Belmont Contributory Retirement System

Governmental Accounting Standards Board (GASB) Statements No. 67 and 68 Accounting Valuation Report

As of December 31, 2021

This report has been prepared at the request of the Belmont Contributory Retirement Board to assist the Board and the member units in preparing their financial reports for their liabilities associated with the Belmont Contributory Retirement System. This valuation report may not otherwise be copied or reproduced in any form without the consent of the Belmont Contributory Retirement Board and may only be provided to other parties in its entirety. The measurements shown in this actuarial valuation may not be applicable for other purposes.

Segal

116 Huntington Avenue
Suite 901
Boston, MA 02116-5744
segalco.com
T 617.424.7300

November 30, 2022

Retirement Board
Belmont Contributory Retirement System
455 Concord Avenue
Belmont, MA 02478-0900

Dear Board Members:

We are pleased to submit this Governmental Accounting Standards Board (GASB) Statements No. 67 and 68 Accounting Valuation as of December 31, 2021 for the Belmont Contributory Retirement System, a cost-sharing multiple employer defined benefit pension plan. It contains the actuarial information that will need to be disclosed in order to comply with GASB 67 and 68.

This report was prepared in accordance with generally accepted actuarial principles and practices at the request of the Board to assist the Board and the member units in preparing their financial reports for their liabilities associated with the Belmont Contributory Retirement System. The census and financial information on which our calculations were based were provided by the staff of the Belmont Contributory Retirement System. That assistance is gratefully acknowledged.

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 completed under the supervision of Bridget P. Orr, ASA, FCA, MAAA, Enrolled Actuary. She is a member of the American Academy of Actuaries and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the best of her knowledge, the information supplied in the actuarial valuation is complete and accurate. The assumptions used in this actuarial valuation were selected by the Board based upon her analysis and recommendations. In her opinion, the assumptions are reasonable and take into account the experience of the Belmont 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

Bridget P. Orr, ASA, FCA, MAAA, EA
Consulting Actuary

Table of Contents

Section 1: Actuarial Valuation Summary

Purpose

This report has been prepared by Segal to present certain disclosure information required by Governmental Accounting Standards Board (GASB) Statements No. 67 and 68 as of December 31, 2021. This report is based on financial information as of December 31, 2021 and the following:

- 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, 2021, 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.

Significant issues

The following key findings were the result of this actuarial valuation:

1. The Net Pension Liability (NPL) is equal to the difference between the Total Pension Liability (TPL) and the Plan's Fiduciary Net Position. The Plan Fiduciary Net Position is equal to the market value of assets and therefore, the NPL measure is very similar to an Unfunded Actuarial Accrued Liability (UAAL) on a market value basis. The NPL decreased from $69.6 million as of December 31, 2020 to $48.0 million as of December 31, 2021 and the Plan's Fiduciary Net Position as a percent of the TPL increased from 66.47% to 77.11%.
2. The NPL measured as of December 31, 2021 and December 31, 2020 was determined based upon the results of the actuarial valuations as of January 1, 2022 and January 1, 2020, respectively.
3. The discount rates used to measure the TPL and NPL as of December 31, 2021 and December 31, 2020 were 7.00% and 7.15%, respectively.

Important information about actuarial valuations

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

Plan of benefits:	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. It is important to keep Segal informed with respect to plan provisions and administrative procedures, and to review the plan description in this report (as well as the plan summary included in our funding valuation report) to confirm that Segal has correctly interpreted the plan of benefits.
Participant data:	An actuarial valuation for a plan is based on data provided to the actuary by the Retirement 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.
Assets:	The valuation is based on the market value of assets as of the valuation date, as provided by the Retirement System. The Retirement System uses 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 projects the benefits to be paid to existing plan participants for the rest of their lives and the lives of their beneficiaries. This projection requires actuarial assumptions as to the probability of death, disability, withdrawal, and retirement of each participant for each year. In addition, the benefits projected to be paid for each of those events in each future year reflect actuarial assumptions as to salary increases and cost-of-living adjustments. The projected benefits are then discounted to a present value, based on the assumed rate of return that is expected to be achieved on the plan’s assets. There is a reasonable range for each assumption used in the projection and the results may vary materially based on which assumptions are selected. It is important for any user of an actuarial valuation to understand this concept. Actuarial assumptions are periodically reviewed to ensure that future valuations reflect emerging plan experience. While future changes in actuarial assumptions may have a significant impact on the reported results, that does not mean that the previous assumptions were unreasonable.
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.

