ANDOVER CONTRIBUTORY RETIREMENT SYSTEM

ACTUARIAL VALUATION
as of
January 1, 2023

KMS Actuaries, LLC
52 Hunt Road
Kingston, NH 03848

June, 2023

KMS

ACTUARIES

LLC

June 15, 2023

Andover Contributory Retirement Board
Town Offices
36 Bartlet Street
Andover, MA 01810

Dear Board Members:

We are pleased to present the enclosed report providing the results of our actuarial valuation of the Andover Contributory Retirement System as of January 1, 2023. 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, 2023. 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 Andover 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 5.75%, 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 Andover 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.

KMS Actuaries is completely independent of the Andover Contributory Retirement System and any of its officers or key personnel. None of the actuaries signing this report or anyone closely associated with them has a relationship with the Andover Contributory Retirement System, other than as consulting actuary for this assignment, that would impair our independence.

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 Andover Contributory Retirement System as of January 1, 2023. 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 Andover Contributory Retirement Board. Information for the prior valuation completed as of January 1, 2021 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, 2022, the assets as of December 31, 2022 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, 2022 are provided in a separate report.

Pension Obligation Bond

In 2021, the Town of Andover issued $165 million in Pension Obligation Bond (POB) debt. The Town considered and ultimately decided to issue a POB because of substantial increases in projected future contributions. The required payments under the POB will replace a large portion of the Retirement System appropriations needed to fully fund the Town's remaining unfunded actuarial accrued liability by 2032. The Andover Housing Authority did not participate in the POB; the unfunded actuarial accrued liability attributed to the Andover Housing Authority is expected to be fully funded by 2037.

As a result of the POB issuance, the funded status of the System increased overall from 46.9% in 2021 to 95.6% in 2023. The funded status of the Housing Authority's portion of the liabilities is approximately 50% while the funded status of the remaining entities is approximately 96%.

Assets

This valuation is based upon asset information reported to the Public Employee Retirement Administration Commission (PERAC) by the Andover Contributory Retirement Board. The market value of assets increased from $183,587,589 as of December 31, 2020 to $343,524,899 as of December 31, 2022. During the plan years ended 2021 and 2022, the market value rates of return were 19.22% and -8.71%, respectively.

The actuarial value of assets increased from $170,829,408 as of January 1, 2021 to $368,173,080 as of January 1, 2023. During the plan years ended 2021 and 2022, the rates of return on the actuarial value of assets were 9.37% and 4.75%, respectively.

Changes Since the Last Valuation

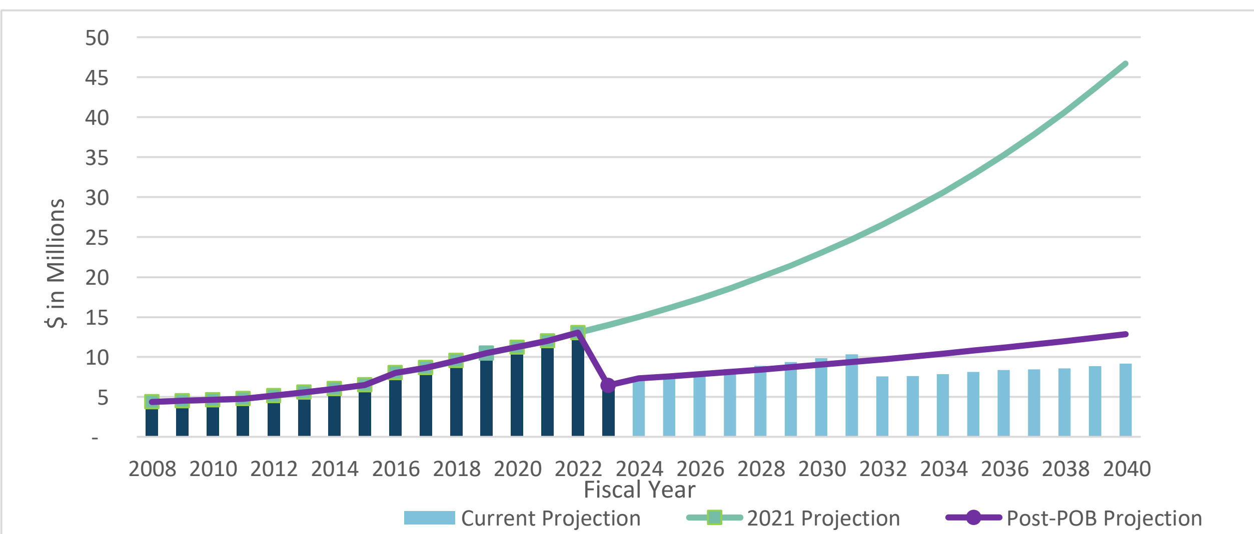
Since the last valuation, the total unfunded actuarial accrued liability of the System was expected to decrease from $193,475,186 as of January 1, 2021 to $24,484,328 as of January 1, 2023, for a total decrease of $168,990,858. The actual unfunded actuarial accrued liability, before any assumption or plan changes, was $15,792,701, resulting in an actuarial gain of $8,691,627. The actuarial gain was primarily due to an asset gain of approximately $6,122,000 and a demographic experience gain of approximately $2,570,000, which includes the effect of the one-time additional 2% COLA that was approved on the $13,000 COLA base effective July 1, 2022. 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 annual payments of the appropriation made August 1. The appropriation calculated as of the January 1, 2023 valuation is $7,291,846, and is made up of a normal cost payment of $5,354,466, net 3(8)(c) transfers of $0, and an amortization payment of $1,937,380. The amortization method is an increasing amortization of the unfunded actuarial accrued liability at 4% over 14 years for the Andover Housing Authority and 9 years for all other entities and is expected to fully pay the unfunded actuarial accrued liability by the year 2037 for the Andover Housing Authority and 2032 for all other entities. The development of the appropriation as of January 1, 2023 is presented in Section 3, Annual Appropriations.

For fiscal year 2024, we show the actual appropriation developed under the previous funding schedule and reported on the PERAC "Required Fiscal Year 2024 Appropriation" letter dated November 18, 2022 of $7,297,628. For fiscal year 2025, we developed an annual appropriation of $7,666,605, which is made up of a normal cost of $5,684,984, net 3(8)(c) transfers of $0 and payment toward the unfunded actuarial accrued liability of $1,981,621. The unfunded actuarial accrued liability is expected to be fully paid by 2037 for the Andover Housing Authority and 2032 for all other entities. The Board adopted a schedule with 7.37% annual increases in appropriations for the Andover Housing Authority, and 5.00% for the other entities. 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) as well as the revised funding schedule amounts after the Pension Obligation Bond was issued (purple line). FY2022 does not include the proceeds from the Pension Obligation Bond issued by the Town.



Plan Provisions

The maximum amount of pension benefit subject to a cost-of-living adjustment (COLA) increased from $12,000 to $13,000 effective July 1, 2022. The maximum amount of pension benefit subject to a COLA will then increase from $13,000 to $14,000 effective July 1, 2023. All plan provisions used in this valuation 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 increasing the administrative expense assumption from $310,000 to $400,000 per year and updating the mortality improvement rates. Changing these assumptions resulted in a net decrease in the unfunded actuarial accrued liability of $2,625,146 and a decrease in the employer normal cost of $31,354. The Actuarial Assumptions and Methods utilized in this valuation are detailed in Section 6, Actuarial Assumptions and Methods.

Census Data

Census data as of the valuation date were submitted by the Retirement Board. Adjustments were made to retirees' retirement allowances to incorporate the additional 2% COLA awarded July 1, 2022 and approved by the Select Board after the valuation date. As of January 1, 2023, there are 708 active members who may be eligible for benefits in the future, 529 retirees and beneficiaries, 267 inactives and 43 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, it is very likely that the pandemic materially affected the economic and demographic experience in a way not anticipated by the assumptions on which the projections are based.

SECTION 1 - EXECUTIVE SUMMARY

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

Valuation Date	January 1, 2023	January 1, 2021	% Change
Census Data			
Active Members	708	739	(4.2%)
Valuation Salary	$48,569,864	$45,838,583	6.0%
Average Salary	$68,602	$62,028	10.6%
Retired Members and Beneficiaries	529	479	10.4%
Total Annual Retirement Allowance	$16,766,173	$14,639,261	14.5%
Average Annual Retirement Allowance	$31,694	$30,562	3.7%
Disabled Members	43	44	(2.3%)
Total Annual Retirement Allowance	$2,030,085	$1,932,535	5.0%
Average Annual Retirement Allowance	$47,211	$43,921	7.5%
Inactive Members	267	163	63.8%
Annuity Savings Fund	$4,339,878	$2,295,571	89.1%
Funded Status			
Actuarial Accrued Liability (AAL)	$385,149,787	$364,304,594	5.7%
Market Value of Assets (MVA)	$343,524,899	$183,587,589	87.1%
Unfunded Accrued Liability on MVA	$41,624,888	$180,717,005	(77.0%)
Funded Status on MVA	89.2%	50.4%	77.0%
Actuarial Value of Assets (AVA)	$368,173,080	$170,829,408	115.5%
Unfunded Accrued Liability on AVA	$16,976,707	$193,475,186	(91.2%)
Funded Status on AVA	95.6%	46.9%	103.8%
Appropriations*			
Fiscal Year 2023	N/A	$13,990,159	N/A
Fiscal Year 2024	$7,297,628	$15,021,232	(51.4%)
Fiscal Year 2025	$7,666,605	$16,128,297	(52.5%)
Fiscal Year 2026	$8,054,332	$17,316,952	(53.5%)

*Amounts shown for January 1, 2021 appropriations above are prior to the issuance of the Pension Obligation Bond (POB). We also prepared a revised schedule after the issuance of the POB which reduced the contributions for FY2023 through FY2026 to $6,414,037, $7,297,628, $7,560,738, and $7,833,365, respectively.

