Commonwealth

Actuarial Valuation Report

January 1, 2018

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 pension benefits that are the obligation of the Commonwealth of Massachusetts. The four components are:

- State Employees' Retirement System (SRS)
- Massachusetts Teachers' Retirement System (TRS)
- Boston Teachers
- Cost of Living Allowance Reimbursements to Local Systems

The valuation was performed as of January 1, 2018 pursuant to Chapter 32 of the General Laws of the Commonwealth of Massachusetts, and is based on the plan provisions in effect at that time. The actuarial assumptions used to calculate the actuarial accrued liability and the normal cost primarily reflect our latest experience studies of SRS and TRS issued in 2014 and our most recent analysis of retiree mortality during 2015 and 2016. The actuarial assumptions used in this valuation are the same as those used in the January 1, 2017 actuarial valuation, except the investment return assumption was decreased from 7.50% to 7.35% and the disability retiree mortality assumption for SRS was adjusted slightly.

This valuation is based on member data as of December 31, 2017, which was supplied by the State, Massachusetts Teachers', and Boston Retirement Boards. We performed a number of tests on the data to ensure reasonableness and made specific assumptions for a number of TRS and Boston teachers data items. Asset information as of December 31, 2017 was provided by the Pension Reserves Investment Management (PRIM) Board. We reviewed both the membership data and financial information for reasonableness but we did not audit this information.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; 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.

I, James R. Lamenzo, meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained in this report. In my opinion, the actuarial assumptions used in this report are reasonable, are related to plan experience and expectations, and represent my best estimate of anticipated experience. I believe this report represents an accurate appraisal of the actuarial status of the State Retirement System performed in accordance with generally accepted actuarial principles and practices relating to pension plans.

Respectfully submitted,
Public Employee Retirement Administration Commission

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2. EXECUTIVE SUMMARY

PART A | PRINCIPAL VALUATION RESULTS

The provisions of Chapter 32, Section 22C mandate the establishment of a funding schedule for the Commonwealth of Massachusetts' pension obligation. The SRS, TRS, liabilities for Boston teachers, and State reimbursements to local systems to reflect COLAs granted from 1982 through 1996 (determined on an actuarial basis) have been the components of the Commonwealth schedule. Beginning in FY18, Chapter 5 of the Acts of 2017 required that several additional items included in the development of the Commonwealth funding schedule be shown separately. These items include the administrative expenses of the Public Employee Retirement Administration Commission (PERAC), the payment to the Optional Retirement Plan (ORP) under Section 40 of Chapter 15A, and a modification to the COLA reimbursement to local systems described above to reflect actual reimbursements. The schedule, as mandated by law, calls for payment of the Normal Cost plus an amortization payment on the Unfunded Actuarial Liability (UAL).

The Commonwealth's current funding schedule was filed in January, 2017 and was based on the results of the January 1, 2016 Commonwealth Actuarial Valuation. The FY19 appropriation under the schedule is $2.61 billion. The total appropriation under the schedule increases 8.94% each year until FY36. The amortization of the 2015 Early Retirement Incentive (ERI) will be completed in FY27. Under the schedule adopted at that time, if the actuarial assumptions were exactly realized and there were no changes in the assumptions or plan provisions each year, the UAL would have increased until FY24 before decreasing each year until FY36.

In the 2014 and prior actuarial valuations, the Annual Required Contribution (ARC) was developed under GASB 27 for accounting purposes. The ARC was developed using the minimum allowable schedule for local systems under Chapter 32 (UAL amortized on a 4.0% annual increasing basis to FY40). This ARC calculation is no longer applicable for GASB purposes, but we show it for comparison. Using the ARC basis and the January 1, 2018 valuation results, the FY19 appropriation would be approximately $3.50 billion. Therefore, the FY19 appropriation is 74.6% of the ARC ($2.61B/$3.50B). Had there been no assumption changes in this valuation, this figure would have been approximately 78%. Based on the 2017 valuation results, the FY18 appropriation was 72.7% of the ARC. We expect this percentage to generally increase each year until ultimately the appropriation exceeds the ARC, although changes to the actuarial assumptions and actuarial gains or losses could affect this result.

