Marblehead Retirement System

Actuarial Valuation

January 1, 2022

PUBLIC EMPLOYEE RETIREMENT ADMINISTRATION
COMMISSION COMMONWEALTH OF MASSACHUSETTS

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1. INTRODUCTION & CERTIFICATION

This report presents the results of the actuarial valuation of the Marblehead Contributory Retirement System. The valuation was performed as of January 1, 2022 pursuant to Chapter 32 of the General Laws of the Commonwealth of Massachusetts. The actuarial assumptions used in this valuation are the same as those used in the January 1, 2020 valuation except the investment return assumption was reduced from 7.15% to 7.0% and the mortality assumption was modified to reflect a more current mortality improvement scale.

This valuation was based on member data as of December 31, 2021, which was supplied by the Retirement Board. Such tests as we deemed necessary were performed on the data to ensure accuracy. Asset information as of December 31, 2021 was provided in the Annual Statement for the Financial Condition as submitted to this office in accordance with G.L. c. 32, ss. 20(5)(h), 23(1) and 23(2)(e). Both the membership data and financial information were reviewed for reasonableness but were not audited by us.

This report was prepared by PERAC for the exclusive use of the Marblehead Retirement Board, its staff and its auditors. The report was performed to determine the funded status of the System and the contribution requirements to ensure that System assets along with the contributions are sufficient to provide the prescribed benefits. Use of this report by other parties may not be appropriate and may result in mistaken conclusions because of the failure to understand applicable assumptions, methods or the inapplicability of the report for purposes other than those intended. PERAC should be asked to review any statement to be made based on the results presented in this report. PERAC will accept no responsibility for any such statement made without its prior review.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as plan experience differing from that anticipated by the economic or demographic assumptions, changes in economic and demographic assumptions, and increases or decreases expected as part of natural operation of the methodology used for these measurements such as additional contribution requirements based on the plan's funded status and changes in plan provisions or applicable law. As part of this valuation, we have not performed an analysis of the potential range of future measurements.

We, the undersigned actuaries, are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained in this report. In our opinion, the actuarial assumptions used in this report are reasonable, are related to plan experience and expectations, and represent our best estimate of anticipated experience under the system. We believe this report represents an accurate appraisal of the actuarial status of the system performed in accordance with generally accepted actuarial principles and practices relating to pension plans.

Respectfully submitted,
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September 30, 2022

2. EXECUTIVE SUMMARY

A | COSTS UNDER CURRENT VALUATION

The principal results of the January 1, 2022 actuarial valuation are shown below.

Present Value of Future Benefits

Actives	$96,168,179
Retirees, Survivors, and Inactives	105,400,196
Total	$201,568,375

Normal Cost

Total Normal Cost	$3,789,767
Expected Employee Contributions	2,013,842
Net Normal Cost	$1,775,925

Actuarial Liability and Development of Unfunded Actuarial Liability

Actives	$63,458,102
Retirees, Survivors, and Inactives	105,400,196
Total	$168,858,298
Assets	120,560,350
Unfunded Actuarial Liability	$48,297,948

The Board recently adopted a funding schedule effective in FY23. The appropriation for FY23 under this funding schedule is shown on page 15 and the complete funding schedule is shown on page 16.

2. EXECUTIVE SUMMARY *(continued)*

B | COMPARISON WITH PRIOR VALUATION

The last full valuation was performed by PERAC as of January 1, 2020. The investment return assumption was decreased from 7.15% to 7.0% effective with this valuation. We maintained the base mortality assumption determined from our local system retiree mortality analysis completed in 2019, but updated the mortality improvement scale (see Part C). Other assumptions are based on our Local Experience Study Analysis issued in 2002 with a subsequent adjustment to the salary increase assumption. Below we have shown a comparison of the results between the two valuations.

	1/1/22	1/1/20	Increase/ (Decrease)	% Increase/ (Decrease)
Total Normal Cost	$3,789,767	$3,515,236	$274,531	7.8%
Expected Employee Contributions	2,013,842	1,928,802	$85,040	4.4%
Net Normal Cost	$1,775,925	$1,586,434	$189,491	11.9%
Total Actuarial Liability	$168,858,298	$161,797,889	$7,060,409	4.4%
Assets	120,560,350	100,818,496	$19,741,854	19.6%
Unfunded Actuarial Liability	$48,297,948	$60,979,393	($12,681,445)	(20.8%)
Funded Ratio	71.4%	62.3%	9.1%	
Number of Active Employees	378	396	(18)	(4.5%)
Total Salary	$22,266,514	$21,644,795	$621,719	2.9%
Average Salary	$58,906	$54,659	$4,247	7.8%
Average Age	49.9	49.1	0.8	1.6%
Average Service	11.5	11.2	0.3	2.7%
Number of Retirees/Survivors	346	357	(11)	(3.1%)
Total Benefits*	$10,069,462	$9,776,619	$292,843	3.0%
Average Benefits*	$29,102	$27,385	$1,717	6.3%
Average Age	73.6	74.2	(0.6)	(0.8%)

**excluding State reimbursed COLA*

2. EXECUTIVE SUMMARY *(continued)*

C | FUNDED STATUS AND PLAN EXPERIENCE SINCE PRIOR VALUATION

Funded Status

The unfunded actuarial liability (UAL) and funded ratio are measures of the plan's funded status. These measures reflect the plan's position as of January 1, 2022. We believe these measures, by themselves, are not appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations or assessing the need for or the amount of future contributions. However, we believe these measures, in conjunction with the plan's funding schedule shown on page 16, are appropriate for assessing the amount of future contributions.

The UAL in this valuation reflects the actuarial value of assets, a method that recognizes investment gains and losses over five years. As of January 1, 2022, the actuarial value of assets is 90.0% of the market value. On a market value basis, the UAL is $34.9 million and the funded ratio is 79.3%.

Plan Experience

Plan Liabilities
The System experienced a gain on plan liabilities of approximately $5.0 million since the last valuation (the actuarial liability was less than expected). This gain is primarily due to salary increases for continuing active members increasing less than assumed as well as more retiree deaths than assumed over the past 2 years. This gain is determined before reflecting the assumption changes discussed on the next few pages.

Plan Assets
The System previously adopted an asset smoothing methodology to determine the actuarial value of assets (AVA). As of January 1, 2022, the AVA is $120.6 million compared with the market value of assets (MVA) of $134.0 million. The AVA is 90.0% of the MVA. The rates of return on a market value basis in 2020 and 2021 were 12.4% and 20.3% respectively. The returns on an AVA basis were approximately 10.5% and 16.3% respectively. The recognition of a portion of prior deferred investment gains and losses contributed to an asset gain of approximately $13.1 million over the 2-year period on an AVA basis.

Total
There was a total net gain of approximately $18.1 million since the last valuation ($5.0 million gain on actuarial liability plus $13.1 million gain on the AVA).

2. EXECUTIVE SUMMARY *(continued)*

C | FUNDED STATUS AND PLAN EXPERIENCE SINCE PRIOR VALUATION *(continued)*

Actuarial Assumptions

Investment Return
For our 2020 actuarial valuations, we generally recommended an assumption between 6.90% and 7.15%. For the Marblehead Retirement System, we used an assumption of 7.15%. The long-term trend, both in Massachusetts and nationally, has been to consistently reduce this assumption.

Early this year, NEPC, the Pension Reserves Investment Trust's (PRIT) investment consultant, provided figures for 30-year expected return projections using a building block approach, as well as the target allocation and expected long term returns by asset class. The expected annual return is 6.9% (6.4% if we assume expenses of 50 basis points and the expected return reflects a gross return) in this study. This figure is 10 basis points greater than the figure from the 2021 study. Note that the 6.9% average expected return does not mean that the expected return each year will be 6.9%. In fact, over the shorter term (10 years) the average expected return is 5.7% (10 basis points less than last year). Greater expected returns in later years determine NEPC's long-term projection. The NEPC projected returns are the first measure we use to determine a reasonable range for the long-term investment return assumption.

