READING CONTRIBUTORY RETIREMENT SYSTEM

ACTUARIAL VALUATION
as of
January 1, 2021

KMS Actuaries, LLC
52 Hunt Road
Kingston, NH 03848

July, 2021

KMS ACTUARIES LLC

July 16, 2021

Reading Contributory Retirement Board
16 Lowell Street
Reading, MA 01867

Dear Board Members:

We are pleased to present the enclosed report providing the results of our actuarial valuation of the Reading Contributory Retirement System as of January 1, 2021. Our valuation was performed in accordance with the provisions contained in Chapter 32 of the Massachusetts General Laws, "M.G.L.", as of January 1, 2021. Disclosures under GASB Statement No. 67, Financial Reporting for Pension Plans (GASB 67) and GASB Statement No. 68, Accounting and Financial Reporting for Pensions (GASB 68) are provided in a separate report.

The principal results of our valuation are summarized in Section 2. The Summary of Plan Provisions and Actuarial Assumptions and Methods are shown in Sections 5 and 6, respectively. Section 7 summarizes the demographic profile of active members, retired plan members and beneficiaries and disabled plan members. Asset information and actuarial liabilities are presented in Section 2. The development of the required appropriations pursuant to Chapter 32 of the M.G.L. is shown in Section 3, including a 30-year forecast of the required appropriations and projected cash flows. Section 4 includes a summary of valuation information for PERAC as well as information relating to the primary risks to the System and an assessment of those risks.

This valuation is based upon member data provided by the Reading Contributory Retirement Board and asset information reported to the Public Employee Retirement Administration Commission (PERAC) by the Retirement Board. Although we did not audit the data used in the valuation, we believe that the information is complete and reliable.

Liabilities presented in this report are based on a long-term investment return rate assumption of 7%, net of investment expense, compounded annually.

This report was completed in accordance with generally accepted actuarial standards and procedures, and conforms to the Code of Professional Conduct of the American Academy of Actuaries. The actuarial assumptions used in the determination of costs are reasonably related to the experience of the System and to reasonable expectations, and represent our best estimate of anticipated long-term experience under the System.

Future actuarial valuation results may differ significantly from the current results presented in this report. Examples of potential sources of volatility include plan experience differing from that anticipated by the economic or demographic assumptions, the effect of new entrants, changes in economic or demographic assumptions, the effect of law changes and the delayed effect of smoothing techniques.

Our valuation follows generally accepted actuarial methods and we perform such tests as we consider necessary to assure the accuracy of the results. The amounts presented in this report have been appropriately determined according to the actuarial assumptions and methods stated herein.

This report is intended for the sole use of the Reading Contributory Retirement Board and is intended to provide information to comply with the stated purpose of the report. It may not be appropriate for other purposes.

The undersigned credentialed actuaries are Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries necessary to render the actuarial opinion contained herein. They are available to answer any questions with regard to this report.

Respectfully submitted,

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SECTION 1 - EXECUTIVE SUMMARY

Background

We have completed the Actuarial Valuation of the Reading Contributory Retirement System as of January 1, 2021. This valuation is based upon census data provided by the Retirement Board and asset information reported to the Public Employee Retirement Administration Commission (PERAC) by the Reading Contributory Retirement Board. Information for the prior valuation completed as of January 1, 2019 was obtained from the valuation report prepared by KMS Actuaries, LLC.

Massachusetts General Laws

The valuation was prepared in accordance with Chapter 32 of the Massachusetts General Laws ("M.G.L."). The results are based on the active, inactive and retired members and beneficiaries as of December 31, 2020, the assets as of December 31, 2020 and assumptions regarding investment returns, salary increases, mortality, turnover, disability and retirement.

The valuation does not take into consideration:

- Changes in the law after the valuation date,
- Transfers between retirement systems pursuant to Section 3(8)(c) of Chapter 32,
- State-mandated benefits and
- Cost-of-living increases granted to members in pay status between 1982 and 1997.

GASB Statement Numbers 67 and 68

In June 2012, the GASB approved two related Statements that significantly changed the way pension plans and governments account and report pension liabilities. Effective for plans with fiscal years beginning after June 15, 2013, GASB Statement No. 67, Financial Reporting for Pension Plans, replaced the requirements of Statement No. 25 and effective for employers with fiscal years beginning after June 15, 2014, GASB Statement No. 68, Accounting and Financial Reporting for Pensions, replaced the requirements of Statement No. 27.

The pension standards reflect changes from those previously in place regarding how governments calculate total pension liability and pension expense. Further, the standards contain requirements for disclosing information in the notes to financial statements and presenting required supplementary information following the notes.

The required disclosures and notes under GASB Statement Number 67 and 68 for the fiscal year ending December 31, 2020 are provided in a separate report.

Assets

This valuation is based upon asset information reported to the Public Employee Retirement Administration Commission (PERAC) by the Reading Contributory Retirement Board. The market value of assets increased from $136,261,047 as of December 31, 2018 to $168,323,981 as of December 31, 2020. During the plan years ended 2019 and 2020, the market value rates of return were 15.66% and 12.44%, respectively.

The actuarial value of assets increased from $142,056,825 as of January 1, 2019 to $160,717,539 as of January 1, 2021. During the plan years ended 2019 and 2020, the rates of return on the actuarial value of assets were 8.04% and 8.78%, respectively.

Changes Since the Last Valuation

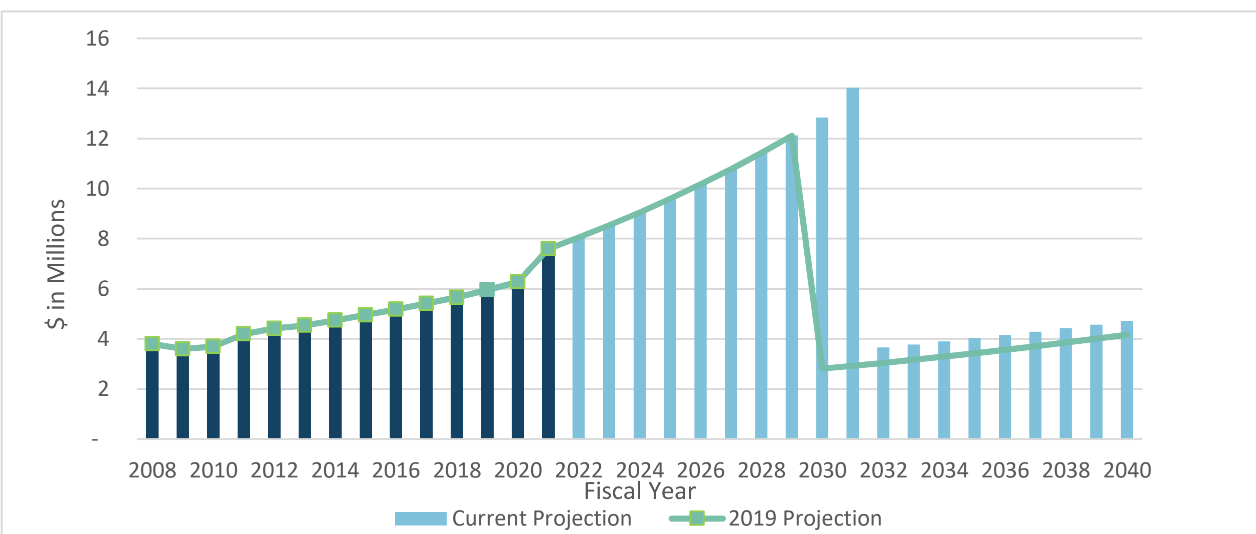
During the two years since the last valuation, the total unfunded actuarial accrued liability of the System was expected to decrease from $47,371,512 as of January 1, 2019 to $41,517,509 as of January 1, 2021, for a total decrease of $5,854,003. The actual unfunded actuarial accrued liability, before any assumption or plan changes, was $40,987,140, resulting in an actuarial gain of $530,369. The actuarial gain was primarily due to an asset gain of approximately $2,715,000 and a demographic experience loss of approximately $2,185,000. The details of the gain and loss analysis are provided in Section 2, Actuarial Experience.

Appropriations

The funding appropriation for each year is computed as the sum of the normal cost, net 3(8)(c) transfers and an amortization payment to pay off the Unfunded Actuarial Liability, adjusted for semi-annual payments of the appropriation made August 1 and December 31. The appropriation calculated as of the January 1, 2021 valuation is $8,432,944, and is made up of a normal cost payment of $2,523,243, net 3(8)(c) transfers of $0, and an amortization payment of $5,909,701. The amortization method is an increasing amortization of the unfunded actuarial accrued liability at 4% over 10 years and is expected to fully pay the unfunded actuarial accrued liability by the year 2031. The development of the appropriation as of January 1, 2021 is presented in Section 3, Annual Appropriations.

For fiscal year 2022, we show the actual appropriation developed under the previous funding schedule and reported on the PERAC "Required Fiscal Year 2022 Appropriation" letter dated December 1, 2020 of $8,059,372. For fiscal year 2023, we developed an annual appropriation of $8,542,933, which is made up of a normal cost of $2,740,468, net 3(8)(c) transfers of $0 and payment toward the unfunded actuarial accrued liability of $5,802,465. The unfunded actuarial accrued liability is expected to be fully paid by 2031. The Board adopted a schedule that limits the annual increase in appropriation to 6% for each year. The current funding schedule is shown in Section 3, Exhibit 3.1.

The chart below shows the historical (navy bars) and projected (blue bars) annual appropriations compared to the projected amounts shown in the prior valuation and funding schedule (green line).



Plan Provisions

All Plan provisions used in this valuation are the same as those used in the prior valuation and are summarized in Section 5, Summary of Plan Provisions.

Actuarial Assumptions and Methods

Some Actuarial Assumptions and Methods used in this valuation have changed since the last valuation, including reducing the investment return rate from 7.50% to 7.00%, increasing the administrative expense assumption from $200,000 to $290,000, reducing the payroll growth rate from 4% to 3.25%, and updating the mortality and mortality improvement rates. Changing these assumptions resulted in a net increase in the unfunded actuarial accrued liability of $11,184,719 and an increase in the employer normal cost of $500,214. The Actuarial Assumptions and Methods utilized in this valuation are detailed in Section 6, Actuarial Assumptions and Methods.

Census Data

As of January 1, 2021, there are 355 active members who may be eligible for benefits in the future, 330 retirees and beneficiaries, 56 inactives and 36 disabled retirees. Summaries of the active, retired and disabled employees are included in Section 7, Plan Member Information.

COVID-19 Pandemic

The assumptions in this report do not reflect the potential impacts of the COVID-19 pandemic on the System. Especially in the short range, the pandemic is likely to materially affect the economic and demographic experience, in a way not anticipated by the assumptions on which the projections are based.

A summary of principal valuation results from the current valuation and the prior valuation follows.