Market Value of Assets

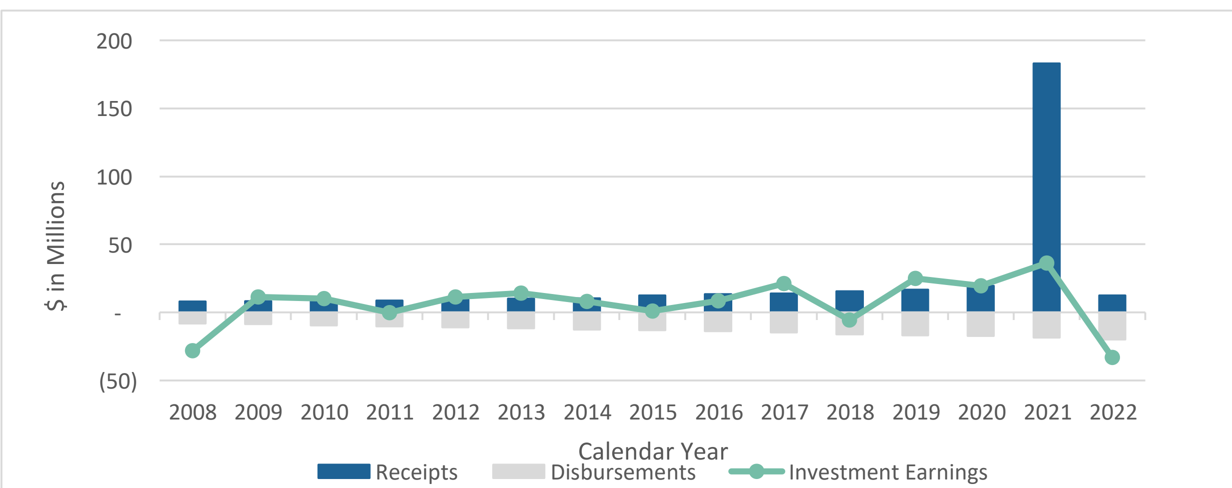
Asset information is reported annually to the Public Employee Retirement Administration Commission by the Andover Contributory Retirement Board. The Market Value of Assets for the three most recent calendar years are as follows:

Calendar Year	2022	2021	2020
Trust Fund Composition at Year-End			
Cash	$25,405,594	$688,807	$346,743
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	55,074,952	65,549,599	53,612,785
Pooled International Equity Funds	7,737,990	9,475,868	9,010,131
Pooled Global Equity Funds	0	0	0
Pooled Domestic Fixed Income Funds	13,285,738	15,321,758	15,041,645
Pooled International Fixed Income Funds	0	0	0
Pooled Global Fixed Income Funds	0	0	0
Pooled Alternative Investments	0	0	0
Pooled Real Estate Funds	18,047,193	16,866,775	13,256,151
Pooled Domestic Balanced Funds	0	0	0
Pooled International Balanced Funds	0	0	0
Hedge Funds	0	0	0
PRIT Cash	229,452	164,566,685	350,079
PRIT Fund	223,753,173	111,715,685	91,871,462
Interest Due & Accrued	0	0	0
Prepaid Expenses	0	275	260
Accounts Receivable	21,624	140,948	112,581
Land	0	0	0
Buildings	0	0	0
Accumulated Depreciation - Buildings	0	0	0
Accounts Payable	(30,817)	(28,270)	(14,248)
Total Market Value of Assets	**$343,524,899**	**$384,298,130**	**$183,587,589**

Market Value of Assets

Calendar Year	2022	2021	2020
Funds			
Annuity Savings Fund	$47,134,959	$46,062,163	$45,680,722
Annuity Reserve Fund	15,917,393	15,680,350	14,283,064
Special Military Service Fund	31,933	31,902	31,870
Pension Fund	157,430,227	165,531,745	2,080,657
Expense Fund	0	0	0
Pension Reserve Fund	123,010,387	156,991,970	121,511,276
Total Market Value of Assets	**$343,524,899**	**$384,298,130**	**$183,587,589**
Asset Activity			
Market Value as of Beginning of Year	$384,298,130	$183,587,589	$162,235,822
Contributions and Receipts	12,436,733	183,100,244	19,419,020
Benefit Payments and Expenses	(20,077,530)	(18,681,064)	(17,495,532)
Investment Return	(33,132,434)	36,291,361	19,428,279
Total Market Value of Assets	**$343,524,899**	**$384,298,130**	**$183,587,589**
Rate of Return	-8.71%	19.22%	12.42%

Below are the receipts and disbursements during the last 15 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

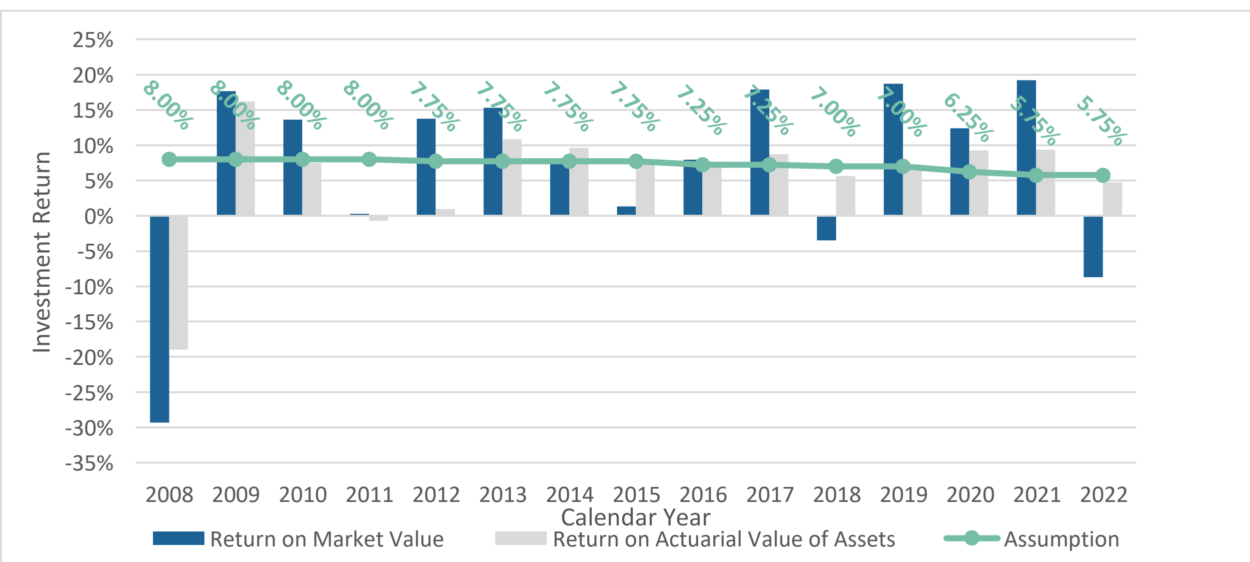
The Actuarial Value of Assets is the market value of assets as of the valuation date adjusted to phase in investment gains and losses over a 5-year period, further constrained to be within 15% of the market value of assets. Investment gains and losses are the excess or deficiency of the expected returns over the actual returns.