The principal results of the January 1, 2018 actuarial valuation are as follows (in thousands):

Total Normal Cost	$1,897,356
Expected Employee Contributions	1,305,290
Net Normal Cost	$592,066
Total Expenses and Transfers	$97,500
Net Normal Cost Plus Expenses	$689,566

Total Actuarial Liability	$96,316,894
Assets	$54,918,125
Unfunded Actuarial Liability	$41,398,769
Funded Ratio	57.0%

2. EXECUTIVE SUMMARY *(continued)*

PART B | COMPARISON WITH PRIOR VALUATION AND EXPERIENCE ANALYSIS

A comparison of the results of this valuation and the January 1, 2017 valuation is shown below (in thousands).

	1/1/18	1/1/17	Increase (Decrease)	Increase (Decrease)
Total Normal Cost	$1,897,356	$1,802,008	$95,348	5.3%
Expected Employee Contributions	1,305,290	1,250,904	54,386	4.3%
Net Normal Cost	$592,066	$551,104	$40,962	7.4%
Administrative Expenses	$64,600	$51,800	$12,800	24.7%
Optional Retirement Plan Payment	13,500	18,600	(5,100)	(27.4%)
3(8)(c) Amounts Transferred to Other Systems	19,400	20,300	(900)	(4.4%)
Total Expenses and Transfers	$97,500	$90,700	$6,800	7.5%
Net Normal Cost Plus Expenses and Transfers	$689,566	$641,804	$47,762	7.4%
Actuarial Liability				
Actives	$40,075,804	$38,006,074	$2,069,730	5.4%
Retirees and Inactives	56,241,090	53,567,924	2,673,166	5.0%
Total	$96,316,894	$91,573,998	$4,742,896	5.2%
Assets (Actuarial Value)	54,918,125	51,952,206	2,965,919	5.7%
Unfunded Actuarial Liability	$41,398,769	$39,621,792	$1,776,977	4.5%
Funded Ratio	57.0%	56.7%	0.3%	

Total Expenses and Transfers

In our 2017 valuation, we began showing the expense and transfer items separately from the normal cost. Administrative expenses (including PERAC's administrative expenses) reflect the expenses from the most recent Annual Statements excluding investment related expenses and the Optional Retirement Plan (ORP) payment which is shown separately for the SRS. The ORP payment is the amount transferred by statute from the Commonwealth (previously from SRS) to the ORP for higher education employees. By including this payment as part of the normal cost, we have treated it as a reimbursement to the pension trust fund. Finally, $19.4 million is included for amounts transferred to other systems under Section 3(8)(c) for members with SRS and TRS service who retired from another system. Section 3(8)(c) receipts from other systems are transferred to the State's general account. By including the Section 3(8)(c) disbursements with normal cost, the net Section 3(8)(c) cash flow is zero for funding purposes.

2. EXECUTIVE SUMMARY *(continued)*

PART B | COMPARISON WITH PRIOR VALUATION AND EXPERIENCE ANALYSIS *(continued)*

Gain/(Loss) and Change in Unfunded Actuarial Liability (UAL)
The development of the actuarial gain/(loss) is shown in Section 4. During 2017, there was an overall actuarial gain of $1.26 billion. There was a non-investment related gain on actuarial liability of approximately $93 million and a gain on assets (on an actuarial value basis) of approximately $1.17 billion. The return on assets was approximately 9.8% on an AVA basis compared to 17.7% on a market value basis.

PERAC values system assets using a smoothing technique which spreads gains and losses over short periods (5 years) and employs a "corridor" so that the actuarial value is within 10% of the market value of assets. The calculated AVA as of January 1, 2018 is 94.6% of the market value and is within the specified corridor.

The UAL increased from $39.6 billion as of January 1, 2017 to $41.4 billion as of January 1, 2018. The UAL would have only increased to $39.9 billion and the funded ratio would have been 57.9% had there been no changes in actuarial assumptions and plan provisions (see next sections).