Section 1: Actuarial Valuation Summary

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

The valuation is prepared at the request of the Retirement Board to assist the Board and the member units in preparing items related to the pension plan in their financial reports. Segal is not responsible for the use or misuse of its report, particularly by any other party.
An actuarial valuation is a measurement of the plan's assets and liabilities at a specific date. Accordingly, except where otherwise noted, Segal did not perform an analysis of the potential range of future financial measures. 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.
Sections of this report may include actuarial results that are not rounded, but that does not imply precision.
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's provisions, but they may be subject to alternative interpretations. The Board should look to their other advisors for expertise in these areas.

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

Section 2: GASB Information

General information about the pension plan

Plan membership. On December 31, 2021, pension plan membership consisted of the following:

Retired members or beneficiaries currently receiving benefits	357
Inactive participants with a vested right to a deferred or immediate benefit	16
Inactive participants entitled to a refund of employee contributions	311
Active members	460
Total	1,144

Exhibit 1 – Net pension liability

	December 31, 2021	December 31, 2020
Components of the Net Pension Liability		
Total Pension Liability	$209,885,380	$207,612,163
Plan Fiduciary Net Position	161,844,218	137,990,529
Net Pension Liability	48,041,162	69,621,634
Plan Fiduciary Net Position as a percentage of the Total Pension Liability*	77.11%	66.47%

* These funded percentages are not necessarily appropriate for assessing the sufficiency of Plan assets to cover the estimated cost of settling the Plan's benefit obligation or the need for or the amount of future contributions.

Actuarial assumptions. The total pension liability as of December 31, 2021 was measured by an actuarial valuation as of January 1, 2022, using the following actuarial assumptions, applied to all periods included in the measurement:

Salary Increases:	Varies by length of service with ultimate rates of 3.75% for Groups 1 and 2 and 4.25% for Group 4
Wage Inflation:	3.00%
Net Investment Return:	7.00%
Cost of Living Adjustment:	3% of first $13,000
Mortality Rates:	Pre-Retirement: RP-2014 Blue Collar Employee Mortality Table set forward one year for female participants and projected generationally with Scale MP-2021 Healthy Retiree: RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year for female participants and 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

Determination of discount rate and investment rates of return

The long-term expected rate of return on pension plan investments was determined using a building-block method in which expected future real rates of return (expected returns, net of inflation) are developed for each major asset class. These returns are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage, adding expected inflation and subtracting expected investment expenses and a risk margin. The target allocation (approved by the Board) and projected arithmetic real rates of return for each major asset class, after deducting inflation, but before investment expenses, used in the derivation of the long-term expected investment rate of return assumption are summarized in the following table:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return
Domestic equity	23.00%	6.11%
International developed markets equity	13.00%	6.49%
International emerging markets equity	7.00%	8.12%
Core fixed income	8.00%	0.38%
High-yield fixed income	8.00%	2.48%
Emerging markets debt	5.00%	2.67%
Real estate	12.00%	3.72%
Commodities	10.00%	3.44%
Hedge fund, GTAA, Risk parity	7.00%	2.63%
Private equity	7.00%	9.93%
Total	100.00%	

Note: Some asset classes included in the pension plan’s target asset allocation have been combined.

Discount rate. The discount rate used to measure the Total Pension Liability (TPL) was 7.00% as of December 31, 2021 and 7.15% as of December 31, 2020. The projection of cash flows used to determine the discount rate assumed plan member contributions will be made at the current contribution rate and that employer contributions will be made at rates equal to the actuarially determined contribution rates. For this purpose, only employer contributions that are intended to fund benefits for current plan members and their beneficiaries are included. Projected employer contributions that are intended to fund the service costs for future plan members and their beneficiaries, as well as projected contributions from future plan members, are not included. Based on those assumptions, the Plan Fiduciary Net Position (FNP) was projected to be available to make all projected future benefit payments for current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the TPL as of both December 31, 2021 and December 31, 2020.

Discount rate sensitivity

Sensitivity of the Net Pension Liability to changes in the discount rate. The following presents the Net Pension Liability (NPL) of the Belmont Contributory Retirement System as of December 31, 2021, calculated using the discount rate of 7.00%, as well as what the Belmont Contributory Retirement System's NPL would be if it were calculated using a discount rate that is 1-percentage-point lower (6.00%) or 1-percentage-point higher (8.00%) than the current rate.