A comparison of recent expected return projections as well as historical PRIT returns is shown below.

	Expected Annual Return						
	2016	2017	2018	2019	2020	2021	2022
10-year expected return *	6.8%	6.8%	6.6%	6.8%	6.2%	5.8%	5.7%
30-year expected return	7.8%	7.8%	7.7%	7.9%	7.3%	6.8%	6.9%

* In years prior to 2020, NEPC's short-term horizon was 5-7 years

Actual Returns as of December 31, 2021	
2021	20.5%
5 years (2017-2021)	12.9%
10 years (2012-2021)	11.0%
20 years (2002-2021)	8.6%
36 years (1985-2021)	9.9%

Besides the NEPC analysis, we review the capital market assumptions of other investment consultants for comparison. We also review the Horizon Actuarial Services Survey of Capital Market Assumptions. This study compares the assumptions of 39 different investment consultants including NEPC. The Horizon study used in our analysis was published in August 2021. Since it reflects 2021 capital market assumptions, there is a lag between the Horizon results and the NEPC study. However, the Horizon study continued to show the trend of decreasing expected investment returns. Other studies we reviewed show results consistent with this trend.

C | FUNDED STATUS AND PLAN EXPERIENCE SINCE PRIOR VALUATION *(continued)*

In addition to the NEPC and other capital market analyses, NASRA periodically publishes a survey of investment return assumptions used by over 100 large public plans. In its study as of January 2022, the average investment return assumption is 7.04%, a decrease from the 7.18% figure published in February 2021. Although this study does not consider different asset allocations between the plans, it demonstrates the continuing reduction in this assumption.

As part of our analysis, we considered whether to recommend maintaining the 7.15% assumption adopted in 2020 or reducing the assumption further. We recommend reducing this assumption as part of this valuation.

There are several reasons we recommend a reduction in this assumption. Both the NASRA survey and the Horizon study show reductions from last year's results. As the NASRA survey outlined above shows, there was a decrease in the average assumption by 14 basis points (7.18% to 7.04%). The Horizon study shows a decrease in the expected long-term return based on a "hypothetical fund" (the allocation is roughly comparable to PRIT's allocation) from 6.66% to 6.25%.

The investment return assumption is assumed to be net of expenses. We have taken a measured approach with regard to our recommendation of this assumption. We review this assumption annually, and generally, we have not recommended a decrease in this assumption of more than 25 basis points between any two successive years. Until a few years ago, our recommended assumption had been between the NEPC short-term and long-term expectations. However, with the significant decreases in the NEPC expectations in 2020 and 2021, and our measured approach, the majority of our recommended range for 2021 (6.75% - 7.15%) ended up being greater than NEPC's long-term expectation (6.8%). Because of our measured approach with regard to this assumption, the assumption might exceed the NEPC long-term expectation for a limited period. However, we expect our recommended assumption once again be between the short and long-term expectations within a few years.

We prefer that the investment return assumption be between the NEPC short and long-term expectations, and not exceed the NEPC long-term expectation for two reasons. First, although the assumption is a long-term assumption, we want to reflect that over the short-term, returns are expected to be lower. Second, we noted earlier that the 30-year expected return would be 6.4% if we assume expenses to be 50 basis points. Although actual PRIM returns are reported gross of expenses, our understanding is that NEPC considers the expectations to be net of expenses because their methodology models indexed funds with negligible fees and that active management has historically at least offset fees. However, the Actuarial Standards of Practice, which provide guidance in developing assumptions, note that anticipating superior performance may be unduly optimistic. We are inclined to be conservative in developing the investment return assumption, to reflect both short-term returns and investment expenses.

C | FUNDED STATUS AND PLAN EXPERIENCE SINCE PRIOR VALUATION *(continued)*

Lastly, we note that PRIT's return was 20.5% in 2021. It is easier to reduce the investment return assumption when there are investment gains to offset the increase in actuarial liability due to a reduction in the investment return assumption. In that respect, CalPERS has adopted a funding risk mitigation policy that reduces the investment return assumption when the actual investment return in a given year exceeds the investment return assumption.

There are fewer reasons to consider maintaining this assumption. First, there was virtually no change in the NEPC short and long-term expectation this year compared to last year. Also, PRIT's returns for 2020 and 2021 were 12.5% and 20.5% respectively. The 5-year, 10-year, and 20-year average returns were 12.9%, 11.0% and 8.6%. On average, PRIT's returns have exceeded the assumption during these periods.

The system used an assumption of 7.15% in the January 1, 2020 actuarial valuation. Since we did not perform an actuarial valuation of your plan as of January 1, 2021 (and thus did not consider reducing this assumption at that time), we recommended reducing the investment return assumption as of January 1, 2022 to reflect the two-year period since the prior assumption was selected. Our initial recommendation for your system was 7.0% (which falls within the range we are generally recommending for 2022, 6.75% to 7.15%).

The Board adopted a schedule using an assumption of 7.0%. This reflects a reduction in this assumption from 7.15%. We will continue to monitor this assumption and we may recommend decreasing this assumption as part of the January 1, 2024 actuarial valuation. A reduction in the investment return assumption increases the plan's liabilities.

This change increased the normal cost by approximately $109,000 and the actuarial accrued liability by approximately $2.5 million.

Mortality

We completed a local system retiree mortality analysis in 2019. As part of our analysis, we compared our experience to the public retirement plan mortality tables released in 2019 (the Pub-2010 Mortality Tables-which did not include Massachusetts public plans). We found that our experience was not consistent with these tables. Based on our findings, we adopted the RP-2014 Blue Collar table projected generationally with Scale MP-2018. We continue to use this base table for our 2022 local system actuarial valuations. However, we are updating the mortality improvement scale to the more current MP-2020.

This modest change decreased the normal cost by approximately $7,000 and the actuarial accrued liability by approximately $1.3 million.

Total Impact

The overall impact of these two assumption changes increased the plan's normal cost by $102,000. The actuarial liability increased by approximately $1.2 million. The funding schedule shown in this report reflects these revised assumptions.

C | FUNDED STATUS AND PLAN EXPERIENCE SINCE PRIOR VALUATION *(continued)*

Chapter 176 Provisions

Chapter 176 of the Acts of 2011, *An Act Providing for Pension Reform and Benefit Modernization,* made a number of changes to the Chapter 32 pension law. There are several changes that will have the most impact on decreasing plan liabilities over the longer term. These include an increase in the normal retirement age by two years (for example, from age 65 to age 67 for Group 1 members), an increase in the age (early retirement) reduction factor for ages below the maximum age (from a 4.0% to a 6.0% annual reduction), and an increase in the period for determining a member's average annual compensation (from 3 years to 5 years). These changes are effective only for members hired after April 1, 2012.

As of January 1, 2022, there were 225 members hired after April 1, 2012. The normal cost decreased approximately $200,000 and the actuarial liability decreased approximately $1.9 million for these members compared to the figures under the prior provisions.

COLA Base

This valuation reflects a COLA base of $12,000. The 2020 valuation reflected this same base.