Actuarial Assumptions
Investment Return
The January 1, 2018 report reflects a 7.35% investment return assumption (reduced from the 7.50% assumption in the January 1, 2017 valuation). The investment return assumption had previously decreased several times, from 8.25% as of January 1, 2012 to 7.50% as of January 1, 2016. As part of this valuation, we considered whether to maintain the 7.50% assumption used in 2017 or reduce it further. Although a case can be made to maintain the 7.50% assumption, we believe a stronger case can be made to slightly reduce this assumption.

Earlier this year, NEPC, PRIT's investment consultant, completed its annual study of expected returns on both a short-term and long-term basis. The results showed a 30-year average annual expected return of 7.7%, a decrease of 10 basis points from last year's report. The 5-7 year expected return is 6.6%, a 20 basis point decrease. We believe a corresponding reduction in the investment return assumption is appropriate. In addition, the most recent NASRA study (February 2018) shows the average investment return assumption for 130 large public plans across the country (7.36%) continues to decrease. The February 2017 NASRA study showed the average assumption to be 7.52%. Note these results are for comparison only as difference in investment allocations were not considered in the NASRA results.

We expect the 7.36% national average above would decrease if the 2018 assumptions for all state systems were known and included. For example, the study does not include the decision to use a 7.35% assumption for the State Retirement System and the Massachusetts Teachers' Retirement System.

The change in the investment return assumption increased the normal cost by $62 million and the actuarial liability by $1.52 billion.

Mortality
In our 2011 actuarial valuation, we began reflecting future mortality improvement (longer life expectancy). Each year we modified this assumption as we moved closer to a fully generational mortality assumption (a two dimensional table based on a member's age and calendar year that includes all expected future mortality improvements). Based on our analysis of SRS and TRS retiree mortality during 2012, 2013, and 2014, we adopted a fully generational assumption in the 2015 valuation. In early 2017, we analyzed retiree mortality

PART B | COMPARISON WITH PRIOR VALUATION AND EXPERIENCE ANALYSIS *(continued)*

experience during 2015 and 2016 and adopted updated generational mortality assumptions for superannuation retirees in our 2017 actuarial valuation. For SRS, we adopted a blue collar version of the RP-2014 table. For TRS and Boston teachers, we adopted the RP-2014 White Collar table. We maintained these assumptions in this valuation with the exception of the disability retiree assumption for SRS.

We did not adjust the mortality assumption for disabled retirees in 2017. Due to the smaller number of retirees, it is more difficult to assess the mortality experience. For SRS in this valuation, we assumed the mortality for disabled members would reflect the same assumption as for superannuation retirees, but with an age set forward of one year. This change increased the actuarial liability by $9 million. We made no change to this assumption for teachers.

COLA Base
The Boston Retirement System increased the COLA base from $13,000 to $14,000 effective in FY18. We determined the plan cost for Boston teachers using a $14,000 base. The normal cost increased approximately $240,000 and the actuarial liability increased approximately $14.0 million to reflect this change.

Job groups
We noted several issues relating to job group as part of the valuation data we received from SRS and made adjustments as we have in the past. As we have done in previous years, we changed the job group for about 90 University of Massachusetts Police members (from Group 1 to Group 2).

In last year's valuation, we analyzed costs for certain members of the Department of Mental Health (DMH) and Social Services who were coded as job Group 1. We determined plan liabilities for these members based on both Group 1 and Group 2 status. DMH members with certain titles and Social Services workers with 10 years of service in certain capacities are eligible to be in Group 2. Based on our discussions with SRS, most of these members will ultimately be eligible for Group 2 status. By assuming these members will ultimately be in Group 2, we are being somewhat conservative. We used the results of our 2017 work to estimate the increase in actuarial liability due to this adjustment to be approximately $125 million in this valuation.

In 2017, there were 446 State Police that we adjusted from Group 1 to Group 3. In this year's data, it appears State Police were correctly coded as Group 3. However, as we noted in the last two valuations, a number of State Police are not contributing at the 12% contribution rate we would expect for members hired after July 1, 1996. The discrepancy is due to members with prior service (and a lower contribution rate) who transferred to the State Police but maintained their prior contribution rate. Based on the data provided for this valuation, there are 669 members hired after July 1, 1996 who are contributing at a rate below 12% (most are at 9%). In August 2017, after discussions between the SRS, the State Police, and PERAC, SRS issued a letter to the State Police indicating that for recruiting classes beginning on August 14, 2017 and after, the contribution rate would be 12% regardless of prior service. We found in the January 1, 2018 data, that all State Police with a hire date after January 1, 2017 have a 12% contribution rate. Our understanding is that no adjustment will be made for the 669 members contributing at a rate below 12%.