Net Pension Liability	1% Decrease (6.00%)	Current Discount Rate (7.00%)	1% Increase (8.00%)
Belmont Contributory Retirement System's net pension liability as of December 31, 2021	$70,870,013	$48,041,162	$28,802,284

Exhibit 2 – Schedule of Changes in Net Pension Liability – Last Two Fiscal Years

	December 31, 2021	December 31, 2020
Total Pension Liability		
Service cost	$5,070,223	$4,915,533
Interest	14,753,149	14,267,460
Change of benefit terms	0	0
Differences between expected and actual experience	-6,325,237	0
Changes of assumptions	1,464,364	0
Benefit payments, including refunds of member contributions	-12,689,282	-12,400,376
Net change in Total Pension Liability	$2,273,217	$6,782,617
Total Pension Liability – beginning	207,612,163	200,829,546
Total Pension Liability – ending	$209,885,380	$207,612,163
Plan Fiduciary Net Position		
Contributions – employer	$11,263,933	$10,784,043
Contributions – employee	2,881,865	2,907,915
Net investment income	22,732,996	12,965,031
Benefit payments, including refunds of member contributions	-12,689,282	-12,400,376
Administrative expense	-335,823	-349,365
Net change in Plan Fiduciary Net Position	$23,853,689	$13,907,248
Plan Fiduciary Net Position – beginning	137,990,529	124,083,281
Plan Fiduciary Net Position – ending	$161,844,218	$137,990,529
Net Pension Liability – ending	48,041,162	69,621,634
Plan Fiduciary Net Position as a percentage of the Total Pension Liability	77.11%	66.47%
Covered payroll[1]	$28,593,922	$30,859,703
Plan Net Pension Liability as percentage of covered payroll	168.01%	225.61%

[1] Covered employee payroll for 2021 and 2020 as estimated in the January 1, 2022 and January 1, 2020 funding valuations, respectively.

Notes to schedule:

Changes in Actuarial Assumptions:	Effective January 1, 2021: • None Effective January 1, 2022: • The investment return assumption was lowered from 7.15% to 7.00% • The mortality projection scale was updated from scale MP-2017 to MP-2021
Changes in Plan Provisions:	None

Exhibit 3 – Schedule of contributions – Last Eight Fiscal Years

Year Ended December 31	Actuarially Determined Contributions	Contributions in Relation to the Actuarially Determined Contributions	Contribution Deficiency / (Excess)	Covered Employee Payroll	Contributions as a Percentage of Covered Employee Payroll
2014	$7,364,523	$7,364,523	$0	$25,142,886	29.29%
2015	7,877,960	7,877,960	0	25,031,508	31.47%
2016	8,427,189	8,432,117	-4,928	26,016,467	32.41%
2017	9,014,711	9,014,711	0	26,395,332	34.15%
2018	9,643,193	9,643,193	0	27,455,996	35.12%
2019	10,197,676	10,197,676	0	29,659,289	34.38%
2020	10,784,043	10,784,043	0	30,859,703	34.95%
2021	11,263,933	11,263,933	0	28,593,922	39.39%

Notes to Schedule:

Valuation date:	Actuarial determined contribution for year ended December 31, 2021 is determined with the January 1, 2020 actuarial valuation.
Actuarial cost method:	Entry Age Normal Cost Method
Amortization method:	Payments increasing 4.50% for the 2003 ERI liability and remaining liability amortized so that the total payment increases 4.45% per year.
Remaining amortization period:	As of July 1, 2020, 5 years for the 2003 ERI liability and 11 years for the remaining unfunded liability.
Asset valuation method:	The difference between the expected return and the actual investment return on a market value basis is recognized over a five-year period. Asset value is adjusted as necessary to be within 20% of the market value.
Actuarial assumptions:	
• Investment rate of return	7.15%
• Discount rate	7.15%
• Wage inflation rate	3.00%
• Projected salary increases	Varies by length of service with ultimate rates of 3.75% for Groups 1 and 2 and 4.25% for Group 4
• Cost of living adjustments	3% of first $13,000

Plan membership:

• Retired participants and beneficiaries receiving benefits	351
• Inactive participants entitled to a return of their employee contributions	252
• Inactive participants with a vested right to a deferred or immediate benefit	18
• Active participants	498
• Total	1,119