2. EXECUTIVE SUMMARY *(continued)*

C | FUNDED STATUS AND PLAN EXPERIENCE SINCE PRIOR VALUATION *(continued)*

Expenses

We have generally included administrative expenses paid by the plan in the development of normal cost in our actuarial valuations. However, that is not the case with investment related expenses. Historically, most local systems have used an investment return assumption that is net of investment related expenses. Over 10 years ago, we began reflecting a portion of investment related expenses in the normal cost. We used an expense assumption of $400,000 in this valuation, which reflects approximately $220,000 of investment related expenses. Over time, we expect the total administrative and investment expenses to be included in the normal cost. Alternatively, a lower investment return assumption can achieve a similar result.

Net 3(8)(c) Reimbursements

A common assumption is that §3(8)(c) payments paid from a system are approximately equal to §3(8)(c) payments paid to a system. However, we found for most local systems, this isn't true. For your system, there is net §3(8)(c) cash outflow during the year. In order to better reflect the actual cost to the System, we have once again included expected net §3(8)(c) payments in the funding schedule.

Funding Schedule

The funding schedule presented in this report was recently adopted by the Board. The FY23 payment was maintained from the prior schedule. The total appropriation increases 8.6% each year through FY35 with a final amortization payment in FY36.

GASB 67/68

The auditors requested we use the results of this valuation to prepare the Governmental Accounting Standards Board (GASB) disclosures for the fiscal year ending June 30, 2022 and the plan year ending December 31, 2021. The statements are commonly referred to as GASB 67 and GASB 68. GASB 67 relates to financial reporting for state and local government pension plans (plan financials). GASB 68 relates to financial reporting by state and local governments for pension plans (employer financials). We have used a measurement date of December 31 in each year we have provided these disclosures. We have not provided any GASB 67/68 exhibits in this report. These disclosure exhibits have been provided under separate cover.

2. EXECUTIVE SUMMARY *(continued)*

D | RISK

Risk is defined as the potential for differences in future plan measurements resulting from actual future experience deviating from actual assumed experience. The plan is subject to a number of risks that could affect the plan's future financial condition. Examples of risk 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 liabilities;

Interest rate risk – the potential that interest rates will be different than expected;

Longevity and demographic risk – the potential that mortality or other demographic experience will be different than expected;

Contribution risk – the potential that employer contributions to the plan will not be made, or will not be made at the assumed level.

In this section, we provide a brief analysis of several risk measures that we believe are most significant for the plan. A more detailed risk assessment that includes further scenario testing (assessing the impact of one or several events on the plan's financial condition, for example projecting plan investment returns), stress testing (assessing the impact of an adverse change in one or several factors), sensitivity testing (assessing the impact of a change in an actuarial assumption), or stochastic modeling (generating numerous possible outcomes by allowing for random variations in input items to assess the distribution of the outcomes) may provide a better understanding than the analysis in this section.

Unfunded Actuarial Liability and Funded Ratio

The plan's unfunded actuarial liability (UAL) and the funded ratio for the past 10 years are shown below. The UAL is the Actuarial Liability less the Actuarial Value of Assets. The funded ratio is the Actuarial Value of Assets divided by the Actuarial Liability. The retirement system is said to be fully funded when the UAL is zero, or said another way, when the funded ratio is 100%. Actuarial valuations have been performed every two years over this period and the valuation results are determined as of January 1.

	Valuation Date					
	2012	2014	2016	2018	2020	2022
UAL (in millions)	$28.4	$40.5	$45.9	$52.4	$61.0	$48.3
Funded Ratio	73.7%	66.8%	65.8%	64.8%	62.3%	71.4%

The UAL generally increased over this period with a significant decrease in 2022. The 2012 valuation was the second actuarial valuation after the significant market value loss in 2008. The 2008 investment loss was not fully recognized until the 2014 valuation. Reductions in the investment return assumption and changes to the mortality assumption in the past 10 years have increased the plan's actuarial liability and therefore the UAL. The plan has reduced its investment return assumption several times from 8.0% in the 2012 valuation to 7.0% in this valuation. The mortality assumption has also been updated several times including the adoption of a fully generational table in 2015 and the update described in this report. For comparison, using the January 1, 2012 plan assumptions, the UAL as of January 1, 2022 would be approximately $26 million.

2. EXECUTIVE SUMMARY *(continued)*

D | RISK *(continued)*

The funded ratio generally decreased over this period with a significant increase in 2022. The assumption changes described above have also significantly impacted the funded ratio. For comparison, using the 2012 plan assumptions, the 2022 funded ratio would be approximately 82%.

Investment Return Assumption and Funding Schedule

Investment return assumption: 7.0%

Amortization of UAL basis: 8.6% total appropriation increase to FY35 with a final amortization payment in FY36

The System reduced the investment return assumption to 7.0% in this valuation. For comparison, there are currently 44 Massachusetts systems using an assumption of 7.0% or below. We expect about 50 systems will use an investment return assumption of 7.0% or below once all the 2022 valuations are completed.

It is important to note that our emphasis for over the past several years has been to establish funding schedules that complete the amortization of the UAL no later than FY35. This allows systems some flexibility in the event of another market downturn. We believe establishing a schedule that completes the amortization of the UAL by FY35 should be a top priority. The amortization of the UAL extends beyond FY35.

A related priority to fully funding the System by FY35 is limiting the amount and period of "negative amortization". Negative amortization occurs while the UAL increases in the funding schedule. The reason it occurs is that the amortization payment for a given year is not large enough to pay the interest on the UAL. Negative amortization often occurs in amortization schedules with annual increasing payments. Negative amortization is acceptable as long as it is only for a limited period of time. We believe the goal for all systems should be to eliminate negative amortization as soon as possible. The negative amortization for this system is completed in FY25.

Many boards have adopted schedules that increase the total appropriation by a set percentage for a period of time (or the entire length of the schedule). The Board's current schedule reflects this methodology. However, the level of annual increase exceeds 6.0% so there is some risk in whether such a level of increase is sustainable.

Maturity and Volatility Measures

There are a number of plan maturity and volatility ratios that can provide significant insight into the level of a plan's risk. To illustrate, we are providing two such measures. In both cases, we show the 10-year history of the ratio. In addition, we comment on how the results compare with other local systems. We believe that these measures are more useful when compared to historical averages and the results of other plans. See our notes earlier in this section regarding the 2008 investment loss and assumption changes over this period which significantly affect these results.

2. EXECUTIVE SUMMARY *(continued)*

D | RISK *(continued)*

Retiree Actuarial Liability / Total Actuarial Liability

This ratio measures the percentage of actuarial liability due to the plan's retirees. Higher ratios and/or an increase in this ratio indicate a system that is more mature or becoming more mature. As this ratio increases, it generally indicates the retired population is increasing faster than the active member population and there is a greater likelihood of negative cash flow (benefit payments exceeding employer and employee contributions). Retirees in pay status are more expensive than younger members. As a plan matures, it becomes more sensitive to investment volatility and the plan will have more difficulty recovering from losses even with increases in employer contributions.

	Valuation Date					
	2012	2014	2016	2018	2020	2022
Retiree/Total Liability	0.61	0.63	0.61	0.60	0.61	0.60

The ratios for this system are fairly consistent indicating the plan is mature. Public sector plans often have aging populations generating an increase in this ratio. We have found this to be generally true for the systems for which PERAC is the actuary. In 2012, this ratio ranged from .33 to .61. In recent valuations this range has increased to .45 to .66. Many local systems have seen an increase in this ratio over the past 10-15 years as the number of retirees, and specifically the retiree liability has increased as a percentage of the total. A number of systems have had fairly consistent ratios and a few have had decreasing ratios. Such systems have already reached and or maintained a more mature level.

Actuarial Liability / Pay

This measure reflects how a change in actuarial liability (and therefore UAL) may impact the adequacy of contributions. As this ratio increases, plan contributions (using a traditional amortization schedule) increase as a percentage of pay. Furthermore, like the Retiree Liability ratio noted above, higher ratios exacerbate the impact of investment losses on plan contributions.