Valuation Date	January 1, 2021	January 1, 2019	% Change
Census Data			
Active Members	355	355	0.0%
Valuation Salary	$29,612,763	$27,381,485	8.1%
Average Salary	$83,416	$77,131	8.1%
Retired Members and Beneficiaries	330	324	1.9%
Total Annual Retirement Allowance	$10,973,624	$10,263,921	6.9%
Average Annual Retirement Allowance	$33,253	$31,679	5.0%
Disabled Members	36	39	(7.7%)
Total Annual Retirement Allowance	$1,394,948	$1,421,542	(1.9%)
Average Annual Retirement Allowance	$38,749	$36,450	6.3%
Inactive Members	56	43	30.2%
Annuity Savings Fund	$1,673,863	$1,285,478	30.2%
Funded Status			
Actuarial Accrued Liability (AAL)	$212,889,398	$189,428,337	12.4%
Market Value of Assets (MVA)	$168,323,981	$136,261,047	23.5%
Unfunded Accrued Liability on MVA	$44,565,417	$53,167,290	(16.2%)
Funded Status on MVA	79.1%	71.9%	10.0%
Actuarial Value of Assets (AVA)	$160,717,539	$142,056,825	13.1%
Unfunded Accrued Liability on AVA	$52,171,859	$47,371,512	10.1%
Funded Status on AVA	75.5%	75.0%	0.7%
Appropriations			
Fiscal Year 2021	N/A	$7,603,181	N/A
Fiscal Year 2022	$8,059,372	$8,059,372	0.0%
Fiscal Year 2023	$8,542,933	$8,542,934	0.0%
Fiscal Year 2024	$9,055,509	$9,055,510	0.0%

Market Value of Assets

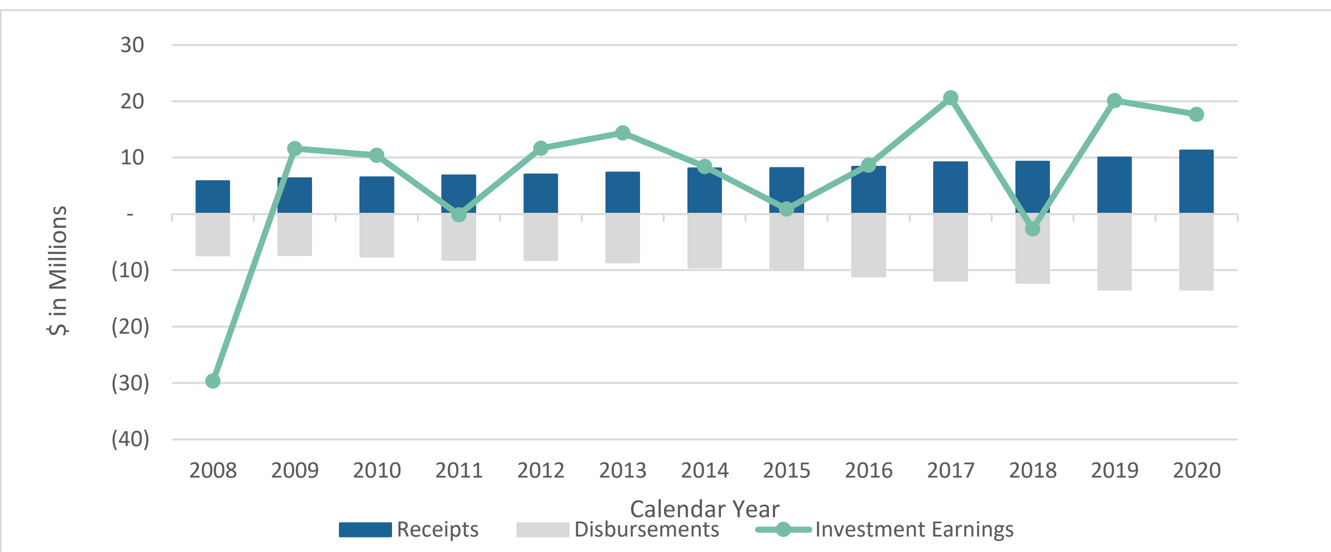
Asset information is reported annually to the Public Employee Retirement Administration Commission by the Reading Contributory Retirement Board. The Market Value of Assets for the three most recent calendar years are as follows:

Calendar Year	2020	2019	2018
Trust Fund Composition at Year-End			
Cash	$5,643,937	$5,099,297	$13,042,063
Short-Term Investments	0	0	0
Fixed Income Securities	0	0	0
Equities	0	0	0
Pooled Short Term Funds	0	0	0
Pooled Domestic Equity Funds	0	0	0
Pooled International Equity Funds	0	0	0
Pooled Global Equity Funds	0	0	0
Pooled Domestic Fixed Income Funds	0	0	0
Pooled International Fixed Income Funds	0	0	0
Pooled Global Fixed Income Funds	0	0	0
Pooled Alternative Investments	1,152,300	336,535	0
Pooled Real Estate Funds	0	0	0
Pooled Domestic Balanced Funds	0	0	0
Pooled International Balanced Funds	0	0	0
Hedge Funds	0	0	0
PRIT Cash	36	664	902
PRIT Fund	161,456,988	147,426,732	123,159,975
Interest Due & Accrued	0	0	0
Prepaid Expenses	36,461	8,400	8,400
Accounts Receivable	35,984	36,416	50,292
Land	0	0	0
Buildings	0	0	0
Accumulated Depreciation - Buildings	0	0	0
Accounts Payable	(1,725)	0	(585)
Total Market Value of Assets	**$168,323,981**	**$152,908,044**	**$136,261,047**

Market Value of Assets

Calendar Year	2020	2019	2018
Funds			
Annuity Savings Fund	$28,852,777	$27,031,228	$26,390,829
Annuity Reserve Fund	9,610,118	10,617,946	10,370,100
Special Military Service Fund	44,123	26,835	26,808
Pension Fund	9,352,994	9,687,013	9,188,152
Expense Fund	0	0	0
Pension Reserve Fund	120,463,969	105,545,022	90,285,158
Total Market Value of Assets	**$168,323,981**	**$152,908,044**	**$136,261,047**
Asset Activity			
Market Value as of Beginning of Year	$152,908,044	$136,261,047	$141,905,918
Contributions and Receipts	11,229,409	9,986,117	9,270,333
Benefit Payments and Expenses	(13,452,595)	(13,442,862)	(12,258,490)
Investment Return	17,639,123	20,103,742	(2,656,714)
Total Market Value of Assets	**$168,323,981**	**$152,908,044**	**$136,261,047**
Rate of Return	12.44%	15.66%	-1.39%

Below are the receipts and disbursements during the last 13 years. The green line reflects investment earnings, which vacillate as investment markets fluctuate. Blue bars indicate contributions, from employees and employers, and grey bars show benefit payments and administrative expenses.



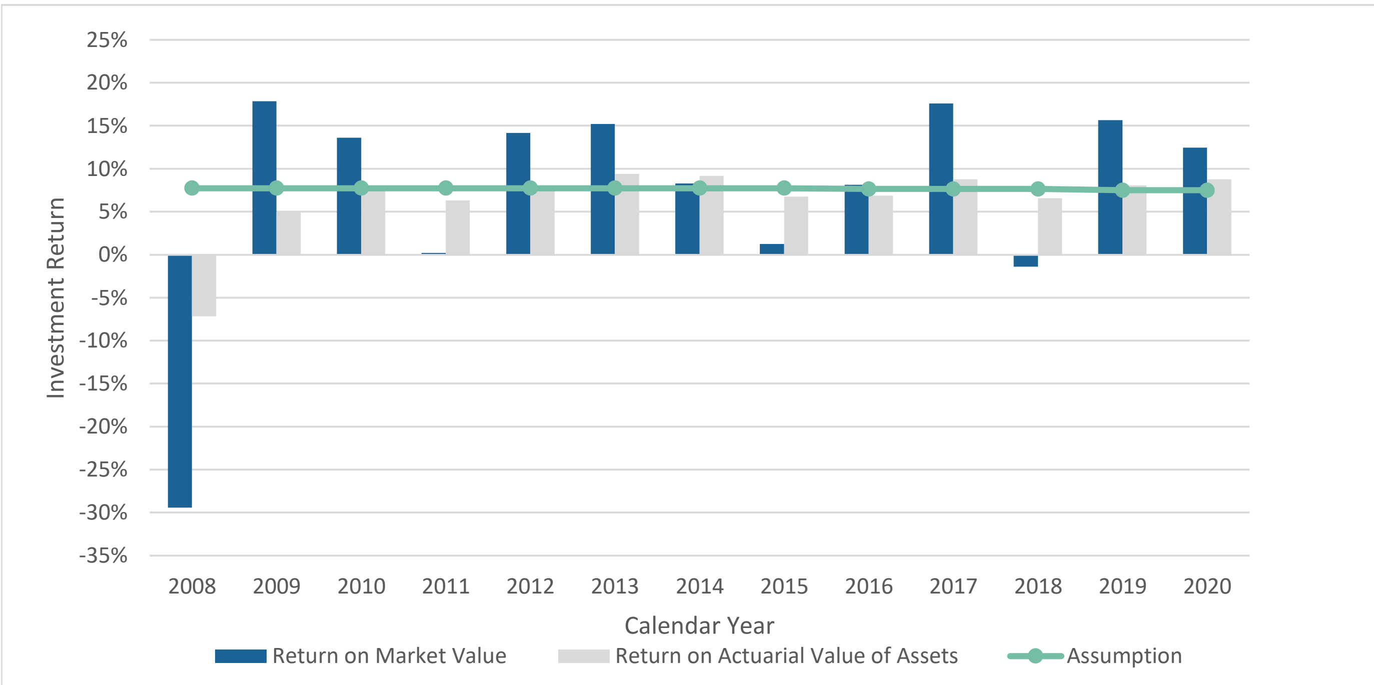
Actuarial Value of Assets

The preliminary Actuarial Value of Assets is the prior year's Actuarial Value of Assets, plus contributions and receipts, minus benefit payments and expenses, plus expected investment earnings. An adjustment equal to 20% of the excess of the Market Value of Assets at the end of the year over the preliminary Actuarial Value of Assets is added to the preliminary Actuarial Value of Assets. The Actuarial Value of Assets is further constrained to be within 20% of the market value of assets.

Valuation Date	January 1, 2021	January 1, 2020	January 1, 2019
1. Actuarial Value of Assets, prior year	$149,881,380	$142,056,825	$136,189,711
a. Prior Year Contributions and Receipts	11,229,409	9,986,117	9,270,333
b. Prior Year Benefit Payments and Expenses	(13,452,595)	(13,442,862)	(12,258,490)
c. Average Actuarial Value of Assets	148,769,787	140,328,453	134,695,633
d. Expected Investment Return Rate	7.50%	7.50%	7.65%
e. Expected Investment Income	11,157,734	10,524,634	10,304,216
f. Preliminary Actuarial Value of Assets	158,815,928	149,124,714	143,505,770
g. Market Value of Assets as of end of year	168,323,981	152,908,044	136,261,047
h. Adjustment toward Market Value	1,901,611	756,666	(1,448,945)
i. Actuarial Value of Assets, before corridor	160,717,539	149,881,380	142,056,825
2. Actuarial Value of Assets			
a. Actuarial Value of Assets before corridor	$160,717,539	$149,881,380	$142,056,825
b. 80% of Market Value of Assets	134,659,185	122,326,435	109,008,838
c. 120% of Market Value of Assets	201,988,777	183,489,653	163,513,256
d. Actuarial Value of Assets, a., but not less than b. and not greater than c.	160,717,539	149,881,380	142,056,825
e. Ratio of Actuarial Value of Assets to Market Value of Assets	95.48%	98.02%	104.25%
3. Rate of Return on Actuarial Value of Assets for Prior Calendar Year	8.78%	8.04%	6.57%

Actuarial Value of Assets

Below are the investment returns during the last 13 years. The green line reflects the investment return actuarial assumption. Blue bars indicate investment return rates on market value of assets, and grey bars show investment return rates on actuarial value of assets.