Exhibit 4 – Pension expense

Reporting Date for Employer under GASB 68	**June 30, 2022**	**June 30, 2021**
Measurement Date for Employer under GASB 68	**December 31, 2021**	**December 31, 2020**
Components of Pension Expense		
Service cost	$5,070,223	$4,915,533
Interest on the Total Pension Liability	14,753,149	14,267,460
Current-period benefit changes	0	0
Expensed portion of current-period difference between expected and actual experience in the Total Pension Liability	-1,265,049	0
Expensed portion of current-period changes of assumptions	292,872	0
Member contributions	-2,881,865	-2,907,915
Projected earnings on plan investments	-9,906,388	-8,905,639
Expensed portion of current-period differences between actual and projected earnings on plan investments	-2,565,320	-811,880
Administrative expense	335,823	349,365
Recognition of beginning of year deferred outflows of resources as pension expense	4,622,249	4,622,251
Recognition of beginning of year deferred inflows of resources as pension expense	-3,791,482	-3,052,329
Pension Expense	**$4,664,212**	**$8,476,846**

Deferred outflows of resources and deferred inflows of resources

Reporting Date for Employer under GASB 68		**June 30, 2022**	**June 30, 2021**
Measurement Date for Employer under GASB 68		**December 31, 2021**	**December 31, 2020**
Deferred Outflows of Resources			
Changes in proportion and differences between employer's contributions and proportionate share of contributions		$2,413,829	$893,504
Changes of assumptions or other inputs		3,161,920	3,643,062
Net difference between projected and actual earnings on pension plan investments		0	0
Difference between expected and actual experience in the Total Pension Liability		265,140	954,290
Total Deferred Outflows of Resources		$5,840,889	$5,490,856
Deferred Inflows of Resources			
Changes in proportion and differences between employer's contributions and proportionate share of contributions		$2,413,829	$893,504
Changes of assumptions or other inputs		0	0
Net difference between projected and actual earnings on pension plan investments		13,966,527	5,216,256
Difference between expected and actual experience in the Total Pension Liability		5,060,188	0
Total Deferred Inflows of Resources		$21,440,544	$6,109,760
Deferred outflows of resources and deferred inflows of resources related to pension will be recognized as follows:			
Reporting Date for Employer under GASB 68 Year Ended June 30:			
	2022	N/A	$830,767
	2023	-$2,716,160	821,336
	2024	-4,996,625	-1,459,129
	2025	-4,349,374	-811,878
	2026	-3,537,496	0
	Thereafter	0	0

Note: Average expected remaining service life as of December 31, 2021 and December 31, 2020 is 5 years.

Exhibit 5 – Determination of Proportionate Share

Employer Name	FY 2021 Total Appropriation	Percent of FY 2021 Total Appropriation	Share of NPL as of January 1, 2021	FY 2022 Total Appropriation	Percent of FY 2022 Total Appropriation	Share of NPL as of January 1, 2022
Town of Belmont	$3,482,321	32.291424%	$22,481,817	$3,464,885	30.760881%	$14,777,885
Belmont Housing Authority	128,362	1.190296%	828,703	155,034	1.376375%	661,227
Light Department	1,106,072	10.256561%	7,140,786	1,198,009	10.635797%	5,109,560
Water Department	216,950	2.011769%	1,400,626	248,832	2.209104%	1,061,279
School Department	2,260,027	20.957140%	14,590,703	2,667,309	23.680086%	11,376,188
Police and Fire Departments	3,590,311	33.292810%	23,178,999	3,529,864	31.337757%	15,055,023
Grand Totals	**$10,784,043**	**100.000000%**	**$69,621,634**	**$11,263,933**	**100.000000%**	**$48,041,162**

Exhibit 6 – Determination of Proportionate Share Amounts by Employer

Employer Name	2022 Share of Cost Allocation (1)	Net Pension Liability (2)	Covered Employee Payroll (3)	Discount Rate Sensitivity: 1% Decrease (6.00%) (4)	Discount Rate Sensitivity: Current Discount Rate (7.00%) (5)	Discount Rate Sensitivity: 1% Increase (8.00%) (6)
Town of Belmont	30.760881%	$14,777,885	$7,947,686	$21,800,240	$14,777,885	$8,859,836
Belmont Housing Authority	1.376375%	661,227	271,993	975,437	661,227	396,428
Light Department	10.635797%	5,109,560	3,257,218	7,537,590	5,109,560	3,063,352
Water Department	2.209104%	1,061,279	683,688	1,565,592	1,061,279	636,272
School Department	23.680086%	11,376,188	6,914,607	16,782,080	11,376,188	6,820,406
Police and Fire Departments	31.337757%	15,055,023	9,518,730	22,209,074	15,055,023	9,025,990
Grand Totals	**100.000000%**	**$48,041,162**	**$28,593,922**	**$70,870,013**	**$48,041,162**	**$28,802,284**