	Valuation Date					
	2012	2014	2016	2018	2020	2022
Actuarial Liability/Pay	6.5	6.5	6.6	7.0	7.5	7.6

This system shows mostly increasing rates. For comparison with other PERAC systems, in 2012, this ratio ranged from 4.6 to 7.3. For more recent valuations this range has increased. The ratios currently range from 5.1 to 8.9. This ratio has increased for most local systems indicating increasing levels of risk.

Impact of Investment Returns on Unfunded Liability and Funded Ratio (Market Value Basis)

We have prepared a simple 5-year projection illustrating the potential impact of actual investment returns on funding levels. For this estimate, we used the market value of assets and did not attempt to develop an actuarial value of assets. In projecting the actuarial liability, we assumed the January 1, 2022 actuarial assumptions are exactly realized over the next 5 years and that there are no changes in assumptions over this period.

2. EXECUTIVE SUMMARY *(continued)*

D | RISK *(continued)*

We first projected the market value of assets assuming the actual return for each of the next 5 years is 7.0% (the assumption used in the valuation). For comparison, we have also shown the results if the return were 3.0% each year. The 3.0% assumption is not intended to be a worst case basis, but only to reflect the impact of a lower short term return than the current plan assumption. As discussed earlier in the Executive Summary, projected returns are lower over the next 10 years than over the next 30 years.

	Valuation Date					
	2022	2023	2024	2025	2026	2027
UAL (in millions)						
7.00%	$34.9	$34.3	$33.2	$31.7	$29.7	$27.0
3.00%	$34.9	$39.5	$44.2	$48.9	$53.5	$58.1
Funded Ratio						
7.00%	79.3%	80.3%	81.6%	83.0%	84.6%	86.5%
3.00%	79.3%	77.3%	75.5%	73.8%	72.3%	71.0%

For this comparison, we assumed that for the 3.0% projections, the appropriation for the next 5 years would remain as in the current funding schedule (and the same as that if the actual returns were 7.0% per year). If returns were actually 3.0% per year, the funding schedule might have to be increased before FY27.

Cash Flow

Cash flow reflects receipts (primarily employee and employer contributions) less disbursements (primarily benefit payments and expenses). We use the information provided in the Annual Statement but subtract any investment income credit or excess investment income entries from the total receipts. Then we measure the ratio of receipts to disbursements. A ratio greater than 1.0 means receipts are greater than disbursements (positive cash flow). Likewise, a ratio less than 1.0 means receipts are less than disbursements (negative cash flow).

Most Massachusetts public systems have negative cash flow. This is not a significant issue for long-term funding but presents potential issues for short-term funding. All else being equal, over the short term, a negative cash flow produces a yearly funded ratio lower than it would have been if there were positive cash flow. This is because a portion of the investment earnings are being used to pay the net benefits and expenses. Therefore, less of the investment earnings are included in the end of the year value of the plan assets resulting in a lower MVA and a lower funded ratio. This may dampen funded ratio expectations somewhat when reviewing 5-year projections. This plan had a ratio of 0.60, 0.60, 0.63, and 0.70 using the 2017, 2019, 2020, and 2021 Annual Statements respectively. The ratio has increased over the past 2 years because of the significant increase in the employer's annual contributions (see page 11). The current ratio is 0.70 but is expected to continue to increase due to the Board's aggressive funding schedule. The current ratio has a significant impact on the first few years of our projection, but the impact is expected to lessen for the last few years of our projection.

3. SUMMARY OF VALUATION RESULTS

A. Number of Members on Current Valuation Date	
Active Members	378
Vested Terminated Members	17
Non-Vested Terminated Members	129
Retired Members and Survivors	346
Total	870
B. Total Regular Compensation of Active Members	$22,266,514
C. Normal Cost	
Total Normal Cost	3,789,767
Expected Employee Contributions	2,013,842
Net Employer Normal Cost	$1,775,925
D. Actuarial Liability	
Active Members	63,458,102
Vested Terminated Members	2,514,889
Non-Vested Terminated Members	1,069,843
Retirees and Survivors	101,815,464
Total Actuarial Liability	$168,858,298
E. Actuarial Value of Assets	120,560,350
F. Unfunded Actuarial Liability: D – E	$48,297,948
G. Funded Ratio: E/D	71.4%

4. APPROPRIATION DEVELOPMENT FOR FISCAL YEAR 2023

A | DERIVATION OF APPROPRIATION

Cost Under Current Funding Schedule

1. a. Employer Normal Cost as of January 1, 2022	$1,775,925
b. Estimated Expenses	$400,000
c. Total Employer Normal Cost (a+b, adjusted for timing)	$2,252,082
2. Net 3(8)(c) payments	$35,000
3. a. Unfunded Actuarial Liability as of January 1, 2022	$48,297,948
b. FY23 amortization payment (14-year, 8.6% increasing) *	$2,908,231
4. Total FY23 Payment [Sum of 1(c), 2, and 3(b)]	$5,195,313

* FY23 appropriation was maintained at the same level as the prior schedule.

All amounts assume payments will be made July 1 of each fiscal year.

4. APPROPRIATION DEVELOPMENT FOR FISCAL YEAR 2023
(continued)

B | CURRENT FUNDING SCHEDULE

Fiscal Year	Normal Cost	Net 3(8)(c)	Amort. of UAL	Total Cost	Unfunded Act. Liab.	Change in Cost
2023	2,252,082	35,000	2,908,231	5,195,313	49,988,376	
2024	2,353,426	35,000	3,253,684	5,642,110	50,375,756	8.6%
2025	2,459,330	35,000	3,633,001	6,127,331	50,420,617	8.6%
2026	2,570,000	35,000	4,049,282	6,654,282	50,062,749	8.6%
2027	2,685,650	35,000	4,505,900	7,226,550	49,234,410	8.6%
2028	2,806,504	35,000	5,006,529	7,848,033	47,859,506	8.6%
2029	2,932,797	35,000	5,555,167	8,522,964	45,852,685	8.6%
2030	3,064,773	35,000	6,156,166	9,255,939	43,118,344	8.6%
2031	3,202,688	35,000	6,814,262	10,051,950	39,549,530	8.6%
2032	3,346,809	35,000	7,534,609	10,916,418	35,026,737	8.6%
2033	3,497,415	35,000	8,322,815	11,855,230	29,416,576	8.6%
2034	3,654,799	35,000	9,184,981	12,874,779	22,570,325	8.6%
2035	3,819,265	35,000	10,127,746	13,982,010	14,322,319	8.6%
2036	3,991,132	35,000	4,488,193	8,514,325	4,488,193	-39.1%
2037	4,170,733	35,000		4,205,733	0	-50.6%

All amounts assume payments will be made July 1 of each fiscal year.
Total appropriation assumed to increase 8.6% each year until FY35, with a final amortization payment in FY36.
FY23 normal cost includes assumed expenses of $400,000 and is assumed to increase 4.5% per year.
FY23 appropriation was maintained at the same level as the prior schedule.

5. GASB INFORMATION

The actuarial information required by Governmental Accounting Standards Board (GASB) Statement Nos. 67 and 68 replaced the information required by Statement Nos. 25 and 27.

The information required by GASB 67 (plan) is to be reported and measured as of December 31 each year.

The information required by GASB 68 (employer) is to be reported as of the end of the fiscal year (June 30 for cities and towns). We are allowed to select a measurement date at any date during the fiscal year. We have selected a measurement date of December 31 which is consistent with GASB 67.

We have not provided any GASB 67 or 68 exhibits in this valuation report. We have provided the disclosure exhibits under separate cover.