Actuarial Liabilities

The **Actuarial Present Value of Future Benefits** is the present value of the cost to finance all benefits payable in the future, discounted to reflect the probability of payment and the time value of money. Below is the Actuarial Present Value of Future Benefits from the current valuation and the prior valuation:

Valuation Date	January 1, 2021	January 1, 2019
Actives	$133,709,385	$115,754,770
Retired Members and Beneficiaries	110,061,662	98,194,072
Disabled Members	15,353,387	14,976,753
Inactive Members	1,673,863	1,285,478
Total Present Value of Future Benefits	$260,798,297	$230,211,073

The **Actuarial Accrued Liability** is the portion of the Actuarial Present Value of Future Benefits which is allocated to all periods prior to a valuation year and therefore is not provided for by future Normal Costs. Below is the Actuarial Accrued Liability from the current valuation and the prior valuation:

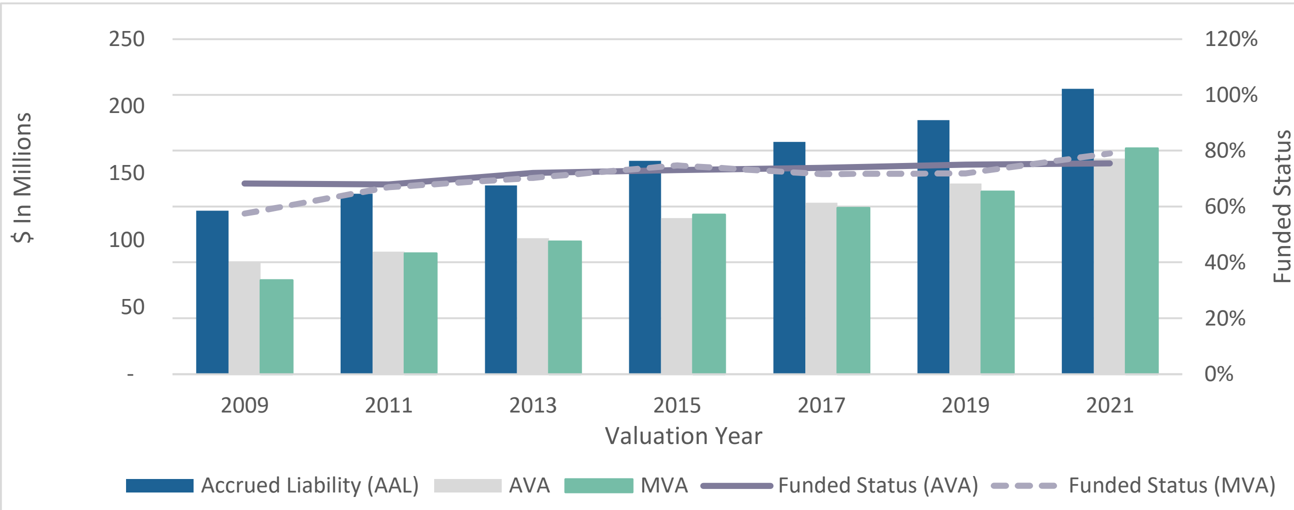
Valuation Date	January 1, 2021	January 1, 2019
Actives	$85,800,486	$74,972,034
Retired Members and Beneficiaries	110,061,662	98,194,072
Disabled Members	15,353,387	14,976,753
Inactive Members	1,673,863	1,285,478
Total Actuarial Accrued Liability	$212,889,398	$189,428,337

The **Unfunded Actuarial Accrued Liability** is the difference between the Actuarial Accrued Liability and the Actuarial Value of Assets as of the valuation date. The **Funded Status** is the Actuarial Value of Assets divided by the Actuarial Accrued Liability and is a point-in-time measurement of the amount of assets set aside to cover actuarial accrued liabilities. Below is the Unfunded Actuarial Accrued Liability and Funded Status from the current valuation and the prior valuation:

Valuation Date	January 1, 2021	January 1, 2019
Unfunded Actuarial Accrued Liability		
a. Actuarial Accrued Liability	$212,889,398	$189,428,337
b. Actuarial Value of Assets	160,717,539	142,056,825
c. Unfunded Actuarial Accrued Liability (a. - b.)	$52,171,859	$47,371,512
d. Funded Status (b. divided by a.)	75.5%	75.0%

Actuarial Liabilities

Below are the accrued liabilities, asset values (actuarial and market) and funded status for each of the last 7 valuations. The purple solid line reflects the funded status on an actuarial value of assets (AVA) basis and the purple dotted line reflects the funded status on a market value (MVA) basis. Blue bars indicate actuarial accrued liabilities, grey bars indicate actuarial value of assets and green bars indicate market value of assets.



The **Normal Cost** is the portion of the Actuarial Present Value of Future Benefits which is allocated to a valuation year. Only active employees who have not reached Normal Retirement Age incur a Normal Cost. Below is the Normal Cost from the current valuation and the prior valuation:

Valuation Date	January 1, 2021	January 1, 2019
Total Normal Cost	$5,186,923	$4,321,147
As of Percentage of Salary	17.5%	15.8%
Employee Normal Cost	$2,953,680	$2,716,589
As of Percentage of Salary	10.0%	9.9%
Administrative Expenses	$290,000	$200,000
As a Percentage of Salary	1.0%	0.7%
Net Employer Normal Cost	$2,523,243	$1,804,558
As a Percentage of Salary	8.5%	6.6%

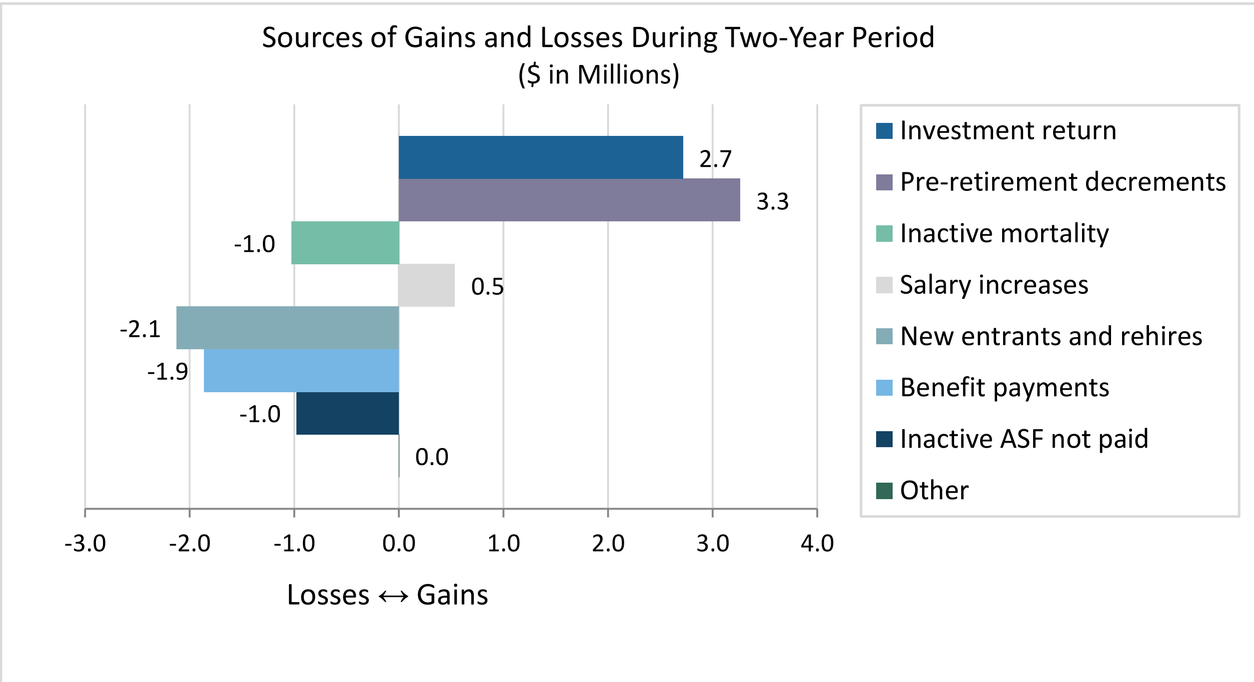
Actuarial Experience

In performing the actuarial valuation, various assumptions are made regarding mortality, retirement, disability and withdrawal rates as well as salary increases and investment returns. A comparison of the results of the current valuation and the prior valuation is made to determine how closely actual experience relates to expected. During the two years since the last valuation, the total unfunded actuarial accrued liability of the System was expected to decrease by $5,854,003. Below is the development of the Actuarial Gain for the current 2-year period:

Calendar Year Ending	December 31, 2020	December 31, 2019
Expected Unfunded Actuarial Accrued Liability		
1. Unfunded Actuarial Accrued Liability, Beginning of Year	$45,209,012	$47,371,512
2. Normal Cost, Beginning of Year	4,249,612	4,321,147
3. Total Contributions	11,229,409	9,986,117
4. Interest (full year on 1. and 2., one-half year on 3.)	3,288,294	3,502,470
5. Expected Unfunded Actuarial Accrued Liability	$41,517,509	$45,209,012
6. Unfunded Actuarial Accrued Liability (before changes)	40,987,140	
7. (Gain)/Loss (6. - 5.)	($530,369)	
Asset Gain/(Loss)		
1. Actuarial Value of Assets, Beginning of Year	$149,881,380	$142,056,825
2. Contributions and Receipts	11,229,409	9,986,117
3. Benefit Payments and Expenses	(13,452,595)	(13,442,862)
4. Assumed Rate of Return (prior valuation)	7.50%	7.50%
5. Expected Return	11,157,734	10,524,634
6. Actuarial Value of Assets, End of Year	$160,717,539	$149,881,380
7. Actual Return	13,059,345	11,281,300
8. Actual Rate of Return	8.78%	8.04%
9. Asset Gain/(Loss) (7. - 5.)	1,901,611	756,666
10. Total Asset Gain/(Loss), 2-Year Period	$2,715,027	

Actuarial Experience

Below are the various sources of gains and losses over the 2-year period. The asset gain during the period was $2,715,027, and the total demographic loss during the period was $2,184,658, which totals to an overall gain of $530,369.



Unfunded Actuarial Accrued Liability

1. Changes due to:	
a. Asset Gain	($2,715,027)
b. Demographic Experience Loss	2,184,658
c. Total Gain Prior to Changes	(530,369)
d. Plan Change	-
e. Assumption Change - Change in Mortality and Mortality Improvement Rates and Investment Return Rate	11,184,719
f. Total Increase (including changes)	10,654,350
2. Unfunded Actuarial Accrued Liability, End of Year	$52,171,859

Annual Appropriations

The Annual Appropriation is determined in accordance with the requirements set forth in Sections 22D and 22F of Chapter 32 of the Massachusetts General Laws ("M.G.L."). The appropriation is comprised of the annual employer normal cost and amortization payments to pay the unfunded actuarial accrued liability. Below are the details of the annual appropriations for the current and prior valuations, adjusted for semi-annual payments made August 1 and December 31. The appropriations shown are based on the results of the valuation and do not account for any adjustments made to appropriations in the selected funding schedule.

	Valuation Date	January 1, 2021	January 1, 2019
1.	Unfunded Actuarial Accrued Liability		
	Fully Funded Year	2031	2029
	Investment Return Rate	7.00%	7.50%
	Balance as of Valuation Date	$52,171,859	$47,371,512
	Amortization Amount	$5,909,701	$5,362,877
	Increasing Rate	4.00%	4.50%
	Remaining Payment Period from Valuation Date	10	10
2.	Total Amortization Payments	$5,909,701	$5,362,877
3.	Normal Cost	$2,523,243	$1,804,558
4.	Net 3(8)(c) Transfers	$0	$0
5.	Total Appropriation as of January 1	$8,432,944	$7,167,435
6.	**Adjusted for Semi-Annual Payments as of August 1 and December 31**	**$8,870,639**	**$7,565,700**

Exhibit 3.1 - 30-Year Forecast of Annual Appropriations

Fiscal Year Ending	Employer Normal Cost	Amortization Payment of UAL	Net 3(8)(c) Transfers	Total Employer Cost	Increase over Prior Year	Unfunded Actuarial Accrued Liability
2022	$2,559,536	$5,499,836	$0	$8,059,372		$52,171,859
2023	2,740,468	5,802,465	-	8,542,933	6.00%	50,229,435
2024	2,829,534	6,225,975	-	9,055,509	6.00%	47,843,205
2025	2,921,493	6,677,347	-	9,598,840	6.00%	44,859,142
2026	3,016,441	7,158,329	-	10,174,770	6.00%	41,207,058
2027	3,114,476	7,670,781	-	10,785,257	6.00%	36,810,072
2028	3,215,696	8,216,675	-	11,432,371	6.00%	31,584,028
2029	3,320,206	8,798,108	-	12,118,314	6.00%	25,436,875
2030	3,428,112	9,417,300	-	12,845,412	6.00%	18,267,986
2031	3,539,525	10,484,770	-	14,024,295	9.18%	9,967,430
2032	3,654,560	-	-	3,654,560	-73.94%	-
2033	3,773,334	-	-	3,773,334	3.25%	-
2034	3,895,968	-	-	3,895,968	3.25%	-
2035	4,022,588	-	-	4,022,588	3.25%	-
2036	4,153,321	-	-	4,153,321	3.25%	-
2037	4,288,305	-	-	4,288,305	3.25%	-
2038	4,427,674	-	-	4,427,674	3.25%	-
2039	4,571,574	-	-	4,571,574	3.25%	-
2040	4,720,150	-	-	4,720,150	3.25%	-
2041	4,873,554	-	-	4,873,554	3.25%	-
2042	5,031,944	-	-	5,031,944	3.25%	-
2043	5,195,483	-	-	5,195,483	3.25%	-
2044	5,364,336	-	-	5,364,336	3.25%	-
2045	5,538,677	-	-	5,538,677	3.25%	-
2046	5,718,683	-	-	5,718,683	3.25%	-
2047	5,904,540	-	-	5,904,540	3.25%	-
2048	6,096,438	-	-	6,096,438	3.25%	-
2049	6,294,572	-	-	6,294,572	3.25%	-
2050	6,499,145	-	-	6,499,145	3.25%	-
2051	6,710,367	-	-	6,710,367	3.25%	-