Section 2: GASB Information

Employer Name	Schedule of Contributions				Pension Expense		
	Statutory Required Contribution (7)	Contributions In Relation to the Statutory Required Contribution (8)	Contribution Deficiency/ (Excess) (9)	Contributions as a Percentage of Covered Employee Payroll (10)	Proportionate Share of Plan Pension Expense (11)	Net Amortization of Deferred Amounts from Changes in Proportion and Differences Between Employer Contributions and Proportionate Share of Contributions (12)	Total Employer Pension Expense (13)
Town of Belmont	$3,464,885	$3,464,885	-	43.60%	$1,434,753	-$407,702	$1,027,051
Belmont Housing Authority	155,034	155,034	-	57.00%	64,197	-49,482	14,715
Light Department	1,198,009	1,198,009	-	36.78%	496,076	288,564	784,640
Water Department	248,832	248,832	-	36.40%	103,037	-62,460	40,577
School Department	2,667,309	2,667,309	-	38.57%	1,104,489	402,019	1,506,508
Police and Fire Departments	3,529,864	3,529,864	-	37.08%	1,461,660	-170,939	1,290,721
Grand Totals	**$11,263,933**	**$11,263,933**	**-**	**39.39%**	**$4,664,212**	**-**	**$4,664,212**

Section 2: GASB Information

	Deferred Outflows of Resources				Deferred Inflows of Resources				
Employer Name	Differences Between Expected and Actual Experience (14)	Changes of Assumptions (15)	Changes in Proportion and Differences Between Employer Contributions and Proportionate Share of Contributions (16)	Total Deferred Outflows of Resources (17)	Differences Between Expected and Actual Experience (18)	Net Difference Between Projected and Actual Investment Earnings on Pension Plan Investments (19)	Changes of Assumptions (20)	Changes in Proportion and Differences Between Employer Contributions and Proportionate Share of Contributions (21)	Total Deferred Inflows of Resources (22)
Town of Belmont	$81,559	$972,634	$9,561	$1,063,754	$1,556,558	$4,296,227	-	$881,188	$6,733,973
Belmont Housing Authority	3,649	43,520	104,564	151,733	69,647	192,232	-	119,181	381,060
Light Department	28,200	336,295	450,349	814,844	538,191	1,485,451	-	-	2,023,642
Water Department	5,857	69,850	112,097	187,804	111,785	308,535	-	246,146	666,466
School Department	62,785	748,745	1,539,278	2,350,808	1,198,257	3,307,286	-	68,722	4,574,265
Police and Fire Departments	83,090	990,876	197,980	1,271,946	1,585,750	4,376,796	-	1,098,592	7,061,138
Grand Totals	**$265,140**	**$3,161,920**	**$2,413,829**	**$5,840,889**	**$5,060,188**	**$13,966,527**	**-**	**$2,413,829**	**$21,440,544**

Section 2: GASB Information

Employer Name	2023 (23)	2024 (24)	2025 (25)	2026 (26)	Thereafter (27)
	Deferred Inflows/(Outflows) Recognized in Future Pension Expense (Year Ended June 30)				
Town of Belmont	-$1,051,072	-$1,762,123	-$1,553,848	-$1,303,177	$0
Belmont Housing Authority	-88,480	-84,520	-33,779	-22,548	0
Light Department	-115,222	-361,448	-409,164	-322,966	0
Water Department	-154,204	-205,702	-68,330	-50,425	0
School Department	-286,458	-834,734	-647,103	-455,160	0
Police and Fire Departments	-1,020,724	-1,748,098	-1,637,150	-1,383,220	0
Grand Totals	**-$2,716,160**	**-$4,996,625**	**-$4,349,374**	**-$3,537,496**	**$0**

Section 3: Actuarial Assumptions, Methods and Appendices

Exhibit I – Actuarial Assumptions and Cost Method

Net Investment Return:

7.00% (previously, 7.15%)

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	Group 1	Group 2	Group 4
0	6.00%	6.00%	7.00%
1	5.50%	5.50%	6.50%
2	5.50%	5.50%	6.00%
3	5.00%	5.00%	5.50%
4	5.00%	5.00%	5.00%
5	4.50%	4.50%	5.00%
6	4.50%	4.50%	4.50%
7	4.00%	4.00%	4.50%
8	4.00%	4.00%	4.25%
9+	3.75%	3.75%	4.25%

Includes an allowance for inflation of 3.0% per year.