Although GASB 25 no longer applies, we are including the schedule of funding progress previously required by the Statement to provide historical context.

Schedule of Funding Progress

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL)* (b)	Unfunded AAL (UAAL) (b-a)	Funded Ratio (a/b)	Covered Payroll (c)	UAAL as a % of Cov. Payroll ((b-a)/c)
1/1/22	$120,560,350	$168,858,298	$48,297,948	71.4%	$22,266,514	216.9%
1/1/20	$100,818,496	$161,797,889	$60,979,393	62.3%	$21,644,795	281.7%
1/1/18	$96,181,619	$148,535,913	$52,354,294	64.8%	$21,324,819	245.5%
1/1/16	$88,309,295	$134,203,533	$45,894,238	65.8%	$20,286,731	226.2%
1/1/14	$81,979,599	$122,307,600	$40,328,001	67.0%	$18,842,144	214.0%

**excludes State reimbursed COLA*

6. PLAN ASSETS

A | BREAKDOWN OF ASSETS BY INVESTMENT TYPE

Cash and Cash Equivalents	$58,313
PRIT Cash	90,047
PRIT Fund	133,795,339
Accounts Receivable	14,106
Accounts Payable	(1,861)
Total	$133,955,944

B | BREAKDOWN OF ASSETS BY FUND

Annuity Savings Fund	$22,206,293
Annuity Reserve Fund	5,035,988
Military Fund	9,100
Pension Fund	963,187
Pension Reserve Fund	105,741,376
Total	$133,955,944

C | MARKET VALUE OF ASSETS $133,955,944

D | ACTUARIAL VALUE OF ASSETS $120,560,350

6. PLAN ASSETS *(continued)*

E | DEVELOPMENT OF ACTUARIAL VALUE OF ASSETS

	2020	2021	2022
1A. Development of total investment income including appreciation			
1. Beginning of year market value	106,088,597	114,565,923	133,955,944
2a. Employee contributions	2,224,825	2,227,537	
b. Employer contributions	4,405,062	4,783,897	
c. Other receipts	507,710	996,804	
d. Total receipts: (a) + (b) + (c)	7,137,597	8,008,238	
e. Benefit payments	9,858,379	9,913,145	
f. Expenses	659,398	787,192	
g. Other disbursements	858,251	800,632	
h. Total disbursements: (e) + (f) + (g)	11,376,028	11,500,969	
i. Cash flow: (d) – (h)	(4,238,431)	(3,492,731)	
3. End of year market value	114,565,923	133,955,944	
4. Investment income including appreciation: (3) – (1) – (2(i))	12,715,757	22,882,752	
B. Expected market value development			
1. Beginning of year market value	106,088,597	114,565,923	
2. Cash flow (A2(i))	(4,238,431)	(3,492,731)	
3. Expected Return on (1)	7,585,335	8,191,463	
4. Expected return on cash flow A2(i) x 0.0715 / 2	(151,524)	(124,865)	
5. Expected market value end of year (1)+(2)+(3)+(4)	109,283,977	119,139,790	
C. Gain/(loss) for year: A3-B5	5,281,946	14,816,154	
D. Development of Actuarial Value of Assets			
1. Beginning of year market value	106,088,597	114,565,923	133,955,944
2a. Asset gain/(loss) in prior year	8,720,868	5,281,946	14,816,154
b. Asset gain/(loss) in 2nd prior year	(8,997,620)	8,720,868	5,281,946
c. Asset gain/(loss) in 3rd prior year	9,011,524	(8,997,620)	8,720,868
d. Asset gain/(loss) in 4th prior year	436,846	9,011,524	(8,997,620)
3. Unrecognized gain/(loss) .8 x [2a] + .6 x [2b] + .4 x [2c] +.2 x [2d]	5,270,101	7,661,344	16,710,914
4. Beginning of year actuarial value of assets: [1] - [3]	100,818,496	106,904,579	117,245,030
5. Actuarial value / Market value	95.0%	93.3%	87.5%
6. Adjusted actuarial value: (4) but not less than 90% nor greater than 110% of market value	100,818,496	106,904,579	120,560,350

7. INFORMATION ON SYSTEM MEMBERSHIP

A critical element of an actuarial valuation is accurate and up-to-date membership information. PERAC conducted an extensive review of member data submitted for this valuation.

A | ACTIVE MEMBERS

	Actives	Vested Terminations
Number of Members	378	17
Average Age	49.9	54.4
Average Service	11.5	14.0
Average Salary	$58,906	$46,031
Average Annuity Savings Fund Balance	$53,652	$47,800

Age by Service Distribution of Active Members

Years of Service

Present Age	0 - 4	5 –9	10 - 14	15 - 19	20 - 24	25 - 29	30+	Total
0 - 24	8							8
25 - 29	16	8						24
30 - 34	14	12	1					27
35 - 39	12	8	10	3				33
40 - 44	11	8	6	12	4			41
45 - 49	9	6		11	3	2		31
50 - 54	11	12	10	7	7	8	1	56
55 - 59	13	17	16	6	8	6	1	67
60 - 64	9	10	9	10	8	5	4	55
65+	4	4	8	7	8	4	1	36
Total	107	85	60	56	38	25	7	378

7. INFORMATION ON SYSTEM MEMBERSHIP *(continued)*

A | ACTIVE MEMBERS *(continued)*

Salary by Age Distribution of Active Members

Present Age	Number of Members	Total Salary	Average Salary
0 - 24	8	$362,202	$45,275
25 - 29	24	$1,302,574	$54,274
30 - 34	27	$1,530,084	$56,670
35 - 39	33	$2,269,348	$68,768
40 - 44	41	$2,710,130	$66,101
45 - 49	31	$2,020,760	$65,186
50 - 54	56	$3,627,063	$64,769
55 - 59	67	$3,649,074	$54,464
60 - 64	55	$3,038,601	$55,247
65+	36	$1,756,678	$48,797
Total	378	$22,266,514	$58,906

7. INFORMATION ON SYSTEM MEMBERSHIP *(continued)*

B | RETIREES AND SURVIVORS

	Superannuation	Ordinary Disability	Accidental Disability	Survivors	Total
Number of Members	274	3	20	49	346
Average Age	73.7	61.0	65.0	77.5	73.6
Average Annual Benefit	$30,385	$27,482	$38,498	$18,934	$29,207

Benefit by Payment and Retirement Type

	Superannuation	Ordinary Disability	Accidental Disability	Survivors	Total
Total Annuity	$1,663,493	$10,271	$60,851	$100,325	$1,834,940
Pension (excluding State reimbursed COLA)	$6,651,908	$72,174	$702,636	$807,804	$8,234,522
State reimbursed COLA	$10,174	$0	$6,480	$19,618	$36,272
Total	$8,325,575	$82,445	$769,967	$927,747	$10,105,734

7. INFORMATION ON SYSTEM MEMBERSHIP *(continued)*

B | RETIREES & SURVIVORS *(continued)*

Benefit by Age Distribution

Present Age	Number of Members	Total Benefits	Average Benefits
Less than 40	2	$55,727	$27,864
40 - 44	1	$34,706	$34,706
45 - 49			
50 - 54	4	$123,265	$30,816
55 - 59	14	$572,756	$40,911
60 - 64	29	$1,031,978	$35,585
65 - 69	71	$2,277,728	$32,081
70 - 74	92	$2,834,361	$30,808
75 - 79	57	$1,652,158	$28,985
80 - 84	33	$745,883	$22,603
85 - 89	22	$452,336	$20,561
90+	21	$324,836	$15,468
Totals	346	$10,105,734	$29,207

8. VALUATION COST METHODS

A | ACTUARIAL COST METHOD

The Actuarial Cost Method which was used to determine pension liabilities in this valuation is known as the *Entry Age Normal Cost Method***.** Under this method the *Normal Cost* for each active member on the valuation date is determined as the level percent of salary, which, if paid annually from the date the employee first became a member of the retirement system, would fully fund by retirement, death, disability or termination, the projected benefits which the member is expected to receive. The *Actuarial Liability* for each member is determined as the present value as of the valuation date of all projected benefits which the member is expected to receive, minus the present value of future annual Normal Cost payments expected to be made to the fund. Since only active members have a Normal Cost, the Actuarial Liability for inactive members, retirees and survivors is simply equal to the present value of all projected benefits. The sum of Normal Cost and Actuarial Liability for each member is equal to the Normal Cost and Actuarial Liability for the Plan. The *Unfunded Actuarial Liability* is the Actuarial Liability less current assets.