Exhibit 3.2 - 30-Year Forecast of Cash Flow

Calendar Year	Market Value of Assets, BOY	Benefit Payments	Employee Contributions	Employer Contributions	Investment Return	Market Value of Assets, EOY
2021	$168,323,981	$14,737,423	$2,953,680	$7,661,705	$12,009,946	$176,211,889
2022	176,211,889	13,673,639	3,049,675	8,121,407	12,638,231	186,347,563
2023	186,347,563	14,427,373	3,148,789	8,608,692	13,362,395	197,040,066
2024	197,040,066	14,904,107	3,251,125	9,125,214	14,137,505	208,649,803
2025	208,649,803	15,432,496	3,356,787	9,672,726	14,977,415	221,224,235
2026	221,224,235	15,947,932	3,465,883	10,253,090	15,887,847	234,883,123
2027	234,883,123	16,463,837	3,578,524	10,868,275	16,876,860	249,742,945
2028	249,742,945	16,880,283	3,694,826	11,520,371	17,956,260	266,034,119
2029	266,034,119	17,342,214	3,814,908	12,211,593	19,137,266	283,855,672
2030	283,855,672	17,732,290	3,938,893	13,332,308	20,458,251	303,852,834
2031	303,852,834	18,153,032	4,066,907	3,474,237	21,162,222	314,403,168
2032	314,403,168	18,969,918	4,199,081	3,587,150	21,889,311	325,108,792
2033	325,108,792	19,823,564	4,335,551	3,703,733	22,626,541	335,951,053
2034	335,951,053	20,715,624	4,476,456	3,824,105	23,372,566	346,908,556
2035	346,908,556	21,647,827	4,621,941	3,948,388	24,125,848	357,956,906
2036	357,956,906	22,621,979	4,772,154	4,076,711	24,884,635	369,068,427
2037	369,068,427	23,639,968	4,927,249	4,209,204	25,646,943	380,211,855
2038	380,211,855	24,703,767	5,087,385	4,346,003	26,410,535	391,352,011
2039	391,352,011	25,815,437	5,252,725	4,487,248	27,172,899	402,449,446
2040	402,449,446	26,977,132	5,423,439	4,633,083	27,931,218	413,460,054
2041	413,460,054	28,191,103	5,599,701	4,783,658	28,682,350	424,334,660
2042	424,334,660	29,459,703	5,781,691	4,939,127	29,422,794	435,018,569
2043	435,018,569	30,785,390	5,969,596	5,099,649	30,148,658	445,451,082
2044	445,451,082	32,170,733	6,163,608	5,265,387	30,855,630	455,564,974
2045	455,564,974	33,618,416	6,363,925	5,436,512	31,538,934	465,285,929
2046	465,285,929	35,131,245	6,570,753	5,613,198	32,193,298	474,531,933
2047	474,531,933	36,712,151	6,784,302	5,795,627	32,812,905	483,212,616
2048	483,212,616	38,364,198	7,004,792	5,983,985	33,391,351	491,228,546
2049	491,228,546	40,090,587	7,232,448	6,178,464	33,921,592	498,470,463
2050	498,470,463	41,894,663	7,467,503	6,379,264	34,395,893	504,818,460

Forecast Notes

Exhibit 3.1:

- The Employer Normal Cost is expected to increase 3.25% per year.

- The Unfunded Actuarial Accrued Liability ("UAL") is computed as of January 1 of each year assuming no future gains or losses.

- The Amortization Payment of UAL is an increasing payment at 4% paid over 10 years through 2031.

- Net 3(8)(c) transfers are a level dollar amount based on the net transfers expected to be paid by the Reading Contributory Retirement Board during the current year offset by the amount received during the same period.

- Total Employer Cost is the sum of the Employer Normal Cost, net 3(8)(c) transfers and the Amortization of the UAL, all computed as of January 1 of each year and adjusted for semi-annual payments made on August 1 and December 31.

- For fiscal year 2022, we show the actual appropriation developed under the previous funding schedule of $8,059,372. For fiscal years 2023 and later, the Board has selected a funding schedule that fully amortizes the unfunded actuarial accrued liability by 2031, with annual employer costs limited to increases of 6% over the prior year.

Exhibit 3.2:

- Expected benefit payments include payments expected to be made to retired members, beneficiaries, disabled members and active members expected to retire. In addition, expected benefit payments include distribution of the annuity savings fund attributed to inactive members.

- Benefit payments exclude cost-of-living increases granted to members in pay status between 1982 and 1997. In addition, benefit payments are as expected for the first ten years of the forecast, then increase by the greater of 4.5% per year thereafter or the expected future payments for the current population projected by our computer model.

- Calendar year cash flow entries are developed as of each January 1.

SECTION 4 - DISCLOSURES

4.1 - GASB 67 and GASB 68 Disclosures

In June 2012, the GASB approved two related Statements that significantly changed the way pension plans and governments account and report pension liabilities. Effective for plans with fiscal years beginning after June 15, 2013, GASB Statement No. 67, *Financial Reporting for Pension Plans*, replaced the requirements of Statement No. 25 and effective for employers with fiscal years beginning after June 15, 2014, GASB Statement No. 68, *Accounting and Financial Reporting for Pensions*, replaced the requirements of Statement No. 27.

The pension standards reflect changes from those previously in place regarding how governments calculate total pension liability and pension expense. Further, the standards contain requirements for disclosing information in the notes to financial statements and presenting required supplementary information following the notes.

GASB 67 requires defined benefit pension plans, such as the Reading Contributory Retirement System, to present a statement of fiduciary net position (pension plan assets) and a statement of changes in fiduciary net position. Further, the statement requires that notes to financial statements include descriptive information such as the types of benefits provided, the classes of plan members covered and the composition of the pension plan's retirement board. Finally, GASB 67 requires pension plans to present in required supplementary information the sources of the changes in the net pension liability and information about the actuarially determined contributions compared with the actual contributions made to the plan and related ratios.

GASB 67 and GASB 68 require projected benefit payments be discounted to their actuarial present value using the single rate that reflects:

(1) a long-term expected rate of return on pension plan investments *to the extent that the pension plan's assets are sufficient to pay benefits and pension plan assets are expected to be invested using a strategy to achieve that return and*

(2) a tax-exempt, high-quality municipal bond rate *to the extent that the conditions for use of the long-term expected rate of return are not met.*

GASB 68 establishes standards for measuring and recognizing liabilities, deferred outflows of resources, deferred inflows of resources and pension expense by state and local governments.

The effective date for GASB 67 is for plan years beginning after June 15, 2013, which is the fiscal year ending December 31, 2014 for the Reading Contributory Retirement System. The effective date for GASB 68 is for employers' fiscal years beginning after June 15, 2014. The GASB report, submitted under separate cover and prepared as of December 31, 2020 (the measurement date), presents information to assist the Reading Contributory Retirement Board in providing the required information under GASB 68 to participating employers.

4.2 - PERAC Disclosure Information

The most recent actuarial valuation of the System was prepared by KMS Actuaries, LLC as of January 1, 2021.

Normal Cost - Employees	$2,953,680	10.0% of payroll
Normal Cost - Employers	$2,523,243	8.5% of payroll
Actuarial Liability - Active Members	$85,800,486	40% of total AAL
Actuarial Liability - Retired and Inactive Members	127,088,912	60% of total AAL
Total Actuarial Liability (AAL)	$212,889,398	
System Assets	$160,717,539	
Unfunded Actuarial Accrued Liability	$52,171,859	
Funded Status	75.5%	

Principal actuarial assumptions used in the valuation:

Investment Return	7.00%
Rate of Salary Increase	Based on service, 6% graded down to 4.25% for Group 1
	Based on service, 7% graded down to 4.75% for Group 4

4.3 - Risk Measures

The Reading Contributory Retirement System is subject to certain risks that could affect the plan's future financial condition. Here we identify the primary risks to the System, provide some background information about those risks, and provide an assessment of those risks in accordance with Actuarial Standards of Practice (ASOP) 51.

Risk is the potential of actual future measurements deviating from expected future measurements resulting from actual future experience deviating from actuarially assumed experience. Examples of potential risks that may be reasonably anticipated to significantly affect the future financial condition of the plan include the following:

- **Investment Risk** - the potential that investment returns will be different than expected.
- **Asset/Liability Mismatch Risk** - the potential that changes in asset values are not matched by changes in the value of liabilities.
- **Interest Rate Risk** - the potential that interest rates will be different than expected.
- **Longevity and Other Demographic Risks** - the potential that mortality or other demographic experience will be different than expected.
- **Contribution Risk** - the potential of actual future contributions deviating from expected future contributions. For example, that actual contributions are not made in accordance with the plan's funding policy, that other anticipated payments to the plan are not made, or that material changes occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base.

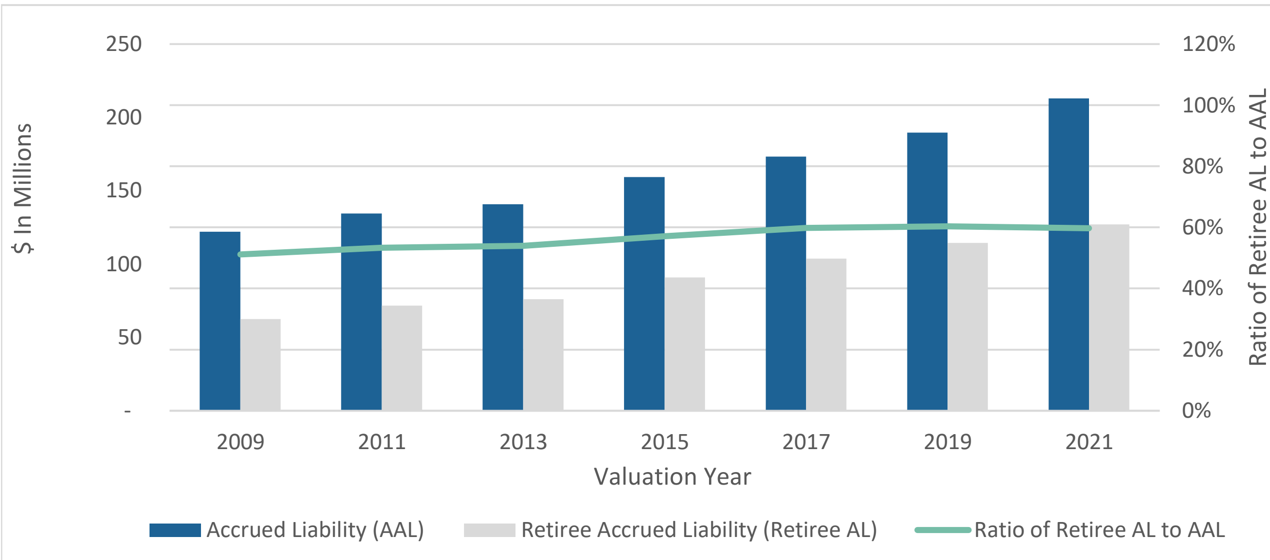
We have provided several risk measures in this section that we believe are most significant for the plan. However, we believe that a more rigorous assessment of risk would be beneficial to the Board to understand the risks identified above, such as:

- Scenario Test - a process for assessing the impact of one possible event, or several simultaneous or sequentially occurring possible events, on a plan's financial condition.
- Sensitivity Test - a process for assessing the impact of a change in an actuarial assumption on an actuarial measurement.
- Stochastic Modeling - a process for generating numerous potential outcomes by allowing for random variations in one or more inputs over time for the purpose of assessing the distribution of those outcomes.
- Stress Test - a process for assessing the impact of adverse changes in one or relatively few factors affecting a plan's financial condition.