Valuation Date		January 1, 2023	January 1, 2022	January 1, 2021
1. Expected Market Value of Assets				
a. Market Value of Assets as of prior January 1		$384,298,130	$183,587,589	$162,235,822
b. Prior Year Contributions and Receipts		12,436,733	183,100,244	19,419,020
c. Prior Year Benefit Payments and Expenses		(20,077,530)	(18,681,064)	(17,495,532)
d. Expected Investment Return Rate		5.75%	5.75%	6.25%
e. Expected Investment Return		21,877,470	15,283,338	10,199,848
f. Expected Market Value of Assets		$398,534,803	$363,290,107	$174,359,158
2. Prior Year Gain/(Loss)				
a. Market Value of Assets as of January 1		$343,524,899	$384,298,130	$183,587,589
b. Expected Market Value of Assets		398,534,803	363,290,107	174,359,158
c. Prior Year Gain /(Loss)		($55,009,904)	$21,008,023	$9,228,431
3. Phase-In of Asset Gains and Losses				
Calendar Year	Gain / (Loss)	Unrecognized Gain / (Loss)	Unrecognized Gain / (Loss)	Unrecognized Gain / (Loss)
a. 2022	($55,009,904)	($44,007,923)	$0	$0
b. 2021	21,008,023	12,604,814	16,806,418	0
c. 2020	9,228,431	3,691,372	5,537,059	7,382,745
d. 2019	15,317,779	3,063,556	6,127,112	9,190,667
e. 2018	(15,666,946)	0	(3,133,389)	(6,266,778)
f. 2017	12,257,736	0	0	2,451,547
g. Total Deferred Gains/(Losses)		($24,648,181)	$25,337,200	$12,758,181

Actuarial Value of Assets

Valuation Date	January 1, 2023	January 1, 2022	January 1, 2021
4. Actuarial Value of Assets			
a. Market Value of Assets	$343,524,899	$384,298,130	$183,587,589
b. Deferred Gains/(Losses)	(24,648,181)	25,337,200	12,758,181
c. Market Value of Assets Less Deferred Gains/(Losses)	$368,173,080	$358,960,930	$170,829,408
d. 85% of Market Value of Assets	291,996,164	326,653,411	156,049,451
e. 115% of Market Value of Assets	395,053,634	441,942,850	211,125,727
f. Actuarial Value of Assets, c., but not less than d. and not greater than e.	$368,173,080	$358,960,930	$170,829,408
g. Ratio of Actuarial Value of Assets to Market Value of Assets	107.2%	93.4%	93.1%
5. Rate of Return on Actuarial Value of Assets for Prior Calendar Year	4.75%	9.37%	9.28%

Below are the investment returns during the last 15 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.



SECTION 2 - PRINCIPAL VALUATION RESULTS

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, 2023	January 1, 2021
Actives	$257,591,998	$261,117,051
Retired Members and Beneficiaries	190,444,357	166,190,269
Disabled Members	26,682,704	24,540,045
Inactive Members	8,132,810	4,642,367
Total Present Value of Future Benefits	$482,851,869	$456,489,732

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:

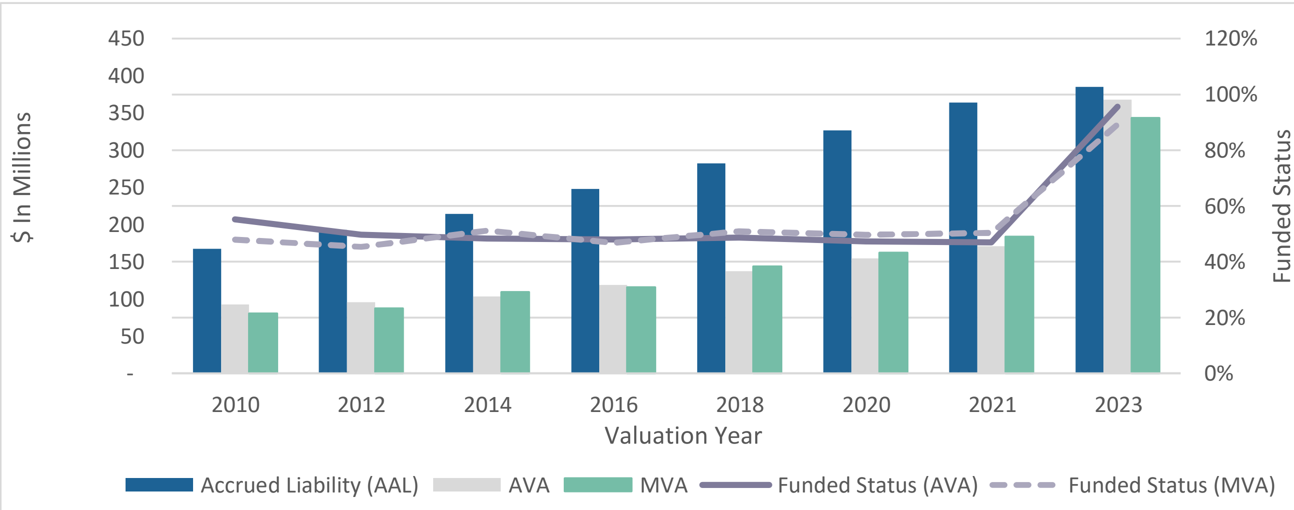
Valuation Date	January 1, 2023	January 1, 2021
Actives	$159,889,916	$168,931,913
Retired Members and Beneficiaries	190,444,357	166,190,269
Disabled Members	26,682,704	24,540,045
Inactive Members	8,132,810	4,642,367
Total Actuarial Accrued Liability	$385,149,787	$364,304,594

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, 2023	January 1, 2021
Unfunded Actuarial Accrued Liability		
a. Actuarial Accrued Liability	$385,149,787	$364,304,594
b. Actuarial Value of Assets	368,173,080	170,829,408
c. Unfunded Actuarial Accrued Liability (a. - b.)	$16,976,707	$193,475,186
d. Funded Status (b. divided by a.)	95.6%	46.9%

Actuarial Liabilities

Below are the accrued liabilities, asset values (actuarial and market) and funded status for each of the last 8 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, 2023	January 1, 2021
Total Normal Cost	$9,673,073	$9,365,800
As of Percentage of Salary	19.9%	20.4%
Employee Normal Cost	$4,718,607	$4,472,233
As of Percentage of Salary	9.7%	9.8%
Administrative Expenses	$400,000	$310,000
As a Percentage of Salary	0.8%	0.7%
Net Employer Normal Cost	$5,354,466	$5,203,567
As a Percentage of Salary	11.0%	11.4%

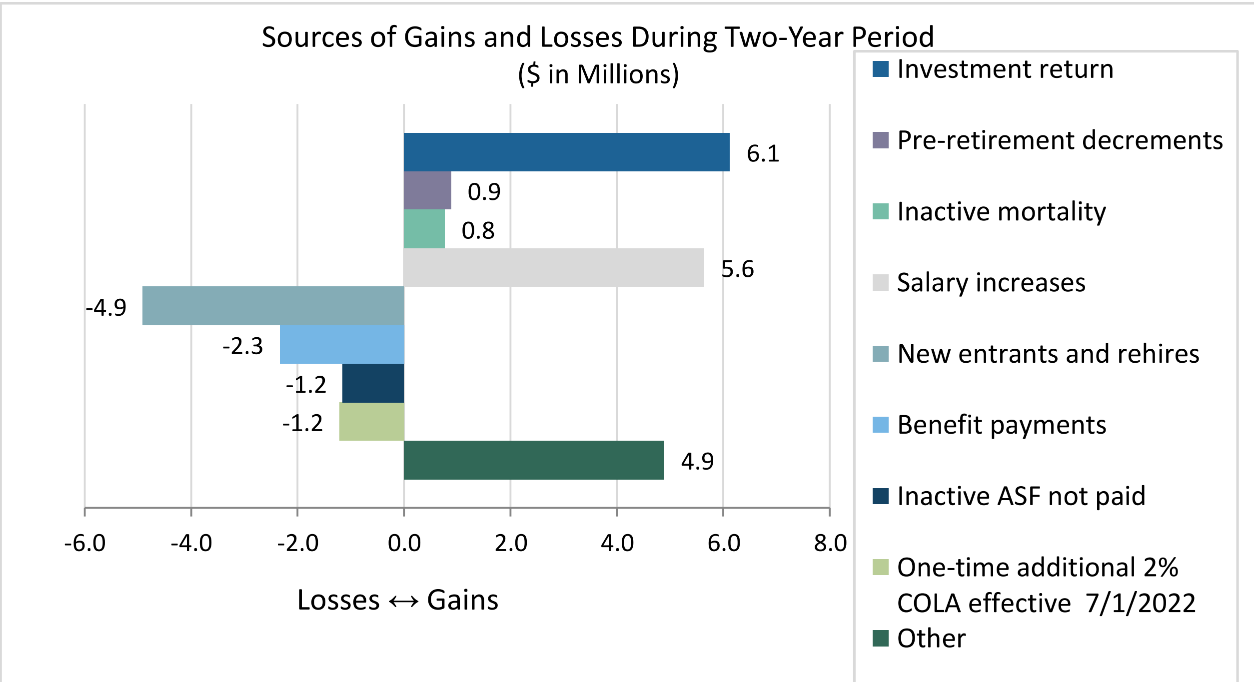
Actuarial Experience

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 $168,990,858. Below is the development of the Actuarial Gain for the current 2-year period:

Calendar Year Ending		December 31, 2022	December 31, 2021
Expected Unfunded Actuarial Accrued Liability			
1.	Unfunded Actuarial Accrued Liability, Beginning of Year	$26,139,967	$193,475,186
2.	Normal Cost, Beginning of Year	9,111,681	9,365,800
3.	Total Contributions	12,436,733	183,100,244
4.	Interest (full year on 1. and 2., one-half year on 3.)	1,669,414	6,399,225
5.	Expected Unfunded Actuarial Accrued Liability	$24,484,328	$26,139,967
6.	Unfunded Actuarial Accrued Liability (before changes)	15,792,701	
7.	(Gain)/Loss (6. - 5.)	($8,691,627)	
Asset Gain/(Loss)			
1.	Actuarial Value of Assets, Beginning of Year	$358,960,930	$170,829,408
2.	Contributions and Receipts	12,436,733	183,100,244
3.	Benefit Payments and Expenses	(20,077,530)	(18,681,064)
4.	Assumed Rate of Return (prior valuation)	5.75%	5.75%
5.	Expected Return	20,420,581	14,549,742
6.	Actuarial Value of Assets, End of Year	$368,173,080	$358,960,930
7.	Actual Return	16,852,947	23,712,342
8.	Actual Rate of Return	4.75%	9.37%
9.	Asset Gain/(Loss) (7. - 5.)	(3,567,634)	9,162,600
10.	Total Asset Gain/(Loss), 2-Year Period	6,121,816	

Actuarial Experience

Below are the various sources of gains and losses over the 2-year period. The asset gain during the period was $6,121,816, and the total demographic gain during the period was $2,569,812, which totals to an overall gain of $8,691,627.