The Normal Cost for a member will remain a level percent of salary for each year of membership except for changes in provisions of the Plan or the actuarial assumptions employed in projection of benefits and present value determinations. The Normal Cost for the entire system will also change due to the addition of new members or the retirement, death or termination of members. The Actuarial Liability for a member will increase each year to reflect the additional accrual of Normal Cost. It will also change if the Plan provisions or actuarial assumptions are changed.

Differences each year between the actual experience of the Plan and the experience projected by the actuarial assumptions are reflected by adjustments to the Unfunded Actuarial Liability. An experience difference which increases the Unfunded Actuarial Liability is called an *Actuarial Loss* and one which decreases the Unfunded Actuarial Liability is called an *Actuarial Gain.*

B | ASSET VALUATION METHOD

The actuarial value of assets is determined in accordance with the deferred recognition method under which 20% of the gains or losses occurring in the prior year are recognized, 40% of those occurring 2 years ago are recognized, etc., so that 100% of gains or losses occurring 5 years ago are recognized. The actuarial value of assets will be adjusted, if necessary, in order to remain between 90% and 110% of market value.

C | ACTUARIAL MODELS

The software we used in our actuarial valuations measures the present value of the plan's actuarial liabilities from which we develop funding schedules that determine annual appropriations for each system. The software was created and is maintained by a national vendor of actuarial software and we have used this software for over 20 years. We periodically review the results of the software by analyzing detailed individual test lives and have compared our results to those of other actuaries using the same data set. The valuation output is prepared before a final review by our actuary.

In addition, we used a simple projection model prepared in a spreadsheet, to perform a rough analysis of the impact of investment returns on the unfunded actuarial liability and funded ratio for the next five years. The work is tailored to each valuation and reviewed by the actuary.

9. ACTUARIAL ASSUMPTIONS

Investment Return

7.0% per year net of investment expenses *(prior assumption 7.15%)*

The investment return assumption is a long-term assumption and is 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 which included expected returns by asset class, risk analysis, and the determination of a 30-year expected target rate of return.

Inflation

2.5% per year

Interest Rate Credited to the Annuity Savings Fund

3.5% per year

Assumed Rate of Cost of Living Increases (COLA)

3.0% per year (on the first $12,000 of an allowance)

Mortality

Pre-retirement mortality reflects the RP-2014 Blue Collar Employees table projected generationally with Scale MP-2020 (gender distinct). *(Prior assumption reflected the same base table projected generationally with Scale MP-2018.)*

Post-retirement mortality reflects the RP-2014 Blue Collar Healthy Annuitant table projected generationally with Scale MP-2020 (gender distinct). *(Prior assumption reflected the same base table projected generationally with Scale MP-2018.)*

For disabled members, the mortality rate is assumed to be in accordance with the RP-2014 Blue Collar Healthy Annuitant Table (set forward one year for both males and females) projected generationally with Scale MP-2020 (gender distinct). *(Prior assumption reflected the same base table projected generationally with Scale MP-2018.)*

It is assumed that 55% of pre-retirement deaths are job-related for Group 1 and 2 members and 90% are job-related for Group 4 members. For members retired under an Accidental Disability, 40% of deaths are assumed to be from the same cause as the disability.

We completed a local system retiree mortality study in 2019. As part of our analysis, we compared our experience to the new public retirement plan mortality tables released in early 2019 (the Pub-2010 Mortality Tables). Public plans from Massachusetts were not included in this study. We found that our experience was not consistent with these tables. The mortality assumptions selected reflect observed current mortality and expected mortality improvement as well as professional judgement.

9. ACTUARIAL ASSUMPTIONS *(continued)*

Salary Increase

Service	Group 1	Group 2	Group 4
0	6.00%	6.00%	7.00%
1	5.50%	5.50%	6.50%
2	5.50%	5.50%	6.00%
3	5.25%	5.25%	5.75%
4	5.25%	5.25%	5.25%
5	4.75%	4.75%	5.25%
6	4.75%	4.75%	4.75%
7	4.50%	4.50%	4.75%
8	4.50%	4.50%	4.75%
9	4.25%	4.50%	4.75%
10+	4.25%	4.50%	4.75%

The salary increase assumption reflects both prior experience and professional judgment.

Withdrawal

Based on analysis of past experience. Annual rates are based on years of service. Sample annual rates for Groups 1 and 2 are shown below. For Group 4 members the rate is 0.015 each year for service up to and including 10 years. No withdrawal is assumed thereafter.

Service	Groups 1 & 2
0	0.150
5	0.076
10	0.054
15	0.033
20	0.020

Withdrawal rates are based on our most recent experience analysis which reviewed age, gender and job group. The assumption reflects this analysis as well as professional judgment.

9. ACTUARIAL ASSUMPTIONS *(continued)*

Disability

Based on an analysis of past experience. It is also assumed that the percentage of job-related disabilities is 55% for Groups 1 & 2 and 90% for Group 4.

Age	Groups 1 & 2	Group 4
20	0.00010	0.0010
30	0.00030	0.0030
40	0.00101	0.0030
50	0.00192	0.0125
60	0.00280	0.0085

Disability rates are based on our most recent experience analysis which reviewed age, gender and job group. The assumption reflects this analysis as well as professional judgment.

Expenses

An amount of $400,000 has been included in the Normal Cost for FY23. This amount includes $180,000 which represents the estimated administrative expenses and $220,000 which represents a portion of the investment related expenses. This amount is assumed to increase by 4.5% each year.

Members Hired on or After April 2, 2012

Chapter 176 of the Acts of 2011 changed the retirement eligibility for the different job groups. For example, Group 1 eligibility changed from 55 years old with 10 years of service to 60 years old with 10 years of service (Chapter 176 removed the provision that allowed retirement at any age with 20 years of service). Our software system is programmed such that at any given age, a member is assumed to either retire or terminate, but not both. Therefore, we adjusted the retirement and termination rates for members impacted by Chapter 176. For example, for Group 1 members, we removed retirement rates for ages 50-59. Termination rates remain in effect for those years. We will monitor these assumptions going forward.

9. ACTUARIAL ASSUMPTIONS *(continued)*

Retirement

Age	Groups 1 & 2		Group 4
	Male	Female	
45-49	0.000	0.000	0.010
50	0.010	0.015	0.020
51	0.010	0.015	0.020
52	0.010	0.020	0.020
53	0.010	0.025	0.050
54	0.020	0.025	0.075
55	0.020	0.055	0.150
56	0.025	0.065	0.100
57	0.025	0.065	0.100
58	0.050	0.065	0.100
59	0.065	0.065	0.150
60	0.120	0.050	0.200
61	0.200	0.130	0.200
62	0.300	0.150	0.250
63	0.250	0.125	0.250
64	0.220	0.180	0.300
65	0.400	0.150	1.000
66	0.250	0.200	1.000
67	0.250	0.200	1.000
68	0.300	0.250	1.000
69	0.300	0.200	1.000
70 and after	1.000	1.000	1.000

Retirement rates are based on our most recent experience analysis which reviewed age, service, gender and job group. The assumption reflects this analysis as well as professional judgment.

