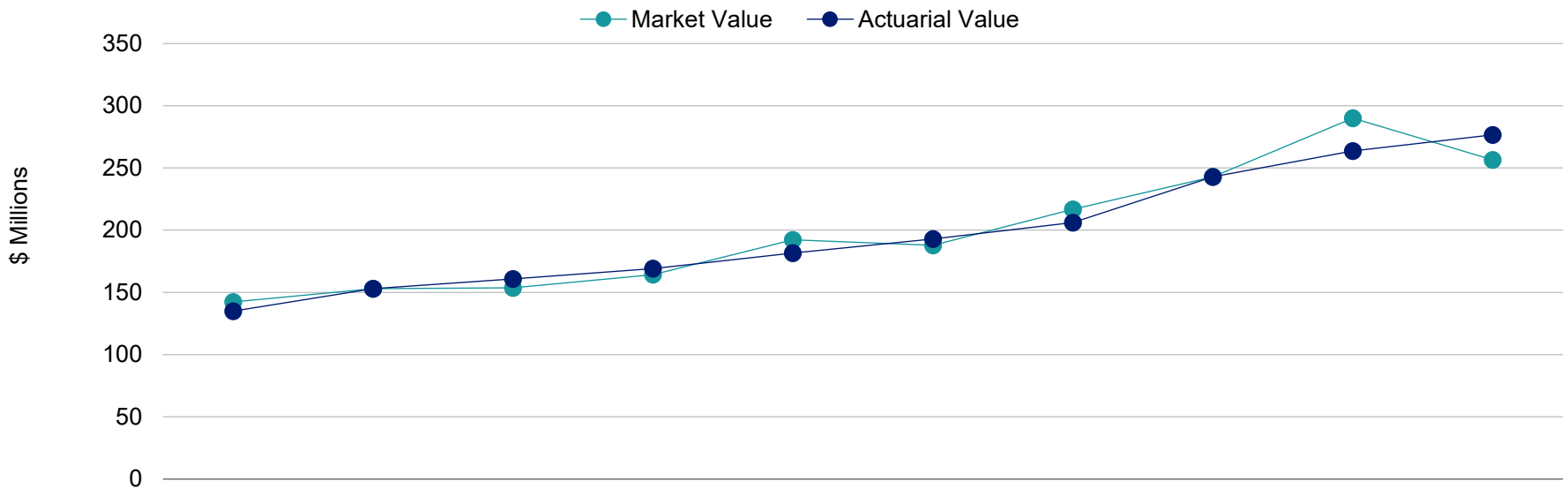
Determination of Actuarial Value of Assets for Year Ended December 31, 2022

1	Market value of assets			$256,604,732
2	Calculation of unrecognized return	**Original Amount[1]**	**Percent Deferred**	**Unrecognized Amount[2]**
	(a) Year ended December 31, 2022	-$49,799,746	80%	-$39,839,797
	(b) Year ended December 31, 2021	32,914,741	60%	19,748,844
	(c) Total unrecognized return			-$20,090,953
3	Preliminary actuarial value: **(1) - (2c)**			276,695,685
4	Adjustment to be within 20% corridor			0
5	Final actuarial value of assets: **(3) + (4)**			276,695,685
6	Actuarial value as a percentage of market value: **(5) ÷ (1)**			107.8%
7	Amount deferred for future recognition: **(1) - (5)**			-$20,090,953

[1] Total return minus expected return on a market value basis
[2] Recognition at 20% per year over five years