Unfunded Actuarial Accrued Liability

1. Changes due to:	
a. Asset Gain	(6,121,816)
b. Demographic Experience Gain	(2,569,812)
c. Total Gain Prior to Changes	(8,691,627)
d. Plan Change	
Increase COLA base from 12,000 to 13,000 effective 7/1/2022 and 14,000 effective 7/1/2023	3,809,152
e. Assumption Change - Mortality Improvement Scale Update	(2,625,146)
f. Total Decrease (including changes)	(7,507,621)

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 annual payments made August 1. 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, 2023	January 1, 2021
1.	Unfunded Actuarial Accrued Liability (All Others)		
	Fully Funded Year	2032	2040
	Balance as of Valuation Date	$15,007,880	$190,953,631
	Amortization Amount	$1,780,992	$11,630,147
	Increasing Rate	4.00%	4.00%
	Remaining Payment Period from Valuation Date	9	19
2.	Unfunded Actuarial Accrued Liability (Housing Authority)		
	Fully Funded Year	2037	2040
	Balance as of Valuation Date	$1,968,827	$2,521,555
	Amortization Amount	$156,388	$153,577
	Increasing Rate	4.00%	4.00%
	Remaining Payment Period from Valuation Date	14	19
3.	Total Amortization Payments	$1,937,380	$11,783,724
4.	Normal Cost	$5,354,466	$5,203,567
5.	Net 3(8)(c) Transfers	$0	$0
6.	Total Appropriation as of January 1	$7,291,846	$16,987,291
7.	**Adjusted for Annual Payments as of August 1**	**$7,533,574**	**$17,550,427**

Exhibit 3.1 - 30-Year Forecast of Annual Appropriations

	Andover Housing Authority						All Others							
Fiscal Year Ending	Employer Normal Cost	Net 3(8)(c) Transfers	Amortization Payment of UAL	Total Employer Cost	Increase Over Prior Year	Unfunded Actuarial Accrued Liability	Employer Normal Cost	Net 3(8)(c) Transfers	Amortization Payment of UAL	Total Employer Cost	Increase Over Prior Year	Unfunded Actuarial Accrued Liability	Total Appropriation	Increase Over Prior Year
2024	$44,689	$0	$128,095	$172,784		$1,968,827	$5,487,280	$0	$1,637,564	$7,124,844		$15,007,880	$7,297,628	
2025	45,765	-	139,754	185,519	7.37%	1,950,920	5,639,219	-	1,841,867	7,481,086	5.00%	14,194,674	7,666,605	5.06%
2026	46,926	-	152,266	199,192	7.37%	1,920,050	5,827,156	-	2,027,984	7,855,140	5.00%	13,125,591	8,054,332	5.06%
2027	48,174	-	165,698	213,872	7.37%	1,874,599	6,009,341	-	2,238,556	8,247,897	5.00%	11,804,532	8,461,769	5.06%
2028	49,443	-	180,191	229,634	7.37%	1,812,786	6,195,162	-	2,465,130	8,660,292	5.00%	10,191,978	8,889,926	5.06%
2029	50,830	-	195,728	246,558	7.37%	1,732,584	6,383,232	-	2,710,074	9,093,306	5.00%	8,254,788	9,339,864	5.06%
2030	52,305	-	212,424	264,729	7.37%	1,631,866	6,619,736	-	2,928,237	9,547,973	5.00%	5,955,492	9,812,702	5.06%
2031	53,825	-	230,415	284,240	7.37%	1,508,268	6,814,365	-	3,211,006	10,025,371	5.00%	3,300,683	10,309,611	5.06%
2032	56,046	-	249,142	305,188	7.37%	1,359,148	7,031,683	-	210,545	7,242,228	-27.76%	203,789	7,547,416	-26.79%
2033	59,669	-	268,012	327,681	7.37%	1,182,285	7,282,429	-	-	7,282,429	0.56%	-	7,610,110	0.83%
2034	60,246	-	291,584	351,830	7.37%	975,938	7,463,107	-	-	7,463,107	2.48%	-	7,814,937	2.69%
2035	60,500	-	317,260	377,760	7.37%	733,598	7,720,451	-	-	7,720,451	3.45%	-	8,098,211	3.62%
2036	62,422	-	343,180	405,602	7.37%	451,043	7,963,106	-	-	7,963,106	3.14%	-	8,368,708	3.34%
2037	64,868	-	129,877	194,745	-51.99%	125,710	8,238,355	-	-	8,238,355	3.46%	-	8,433,100	0.77%
2038	66,470	-	-	66,470	-65.87%	-	8,500,449	-	-	8,500,449	3.18%	-	8,566,919	1.59%
2039	69,074	-	-	69,074	3.92%	-	8,777,361	-	-	8,777,361	3.26%	-	8,846,435	3.26%
2040	70,807	-	-	70,807	2.51%	-	9,077,709	-	-	9,077,709	3.42%	-	9,148,516	3.41%
2041	73,091	-	-	73,091	3.23%	-	9,377,691	-	-	9,377,691	3.30%	-	9,450,782	3.30%
2042	75,453	-	-	75,453	3.23%	-	9,683,723	-	-	9,683,723	3.26%	-	9,759,176	3.26%
2043	77,899	-	-	77,899	3.24%	-	10,003,953	-	-	10,003,953	3.31%	-	10,081,852	3.31%
2044	80,431	-	-	80,431	3.25%	-	10,342,620	-	-	10,342,620	3.39%	-	10,423,051	3.38%
2045	83,050	-	-	83,050	3.26%	-	10,714,185	-	-	10,714,185	3.59%	-	10,797,235	3.59%

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
2023	$343,524,899	$23,154,076	$4,718,607	$7,063,471	$19,764,471	$351,917,372
2024	351,917,372	21,238,131	4,923,059	7,420,609	20,334,414	363,357,323
2025	363,357,323	22,261,286	5,104,925	7,795,895	20,994,831	374,991,688
2026	374,991,688	23,279,908	5,305,047	8,190,258	21,668,705	386,875,790
2027	386,875,790	24,239,972	5,514,847	8,604,677	22,360,331	399,115,673
2028	399,115,673	25,128,743	5,736,037	9,040,179	23,076,332	411,839,478
2029	411,839,478	26,191,720	5,924,422	9,497,844	23,814,538	424,884,562
2030	424,884,562	27,049,603	6,167,950	9,978,809	24,581,625	438,563,343
2031	438,563,343	27,900,456	6,404,006	7,305,244	25,203,536	449,575,673
2032	449,575,673	28,754,479	6,622,050	7,365,926	25,828,219	460,637,389
2033	460,637,389	29,365,612	6,927,111	7,564,181	26,475,638	472,238,707
2034	472,238,707	30,687,065	7,175,096	7,838,365	27,134,747	483,699,850
2035	483,699,850	32,067,983	7,453,089	8,100,183	27,785,100	494,970,239
2036	494,970,239	33,511,042	7,717,043	8,162,510	28,410,421	505,749,171
2037	505,749,171	35,019,039	8,013,192	8,292,035	29,011,331	516,046,690
2038	516,046,690	36,594,896	8,313,329	8,562,581	29,590,946	525,918,650
2039	525,918,650	38,241,666	8,611,596	8,854,971	30,145,202	535,288,753
2040	535,288,753	39,962,541	8,930,360	9,147,537	30,669,659	544,073,768
2041	544,073,768	41,760,855	9,264,587	9,446,036	31,159,478	552,183,014
2042	552,183,014	43,640,093	9,607,136	9,758,359	31,609,387	559,517,803
2043	559,517,803	45,603,897	9,954,678	10,088,610	32,013,651	565,970,845
2044	565,970,845	47,656,072	10,294,015	10,450,788	32,366,038	571,425,614
2045	571,425,614	49,800,595	10,662,532	10,808,339	32,659,781	575,755,671
2046	575,755,671	52,041,622	11,032,544	11,189,807	32,887,540	578,823,940
2047	578,823,940	54,383,495	11,412,252	11,587,881	33,041,359	580,481,937
2048	580,481,937	56,830,752	11,812,527	11,992,611	33,112,623	580,568,946
2049	580,568,946	59,388,136	12,246,329	12,391,989	33,092,009	578,911,137
2050	578,911,137	62,060,602	12,716,547	12,784,113	32,969,436	575,320,631
2051	575,320,631	64,853,329	13,211,342	13,181,842	32,734,011	569,594,497
2052	569,594,497	67,771,729	13,701,121	13,615,825	32,373,971	561,513,685

Forecast Notes

Exhibit 3.1:

- The Total Normal Cost is assumed to increase 3.5% per year and the Employee Normal Cost is assumed to increase at a rate that reflects a total payroll increase of 3.5% per year and incorporates new entrants sufficient to maintain constant active membership.