10. 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. 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 retirement board, and approved by PERAC. Membership is optional for certain elected officials.

There are 4 classes of membership under Chapter 32, but one of these classes, Group 3, is made up exclusively of the State Police who are in the State Retirement System. The other 3 classes are as follows:

Group 1:

General employees, including clerical, administrative, technical and all other employees not otherwise classified.

Group 2:

Certain specified hazardous duty positions.

Group 4:

Police officers, firefighters, and other specified hazardous positions.

MEMBER CONTRIBUTIONS

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

Prior to 1975:	5% of regular compensation
1975 - 1983:	7% of regular compensation
1984 to 6/30/96:	8% of regular compensation
7/1/96 to present:	9% of regular compensation
1979 to present:	an additional 2% of regular compensation in excess of $30,000.

In addition, members of Group 1 who join the system on or after April 2, 2012 will have their withholding rate reduced to 6 % after achieving 30 years of creditable service.

10. SUMMARY OF PLAN PROVISIONS *(continued)*

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 10 financial institutions.

RETIREMENT AGE

The mandatory retirement age for some Group 2 and Group 4 employees is age 65. Most Group 2 and Group 4 members may remain in service after reaching age 65. Group 2 and 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 employees in Group 1.

SUPERANNUATION RETIREMENT

A person who became a member before April 2, 2012 is eligible for a superannuation retirement allowance (service retirement) upon meeting the following conditions:

- completion of 20 years of service, or
- attainment of age 55 if hired prior to 1978, or if classified in Group 4, or
- attainment of age 55 with 10 years of service, if hired after 1978, and if classified in Group 1 or 2

A person who became a member on or after April 2, 2012 is eligible for a superannuation retirement allowance (service retirement) upon meeting the following conditions:

- attainment of age 60 with 10 years of service if classified in Group 1, or
- attainment of age 55 with 10 years of service if classified in Group 2, or
- attainment of age 55 if classified in Group 4.

10. SUMMARY OF PLAN PROVISIONS *(continued)*

AMOUNT OF BENEFIT

A member's annual allowance is determined by multiplying average salary by a benefit rate related to the member's age and job classification at retirement, and the resulting product by his creditable service. The amount determined by the benefit formula cannot exceed 80% of the member's highest three year (or five year salary as discussed below) average salary. For veterans as defined in G.L. c. 32, s. 1, there is an additional benefit of $15 per year for each year of creditable service, up to a maximum of $300.

• Salary is defined as gross regular compensation. For persons who become members after January 1, 2011, regular compensation is limited to 64% of the federal limit found in 26 U.S.C. 401(a)(17). In addition, regular compensation for members who retire after April 2, 2012 will be limited to prohibit "spiking" of a member's salary to increase the retirement benefit.

• For persons who became members prior to April 2, 2012, Average Salary is the average annual rate of regular compensation received during the 3 consecutive years that produce the highest average, or, if greater, during the last 3 years (whether or not consecutive) preceding retirement.

• For persons who became members on or after April 2, 2012, Average Salary is the average annual rate of regular compensation received during the 5 consecutive years that produce the highest average, or, if greater, during the last 5 years (whether or not consecutive) preceding retirement.

• The Benefit Rate varies with the member's retirement age. For persons who became members prior to April 2, 2012 the highest rate of 2.5% applies to Group 1 employees who retire at or after age 65, Group 2 employees who retire at or after age 60, and to Group 4 employees who retire at or after age 55. A .1% reduction is applied for each year of age under the maximum age for the member's group. For Group 2 employees who terminate from service under age 55, the benefit rate for a Group 1 employee shall be used.

• For persons who became members on or after April 2, 2012 and retire with less than 30 years of creditable service, the highest rate of 2.5% applies to Group 1 employees who retire at or after age 67, Group 2 employees who retire at or after age 62, and to Group 4 employees who retire at or after age 57. A .15% reduction is applied for each year of age under the maximum age for the member's group.

• For persons who became members on or after April 2, 2012 and retire with more than 30 years of creditable service, the highest rate of 2.5% applies to Group 1 employees who retire at or after age 67, Group 2 employees who retire at or after age 62, and to Group 4 employees who retire at or after age 57. A .125% reduction is applied for each year of age under the maximum age for the member's group.

10. SUMMARY OF PLAN PROVISIONS *(continued)*

DEFERRED VESTED BENEFIT

A participant who has attained the requisite years of creditable service can elect to defer his or her retirement until a later date. Certain public safety employees cannot defer beyond age 65. All participants must begin to receive a retirement allowance or withdraw their accumulated deductions no later than April 15 of the calendar year following the year they reach age 72.

WITHDRAWAL OF CONTRIBUTIONS

Member contributions may be withdrawn upon termination of employment. The interest rate for employees who first become members on or after January 1, 1984 who voluntarily withdraw their contributions with less than 10 years of service will be 3%. Interest payable on all other withdrawals will be set at regular interest.

DISABILITY RETIREMENT

The Massachusetts Retirement Plan provides 2 types of disability retirement benefits:

ORDINARY DISABILITY

Eligibility: Non-veterans who become totally and permanently disabled by reason of a non-job related condition with at least 10 years of creditable service (or 15 years creditable service in systems in which the local option contained in G.L. c. 32, s.6(1) has not been adopted).

Veterans with ten years of creditable service who become totally and permanently disabled by reason of a non-job related condition prior to reaching "maximum age". "Maximum age" applies only to employees classified in Group 4 who are subject to mandatory retirement.

Retirement Allowance: For persons who became members prior to April 2, 2012, the benefit is equal to the accrued superannuation retirement benefit as if the member was age 55. If the member is a veteran, the benefit is 50% of the member's final rate of salary during the preceding 12 months, plus an annuity based upon accumulated member contributions plus credited interest. If the member is over age 55, he or she will receive not less than the superannuation allowance to which he or she is entitled.

For persons in Group 1 who became members on or after April 2, 2012, the benefit is equal to the accrued superannuation retirement benefit as if the member was age 60. If the member is a veteran, the benefit is 50% of the member's final rate of salary during the preceding 12 months, plus an annuity based upon accumulated member contributions plus credited interest. If the member is over age 60, he or she will receive not less than the superannuation allowance to which he or she would have been entitled had they retired for superannuation.

10. SUMMARY OF PLAN PROVISIONS *(continued)*

ORDINARY DISABILITY *(continued)*

For persons in Group 2 and Group 4 who became members on or after April 2, 2012, the benefit is equal to the accrued superannuation retirement benefit as if the member was age 55. If the member is a veteran, the benefit is 50% of the member's final rate of salary during the preceding 12 months, plus an annuity based upon accumulated member contributions plus credited interest. If the member is over age 55, he or she will receive not less than the superannuation allowance to which he or she is entitled.

ACCIDENTAL DISABILITY

Eligibility: Applies to members who become permanently and totally unable to perform the essential duties of the position as a result of a personal injury sustained or hazard undergone while in the performance of duties. There are no minimum age or service requirements.