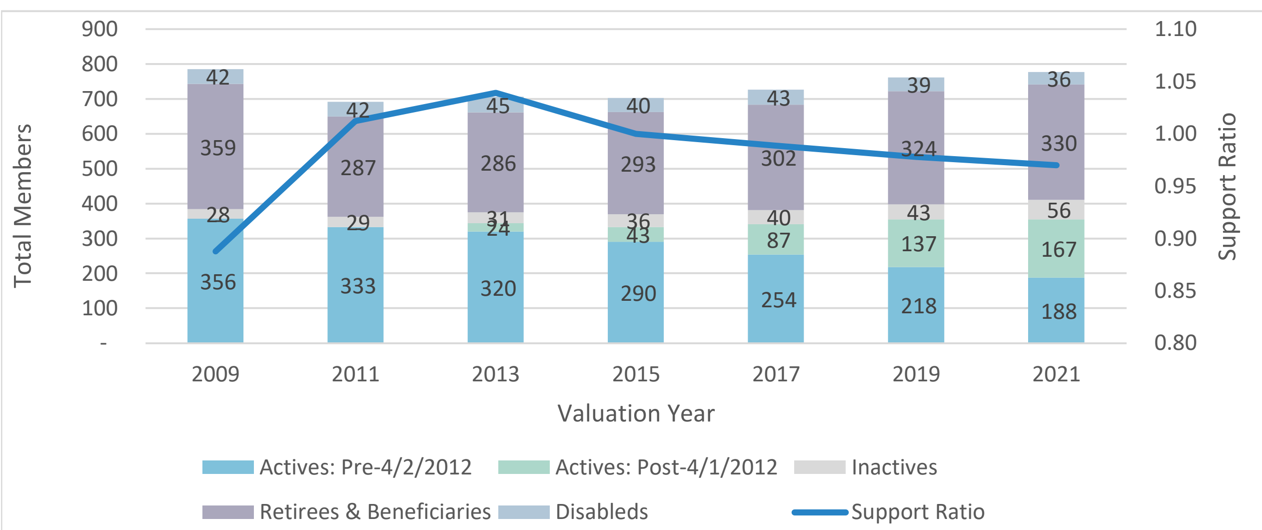
4.3 - Risk Measures

Maturity Measures

As retirement systems mature they become much more sensitive to risks. This is because a higher proportion of the actuarial liability is attributable to participants who are no longer active. Plan maturity measures are helpful in understanding the risks associated with a plan. One such maturity measure is the ratio of the system's retiree liability to its total liabiity. A retirement system in its infancy will have a very low ratio of retiree liability to total liability. As the system matures, the ratio starts increasing. A mature plan will often have a ratio above 60%. For the Reading Contributory Retirement System and other retirement systems in the United States these ratios have been steadily increasing in recent years.



Another maturity measure is the ratio of actives to retirees, or support ratio. A retirement system in its infancy will have a very high ratio of active to retired members. As the system matures, and members retire, the support ratio starts declining. A mature system will often have a support ratio near or below one.



4.3 - Risk Measures

Volatility Indices

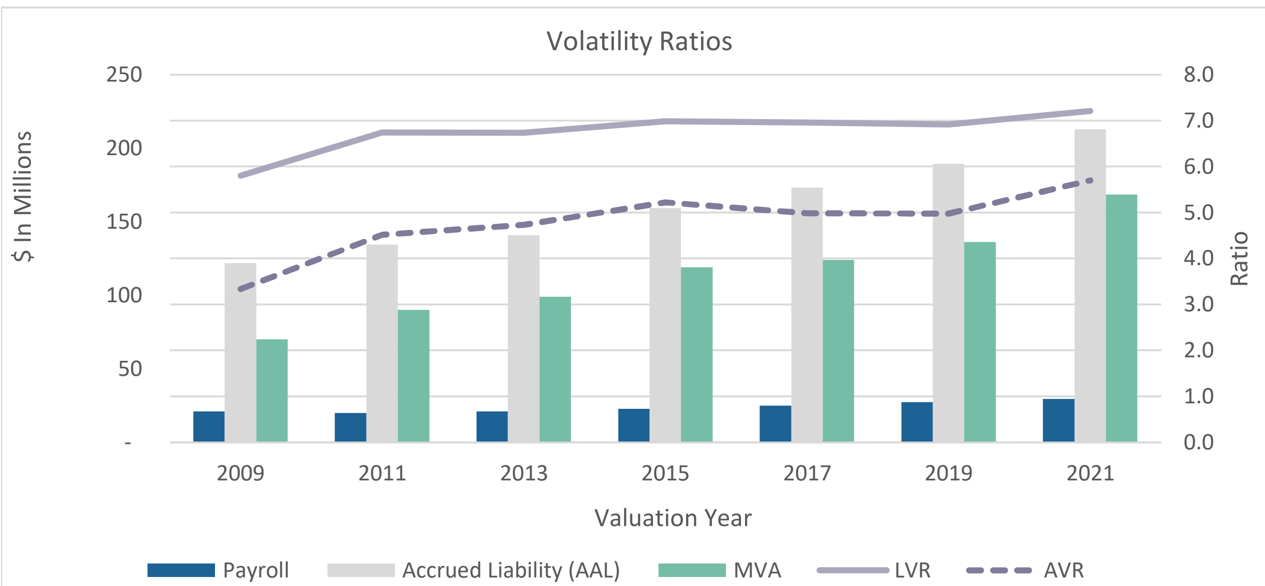
Volatility indices are measures of the relative sensitivity of employer contributions to changes in assets or liabilities. Below we present two such indices - the Asset Volatility Ratio (AVR) and the Liability Volatility Ratio (LVR):

Asset Volatility Ratio (AVR)

The Asset Volatility Ratio (AVR) is the ratio of the Market Value of Assets (MVA) to Payroll. Systems with a higher AVR experience more volatile employer contributions (as a percentage of payroll) due to investment return. This ratio indicates a measure of the system's current contribution volatility. The AVR increases over time but generally tends to stabilize as the system matures.

Liability Volatility Ratio (LVR)

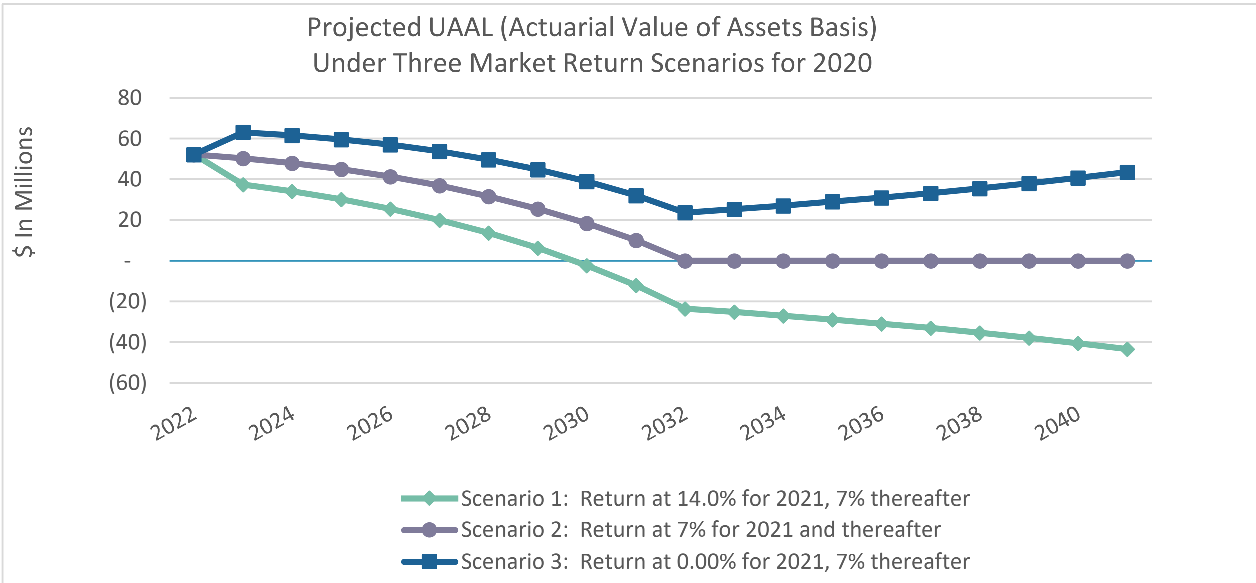
The Liability Volatility Ratio (LVR) is the ratio of the Actuarial Accrued Liability (AAL) to Payroll. Systems with a higher LVR experience more volatile employer contributions (as a percentage of payroll) due to the investment return assumption and changes in liability. This ratio indicates a longer-term potential for contribution volatility. The AVR, described above, will tend to move close to the LVR as the system matures.



4.3 - Risk Measures

Market Return Scenarios

Below we illustrate the projected effect on funding levels of a single year of investment return above or below the assumed investment return. Scenario 1 assumes a one-year return of 2 times the assumed return and the expected return thereafter, Scenario 2 assumes assets earn the expected return every year and Scenario 3 assumes a one-year return of 0% and the expected return thereafter.



Sensitivity Analysis

The following presents the Actuarial Accrued Liability and Funded Status calculated using the investment return rate of 7%, as well as what the Actuarial Accrued Liability and Funded Status would be if it were calculated using an investment return rate 1-percentage point lower (6%) or 1-percentage point higher (8%) than the assumed investment return rate:

	1% Decrease (6%)	Current Investment Return Rate (7%)	1% Increase (8%)
Actuarial Accrued Liability	$236,874,662	$212,889,398	$192,583,774
% Change	11%		-10%
Actuarial Value of Assets	$160,717,539	$160,717,539	$160,717,539
Unfunded Actuarial Accrued Liability	76,157,123	52,171,859	31,866,235
% Change	46%	N/A	-39%
Funded Status	67.85%	75.49%	83.45%

4.3 - Risk Measures

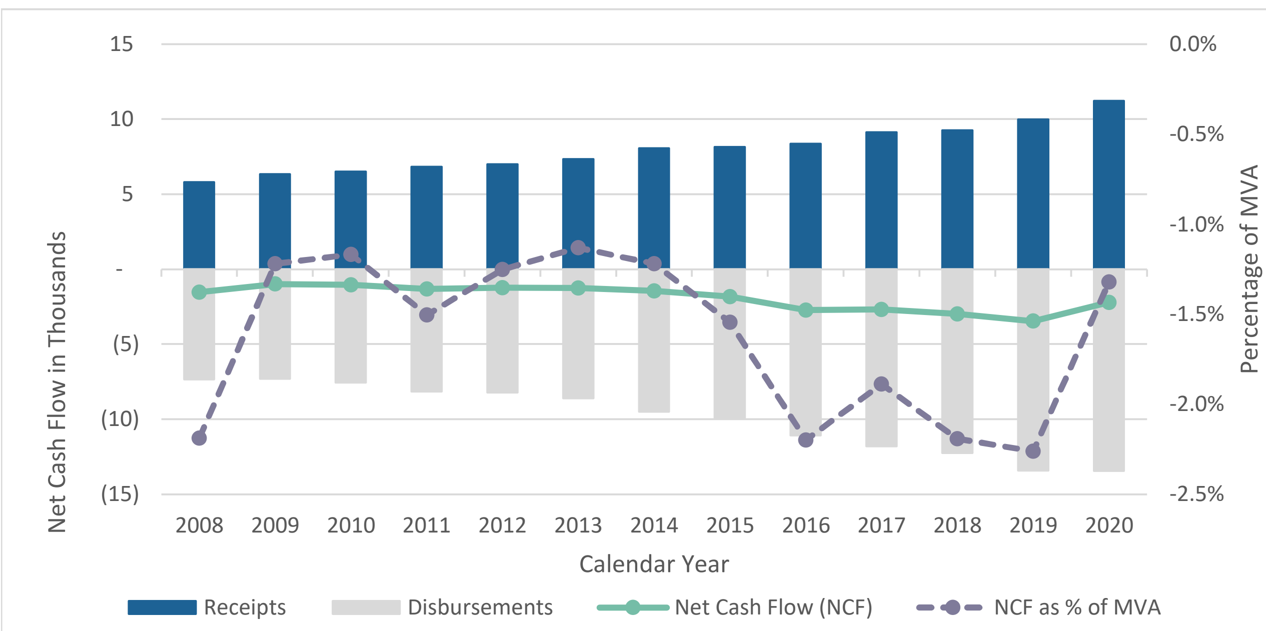
Duration

Duration is another measure that is used to describe how the present value of a cash flow series changes when small changes are made to the underlying interest rates. The duration of the Reading Contributory Retirement System is 10, and this represents an approximate percentage change in the Actuarial Accrued Liability for each 1% change to the investment return rate.