- 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 14 years through 2037 for the Andover Housing Authority and 9 years through 2032 for all other entities.

- Net 3(8)(c) transfers are a level dollar amount based on the net transfers expected to be paid by the Andover Contributory Retirement Board during the current year offset by the amount received during the same period. For the Andover Retirement System, we assumed a net transfer of zero.

- 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 annual payments made on August 1.

- For fiscal year 2024, we show the actual appropriation developed under the previous funding schedule and adjusted due for the Town's issue of $165 million of Pension Obligation Bonds. For fiscal years 2025 and later, the Board has selected a funding schedule that fully amortizes the unfunded actuarial accrued liability by 2037 for the Andover Housing Authority and 2032 for all other entities, with annual employer costs increasing by 5% for all entities other than the Andover Housing Authority and 7.37% for the Andover Housing Authority.

- The funding schedule adopted by the Board results in amortization payments for every year up to and including the full funded date that are greater than the interest computed on the outstanding UAL from the prior year. This amortization method fully amortizes the UAL within a reasonable time period and reduces the UAL by a reasonable amount within a sufficiently short period.

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.

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 Andover 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 Andover 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, 2022 (the measurement date), presents information to assist the Andover 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, 2023.

Normal Cost - Employees	$4,718,607	9.7% of payroll
Normal Cost - Employers	$5,354,466	11.0% of payroll
Actuarial Liability - Active Members	$159,889,916	42% of total AAL
Actuarial Liability - Retired and Inactive Members	225,259,871	58% of total AAL
Total Actuarial Liability (AAL)	$385,149,787	
System Assets	$368,173,080	
Unfunded Actuarial Accrued Liability	$16,976,707	
Funded Status	95.6%	

Principal actuarial assumptions used in the valuation:

Investment Return	5.75%
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 Andover 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.

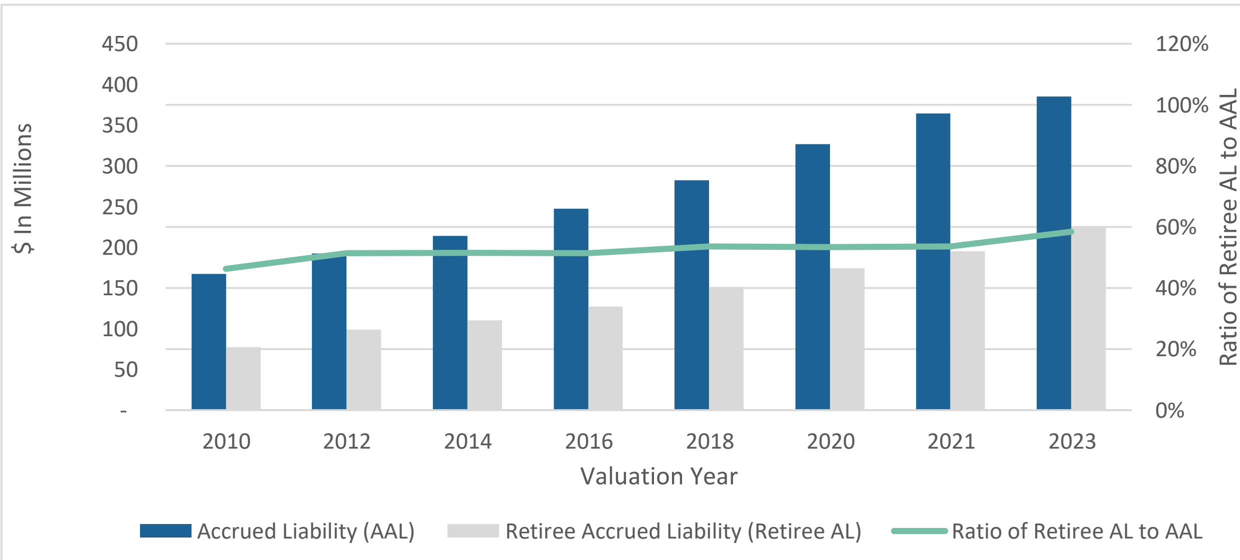
We have provided several risk measures in this section that we believe are most significant for the plan. However, we believe that a more rigorous assessment of risk would be beneficial to the Board to understand the risks identified above, such as:

- 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.

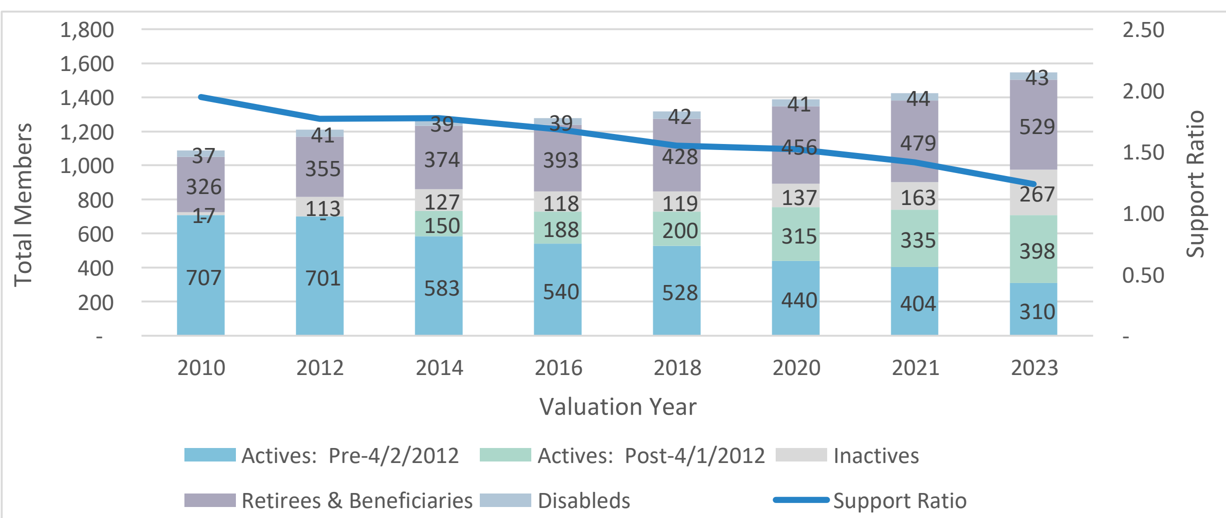
4.3 - Risk Measures

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 Andover 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

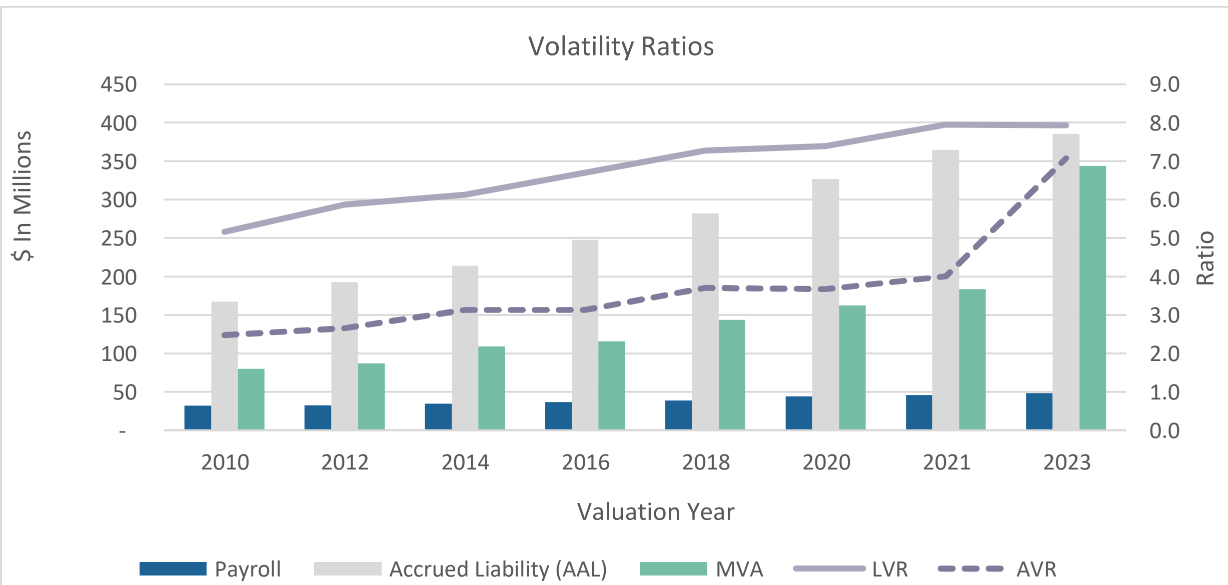
Volatility indices are measures of the relative sensitivity of employer contributions to changes in assets or liabilities. Below we present two such indices - the Asset Volatility Ratio (AVR) and the Liability Volatility Ratio (LVR):