Asset history for years ended December 31

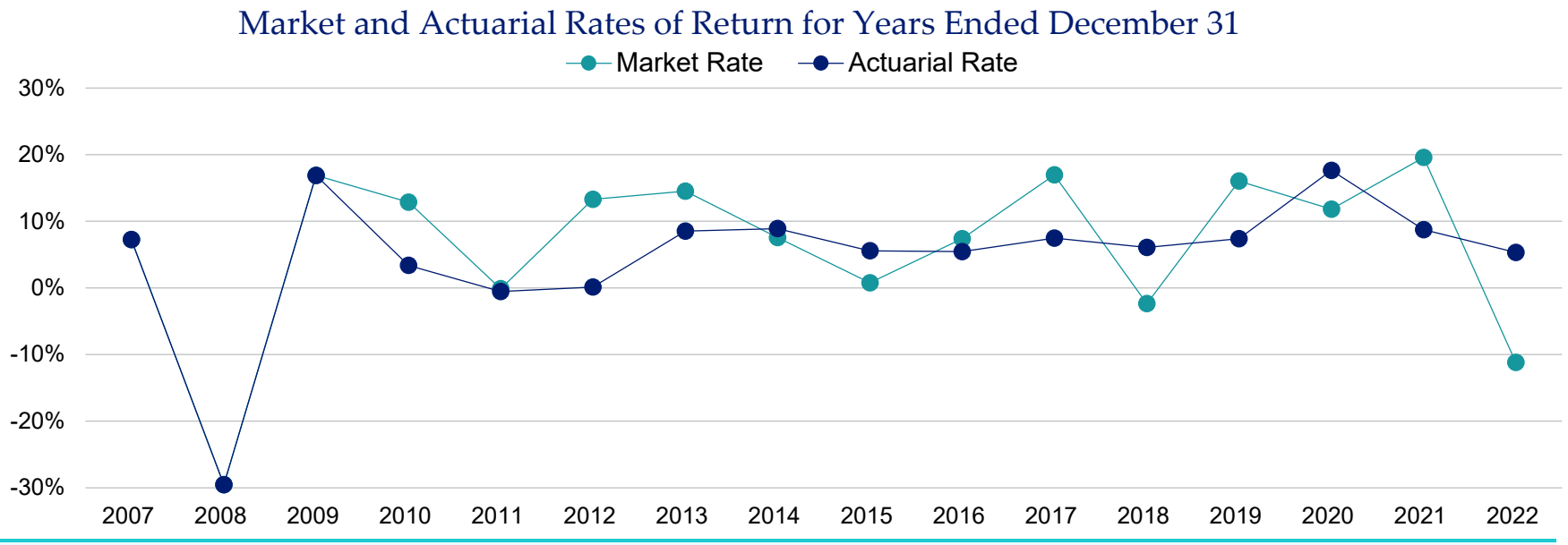
Actuarial Value of Assets vs Market Value of Assets



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Actuarial value[1]	$134.82	$152.96	$160.86	$169.09	$181.70	$193.02	$206.13	$242.97	$263.72	$276.70
Market value[1]	142.34	152.96	153.54	164.35	192.20	187.95	216.83	242.97	290.05	256.60

[1] In $ millions

Historical investment returns



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Market rate	7.26%	-29.51%	16.88%	12.88%	-0.14%	13.29%	14.53%	7.53%	0.76%	7.37%	16.96%	-2.35%	16.01%	11.82%	19.56%	-11.20%
Actuarial rate	7.26%	-29.51%	16.88%	3.36%	-0.56%	0.14%	8.51%	8.90%	5.55%	5.42%	7.48%	6.07%	7.40%	17.62%	8.71%	5.32%
Assumed rate	8.00%	8.00%	8.00%	8.00%	8.00%	7.75%	7.00%	7.00%	6.75%	6.75%	6.625%	6.625%	6.625%	6.00%	6.00%	6.00%

Average Rates of Return	Actuarial Value	Market Value
Most recent five-year average return:	8.91%	5.86%
Most recent ten-year average return:	8.50%	7.25%
Most recent 15-year average return:	6.47%	5.67%

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 Two-Year Period Ended December 31, 2022

1	Gain from investments	$4,785,855
2	Gain from administrative expenses	27,666
3	Net gain from other experience	1,274,155
4	Net experience gain: **1 + 2 + 3**	$6,087,676

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 6.00% considers past experience, the asset allocation policy of the Board and future expectations.