PART B | COMPARISON WITH PRIOR VALUATION AND EXPERIENCE ANALYSIS *(continued)*

Other Chapter 176 issues
There are several other changes under Chapter 176 that we have discussed in previous valuations that 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 factors 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, 2018, there were approximately 60,700 members hired after April 1, 2012. Since these members have less than six years of service and are generally young, there is still relatively little impact on plan costs (on a percentage basis) in this valuation. The employer normal cost is approximately $94 million lower than it would have been if the prior provisions were in place for these members. The actuarial liability is approximately $395 million lower than it would have been if the prior provisions were in place.

Teachers
We have detailed a number of the assumptions we made for missing or questionable data for active members of the TRS in Part C of Section 7.

TRS implemented a new software system with the data submission for the January 1, 2014 valuation. As part of the 2014 and 2015 valuations, we identified several issues that TRS subsequently reviewed prior to the January 1, 2016 data submission. The data submissions for the 2016, 2017 and 2018 valuations improved from prior submissions.

Boston Teachers
The Boston Retirement System (BRS) also implemented a new system with the data submission for the January 1, 2014 valuation. As part of the 2014 valuation, we identified several issues that BRS subsequently reviewed prior to the January 1, 2015 data submission and we believed the data submission improved in 2016 and 2017. However, we found several issues in this valuation regarding the number of active members and reported pay. We asked the Board to review approximately 500 active members with reported pay decreases of more than 20% from last year's valuation. The review found approximately 250 of those members actually terminated employment in 2017, but due to a retroactive payment from a recent contract settlement, the data provided showed these former members as active as of January 1, 2018. For many of the others with significant reported pay decreases, the reason was due to a leave of absence during the year. We estimated an annualized rate of pay for these members based on the pay from last year increased by approximately 4.0%. We have discussed these issues with Boston staff and will work with them to resolve these issues in future years.

In addition, we intially moved approximately 140 active members to inactive status because the total creditable service from the 2017 valuation either decreased or remained the same. We subsequently found that these members were active. We generally added one year of creditable service to the figure from the prior valuation for these members. Finally, we increased the pay provided (or determined) by 2.0% to reflect a contract settlement retroactive to 2017.

2. EXECUTIVE SUMMARY *(continued)*

PART C | FUNDING PROGRESS

The UAL and funded ratio are measures of the plan's funded status. These measures reflect the plan's position as of January 1, 2018. We believe these measures alone are not appropriate for assessing the sufficiency of assets to cover the estimated cost of settling the Commonwealth's benefit obligations or assessing the need for or the amount of future contributions. However, we believe these measures, in conjunction with maintaining the appropriations required under the Commonwealth funding schedule, are appropriate for assessing the amount of future contributions.

The nature of actuarial funding is that assets gradually catch up to the actuarial liability. When pension funding was adopted in 1987, the initial amortization period was established as 40 years. Based on the amortization basis of the schedules adopted, the UAL was expected to increase for a period of time. However, due to actual investment returns significantly exceeding the expected return in the 1990's, the UAL actually decreased until January 1, 2000.

It is important to note that plan assets have grown faster than plan liabilities, despite recent assumption changes and plan amendments (outlined on the next page) that have increased plan liabilities. As of January 1, 1990, the actuarial liability was $20.0 billion and assets were $7.8 billion. The difference of $12.2 billion was the UAL. As of January 1, 2018, the actuarial liability is $96.3 billion and the actuarial value of assets is $54.9 billion. The difference of $41.4 billion is the UAL. The actuarial liability has grown 4.8 times over this period ($96.3B / $20.0B). But assets have grown 7.0 times over this same period ($54.9B / $7.8B).