Net Cash Flow (NCF)

Net cash flow (NCF) during a year is the difference between contributions, both employer and employee, paid into the System and benefit payments and expenses paid from the System. If the level of benefit payments plus expenses is greater than contributions, then the System has negative NCF. Mature plans generally have a negative NCF as the number of retirees grows. When a System has negative NCF, then additional cash from existing assets are needed to pay the pension benefits.

Historical NCF since 2008 is shown in the next graph. Blue bars indicate contributions, from employees and employers, and grey bars show benefit payments and administrative expenses. The NCF is represented by the green line. The dashed purple line (which corresponds to the right-hand axis) provides the NCF as a percentage of the Market Value of Assets. As of December 31, 2020, the NCF was negative $2.2 million, which represents -1.3% of the Market Value of Assets. The NCF falls within the range of -2.3% to -1.1% of total assets over the 13-year period.



SECTION 5 - SUMMARY OF PLAN PROVISIONS

Administration	There are 104 contributory retirement systems for public employees in Massachusetts. Each system is governed by a retirement board and all boards, although operating independently, are governed by Chapter 32 of the Massachusetts General Laws and other applicable statutes. This law in general provides uniform benefits, uniform contribution requirements and a uniform accounting and funds structure for all systems.
Participation	Participation is mandatory for all full-time employees. Eligibility with respect to part-time, provisional, temporary, seasonal or intermittent employment is governed by regulations promulgated by the local retirement board, and approved by PERAC. Membership is optional for certain elected officials.
Membership Groups	There are four membership groups in the Retirement System:

Group 1	General employees, including clerical, administrative, technical and all other employees not otherwise classified.
Group 2	Certain specified hazardous duty positions.
Group 3	State police officers and inspectors.
Group 4	Local police officers, firefighters and other specified hazardous positions.

For members in more than one group, participation will be proportional.

Member Contributions — Member contributions vary depending on the most recent date of membership:

Prior to 1975	5% of Salary
1975 – 1983	7% of Salary
1984 – June 30, 1996	8% of Salary
July 1, 1996 – present	9% of Salary
1979 – present	An additional 2% of Salary in excess of $30,000.
Group 1 members hired on or after April 2, 2012	6% of Salary with 30 or more years of creditable service.

Rate of Interest — Interest on regular deductions made after January 1, 1984 is a rate established by PERAC in consultation with the Commissioner of Banks. The rate is obtained from the average rates paid on individual savings accounts by a representative sample of at least ten financial institutions.

Retirement Age

The mandatory retirement age for some Group 2 and Group 4 members is age 65. Most Group 2 and Group 4 members may remain in service after reaching age 65. Group 4 members who are employed in certain public safety positions are required to retire at age 65. There is no mandatory retirement age for members in Group 1.

Salary

Gross regular compensation. This does not include bonuses, overtime, severance pay, unused sick leave credit or other similar compensation.

Average Salary

Membership before April 2, 2012

- Average annual rate of regular compensation received during the three consecutive years that produce the highest average, or, if greater, during the last three years (whether or not consecutive) preceding retirement.

Membership on or after April 2, 2012

- Average annual rate of regular compensation received during the five consecutive years that produce the highest average, or, if greater, during the last five years (whether or not consecutive) preceding retirement.

Creditable Service

The period during which a member contributes to the retirement system plus certain periods of military service and "purchased" service.

Benefit Rate

The benefit rate varies with the member's retirement age, Group, membership date and years of creditable service at retirement. Each year a member retires prior to the age at which the 2.5% maximum benefit rate applies, a reduction is applied to each year of age under the maximum age. The maximum age and reduction for each Group and membership date is as follows:

	Group 1	Group 2	Group 4
2.5% for Membership before April 2, 2012:			
Maximum age:	65	60	55
Reduction:	0.1%	0.1%	0.1%
2.5% for Membership on or after April 2, 2012 (less than 30 years of service):			
Maximum age:	67	62	57
Reduction:	0.15%	0.15%	0.15%
2.5% for Membership on or after April 2, 2012 (30+ years of service):			
Maximum age:	67	62	57
Reduction:	0.125%	0.125%	0.125%

Superannuation Retirement	Eligibility if membership before April 2, 2012	♦ completion of 20 years of Creditable Service, or ♦ attainment of age 55 if hired prior to 1978, or ♦ attainment of age 55 with 10 years of Creditable Service, if hired after 1978.
	Eligibility if membership on or after April 2, 2012	♦ attainment of age 60 with 10 years of Creditable Service if classified in Group 1 ♦ attainment of age 55 with 10 years of Creditable Service if classified in Group 2 ♦ attainment of age 55 if classified in Group 4
	Benefit Amount	Product of the member's Benefit Rate, Average Salary and Creditable Service.
	Maximum Benefit	80% of the member's Average Salary.
	Veteran's Benefit	Additional benefit of $15 per year of Creditable Service, up to a maximum of $300.
Deferred Vested	Eligibility	♦ completion of ten or more years of Creditable Service. ♦ elected officials hired prior to 1978, completion of six years of Creditable Service.
	Benefit Amount	Accrued benefit payable commencing at age 55, or the completion of 20 years of Creditable Service, or may be deferred until later at the participant's option.
Withdrawal of Contributions		Contributions may be withdrawn upon termination of employment. ♦ Members hired on or after January 1, 1984 who terminate with less than ten years of Creditable Service receive contributions plus interest on the Annuity Savings Account at an annual rate of 3%. ♦ All other withdrawals receive contributions plus 100% of the regular interest that has accrued to the Annuity Savings Account.

Ordinary Disability Retirement	Eligibility	Non-job related disability after completion of ten years of Creditable Service.
	Benefit Amount for Group 1 membership before April 2, 2012 or Group 2 or Group 4	Superannuation benefit determined if the member is age 55, up to a maximum of 80% of Average Salary over three years. If the member is a veteran, 50% of final rate of salary (final year) plus an annuity based on the accumulated member contributions plus credited interest, up to a maximum of 80% of Average Salary over five years.
	Benefit Amount for Group 1 membership on or after April 2, 2012	Superannuation benefit determined if the member is age 60, up to a maximum of 80% of Average Salary over three years. If the member is a veteran, 50% of final rate of salary (final year) plus an annuity based on the accumulated member contributions plus credited interest, up to a maximum of 80% of Average Salary over five years.
Accidental Disability Retirement	Eligibility	Disabled as a result of an accident in the performance of duties. There is no minimum age or service requirement.
	Benefit Amount	72% of Salary plus an annuity based on accumulated member contributions plus credited interest.
	Maximum Benefit	100% of Salary if hired before January 1, 1988, otherwise 75% of Salary.
	Veteran's Benefit	Additional allowance of $15 per year of Creditable Service, up to a maximum of $300.
	Supplemental Dependent Allowance	Additional allowance of $980.88 per year for each child until age 18 (or age 22 if a full-time student).
Non-Occupational Death	Eligibility	For members with at least two years of creditable service who die while in active service, but not due to occupational injury.
	Benefit Amount	Benefit as if Option C had been elected. Minimum benefit of $250 per month for surviving spouse, $120 per month for first child and $90 per month for each additional child.

Accidental Death	Eligibility	For members who die as a result of an occupational injury.
	Benefit Amount	72% of Salary plus an annuity based on accumulated member contributions plus credited interest.
	Maximum Benefit	100% of Salary if hired before January 1, 1988, otherwise 75% of Salary.
	Veteran's Benefit	Additional allowance of $15 per year of creditable service, up to a maximum of $300.
	Supplemental Dependent Allowance	Additional allowance of $980.88 per year for each child until age 18 (or age 22 if a full-time student).

Cost-of-Living Adjustment (COLA)

In accordance with the adoption of Chapter 17 of the Acts of 1997, the granting of a Cost-of-Living Adjustment will be determined by an annual vote by the Retirement Board. The amount of increase will be based upon the Consumer Price Index, limited to a maximum of 3.0%, beginning on July 1. All retirees, disabled retirees and beneficiaries who have been receiving benefit payments for at least one year as of July 1 are eligible for the adjustment. The maximum amount of pension benefit subject to a COLA is $14,000. All COLAs granted to members after 1981 and prior to July 1, 1998 are deemed to be an obligation of the Commonwealth of Massachusetts and are not the liability of the Retirement System.

Optional Forms of Payment

A member may elect to receive his or her retirement allowance, payable in monthly installments, in one of three forms of payment:

♦ Option A – Total annual allowance commencing at retirement and terminating at member's death.

♦ Option B – A reduced annual allowance commencing at retirement with death benefit equal to excess of member contributions plus credited interest to retirement over annuity benefit paid to member.

♦ Option C – A reduced annual allowance commencing at retirement with 66⅔% of benefit continued to designated beneficiary upon death of member. For members who retired on or after January 12, 1988, if the beneficiary pre-deceases the retiree, the benefit payable increases based on the factor used to determine the Option C benefit at retirement. For members who retired prior to January 12, 1988, if the System has accepted Section 288 of Chapter 194 of the Acts of 1998 and the beneficiary pre-deceases the retiree, the benefit payable increases based on the factor used to determine the Option C benefit at retirement.

SECTION 6 - ACTUARIAL ASSUMPTIONS AND METHODS

Valuation Date

January 1, 2021

Investment Return

7.00% per year. Previously, 7.50% per year.

The investment return assumption is a long-term assumption based on capital market expectations by asset class, historical returns and professional judgment. We considered analysis prepared by PRIM's investment advisor using a building block approach and using the target asset allocation, expected returns by asset class and risk analysis to determine a long-term expected average annual rate of return.

Annuity Savings Fund Interest Rate

2.00% per year

Amortization Method

Unfunded Actuarial Accrued Liability (UAL):

Increasing dollar amount at 4% to reduce the Unfunded Actuarial Accrued Liability to zero on or before June 30, 2031.

Salary Scale

The assumed annual rates for salary increases including longevity are illustrated by the following rates:

Years of Service	Groups 1 and 2	Group 4
0	6.00%	7.00%
1	5.50%	6.50%
2	5.50%	6.00%
3	5.25%	5.75%
4	5.25%	5.25%
5	4.75%	5.25%
6	4.75%	4.75%
7	4.50%	4.75%
8	4.50%	4.75%
9+	4.25%	4.75%

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

Cost-of-Living Allowance

Cost-of-Living Allowances (COLA) are assumed to be 3% of the pension amount, capped at $420 per year.