Investment Experience

		Year Ended December 31, 2022		Year Ended December 31, 2021	
		Market Value	**Actuarial Value**	**Market Value**	**Actuarial Value**
1	Net investment income	-$32,427,187	$13,995,559	$47,481,121	$21,149,328
2	Average value of assets	289,542,654	263,210,860	242,772,999	242,772,999
3	Rate of return: **1 ÷ 2**	-11.20%	5.32%	19.56%	8.71%
4	Assumed rate of return	6.00%	6.00%	6.00%	6.00%
5	Expected investment income: **2 x 4**	$17,372,559	$15,792,652	$14,566,380	$14,566,380
6	Investment gain/(loss): **1 - 5**	-49,799,746	-1,797,093	32,914,741	6,582,948

Non-investment experience

Administrative expenses

Administrative expenses for the years ending December 31, 2021 and 2022 were $284,740 and $262,337, respectively, compared to the assumption of $275,000 for 2021 and $282,562 for 2022. This resulted in an experience gain of $27,666 for the year, including an adjustment for interest.

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 expected 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 gain from this other experience for the two-year period ending December 31, 2022 amounted to $1,274,155, which is 0.4% of the actuarial accrued liability.

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

Loss due to mortality experience among retired members and beneficiaries	-$411,663
Loss due to salaries increasing more than expected for continuing actives	-2,180,856
Miscellaneous gain	3,866,674
Total	$1,274,155

Actuarial assumptions

The assumption changes reflected in this report are:

- The mortality projection scale was updated from MP-2016 to MP-2021.
- The administrative expense assumption was reset to $275,000.

These changes decreased the actuarial accrued liability by $4.56 million (1.5%) and decreased the normal cost by approximately $60,000 (1.5%).

Plan provisions

The following plan changes are included in this report:

- Pursuant to Chapter 269 of the Acts of 2022, the Retirement Board approved a one-time increase in the COLA percentage from 3% to 5% effective July 1, 2022.
- The Retirement Board increased the COLA base from $18,000 to $19,000 effective July 1, 2023, to $20,000 effective July 1, 2024 and to $21,000 effective July 1, 2025.

These changes increased the actuarial accrued liability by $4.59 million (1.5%) and increased the normal cost by approximately $80,000 (2.0%).

Unfunded actuarial accrued liability

Development of Unfunded Actuarial Accrued Liability

			Year ended December 31, 2022	Year ended December 31, 2021
1	Unfunded actuarial accrued liability at beginning of year		$39,687,662	$43,104,963
2	Normal cost at beginning of year		8,112,977	7,895,841
3	Total contributions		-14,407,529	-13,992,446
4	Interest on **1, 2 & 3**		2,475,999	2,679,304
5	Expected unfunded actuarial accrued liability		$35,869,109	$39,687,662
6	Changes due to:			
	(a)	Net experience (gain)/loss	-$6,087,676	
	(b)	Assumptions	-4,555,975	
	(c)	Plan provisions	4,593,159	
	Total changes		-$6,050,492	
7	Unfunded actuarial accrued liability at end of year		$29,818,617	$39,687,662

Actuarially determined contribution

The Actuarially Determined Contribution is equal to the employer normal cost payment and a payment on the unfunded actuarial accrued liability. For fiscal 2024, the Actuarially Determined Contribution has been set equal to the previously budgeted amount of $10,338,575.

The funding schedule included in this report is projected to fully fund the System by June 30, 2029 if all assumptions are met and there are no changes in the plan of benefits or actuarial assumptions. The appropriation increases 3.0% per year with a smaller appropriation in fiscal 2029.The funding schedule included in the prior report fully funded the System by June 30, 2030 with amortization payments that increased by 3.0% per year.

Actuarially Determined Contribution for year beginning July 1,

		2023		2021	
		Amount	% of Projected Payroll	Amount	% of Projected Payroll
1	Total normal cost	$7,999,682	18.00%	$7,620,841	17.93%
2	Administrative expense assumption	275,000	0.62%	275,000	0.65%
3	Expected employee contributions	-4,436,385	9.98%	-4,175,748	-9.83%
4	Employer normal cost: **(1) + (2) + (3)**	$3,838,297	8.63%	$3,720,093	8.75%
5	Actuarial accrued liability	$306,514,302		$286,078,693	
6	Actuarial value of assets	276,695,685		242,973,730	
7	Unfunded actuarial accrued liability: **(5) - (6)**	$29,818,617		$43,104,963	
8	Employer normal cost projected to the following July 1, adjusted for timing	$3,947,808	8.76%	$3,830,120	8.89 %
9	Projected unfunded actuarial accrued liability	30,700,145		44,379,276	
10	Payment on unfunded actuarial accrued liability, adjusted for timing	6,390,767	14.18%	5,926,089	13.76%
11	Actuarially determined contribution: **(8) + (10)**	$10,338,575	22.94%	$9,756,209	22.65%
12	Projected payroll	$45,060,296		$43,073,214	

Notes:
Actuarially Determined Contributions are set equal to the budgeted amounts determined with the prior valuation.
Actuarially Determined Contributions are assumed to be paid on October 1.