For this reason, we believe the funded ratio represents a better measure of the Commonwealth's progress. If you draw a straight line from the 1990 funded ratio of 39.0% to the January 1, 2018 amount of 57.0%, the line is moving upward to the right. This demonstrates the funding progress to date despite significant assumption and plan changes since 2009 that have increased plan liabilities (see next page). Similar changes made prior to 2009 have also dampened funding progress. Although the funded ratio reached 85.2% on January 1, 2000, this was the result of average annual returns from 1985-1999 that exceeded 12.5% and attaining such a high level of funding so quickly was not expected. Over the past 18 years (2000-2017), the average annual return on assets on a market value basis is approximately 6.5%. Over a 10-year and 5-year period, the returns have been 5.6% and 9.9% respectively. The 33-year return (since inception) is 9.7%. All returns are shown gross of investment fees.

As outlined above, the actuarial liability as of January 1, 2018 increased $1.58 billion to reflect a decrease in the investment return assumption, $9.0 million to reflect a change in the disability retiree assumption for SRS and $14.0 million to reflect the increase in the COLA base from $13,000 to $14,000 for Boston Teachers. There have been a number of other plan and assumption changes since 2009 that have increased the actuarial liability. These changes include three other separate reductions in the investment return assumption, annual adjustments to the mortality assumption prior to the change to a fully generational assumption as of January 1, 2015, and the update to the mortality assumption as of January 1, 2017. The other changes include the adoption of a $13,000 COLA base, the transfer of active members of sheriff departments in six counties to the SRS, the transfer of former members of the Massachusetts Turnpike Authority Retirement System to the SRS, the transfer of ORP members to the SRS, the 2015 ERI, and the 2016 ERI for toll collectors. Including the changes as of January 1, 2018, the unfunded actuarial liability is approximately $12.9 billion greater than it would have been using the 2009 valuation assumptions and plan provisions. Therefore, on a comparable basis with the 2009 assumptions and plan provisions, the UAL on January 1, 2018 would be $28.5 billion and the funded ratio would be 65.8%.

2. EXECUTIVE SUMMARY *(continued)*

PART C | FUNDING PROGRESS *(continued)*

Change in Unfunded Actuarial Liability since 2009 Valuation (in billions)

	State	Mass. Teachers	Boston Teachers	Total
Assumption Changes	$3.74	$7.03	$0.58	$11.35
Plan Amendments	1.14	0.15	0.15	1.44
Total	$4.88	$7.18	$.73	$12.79

Assumption changes (with valuation date reflected)	(in millions)
Reduction in investment return assumption from 8.25% to 8.0% (2013)	$1,670
Reduction in investment return assumption from 8.0% to 7.75% (2015)	1,947
Reduction in investment return assumption from 7.75% to 7.50% (2016)	2,218
Reduction in investment return assumption from 7.50% to 7.35% (2018)	1,520
Adoption of fully generational mortality assumption (2015)	1,700
Other mortality adjustments (2012, 2013, 2014)	1,050
Mortality adjustment (2017)	1,574
Mortality adjustment (2018)	9
Other experience study changes (2013)	(335)
Total	$11,353

Plan amendments (with valuation date reflected)	
Transfer of Massachusetts Turnpike Authority (2010)	$136
Transfer of sheriff departments (2011)	225
Boston Teachers (2011)	127
$13,000 COLA base (2012)	298
$14,000 COLA base for Boston Teachers (2018)	14
Early Retirement Incentive (2016)	230
Transfer of ORP members (2016)	400
Early Retirement Incentive for toll collectors (2017)	10
Total	$1,440