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%

Administrative Expenses:	$350,000 for calendar year 2022, increasing 3.0% per year (previously $330,000 for calendar 2020, increasing 3.0% per year). The administrative expense assumption is based on information on expenses provided by the Retirement System.
Mortality Rates:	*Pre-Retirement:* RP-2014 Blue Collar Employee Mortality Table set forward one year for females and projected generationally with Scale MP-2021 (previously, the MP-2017 projection scale) *Healthy Retiree:* RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year for females and projected generationally with Scale MP-2021 (previously, the MP-2017 projection scale) *Disabled Retiree:* RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year and projected generationally with Scale MP-2021 (previously, the MP-2017 projection scale) The underlying tables with generational projection to the ages of participants as of the measurement date reasonably reflect the 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' assumption over the most recent six years. The mortality tables were then adjusted to future years using the generational projection to reflect future mortality improvement between the measurement date and those years.

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	0.03	0.03
35	0.07	0.03	0.06
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.
90% of the disability rates shown represent accidental disability.
20% of the accidental disabilities will die from the same cause as the disability.
55% 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	0.03	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.
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+	- -
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 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 the projected number based on the prior years' assumptions over the past six years.

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	15.0
56 – 57	2.5	6.5	10.0
58	5.0	6.5	10.0
59	6.5	6.5	15.0
60	12.0	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	- -

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 past six years.

Retirement Age for Inactive Vested Participants:	Age 60 for Group 1 and Group 2 members and age 55 for Group 4 members hired prior to April 2, 2012. For members hired April 2, 2012 or later, age 60 for Group 1 members, age 55 for Group 2 members and age 50 for Group 4 members. The retirement age for inactive vested participants was based on historical and current demographic data, adjusted to reflect the 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.
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.
2021 Salary:	2021 salaries are equal to salaries provided in the data except for employees hired in 2021 for whom salaries were annualized. Calendar year 2021 payroll figures were increased by 3% for Police and Fire Fighters hired prior to 2020 to reflect unsettled bargaining contracts.
Total Service:	Total creditable service reported in the data.
Net 3(8)(c) Liability:	$240,000 for calendar year 2022, increasing 3.0% per year, added to normal cost.
Actuarial Value of Assets:	Market value of assets as reported in the System's Annual Statement plus receivable contributions less unrecognized return in each of the last five years. Unrecognized return is equal to the difference between the actual market value return and the expected market value return and is recognized at 20% per year 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 of the participant less total creditable service. Normal Cost and Actuarial Accrued Liability are calculated on an individual basis and are allocated by salary. Normal Cost is determined by 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 investment return assumption was lowered from 7.15% to 7.00%. • The administrative expense assumption was increased from $330,000 to $350,000. • The generational mortality improvement scale was updated from MP-2017 to MP-2021.

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:	See table below. 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.

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%

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 her 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 $500 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 $12,000 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.

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 of a retirement allowance. 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:	None

Appendix – Definition of Terms

Definitions of certain terms as they are used in Statement 68. The terms may have different meanings in other contexts.