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) Unfunded Actuarial Accrued Liability at Beginning of Fiscal Year	(6) Percent Increase in ADC Over Prior Year
2024	$3,947,808	$6,390,767	$10,338,575	$30,700,145	- -
2025	4,069,054	6,579,678	10,648,732	25,865,907	3.00%
2026	4,194,002	6,774,192	10,968,194	20,544,265	3.00%
2027	4,322,764	6,974,476	11,297,240	14,700,121	3.00%
2028	4,455,459	7,180,698	11,636,157	8,296,098	3.00%
2029	4,592,205	1,311,363	5,903,568	1,292,399	-49.27%
2030	4,733,123	0	4,733,123	0	-19.83%

Notes:
Actuarially Determined Contribution for fiscal year 2024 is set equal to the budgeted amount.
Actuarially Determined Contributions are assumed to be paid October 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 for 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 System 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 and COLAs
  - 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 16 years has ranged from a low of -29.51% to a high of 19.56%.
- 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 System 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 Chapter 32 requires payment of the actuarially determined contribution. If future experience matches current assumptions, we project the unfunded actuarial accrued liability will be paid off in 6 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.
  - More or less active participant turnover than assumed.
  - Disability experience greater or less than expected.
  - Salary increases greater or less than projected.
- 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 Town.

Section 2: Actuarial Valuation Results

- 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 investment gain(loss) for a year has ranged from a loss of -$49.8 million to a gain of $32.9 million.
  – The non-investment gain(loss) for a year has ranged from a loss of $2.5 million to a gain of $5.1 million.
  – The funded percentage on the actuarial value of assets has ranged from a low of 67.5% as of January 1, 2013 to a high of 90.2% as of January 1, 2023.

- Maturity Measures

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

  For the prior year, benefits and administrative expenses paid were $1.0 million more than contributions received. The System is dependent on investment income to pay a portion of benefits.

Section 3: Supplemental Information

Exhibit A: Table of plan demographics

Category	Year Ended December 31 2022	2020	Change From Prior Year
Active participants in valuation:			
Number	656	691	-5.1%
Average age	46.1	46.0	0.1
Average years of service	10.5	10.5	0.0
Average compensation	$65,249	$59,246	10.1%
Account balances	38,521,143	37,441,001	2.9%
Total active vested participants	290	302	-4.0%
Inactive participants			
Inactive vested participants	40	25	60.0%
Inactive nonvested participants due a refund	392	332	18.1%
Retired participants:			
Number in pay status	336	330	1.8%
Average age	74.8	74.8	0.0
Average monthly benefit	$3,009	$2,750	9.4%
Disabled participants:			
Number in pay status	34	34	0.0%
Average age	67.5	65.5	2.0
Average monthly benefit	$3,638	$3,521	3.3%
Beneficiaries:			
Number in pay status	66	62	6.5%
Average age	74.8	73.3	1.5
Average monthly benefit	$1,402	$1,260	11.3%

Note:
Compensation figures are for prior year and reflect annualized salaries for participants hired during the year.