2. EXECUTIVE SUMMARY *(continued)*

PART C | FUNDING PROGRESS *(continued)*

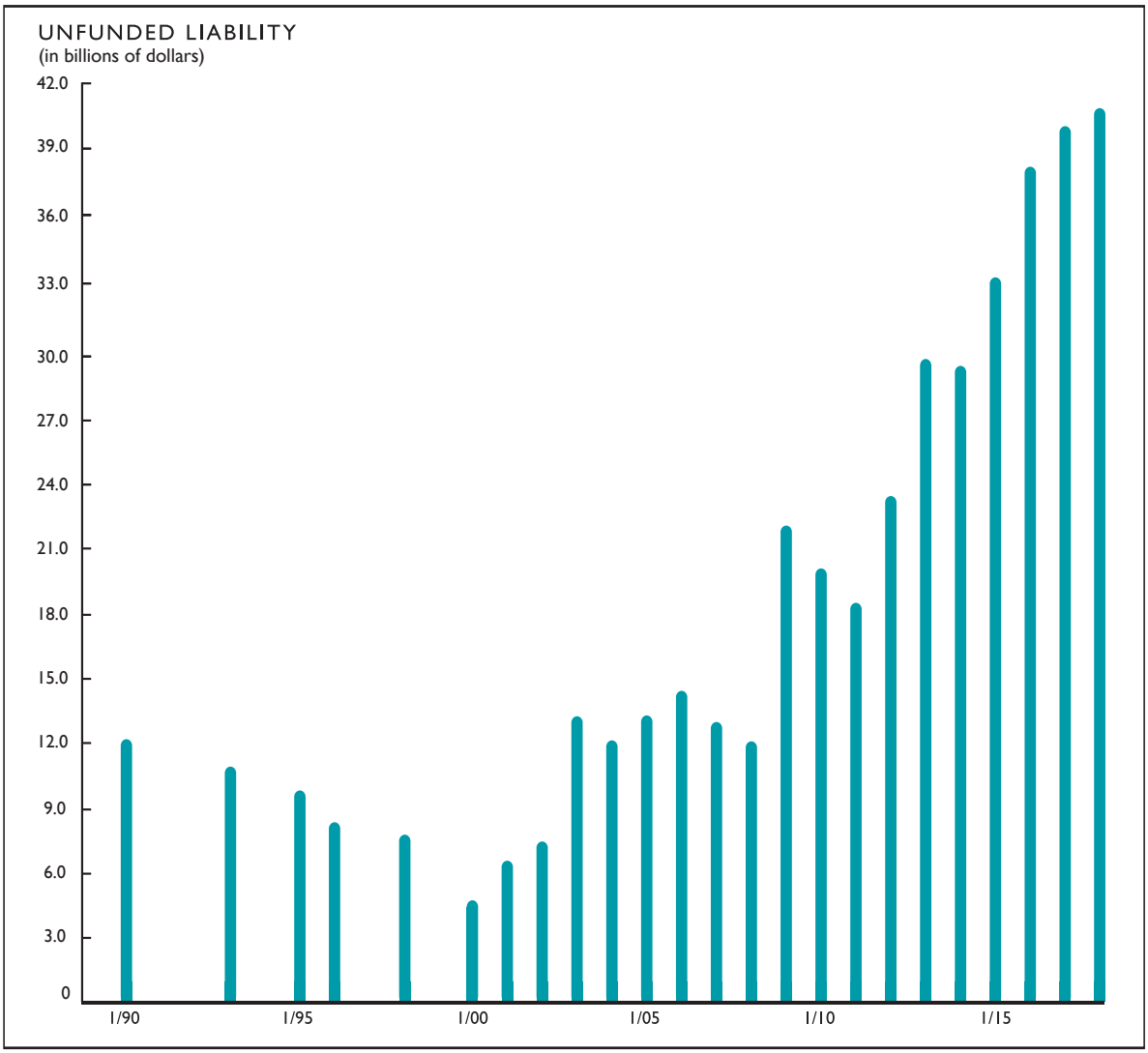
UNFUNDED LIABILITY

The chart below shows the Commonwealth's Unfunded Actuarial Accrued Liability (UAL) since 1990. The UAL represents the actuarial accrued liability less the actuarial value of plan assets. When there is no UAL, a system is said to be "fully funded." In this exhibit, estimates were developed for years prior to 2000 to reflect our implementation of updated actuarial software at that time.

Na^ O ; F ƀl #2/,4 billion. On a market value basis, the UAL is $38.3 billion.

The UAL increased $1.78 billion since January 1, 2017. The revised assumptions and change in plan provisions increased the UAL by $1.54 billion. If the 2018 valuation reflected the 2017 oaluation assumptions and plan provisions, the UAL would have been $39.9 billion.