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)

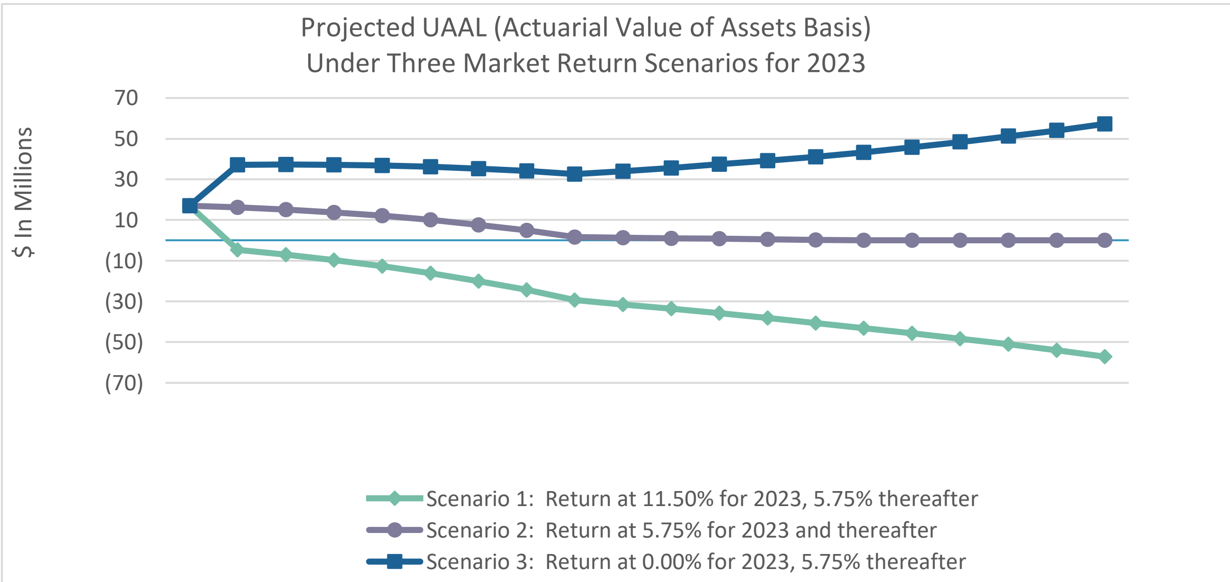
The Liability Volatility Ratio (LVR) is the ratio of the Actuarial Accrued Liability (AAL) to Payroll. Systems with a higher LVR experience more volatile employer contributions (as a percentage of payroll) due to the investment return assumption and changes in liability. This ratio indicates a longer-term 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 5.75%, 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 (4.75%) or 1-percentage point higher (6.75%) than the assumed investment return rate:

	1% Decrease (4.75%)	Current Investment Return Rate (5.75%)	1% Increase (6.75%)
Actuarial Accrued Liability	$432,268,506	$385,149,787	$345,568,442
% Change	12%		-10%
Actuarial Value of Assets	$368,173,080	$368,173,080	$368,173,080
Unfunded Actuarial Accrued Liability	64,095,426	16,976,707	(22,604,638)
% Change	278%	N/A	-233%
Funded Status	85.17%	95.59%	106.54%

4.3 - Risk Measures

Low-Default Risk Obligation Measure (LDROM)

The retirement plan invests in a diversified portfolio of stocks, bonds, real estate, and other assets with the objective of maximizing investment returns at a reasonable level of risk. The potential for investment returns to be different than expected is a key risk for the plan. Reducing the plan's investment risk by investing solely in bonds, however, would also likely reduce the plan's investment returns thereby increasing the amount of contributions needed over the long term. The Low-Default-Risk Obligation Measure (LDROM) represents what the funding liability would be if the plan invested its assets solely in a portfolio of high-quality bonds whose cash flows approximately match future benefit payments. Consequently, the difference between the plan's Actuarial Accrued Liability and the LDROM can be thought of as representing the expected taxpayer savings from investing in the plan's diversified portfolio compared to investing only in high quality bonds.

The following presents the LDROM and Funded Status calculated using the LDROM investment return rate of 4.95%:

LDROM	$422,160,834
Actuarial Value of Assets	$368,173,080
Funded Status	87.21%

The LDROM investment return rate is based on the FTSE Pension Liability Index published as of December 31, 2022. The index represents the single discount rate that would produce the same present value as calculated by discounting a standardized set of liabilities using the Pension Discount Curve, which is a set of yields on hypothetical AA zero coupon bonds whose maturities range from 6 months up to 30 years.

The actuarial valuation reports the funded status and develops appropriations based on the expected return of the plan's investment portfolio. If instead, the plan switched to investing exclusively in high quality bonds, the LDROM illustrates that reported funded status would be lower (which also implies that the Actuarially Determined Contributions would be higher), perhaps significantly. Unnecessarily high appropriation requirements in the near term may not be affordable and could imperil plan sustainability and benefit security.

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 Andover Contributory Retirement System is 11, and this represents an approximate percentage change in the Actuarial Accrued Liability for each 1% change to the investment return rate.

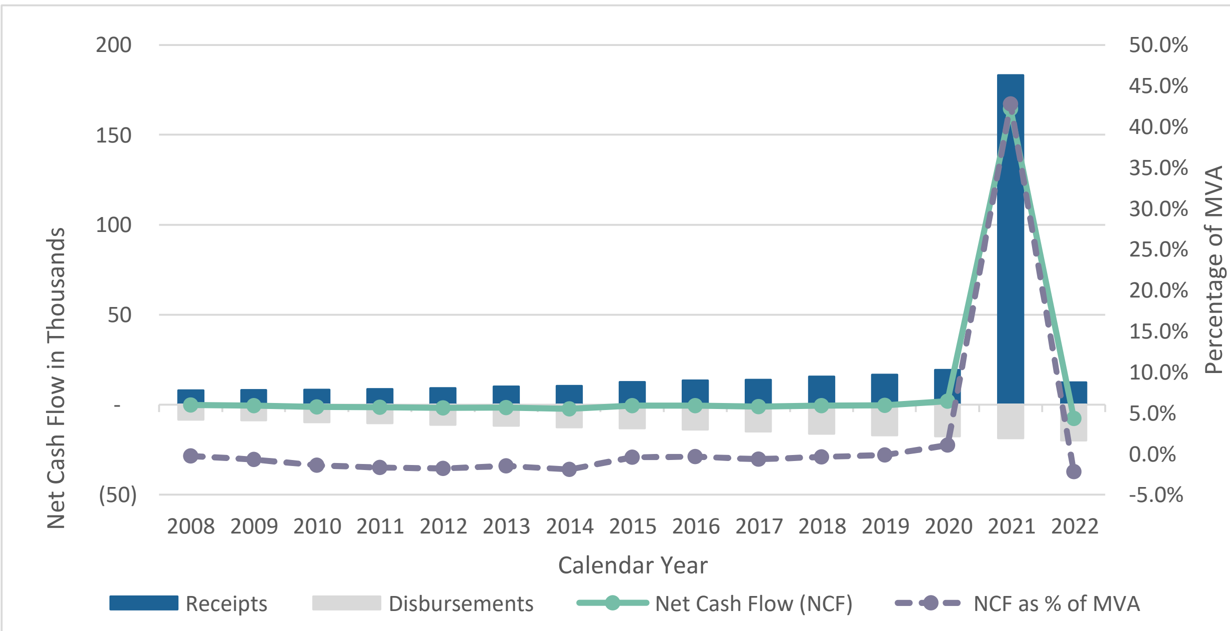
Net Cash Flow (NCF)

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.

4.3 - Risk Measures

Net Cash Flow (NCF), (continued)

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, 2022, the NCF was negative $7.6 million, which represents 2.2% of the Market Value of Assets. The NCF falls within the range of -2.2% to 42.8% of total assets over the 15-year period.



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. 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). For 2023, the limit is 64% of $330,000, or $211,200.

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 $1,060.80 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 $1,060.80 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 increased from $12,000 to $13,000 effective July 1, 2022. A one-time additional 2% COLA was approved on the $13,000 COLA base effective July 1, 2022. The maximum amount of pension benefit subject to a COLA will then increase from $13,000 to $14,000 effective July 1, 2023.

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, 2023

Investment Return Rate

5.75% 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 Andover's investment consultant Dahab Associates and other reliable sources 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.

Low-Default Risk Obligation Measure (LDROM) Investment Return Rate

The LDROM investment return rate is based on the FTSE Pension Liability Index published as of December 31, 2022. The index represents the single discount rate that would produce the same present value as calculated by discounting a standardized set of liabilities using the Pension Discount Curve, which is a set of yields on hypothetical AA zero coupon bonds whose maturities range from 6 months up to 30 years.

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, 2037 for the Andover Housing Authority and June 30, 2032 for all other units.

Output Smoothing Method

Annual appropriations increase by 7.37% per year for the Andover Housing Authority and 5% per year for the remaining units.

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.

Inflation

2.4% per year, based on current economic data, analyses from economists and other experts, and professional judgment.