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	40	40	- -	- -	- -	- -	- -	- -	- -	- -
	$39,133	$39,133	- -	- -	- -	- -	- -	- -	- -	- -
25 - 29	89	82	6	1	- -	- -	- -	- -	- -	- -
	$50,101	$47,878	$78,809	$60,151	- -	- -	- -	- -	- -	- -
30 - 34	69	43	22	4	- -	- -	- -	- -	- -	- -
	$60,002	$50,664	$75,979	$72,508	- -	- -	- -	- -	- -	- -
35 - 39	52	24	16	7	5	- -	- -	- -	- -	- -
	$66,335	$61,449	$61,718	$85,705	$77,441	- -	- -	- -	- -	- -
40 - 44	54	13	11	10	14	6	- -	- -	- -	- -
	$75,958	$46,154	$70,378	$70,891	$103,935	$93,927	- -	- -	- -	- -
45 - 49	57	15	9	7	6	17	3	- -	- -	- -
	$81,357	$48,653	$75,314	$68,962	$77,996	$112,050	$124,720	- -	- -	- -
50 - 54	68	15	11	7	9	15	8	3	- -	- -
	$72,331	$47,208	$62,522	$68,887	$74,118	$89,436	$100,072	$77,091	- -	- -
55 - 59	92	27	15	9	8	11	13	6	3	- -
	$64,610	$50,478	$59,868	$62,691	$70,224	$72,872	$82,532	$76,225	$75,124	- -
60 - 64	84	12	12	11	11	12	15	7	4	- -
	$77,951	$71,946	$62,088	$69,683	$66,996	$78,881	$88,692	$105,218	$105,639	- -
65 - 69	34	7	8	4	4	3	6	- -	1	1
	$61,382	$59,791	$45,099	$73,444	$59,645	$64,055	$69,372	- -	$75,514	$91,381
70 & over	17	3	3	2	2	2	2	2	- -	1
	$56,050	$35,008	$67,973	$52,486	$64,046	$54,706	$59,199	$50,480	- -	$82,067
Total	656	281	113	62	59	66	47	18	8	2
	$65,249	$49,581	$66,190	$70,217	$78,691	$88,783	$87,503	$84,784	$90,430	$86,724

Note:
Compensation is annualized for those hired during the prior plan year

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		$290,053,388		$242,973,730
Contribution and other income:				
Employer contributions	$10,034,958		$9,756,209	
Employee contributions	4,353,513		4,209,989	
Federal grant reimbursement	19,058		26,248	
Total contribution income		*$14,407,529*		*$13,992,446*
Investment income:				
Investment income	-$31,107,026		$48,784,005	
Less investment fees	-1,320,161		-1,302,884	
Net investment income		*-$32,427,187*		*$47,481,121*
Total income available for benefits		**-$18,019,658**		**$61,473,567**
Less benefit payments and administrative expenses:				
Administrative expenses	-$262,337		-$284,740	
Pensions, annuities, refunds, and net transfers	-15,027,264		-14,165,226	
Net 3(8)(c) reimbursements	-139,397		56,057	
Net benefit payments and administrative expenses		*-$15,428,998*		*-$14,393,909*
Change in reserve for future benefits		**-$33,448,656**		**$47,079,658**
Net assets at market value at the end of the year		**$256,604,732**		**$290,053,388**

Exhibit D: Group results as of January 1, 2023

		Groups 1 and 2		Group 4		Total	
1.	Participant counts						
a.	Active employees	552		104		656	
b.	Inactive members entitled to a return of their employee contributions	389		3		392	
c.	Inactive members with a vested right to a deferred or immediate benefit	34		6		40	
d.	Retired members	314		122		436	
e.	Total members: **(a) + (b) + (c) + (d)**	1,289		235		1,524	
2.	Projected payroll for calendar year 2023	$33,787,005		$10,666,205		$44,453,210	
3.	Normal cost		**Percent of Pay**		**Percent of Pay**		**Percent of Pay**
a.	Total normal cost	$5,352,894	15.84%	$2,646,788	24.81%	$7,999,682	18.00%
b.	Expense allowance	184,013	0.54%	90,987	0.85%	275,000	0.62%
c.	Employee contributions	-3,353,065	-9.92%	-1,083,320	-10.16%	-4,436,385	-9.98%
d.	Employer normal cost: **(a) + (b) + (c)**	$2,183,842	6.46%	$1,654,455	15.51%	$3,838,297	8.63%
4.	Total actuarial accrued liability	191,451,617		115,062,685		306,514,302	
5.	Actuarial value of assets	172,826,638		103,869,047		276,695,685	
6.	Unfunded actuarial accrued liability: **(4) - (5)**	$18,624,979		$11,193,638		$29,818,617	