Mortality Rates

RP-2014 Blue Collar Mortality Table with full generational mortality improvement using Scale MP-2018. For disabled members, RP-2014 Blue Collar Mortality Table set forward one year with full generational mortality improvement using Scale MP-2018.

General Employees: 55% of deaths are job-related.

Police and Fire : 90% of deaths are job-related.

PERAC completed a local system retiree mortality study in 2019 and selected the RP-2014 Blue Collar Mortality Table with full generational mortality improvement using Scale MP-2018. The underlying tables with generational mortality improvement selected reasonably reflect the mortality experience of the System as of the valuation date based on historical and current demographic data as well as professional judgement.

Turnover Rates

Illustrative turnover rates are shown below:

Creditable Service	Groups 1 and 2	Group 4
0	0.1500	0.0150
10	0.0540	0.0150
20	0.0200	0.0000
30	0.0000	0.0000

Disability Rates

Illustrative disability rates are shown below:

Attained Age	Groups 1 and 2	Group 4
20	0.0001	0.0010
30	0.0003	0.0030
40	0.0010	0.0030
50	0.0019	0.0125
60	0.0028	0.0085

General Employees: 55% of disabilities are accidental and 45% are ordinary.

Police and Fire : 90% of disabilities are accidental and 10% are ordinary.

Retirement Rates

Illustrative retirement rates are shown below:

Attained Age	Groups 1 and 2		Group 4
	Male	Female	Male & Female
50	0.0100	0.0150	0.0200
51	0.0100	0.0150	0.0200
52	0.0100	0.0200	0.0200
53	0.0100	0.0250	0.0500
54	0.0200	0.0250	0.0750
55	0.0200	0.0550	0.1500
56	0.0250	0.0650	0.1000
57	0.0250	0.0650	0.1000
58	0.0500	0.0650	0.1000
59	0.0650	0.0650	0.1500
60	0.1200	0.0500	0.2000
61	0.2000	0.1300	0.2000
62	0.3000	0.1500	0.2500
63	0.2500	0.1250	0.2500
64	0.2200	0.1800	0.3000
65	0.4000	0.1500	1.0000
66	0.2500	0.2000	1.0000
67	0.2500	0.2000	1.0000
68	0.3000	0.2500	1.0000
69	0.3000	0.2000	1.0000
70	1.0000	1.0000	1.0000

The turnover, disability and retirement rates are based on PERAC's most recent experience analysis of local retirement systems which reviewed age, gender and job group. The assumptions reflect this analysis as well as professional judgment.

Actuarial Cost Method

Individual Entry Age Normal.

Actuarial Asset Method

The Actuarial Value of Assets is determined as follows:

a) A preliminary Actuarial Value of Assets is developed and equals the Actuarial Value of Assets from the prior year plus contributions and receipts minus benefit payments and expenses plus expected investment earnings.

b) An adjustment is added to a) that equals 20% of the excess of the Market Value at the end of the year over the preliminary Actuarial Value of Assets developed in a) above.

c) The Actuarial Value of Assets is further constrained to be not less than 80% or more than 120% of Market Value.

SECTION 6 - ACTUARIAL ASSUMPTIONS AND METHODS

Census Data	Census data as of the valuation date were submitted by the Retirement Board.
Asset Data	Asset information is reported annually to the Public Employee Retirement Administration Commission by the Reading Contributory Retirement Board.
Dependents	80% of all members will be survived by a spouse. Age assumption for spouses is that males are assumed to be three years older than females.
Net Section 3(8)(c) Transfers	Reimbursements paid to and received from other retirement systems for that portion of a retiree's pension that is based on service earned in another retirement system. Net 3(8)(c) transfers are assumed to be $0 per year.
Administrative Expenses	The anticipated administrative expenses for the fiscal year. For Fiscal Year 2022, the administrative expenses were assumed to be $290,000 and are anticipated to increase 3.25% per year. The administrative expense assumption is based on information relating to the System's administrative expenses provided by the Retirement System.

Exhibit 7.1 - Summary of Census Data as of January 1, 2021

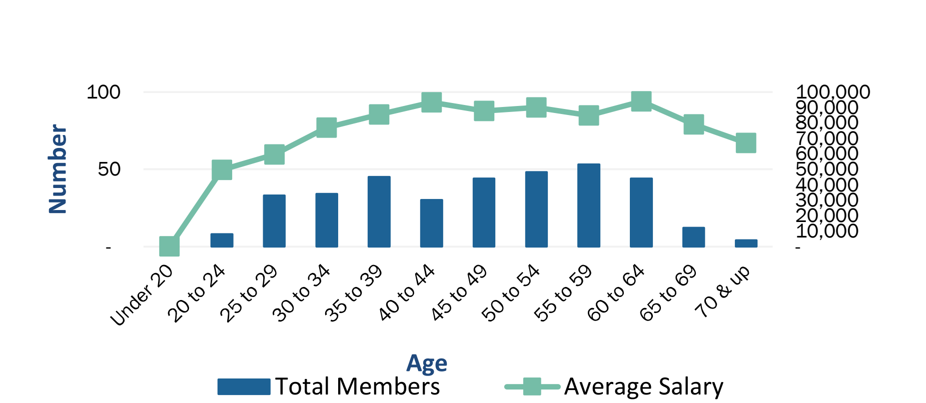
Census data as of December 31, 2020 was provided to us by the Retirement Board. We performed edits on the data to ensure that it is reasonable and complete and made certain assumptions regarding any missing or invalid data so that results are not materially affected. Presented on the following pages are summaries of the demographic profile of active members (Exhibit 7.2) and retired plan members and beneficiaries and disabled plan members (Exhibit 7.3). Below, we present a comparison of the census data from the current and prior valuations:

Valuation Date	January 1, 2021	January 1, 2019	% Change
Census Data			
Active Members	355	355	0.0%
Average Age	46.9	47.0	(0.3%)
Average Service	12.7	12.8	(0.5%)
Valuation Salary	$29,612,763	$27,381,485	8.1%
Average Salary	$83,416	$77,131	8.1%
Retired Members and Beneficiaries	330	324	1.9%
Average Age	74.8	74.5	0.4%
Total Annual Retirement Allowance	$10,973,624	$10,263,921	6.9%
Average Annual Retirement Allowance	$33,253	$31,679	5.0%
State Reimbursed COLAs	$46,457	$61,120	(24.0%)
Total System-Funded Retirement Allowance	$10,927,167	$10,202,801	7.1%
Disabled Members	36	39	(7.7%)
Average Age	67.3	67.2	0.0%
Total Annual Retirement Allowance	$1,394,948	$1,421,542	(1.9%)
Average Annual Retirement Allowance	$38,749	$36,450	6.3%
State Reimbursed COLAs	$26,490	$37,110	(28.6%)
Total System-Funded Retirement Allowance	$1,368,458	$1,384,432	(1.2%)
Inactive Members	56	43	30.2%
Annuity Savings Fund	$1,673,863	$1,285,478	30.2%

Exhibit 7.2 - Active Members by Age and Years of Service as of January 1, 2021

	Years of Service											
Attained Age	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 & up	Total	Total Salary	Average Salary
Under 20	-	-	-	-	-	-	-	-	-	-	-	-
20 to 24	8	-	-	-	-	-	-	-	-	8	396,248	49,531
25 to 29	28	5	-	-	-	-	-	-	-	33	1,964,181	59,521
30 to 34	17	16	1	-	-	-	-	-	-	34	2,616,543	76,957
35 to 39	14	13	17	1	-	-	-	-	-	45	3,839,835	85,330
40 to 44	6	6	1	13	4	-	-	-	-	30	2,798,354	93,278
45 to 49	4	7	4	15	10	3	1	-	-	44	3,854,182	87,595
50 to 54	5	9	10	7	6	5	6	-	-	48	4,314,677	89,889
55 to 59	10	9	5	6	5	8	8	2	-	53	4,485,299	84,628
60 to 64	5	9	11	3	4	2	6	3	1	44	4,129,488	93,852
65 to 69	3	1	3	-	2	-	1	-	2	12	946,066	78,839
70 & up	-	1	1	-	1	-	1	-	-	4	267,891	66,973
Total	100	76	53	45	32	18	23	5	3	355	29,612,763	83,416
Average Salary	70,590	77,753	81,812	94,882	92,303	104,467	103,949	105,014	96,259			

Average Age: 46.88 Average Service: 12.74



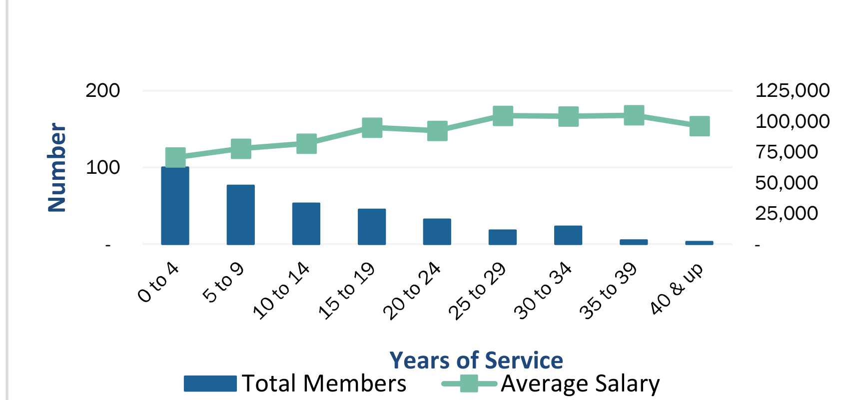
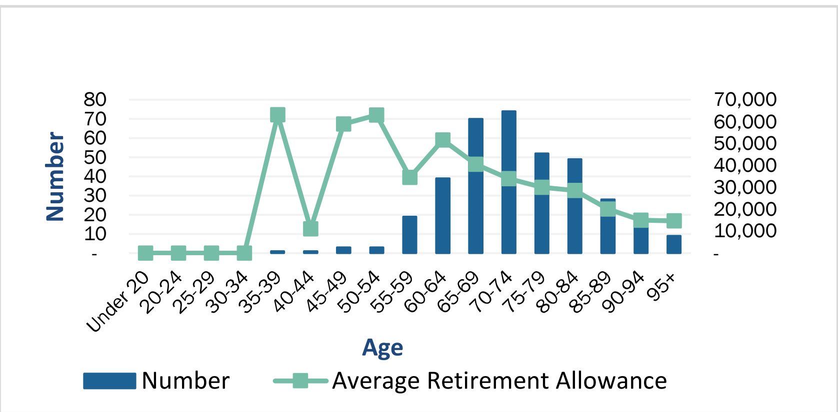
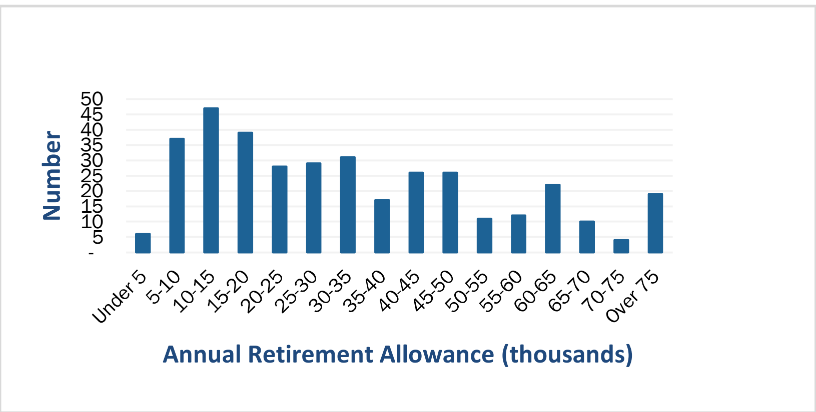


Exhibit 7.3 - Annual Retirement Allowances as of January 1, 2021

Attained Age	Service Retirements Number	Service Retirements Annual Retirement Allowance	Disability Retirements Number	Disability Retirements Annual Retirement Allowance	Beneficiaries Number	Beneficiaries Annual Retirement Allowance
Under 20	0	0	0	0	0	0
20-24	0	0	0	0	0	0
25-29	0	0	0	0	0	0
30-34	0	0	0	0	0	0
35-39	0	0	1	63,044	0	0
40-44	0	0	0	0	1	11,069
45-49	1	63,329	2	113,443	0	0
50-54	1	73,774	2	115,146	0	0
55-59	12	417,938	4	192,689	3	44,102
60-64	34	1,811,068	4	169,687	1	32,130
65-69	60	2,518,390	6	216,683	4	101,286
70-74	57	1,969,347	9	299,865	8	237,770
75-79	42	1,292,444	3	77,534	7	187,188
80-84	45	1,289,295	3	95,801	1	9,973
85-89	18	351,127	2	51,056	8	160,219
90-94	13	207,773	0	0	5	62,817
95+	5	69,025	0	0	4	63,560
Total	288	10,063,510	36	1,394,948	42	910,114
Average Age	74.3		67.3		78.3	
Average Retirement Allowance		34,943		38,749		21,669





Actuarial Accrued Liability – That portion of the Actuarial Present Value of pension plan benefits which is not provided by future Normal Costs or employee contributions. It is the portion of the Actuarial Present Value attributable to service rendered as of the Valuation Date.