Payroll Growth

3.5% per year, based on historical data, current and recent market expectations and professional judgment.

Mortality Rates

RP-2014 Blue Collar Mortality Table with full generational mortality improvement using Scale MP-2021. For disabled members, RP-2014 Blue Collar Mortality Table set forward one year with full generational mortality improvement using Scale MP-2021.

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 and subsequently updated the mortality improvement scale to MP-2021 in 2023. 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 the market value of assets as of the valuation date reduced by the sum of:

a) 80% of gains and losses of the prior year,
b) 60% of gains and losses of the second prior year,
c) 40% of gains and losses of the third prior year,
d) 20% of gains and losses of the fourth prior year.

Investment gains and losses are determined by the excess or deficiency of the expected return over the actual return on the market value. The actuarial valuation of assets is further constrained to be not less than 85% or more than 115% of market value.

SECTION 6 - ACTUARIAL ASSUMPTIONS AND METHODS

Census Data	Census data as of the valuation date were submitted by the Retirement Board. Adjustments were made to retirees' retirement allowances to incorporate the additional 2% COLA awarded July 1, 2022 and approved by the Select Board after the valuation date.
Asset Data	Asset information is reported annually to the Public Employee Retirement Administration Commission by the Andover 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	For Calendar Year 2023, the administrative expenses were assumed to be $400,000 and are anticipated to increase 3.5% per year. The administrative expense assumption is based on information relating to the Board's administrative expenses provided by the Retirement Board.

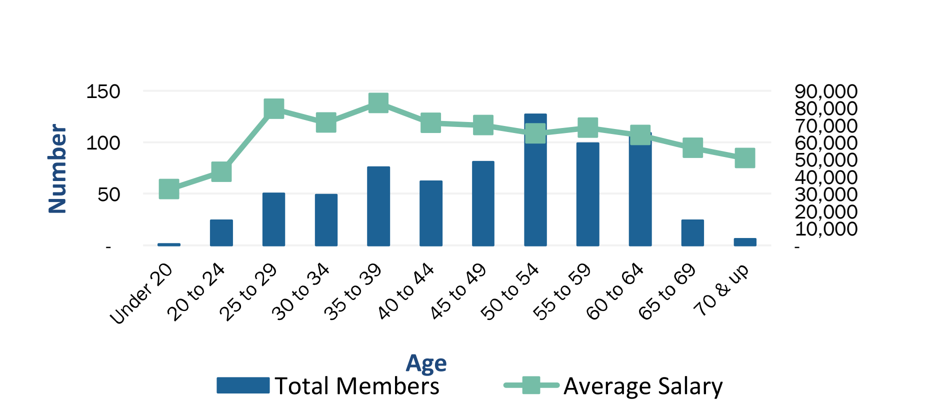
Exhibit 7.1 - Summary of Census Data as of January 1, 2023

Census data as of December 31, 2022 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, 2023	January 1, 2021	% Change
Census Data			
Active Members	708	739	(4.2%)
Average Age	48.1	48.9	(1.6%)
Average Service	11.6	12.3	(5.8%)
Valuation Salary	$48,569,864	$45,838,583	6.0%
Average Salary	$68,602	$62,028	10.6%
Retired Members and Beneficiaries	529	479	10.4%
Average Age	73.1	73.1	0.0%
Total Annual Retirement Allowance	$16,766,173	$14,639,261	14.5%
Average Annual Retirement Allowance	$31,694	$30,562	3.7%
State Reimbursed COLAs[1]	$35,781	$48,171	(25.7%)
Total System-Funded Retirement Allowance	$16,730,392	$14,591,090	14.7%
Disabled Members	43	44	(2.3%)
Average Age	66.0	67.3	(1.9%)
Total Annual Retirement Allowance	$2,030,085	$1,932,535	5.0%
Average Annual Retirement Allowance	$47,211	$43,921	7.5%
State Reimbursed COLAs[1]	$6,442	$7,522	(14.4%)
Total System-Funded Retirement Allowance	$2,023,643	$1,925,013	5.1%
Inactive Members	267	163	63.8%
Annuity Savings Fund	$4,339,878	$2,295,571	89.1%

Exhibit 7.2 - Active Members by Age and Years of Service as of January 1, 2023

Attained Age	0 to 4	5 to 9	10 to 14	15 to 19	Years of Service 20 to 24	25 to 29	30 to 34	35 to 39	40 & up	Total	Total Salary	Average Salary
Under 20	1	-	-	-	-	-	-	-	-	1	32,638	32,638
20 to 24	24	-	-	-	-	-	-	-	-	24	1,024,889	42,704
25 to 29	39	11	-	-	-	-	-	-	-	50	3,971,450	79,429
30 to 34	30	17	2	-	-	-	-	-	-	49	3,496,409	71,355
35 to 39	29	26	16	5	-	-	-	-	-	76	6,289,942	82,762
40 to 44	26	10	9	12	5	-	-	-	-	62	4,410,935	71,144
45 to 49	25	16	8	10	14	8	-	-	-	81	5,657,959	69,851
50 to 54	46	22	12	9	15	21	2	-	-	127	8,254,075	64,993
55 to 59	13	14	16	14	18	5	12	7	-	99	6,782,994	68,515
60 to 64	13	13	15	29	16	8	7	7	1	109	6,985,271	64,085
65 to 69	2	1	5	6	7	3	-	-	-	24	1,359,313	56,638
70 & up	1	-	-	-	1	1	1	2	-	6	303,989	50,665
Total	249	130	83	85	76	46	22	16	1	708	48,569,864	68,602
Average Salary	57,125	64,509	66,654	72,111	79,144	101,394	92,848	89,867	138,390			
					Average Age:		48.13	Average Service:		11.59		



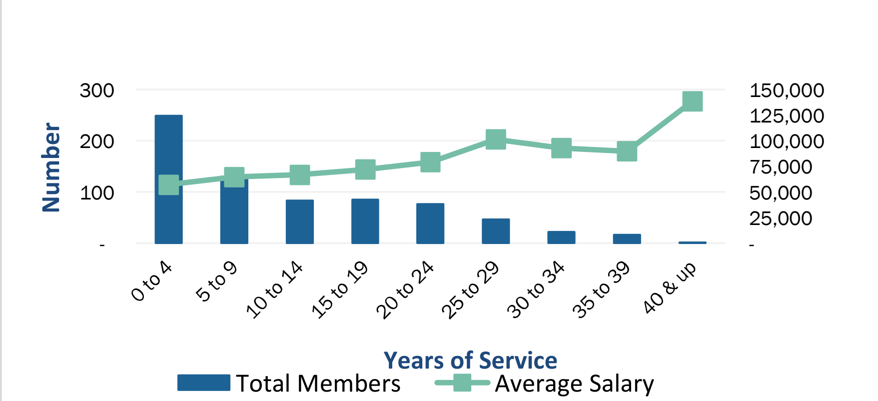
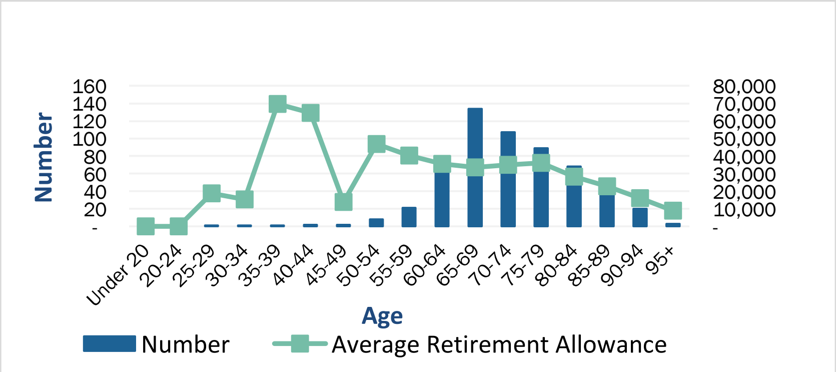
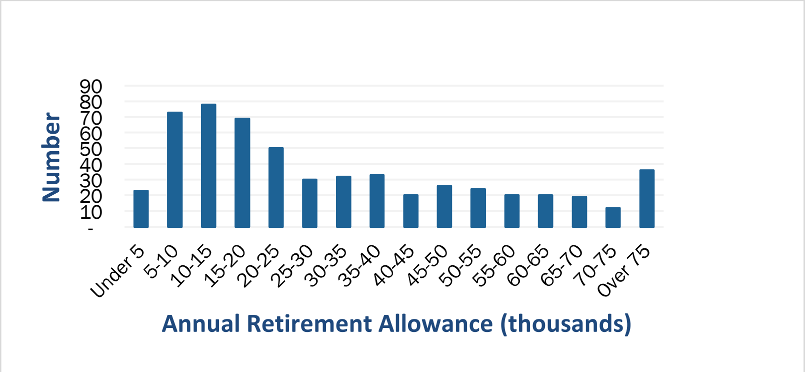


Exhibit 7.3 - Annual Retirement Allowances as of January 1, 2023

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	1	18,731
30-34	0	0	0	0	1	15,327
35-39	0	0	1	69,735	0	0
40-44	0	0	2	129,285	0	0
45-49	0	0	0	0	2	27,878
50-54	3	133,655	5	241,052	0	0
55-59	17	674,142	4	171,592	0	0
60-64	66	2,205,100	8	441,852	3	84,705
65-69	112	3,798,609	6	357,211	16	331,494
70-74	98	3,447,195	4	147,496	5	152,621
75-79	71	2,680,553	8	300,052	10	232,891
80-84	58	1,703,243	4	147,629	6	70,302
85-89	31	730,601	1	24,181	6	112,191
90-94	14	208,363	0	0	6	111,862
95+	3	26,710	0	0	0	0
Total	473	15,608,171	43	2,030,085	56	1,158,002
Average Age	73.0		66.0		73.8	
Average Retirement Allowance		32,998		47,211		20,679





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 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.