Exhibit E: Department results as of January 1, 2023

		Housing	Water	Sewer	Light	School	Veteran	All Other	Total
1.	Participant counts								
	a. Active employees	7	21	5	28	254	1	340	656
	b. Inactive members entitled to a return of their employee contributions	4	0	0	2	334	0	52	392
	c. Inactive members with a vested right to a deferred or immediate benefit	0	1	0	0	15	0	24	40
	d. Retired members[1]	6	16	2	36	122	1	253	436
	e. Total members: **(a) + (b) + (c) + (d)**	17	38	7	66	725	2	669	1,524
2.	Projected payroll for calendar year 2023	$449,777	$1,495,957	$392,774	$2,928,175	$12,165,745	$71,060	$26,949,722	$44,453,210
3.	Normal cost								
	a. Total normal cost	$54,523	$219,048	$57,714	$700,122	$1,840,754	$9,400	$5,118,121	$7,999,682
	b. Expense allowance	1,874	7,530	1,984	24,068	63,278	323	175,943	275,000
	c. Employee contributions	-45,275	-147,836	-36,296	-299,817	-1,185,217	-7,217	-2,714,727	-4,436,385
	d. Employer normal cost: **(a) + (b) + (c)**	$11,122	$78,742	$23,402	$424,373	$718,815	$2,506	$2,579,337	$3,838,297
4.	Total actuarial accrued liability	$2,560,117	$11,935,614	$3,568,290	$29,965,813	$54,195,029	$285,534	$204,003,905	$306,514,302
5.	Actuarial value of assets	2,311,061	10,774,482	3,221,156	27,050,650	48,922,776	257,756	184,157,804	276,695,685
6.	Unfunded actuarial accrued liability: **(4) - (5)**	$249,056	$1,161,132	$347,134	$2,915,163	$5,272,253	$27,778	$19,846,101	$29,818,617
7.	Projected Employer Normal Cost, adjusted for timing	11,439	80,988	24,070	436,481	739,324	2,577	2,652,929	3,947,808
8.	Projected unfunded actuarial accrued liability	256,419	1,195,459	357,396	3,001,344	5,428,117	28,599	20,432,811	30,700,145
9.	Payment on projected unfunded actuarial accrued liability, adjusted for timing	61,580	219,292	65,702	580,247	1,170,318	9,834	4,283,794	6,390,767
10.	Budgeted contribution for fiscal 2024: **(7) + (9)**	$73,019	$300,280	$89,772	$1,016,728	$1,909,642	$12,411	$6,936,723	$10,338,575
11.	Recommended contribution for fiscal 2025	66,796	339,775	101,421	1,092,844	1,925,930	8,792	7,113,174	10,648,732
12.	Recommended contribution for fiscal 2026	68,835	350,005	104,462	1,125,367	1,984,296	9,063	7,326,166	10,968,194

Exhibit F: 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.

Section 3: Supplemental Information

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 periodic required 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: Investment return - the rate of investment yield that the Plan will earn over the long-term future; Mortality rates - the rate or probability of death at a given age for employees and retirees; Retirement rates - the rate or probability of retirement at a given age or service; Disability rates - the rate or probability of disability retirement at a given age; Withdrawal rates - the rate or probability at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement; Salary increase rates - 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.

Section 3: Supplemental Information

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.
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 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 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.
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.

Section 3: Supplemental Information

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.

Section 4: Actuarial Valuation Basis

Exhibit I: Actuarial assumptions, actuarial cost method and models

Net Investment Return: 6.0%

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 Plan'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 scale assumption is a long-term estimate derived from historical data, current and recent market expectations, and professional judgment.

Interest on Employee Contributions: 3.50%

Cost of Living Adjustment (COLA): 2.75% increase on the first $18,000 of retirement allowance, increasing to $19,000 on July 1, 2023, $20,000 on July 1, 2024, and $21,000 on July 1, 2025.

Section 4: Actuarial Valuation Basis

Administrative Expenses:

$275,000 for calendar 2023 increasing 2.75% per year (previously, $275,000 for calendar 2021 increasing 2.75% per year)

The administrative expense assumption is based on information on expected expenses provided by the Retirement System.