Actuarial Assumptions – Assumptions, based upon past experience or standard tables, used to predict the occurrence of future events affecting the commencement, amount and duration of pension benefits, such as: changes in compensation, mortality, withdrawal, disablement and retirement; rates of investment earnings and asset appreciation or depreciation; and any other relevant items.

Actuarial Cost Method (or Funding Method) – A procedure for allocating the Actuarial Present Value of all past and future pension plan benefits to the current year (Normal Cost) and the past (Actuarial Accrued Liability).

Actuarial Gain or Loss (or Experience Gain or Loss) – A measure of the difference between actual experience and that expected based upon the set of Actuarial Assumptions, during the period between the valuation date and the most recent immediately preceding valuation date.

Actuarial Present Value – The dollar value on the valuation date of all benefits expected to be paid to current members based upon the Actuarial Assumptions and the terms of the Plan.

Amortization Payment – That portion of the pension plan appropriation which represents payments made to pay interest on and the reduction of the Unfunded Accrued Liability.

Annual Statement – The statement submitted by the local retirement board to PERAC each year that describes the asset holdings and Fund balances as of December 31 and the transactions during the calendar year that affected the financial condition of the retirement system.

Annuity Reserve Fund – The fund into which total accumulated Member Contributions, including interest, is transferred at the time a member retires, and from which annuity payments are made.

Annuity Savings Fund – The fund in which Member Contributions plus interest credited are held for active members and for former members who have not withdrawn their contributions and are not yet receiving a benefit (inactive members).

Assets – The total value of the investments held by the Plan trust that are for the payment of promised benefits. Employer appropriations and Member Contributions, as well as investment earnings, are added to the Plan trust. Benefit payments and other disbursements are withdrawn from the Plan trust. For valuation purposes, assets are usually measured at market value.

Cost of Benefits – The estimated payment from the pension system for benefits for the fiscal year.

Expense Fund – The fund into which the appropriation for administrative expenses is paid and from which all such expenses are paid.

Funded Ratio – The Actuarial Value of Assets expressed as a percentage of the Actuarial Accrued Liability.

Funding Schedule – The schedule based upon the most recently approved actuarial valuation which sets forth the amount which would be appropriated to the pension system in accordance with Section 22D and Section 22F of M.G.L. Chapter 32.

GASB – Governmental Accounting Standards Board.

Normal Cost – Total Normal Cost is that portion of the Actuarial Present Value of pension plan benefits which is expected to accrue in the current fiscal year. The Employee Normal Cost is the amount of the expected Member Contributions for the current fiscal year. The Employer Normal Cost is the difference between the Total Normal Cost and the Employee Normal Cost.

Pension Fund – The fund into which appropriation amounts as determined by PERAC are paid and from which pension benefits are paid.

Pension Reserve Fund – The fund which shall be credited with all amounts set aside by a system for the purpose of establishing a reserve to meet future pension liabilities. These amounts would include excess interest earnings.

Present Value of Future Benefits – The actuarial present value of the cost to finance benefits payable in the future, discounted to reflect the expected effects of the time value of money and the probabilities of payment.

Special Fund for Military Service Credit – The fund which is credited with amounts paid by the retirement board equal to the amount which would have been contributed by a member during a military leave of absence as if the member had remained in active service of the retirement board. In the event of retirement or a non-job related death, such amount is transferred to the Annuity Reserve Fund. In the event of termination prior to retirement or death, such amount shall be transferred to the Pension Fund.

Total Pension Liability – The portion of the Actuarial Present Value attributable to past service in accordance with the Entry Age cost method as stipulated by GASB Statement Number 67 (GASB 67).

Unfunded Actuarial Accrued Liability – The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets.

SECTION 9 - RESULTS BY DEPARTMENT

Department	Storm Water Enterprise	Housing	Municipal Light	School	Sewer	Water	Retirement	Town	Total
Summary of Member Data as of January 1, 2021									
Active Members	2	3	66	49	4	11	2	218	355
Average Age	45.3	50.6	51.2	50.4	42.2	43.3	56.2	44.9	46.9
Average Service	5.7	5.9	14.3	8.3	16.5	14.0	9.3	13.3	12.7
Salary	92,578	226,691	7,414,484	3,014,511	234,331	712,855	156,985	17,760,329	29,612,763
Average Salary	46,289	75,564	112,341	61,521	58,583	64,805	78,493	81,469	83,416
Retired Members and Survivors	0	7	74	93	4	8	0	144	330
Annual Pensions	0	217,801	3,431,463	1,440,410	65,403	319,638	0	5,498,908	10,973,624
Average Age	0.0	73.2	71.9	78.7	72.8	71.2	0.0	74.1	74.8
Disabled Members	0	0	7	1	1	2	0	25	36
Annual Pensions	0	0	306,153	31,008	30,288	65,473	0	962,025	1,394,948
Average Age	0.0	0.0	64.0	62.7	77.9	63.5	0.0	68.3	67.3
Inactive Members	1	0	6	12	1	3	1	32	56
Annuity Savings Fund	42,463	0	216,292	474,704	13,148	79,433	18,319	829,504	1,673,863
Normal Cost as of January 1, 2021									
1.1 Total Normal Cost	3,514	36,118	1,521,362	440,696	24,345	78,428	25,569	3,056,891	5,186,923
1.2 Administrative Expenses	196	2,019	85,059	24,639	1,361	4,385	1,430	170,911	290,000
1.3 Total Normal Cost = 1.1 + 1.2	3,710	38,137	1,606,421	465,335	25,706	82,813	26,999	3,227,802	5,476,923
1.4 Employee Normal Cost	3,894	23,136	747,225	291,781	22,725	69,353	16,068	1,779,498	2,953,680
1.5 Employer Normal Cost = 1.3 - 1.4	(184)	15,001	859,196	173,554	2,981	13,460	10,931	1,448,304	2,523,243
1.6 Adjusted for payment timing	(194)	15,780	903,791	182,562	3,136	14,159	11,498	1,523,475	2,654,207
Actuarial Accrued Liability as of January 1, 2021									
2.1 Active Employees	145,593	278,015	23,127,029	4,687,625	773,269	1,882,385	353,126	54,553,444	85,800,486
2.2 Retired Members and Survivors	0	2,379,024	36,513,238	12,831,572	808,231	3,379,322	0	54,150,275	110,061,662
2.3 Disabled Members	0	0	3,695,570	432,808	218,654	827,797	0	10,178,558	15,353,387
2.4 Inactive Members	42,463	0	216,292	474,704	13,148	79,433	18,319	829,504	1,673,863
2.5 Total = 2.1 + 2.2 + 2.3 + 2.4	188,056	2,657,039	63,552,129	18,426,709	1,813,302	6,168,937	371,445	119,711,781	212,889,398
Actuarial Value of Plan Assets as of January 1, 2021									
3.1 Actuarial Value of Assets	281,655	1,524,494	50,945,607	12,554,549	1,187,482	4,632,846	122,692	89,468,214	160,717,539

SECTION 9 - RESULTS BY DEPARTMENT

Department	Storm Water Enterprise	Housing	Municipal Light	School	Sewer	Water	Retirement	Town	Total
Unfunded Actuarial Accrued Liability (UAAL) as of January 1, 2021									
4.1 UAL = 2.5 - 3.1	(93,599)	1,132,545	12,606,522	5,872,160	625,820	1,536,091	248,753	30,243,567	52,171,859
Projected Payroll	92,578	226,691	7,414,484	3,014,511	234,331	712,855	156,985	17,760,329	29,612,763
FY2022 Appropriation									
5.1 Employer Normal Cost	(194)	15,780	903,791	182,562	3,136	14,159	11,498	1,523,475	2,654,207
5.2 Amortization Payment of UAL*	194	65,621	1,236,670	426,349	51,781	202,085	(11,498)	3,433,963	5,405,165
5.3 Total = 5.1 + 5.2	0	81,401	2,140,461	608,911	54,917	216,244	0	4,957,438	8,059,372
FY2023 Appropriation									
6.1 Employer Normal Cost	(200)	16,293	933,164	188,495	3,238	14,619	11,872	1,572,987	2,740,468
6.2 Amortization Payment of UAL**	(11,637)	132,376	1,410,687	675,676	71,223	165,514	32,290	3,326,336	5,802,465
6.3 Total = 6.1 + 6.2	(11,837)	148,669	2,343,851	864,171	74,461	180,133	44,162	4,899,323	8,542,933
6.4 Adjusted Appropriation***	11,837	565	8,902	3,282	283	684	(44,162)	18,609	0
6.5 Total = 6.3 + 6.4	**0**	**149,234**	**2,352,753**	**867,453**	**74,744**	**180,817**	**0**	**4,917,932**	**8,542,933**
Increase over prior year	0.000%	83.332%	9.918%	42.460%	36.104%	-16.383%	0.000%	-0.797%	6.000%
FY2024 Appropriation									
7.1 Employer Normal Cost	(207)	16,823	963,492	194,621	3,343	15,094	12,258	1,624,110	2,829,534
7.2 Amortization Payment of UAL	(12,486)	142,038	1,513,650	724,992	76,421	177,595	34,647	3,569,118	6,225,975
7.3 Total = 7.1 + 7.2	(12,693)	158,861	2,477,142	919,613	79,764	192,689	46,905	5,193,228	9,055,509
7.4 Adjusted Appropriation***	12,693	602	9,394	3,488	302	731	(46,905)	19,695	0
7.5 Total = 7.3 + 7.4	**0**	**159,463**	**2,486,536**	**923,101**	**80,066**	**193,420**	**0**	**5,212,923**	**9,055,509**
Increase over prior year	0.000%	6.854%	5.686%	6.415%	7.120%	6.970%	0.000%	5.998%	6.000%

Notes:

1. Actuarial Value of Plan Assets (3.1) is derived from allocation of assets as shown on separate attachment.
2. FY2023 and FY2024 Appropriation is based on Funding Schedule E-3 adopted by the Retirement Board June 25, 2021.
3. 2022 Employer Normal Cost (5.1) is the Employer Normal Cost as of January 1, 2021, adjusted for payment timing (1.6). 2023 Employer Normal Cost (6.1) is based on 2022 Employer Normal Cost (5.1) increased by 3.25%.

*4. Amortization Payment of UAL (5.2) equals fiscal year 2022 budgeted appropriation (5.3) developed in the January 1, 2019 actuarial valuation less Employer Normal Cost (5.1).

**5. Amortization Payment of UAL (6.2) is the total Amortization Payment of UAL (6.2) allocated to each department in the proportion that the UAL (4.1) less 2022 Amortization Payment of UAL (5.2) bears to the total UAL (4.1) less total 2022 Amortization Payment of UAL (5.2).

***6. The appropriation developed for the Retirement department and any appropriation less than zero is allocated to each remaining department in the proportion that the department's fiscal year appropriation bears to the total fiscal year appropriation.