Retirement Allowance: 72% of salary plus an annuity based on accumulated member contributions, with interest. This amount is not to exceed 100% of pay. For those who became members in service after January 1, 1988 or who have not been members in service continually since that date, the amount is limited to 75% of pay. There is an additional pension of $1,010.28 per year (or $312.00 per year in systems in which the local option contained in G.L. c. 32, s. 7(2)(a)(iii) has not been adopted), per child who is under 18 at the time of the member's retirement, with no age limitation if the child is mentally or physically incapacitated from earning. The additional pension may continue up to age 22 for any child who is a full time student at an accredited educational institution. For systems that have adopted Chapter 157 of the Acts of 2005, veterans as defined in G.L. c. 32, s. 1 receive an additional benefit of $15 per year for each year of creditable service, up to a maximum of $300.

ACCIDENTAL DEATH

Eligibility: Applies to members who die as a result of a work-related injury or if the member was retired for accidental disability and the death was the natural and proximate result of the injury or hazard undergone on account of which such member was retired.

Allowance: An immediate payment to a named beneficiary equal to the accumulated deductions at the time of death, plus a pension equal to 72% of current salary and payable to the surviving spouse, dependent children or the dependent parent, plus a supplement of $1,010.28 per year, per child (or $312.00 per year in systems in which the local option contained in G.L. c. 32, s. 9(2)(d)(ii) has not been adopted), payable to the spouse or legal guardian until all dependent children reach age 18 or 22 if a full time student, unless mentally or physically incapacitated.

The surviving spouse of a member of a police or fire department or any corrections officer who, under specific and limited circumstances detailed in the statute, suffers an accident and is killed or sustains injuries while in the performance of his duties that results in his death, may receive a pension equal to the maximum salary for the position held by the member upon his death.

In addition, an eligible family member may receive a one-time payment of $300,000.00 from the State Retirement Board.

10. SUMMARY OF PLAN PROVISIONS *(continued)*

DEATH AFTER ACCIDENTAL DISABILITY RETIREMENT

Effective November 7, 1996, Accidental Disability retirees were allowed to select Option C at retirement and provide a benefit for an eligible survivor. For Accidental Disability retirees prior to November 7, 1996, who could not select Option C, if the member's death is from a cause unrelated to the condition for which the member received accidental disability benefits, a surviving spouse will receive an annual allowance of $6,000. For Systems that accept the provisions of Section 28 of Chapter 131 of the Acts of 2010 the amount of this benefit is $9,000 and for Systems that accept the provisions of Section 65 of Chapter 139 of the Acts of 2012 the amount of this benefit is $12,000.

DEATH IN ACTIVE SERVICE *(OPTION D)*

Allowance: An immediate allowance equal to that which would have been payable had the member retired and selected Option C on the day before his or her death. For a member who became a member prior to April 2, 2012 whose death occurred prior to the member's minimum superannuation retirement age, the age 55 benefit rate is used. For a member classified in Group 1 who became a member on or after April 2, 2012 whose death occurred prior to the member's minimum superannuation retirement age, the age 60 benefit rate is used. If the member died after age 60, the actual age is used. For a member classified in Group 2 or Group 4 who became a member on or after April 2, 2012 and whose death occurred prior to the member's minimum superannuation retirement age, the benefit shall be calculated using an age 55 factor. The minimum annual allowance payable to the surviving spouse of a member in service who dies with at least two years of creditable service is $3,000 unless the retirement system has accepted the local option increasing this minimum annual allowance to $6,000, provided that the member and the spouse were married for at least one year and living together on the member's date of death

The surviving spouse of such a member in service receives an additional allowance equal to the sum of $1,440 per year for the first child and $1,080 per year for each additional child until all dependent children reach age 18 or 22 if a full time student, unless mentally or physically incapacitated.

COST OF LIVING

If a system has accepted Chapter 17 of the Acts of 1997, and the Retirement Board votes to pay a cost of living increase (COLA) for that year, the percentage is determined based on the increase in the Consumer Price Index used for indexing Social Security benefits, but cannot exceed 3.0%. Section 51 of Chapter 127 of the Acts of 1999, if accepted, allows boards to grant COLA increases greater than that determined by CPI but not to exceed 3.0%. The first $12,000 (or the increased COLA base if adopted by the Board) of a retiree's total allowance is subject to a COLA. The total COLA for periods from 1981 through 1996 is paid for by the Commonwealth of Massachusetts.

Under the provisions of Chapter 32, Section 103(j) inserted by Section 19 of Chapter 188 of the Acts of 2010, systems may increase the maximum base on which the COLA is calculated in multiples of $1,000. For many years, the COLA was calculated upon the first $12,000 of a retiree's allowance. Now the maximum base upon which the COLA is calculated varies from System to System. Each increase must be accepted by a majority vote of the Retirement Board and approved by the legislative body.

10. SUMMARY OF PLAN PROVISIONS *(continued)*

METHODS OF PAYMENT

A member may elect to receive his or her retirement allowance in one of 3 forms of payment.

Option A: Total annual allowance, payable in monthly installments, commencing at retirement and terminating at the member's death.

Option B: A reduced annual allowance, payable in monthly installments, commencing at retirement and terminating at the death of the member, provided, however, that if the total amount of the annuity portion received by the member is less than the amount of his or her accumulated deductions, including interest, the difference or balance of his accumulated deductions will be paid in a lump sum to the retiree's beneficiary or beneficiaries of choice.

Option C: A reduced annual allowance, payable in monthly installments, commencing at retirement. At the death of the retired employee, 2/3 of the allowance is payable to the member's designated beneficiary (who may be the spouse, or former spouse who is unmarried at the time of retirement for a member whose retirement becomes effective on or after February 2, 1992, child, parent, sister, or brother of the employee) for the life of the beneficiary. For members who retired on or after January 12, 1988, if the beneficiary pre-deceases the retiree, the benefit payable increases (or "pops up" to Option A) 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 "pops up" to Option A in the same fashion. The Option C became available to accidental disability retirees on November 7, 1996.

ALLOCATION OF PENSION COSTS

If a member's total creditable service was partly earned by employment in more than one retirement system, the cost of the "pension portion" is allocated between the different systems pro rata based on the member's service within each retirement system. If a member received regular compensation concurrently from two or more systems on or after January 1, 2010, and was not vested in both systems as of January 1, 2010, such a pro-ration will not be undertaken. This is because such a person will receive a separate retirement allowance from each system.

11. GLOSSARY OF TERMS

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 amount and duration of pension benefits, such as: mortality, withdrawal, disablement and retirement; changes in compensation; 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 Normal Cost and the 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 two Actuarial Valuation dates.

Note: The effect on the Accrued Liability and/or the Normal Cost resulting from changes in the Actuarial Assumptions, the Actuarial Cost Method, or pension plan provisions would be described as such, not as an Actuarial Gain (Loss).

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.

11. GLOSSARY OF TERMS *(continued)*

ANNUAL STATEMENT

The statement submitted to PERAC each year that describes the asset holdings and Fund balances as of December 3l 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 deductions, including interest, is transferred at the time a member retires, and from which annuity payments are made.

ANNUITY SAVINGS FUND

The fund in which employee 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 value of securities as described in Section 8.

COST OF BENEFITS

The estimated payment from the pension system for benefits for the fiscal year. This was the minimum amount payable during the first six years of some funding schedules.

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 22(6A), Section 22D or Section 22F of M.G.L. Chapter 32.

GASB

Governmental Accounting Standards Board

11. GLOSSARY OF TERMS *(continued)*

NORMAL COST

Total Normal Cost is that portion of the Actuarial Present Value of pension plan benefits, which is to be paid in a single fiscal year. The Employee Normal Cost is the amount of the expected employee contributions for the 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.

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.

UNFUNDED ACCRUED LIABILITY

The excess of the Actuarial Accrued Liability over the Assets.

PUBLIC EMPLOYEE RETIREMENT ADMINISTRATION COMMISSION
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COMMONWEALTH OF MASSACHUSETTS
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