Mortality Rates:

Pre-Retirement: RP-2014 Blue Collar Employee Mortality Table set forward one year for females projected generationally with Scale MP-2021 (previously, MP-2016)

Healthy Retiree: RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year for females projected generationally with Scale MP-2021 (previously, MP-2016)

Disabled Retiree: RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year and projected generationally with Scale MP-2021 (previously, MP-2016)

The mortality tables 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 to reflect future mortality improvement.

Termination Rates before Retirement:

Groups 1 and 2 – Rate per year (%)

	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	0.05
40	0.08	0.05	0.10
45	0.13	0.08	0.15
50	0.22	0.14	0.19
55	0.36	0.20	0.24
60	0.61	0.30	0.28

Notes:
Mortality rates do not reflect generational projection.
55% of the disability rates shown represent accidental disability.
40% of the accidental disabilities will die from the same cause as the disability.
55% of the death rates shown represent accidental death.

Section 4: Actuarial Valuation Basis

	Group 4 – Rate per year (%)		
	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	0.05	0.30
45	0.13	0.08	1.00
50	0.22	0.14	1.25
55	0.36	0.20	1.20
60	0.61	0.30	0.85

Notes:
Mortality rates do not reflect generational projection.
90% of the disability rates shown represent accidental disability.
40% of the accidental disabilities will die from the same cause as the disability.
90% of the death rates shown represent accidental death.

The 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.

Section 4: Actuarial Valuation Basis

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 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 the projected number based on the prior years' assumptions over the five most recent valuations.

Section 4: Actuarial Valuation Basis

Retirement Rates:

	Rate per year (%)		
	Groups 1 and 2		
Age	Male	Female	Group 4
50 – 54	- -	- -	2.0
55	1.00	2.750	10.0
56 – 57	1.25	3.250	5.0
58	2.50	3.250	5.0
59	3.25	3.250	15.0
60	9.00[1]	3.750[1]	20.0
61	15.00	9.750	20.0
62	22.50	11.250	25.0
63	18.75	9.375	25.0
64	16.50	13.500	30.0
65	40.00	15.000	100.0
66 – 67	25.00	20.000	100.0
68	30.00	25.000	100.0
69	30.00	20.000	100.0
70	100.00	100.000	100.0

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 years' assumptions over the five most recent valuations.

Retirement Age for Inactive Vested Participants:

Age 60 for Groups 1 and 2 and age 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. If not specified, participants are assumed to be male.

[1] Because members of Group 1 and 2 hired on or after April 2, 2012 cannot retire before age 60, the rates at age 60 are increased 50% (to 13.50% for males and 5.625% for females; previously 9.00% and 3.75%, respectively)

Section 4: Actuarial Valuation Basis

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 male spouses.
Benefit Election:	All participants are assumed to elect Option A. The benefit election reflects the fact that all benefit options are actuarially equivalent.
2022 Salary:	2022 salary equal to salaries provided in the data except for employees hired in 2022 for whom salaries were annualized.
Total Service:	Total creditable service reported in the data.
Net 3(8)(c) Liability:	No liability is valued for benefits paid to or received from other municipal systems.
Actuarial Value of Assets:	Market value of assets as reported in the System's Annual Statement less unrecognized return in each of the last five years with a fresh start as of January 1, 2021. Unrecognized return is equal to the difference between the actual market value return and the expected market value return and is recognized over a five-year period, further adjusted, if necessary, to be within 20% of the market value.
Actuarial Cost Method:	Entry Age Normal Actuarial Cost Method. Entry Age is the age at date of hire. 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.
Actuarial 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. 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 with this valuation: • The mortality improvement scale was updated from MP-2016 to MP-2021. • The administrative expense assumption was reset to $275,000 for calendar 2023, increasing 2.75% per year.

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.

Section 4: Actuarial Valuation Basis

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 $6,000 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 Retirement 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 $19,000 of a retirement allowance increasing to $20,000 on July 1, 2024 and $21,000 on 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:	Pursuant to Chapter 269 of the Acts of 2022, the Retirement Board approved a one-time increase in the COLA percentage from 3% to 5% effective July 1, 2022. In addition, the Retirement Board increased the COLA base from $18,000 to $19,000 effective July 1, 2023, to $20,000 effective July 1, 2024 and to $21,000 effective July 1, 2025.