Active Employees:	Individuals employed at the end of the reporting or measurement period, as applicable.
Actual Contributions:	Cash contributions recognized as additions to a pension Plan Fiduciary Net Position.
Actuarial Present Value of Projected Benefit Payments:	Projected benefit payments discounted to reflect the expected effects of the time value (present value) of money and the probabilities of payment.
Actuarial Valuation:	The determination, as of a point in time (the actuarial valuation date), of the service cost, Total Pension Liability, and related actuarial present value of projected benefit payments for pensions performed in conformity with Actuarial Standards of Practice unless otherwise specified by the GASB.
Actuarial Valuation Date:	The date as of which an actuarial valuation is performed.
Actuarially Determined Contribution:	A target or recommended contribution to a defined benefit pension plan for the reporting period, determined in conformity with Actuarial Standards of Practice based on the most recent measurement available when the contribution for the reporting period was adopted.
Ad Hoc Cost-of-Living Adjustments (Ad Hoc COLAs):	Cost-of-living adjustments that require a decision to grant by the authority responsible for making such decisions.
Ad Hoc Postemployment Benefit Changes:	Postemployment benefit changes that require a decision to grant by the authority responsible for making such decisions.
Agent Employer:	An employer whose employees are provided with pensions through an agent multiple-employer defined benefit pension plan.
Agent Multiple-Employer Defined Benefit Pension Plan (Agent Pension Plan):	A multiple-employer defined benefit pension plan in which pension plan assets are pooled for investment purposes but separate accounts are maintained for each individual employer so that each employer's share of the pooled assets is legally available to pay the benefits of only its employees.
Allocated Insurance Contract:	A contract with an insurance company under which related payments to the insurance company are currently used to purchase immediate or deferred annuities for individual employees. Also may be referred to as an annuity contract.
Automatic Cost-of-Living Adjustments (Automatic COLAs):	Cost-of-living adjustments that occur without a requirement for a decision to grant by a responsible authority, including those for which the amounts are determined by reference to a specified experience factor (such as the earnings experience of the pension plan) or to another variable (such as an increase in the consumer price index).

Automatic Postemployment Benefit Changes:	Postemployment benefit changes that occur without a requirement for a decision to grant by a responsible authority, including those for which the amounts are determined by reference to a specified experience factor (such as the earnings experience of the pension plan) or to another variable (such as an increase in the consumer price index).
Closed Period:	A specific number of years that is counted from one date and declines to zero with the passage of time. For example, if the recognition period initially is five years on a closed basis, four years remain after the first year, three years after the second year, and so forth.
Collective Deferred Outflows of Resources and Deferred Inflows of Resources Related to Pensions:	Deferred outflows of resources and deferred inflows of resources related to pensions arising from certain changes in the collective Net Pension Liability.
Collective Net Pension Liability:	The Net Pension Liability for benefits provided through (1) a cost-sharing pension plan or (2) a single-employer or agent pension plan in circumstances in which there is a special funding situation.
Collective Pension Expense:	Pension expense arising from certain changes in the collective Net Pension Liability.
Contributions:	Additions to a pension Plan Fiduciary Net Position for amounts from employers, non-employer contributing entities (for example, state government contributions to a local government pension plan), or employees. Contributions can result from cash receipts by the pension plan or from recognition by the pension plan of a receivable from one of these sources.
Cost-of-Living Adjustments:	Postemployment benefit changes intended to adjust benefit payments for the effects of inflation.
Cost-Sharing Employer:	An employer whose employees are provided with pensions through a cost-sharing multiple-employer defined benefit pension plan.
Cost-Sharing Multiple-Employer Defined Benefit Pension Plan (Cost-Sharing Pension Plan):	A multiple-employer defined benefit pension plan in which the pension obligations to the employees of more than one employer are pooled and pension plan assets can be used to pay the benefits of the employees of any employer that provides pensions through the pension plan.
Covered Payroll:	The payroll of employees that are provided with pensions through the pension plan.
Deferred Retirement Option Program (DROP):	A program that permits an employee to elect a calculation of benefit payments based on service credits and salary, as applicable, as of the DROP entry date. The employee continues to provide service to the employer and is paid for that service by the employer after the DROP entry date; however, the pensions that would have been paid to the employee (if the employee had retired and not entered the DROP) are credited to an individual employee account within the defined benefit pension plan until the end of the DROP period.