Actuarial Standard of Practice – Standards set by the Actuarial Standards Board for appropriate actuarial practice in the United States. These Standards describe the procedures an actuary should follow when performing actuarial services and identify what the actuary should disclose when communicating the results of those services.

Actuarial Valuation – The measurement of relevant pension obligations and, when applicable, the determination of periodic costs or actuarially determined contributions.

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.

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.

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.

Output Smoothing Method – A method to reduce volatility of the results of a contribution allocation procedure. Output smoothing methods include 1) phasing in the impact of assumption changes on contributions, 2) blending a prior valuation with a subsequent valuation to determine contributions, or 3) placing a corridor around changes in the dollar amount, contribution rate, or percentage change in contributions from year to year.

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.

Department		Water	Sewer	Andover Housing Authority	School - Cafeteria	School - Other	All Others	Total
Summary of Member Data as of January 1, 2023								
	Active Members	22	3	9	25	305	344	708
	Average Age	44.3	52.2	48.8	51.9	50.0	46.4	48.1
	Average Service	14.2	20.4	13.7	6.8	9.2	13.8	11.6
	Salary	1,788,440	251,038	612,669	901,949	13,171,212	31,844,556	48,569,864
	Average Salary	81,293	83,679	68,074	36,078	43,184	92,571	68,602
	Retired Members and Survivors	14	3	3	25	192	292	529
	Annual Pensions	701,185	89,650	127,858	235,438	3,070,520	12,541,522	16,766,173
	Average Age	68.8	69.2	65.9	74.2	72.9	73.3	73.1
	Disabled Members	2	0	0	1	6	34	43
	Annual Pensions	94,443	0	0	4,737	190,816	1,740,089	2,030,085
	Average Age	69.3	0.0	0.0	57.3	73.7	64.7	66.0
	Inactive Members	3	0	1	30	191	42	267
	Annuity Savings Fund	140,552	0	357	235,336	1,648,994	2,314,639	4,339,878
Normal Cost as of January 1, 2023								
1.1	Total Normal Cost	275,557	40,250	99,683	189,562	2,543,182	6,524,839	9,673,073
1.2	Administrative Expenses	11,395	1,664	4,122	7,839	105,165	269,815	400,000
1.3	Total Normal Cost = 1.1 + 1.2	286,952	41,914	103,805	197,401	2,648,347	6,794,654	10,073,073
1.4	Employee Normal Cost	180,089	24,970	60,550	86,305	1,246,793	3,119,900	4,718,607
1.5	Employer Normal Cost = 1.3 - 1.4	106,863	16,944	43,255	111,096	1,401,554	3,674,754	5,354,466
1.6	Adjusted for payment timing	110,405	17,506	44,689	114,779	1,448,016	3,796,574	5,531,969
Actuarial Accrued Liability as of January 1, 2023								
2.1	Active Employees	5,669,046	1,183,112	2,090,876	1,760,117	34,497,355	114,689,410	159,889,916
2.2	Retired Members and Survivors	8,774,821	1,007,231	1,846,950	2,870,635	37,238,770	138,705,950	190,444,357
2.3	Disabled Members	1,002,921	0	0	101,697	2,272,609	23,305,477	26,682,704
2.4	Inactive Members	253,287	0	357	386,715	2,738,119	4,754,332	8,132,810
2.5	Total = 2.1 + 2.2 + 2.3 + 2.4	15,700,075	2,190,343	3,938,183	5,119,164	76,746,853	281,455,169	385,149,787

Department	Water	Sewer	Andover Housing Authority	School - Cafeteria	School - Other	All Others	Total
2021 Pension Bond Obligation Credit							
3.1 Credit as of January 1, 2021	6,735,774	937,303	0	2,294,999	32,467,094	121,746,614	164,181,784
3.2 Credit with Interest - (2022 - -8.71%)	6,149,088	855,664	0	2,095,105	29,639,210	111,142,484	149,881,551
Actuarial Value of Plan Assets as of January 1, 2023							
4.1 Market Value of Assets at January 1, 2023							343,524,899
4.2 Additional Contributions with Interest at January 1, 2021	72,873	10,469		32,274	383,558	1,509,330	2,008,504
4.3 Actual Return on Additional Contributions (2 years)	6,439	925		2,852	33,891	133,363	177,470
4.4 POB Amounts	6,735,774	937,303		2,294,999	32,467,094	121,746,614	164,181,784
4.5 Actual Return on POB (1 year)	(586,686)	(81,639)		(199,894)	(2,827,884)	(10,604,130)	(14,300,233)
4.6 Remaining Assets at January 1, 2023	7,809,432	1,089,507	1,837,513	2,546,342	38,174,933	139,999,647	191,457,374
4.7 Market Value of Assets at January 1, 2023	14,037,832	1,956,565	1,837,513	4,676,573	68,231,592	252,784,824	343,524,899
4.8 Actuarial Value of Assets	15,045,058	2,096,950	1,969,356	5,012,120	73,127,262	270,922,334	368,173,080
Unfunded Actuarial Accrued Liability (UAAL) as of January 1, 2023							
5.1 UAL = 2.5 - 4.3	655,017	93,393	1,968,827	107,044	3,619,591	10,532,835	16,976,707
5.2 Funded Status	95.83%	95.74%	50.01%	97.91%	95.28%	96.26%	95.59%
FY2024 Appropriation							
6.1 Employer Normal Cost	110,405	17,506	44,689	114,779	1,448,016	3,796,574	5,531,969
6.2 Amortization Payment of UAL*	47,863	16,281	128,095	56,185	393,759	1,123,476	1,765,659
6.3 Total = 6.1 + 6.2	158,268	33,787	172,784	170,964	1,841,775	4,920,050	7,297,628
FY2025 Appropriation							
7.1 Employer Normal Cost	113,462	17,991	45,765	117,957	1,488,111	3,901,698	5,684,984
7.2 Amortization Payment of UAL**	83,524	10,653	139,754	7,226	444,378	1,296,086	1,981,621
7.3 Total = 7.1 + 7.2	**196,986**	**28,644**	**185,519**	**125,183**	**1,932,489**	**5,197,784**	**7,666,605**
Increase over prior year	24.464%	-15.222%	7.370%	-26.778%	4.925%	5.645%	5.056%

Department		Water	Sewer	Andover Housing Authority	School - Cafeteria	School - Other	All Others	Total
FY2026 Appropriation								
8.1	Employer Normal Cost, July 1	117,243	18,591	46,926	121,888	1,537,705	4,031,729	5,874,082
8.2	Amortization Payment of UAL	91,963	11,729	152,266	7,956	489,282	1,427,054	2,180,250
8.3	**Total = 8.1 + 8.2**	**209,206**	**30,320**	**199,192**	**129,844**	**2,026,987**	**5,458,783**	**8,054,332**
	Increase over prior year	6.203%	5.851%	7.370%	3.723%	4.890%	5.021%	5.057%

Notes:

1. Market Value is developed as follows:

   (a) Additional appropriations made during FY2021 as well as the proceeds from the Pension Obligation Bond, plus actual returns through December 31, 2022, are subtracted from Market Value at December 31, 2022.

   (b) Result from (a) is allocated to all departments except Housing Authority in the proportion that the AAL (2.5) bears to the total AAL (2.5).

   (c) Market Value for Housing Authority is developed from actual cash flows during 2022 provided by the Retirement Board.

   (d) Actuarial Value of Assets is allocated to all departments in the proportion that the assets (4.7) for each department bears to the total Market Value of Assets (4.7).

2. FY2025 and FY2026 Appropriation is based on Funding Schedule B-3 adopted by the Retirement Board.

3. 2024 Employer Normal Cost (6.1) is the Employer Normal Cost as of January 1, 2023 (1.6), adjusted for payment timing. 2025 Employer Normal Cost (7.1) is based on 2024 Employer Normal Cost (6.1) increased by 3.5%.

*4. Amortization Payment of UAL (6.2) equals fiscal year 2024 budgeted appropriation (6.3) developed in the January 1, 2021 actuarial valuation (adjusted for the Pension Obligation Bond) less Employer Normal Cost (6.1).

**5. Amortization Payment of UAL (7.2) is the total Amortization Payment of UAL (7.2) allocated to each department in the proportion that the UAL (5.1) less 2024 Amortization Payment of UAL (6.2) bears to the total UAL (5.1) less total Amortization Payment of UAL (6.2).