Defined Benefit Pension Plans:	Pension plans that are used to provide defined benefit pensions.
Defined Benefit Pensions:	Pensions for which the income or other benefits that the employee will receive at or after separation from employment are defined by the benefit terms. The pensions may be stated as a specified dollar amount or as an amount that is calculated based on one or more factors such as age, years of service, and compensation. (A pension that does not meet the criteria of a defined contribution pension is classified as a defined benefit pension for purposes of Statement 68.)
Defined Contribution Pension Plans:	Pension plans that are used to provide defined contribution pensions.
Defined Contribution Pensions:	Pensions having terms that (1) provide an individual account for each employee; (2) define the contributions that an employer is required to make (or the credits that it is required to provide) to an active employee's account for periods in which that employee renders service; and (3) provide that the pensions an employee will receive will depend only on the contributions (or credits) to the employee's account, actual earnings on investments of those contributions (or credits), and the effects of forfeitures of contributions (or credits) made for other employees, as well as pension plan administrative costs, that are allocated to the employee's account.
Discount Rate:	The single rate of return that, when applied to all projected benefit payments, results in an actuarial present value of projected benefit payments equal to the total of the following: 1. The actuarial present value of benefit payments projected to be made in future periods in which (a) the amount of the pension Plan Fiduciary Net Position is projected (under the requirements of Statement 68) to be greater than the benefit payments that are projected to be made in that period and (b) pension plan assets up to that point are expected to be invested using a strategy to achieve the long-term expected rate of return, calculated using the long-term expected rate of return on pension plan investments. 2. The actuarial present value of projected benefit payments not included in (1), calculated using the municipal bond rate.
Entry Age Actuarial Cost Method:	A method under which the actuarial present value of the projected benefits of each individual included in an actuarial valuation is allocated on a level basis over the earnings or service of the individual between entry age and assumed exit age(s). The portion of this actuarial present value allocated to a valuation year is called the normal cost. The portion of this actuarial present value not provided for at a valuation date by the actuarial present value of future normal costs is called the actuarial accrued liability.
Inactive Employees:	Terminated individuals that have accumulated benefits but are not yet receiving them, and retirees or their beneficiaries currently receiving benefits.
Measurement Period:	The period between the prior and the current measurement dates.
Multiple-Employer Defined Benefit Pension Plan:	A defined benefit pension plan that is used to provide pensions to the employees of more than one employer.
Net Pension Liability (NPL):	The liability of employers and non-employer contributing entities to employees for benefits provided through a defined benefit pension plan.

Non-Employer Contributing Entities:	Entities that make contributions to a pension plan that is used to provide pensions to the employees of other entities. For purposes of Statement 68, employees are not considered non-employer contributing entities.
Other Postemployment Benefits:	All postemployment benefits other than retirement income (such as death benefits, life insurance, disability, and long-term care) that are provided separately from a pension plan, as well as postemployment healthcare benefits, regardless of the manner in which they are provided. Other postemployment benefits do not include termination benefits.
Pension Plans:	Arrangements through which pensions are determined, assets dedicated for pensions are accumulated and managed and benefits are paid as they come due.
Pensions:	Retirement income and, if provided through a pension plan, postemployment benefits other than retirement income (such as death benefits, life insurance, and disability benefits). Pensions do not include postemployment healthcare benefits and termination benefits.
Plan Members:	Individuals that are covered under the terms of a pension plan. Plan members generally include (1) employees in active service (active plan members) and (2) terminated employees who have accumulated benefits but are not yet receiving them and retirees or their beneficiaries currently receiving benefits (inactive plan members).
Postemployment:	The period after employment.
Postemployment Benefit Changes:	Adjustments to the pension of an inactive employee.
Postemployment Healthcare Benefits:	Medical, dental, vision, and other health-related benefits paid subsequent to the termination of employment.
Projected Benefit Payments:	All benefits estimated to be payable through the pension plan to current active and inactive employees as a result of their past service and their expected future service.
Public Employee Retirement System:	A special-purpose government that administers one or more pension plans; also may administer other types of employee benefit plans, including postemployment healthcare plans and deferred compensation plans.
Real Rate of Return:	The rate of return on an investment after adjustment to eliminate inflation.
Service Costs:	The portions of the actuarial present value of projected benefit payments that are attributed to valuation years.
Single Employer:	An employer whose employees are provided with pensions through a single-employer defined benefit pension plan.
Single-Employer Defined Benefit Pension Plan (Single-Employer Pension Plan):	A defined benefit pension plan that is used to provide pensions to employees of only one employer.

Special Funding Situations:	Circumstances in which a non-employer entity is legally responsible for making contributions directly to a pension plan that is used to provide pensions to the employees of another entity or entities and either of the following conditions exists: 1. The amount of contributions for which the non-employer entity legally is responsible is not dependent upon one or more events or circumstances unrelated to the pensions. 2. The non-employer entity is the only entity with a legal obligation to make contributions directly to a pension plan.
Termination Benefits:	Inducements offered by employers to active employees to hasten the termination of services, or payments made in consequence of the early termination of services. Termination benefits include early-retirement incentives, severance benefits, and other termination-related benefits.
Total Pension Liability (TPL):	The portion of the actuarial present value of projected benefit payments that is attributed to past periods of employee service in conformity with the requirements of Statement 68.