Based on the current funding schedule and the results of this valuation, if going forward, the actuarial assumptions are exactly realized and there are no changes in the assumptions or plan provisions each year, the UAL is scheduled to increase until FY25 before decreasing each year until FY36 with a final amortization payment in FY37.



2. EXECUTIVE SUMMARY *(continued)*

PART C | FUNDING PROGRESS *(continued)*

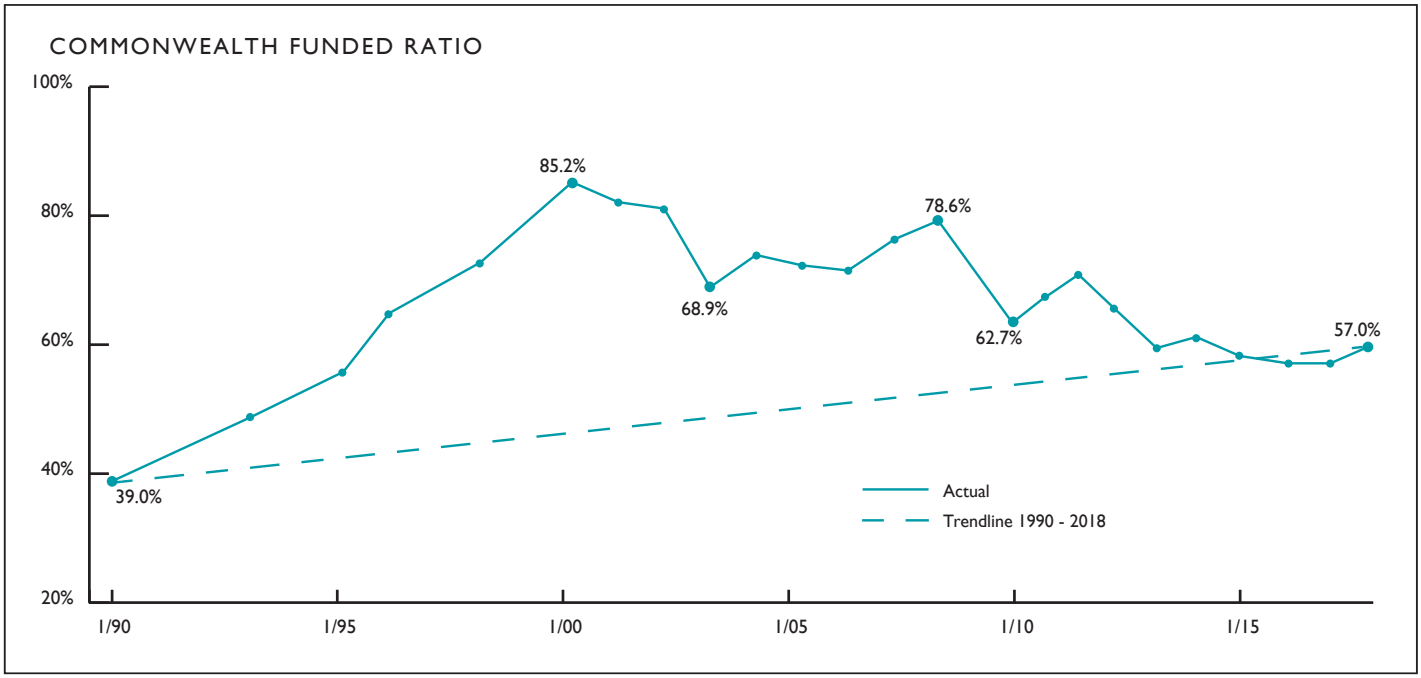
FUNDED RATIO

The chart below shows the Commonwealth's funded ratio progress since 1990. The funded ratio represents the actuarial value of plan assets divided by the actuarial accrued liability. When the funded ratio reaches 100%, a system is said to be "fully funded." In this exhibit, estimates were developed for years prior to 2000 to reflect our implementation of updated actuarial software at that time.

The funded ratio is 57.0%. On a market value basis, the funded ratio is 60.3%.

The funded ratio increased from 56.7% as of January 1, 2017 to 57.0% as of January1, 2018. If the 2018 valuation reflected the 2017 valuation assumptions and plan provisions, the funded ratio would have been 57.9%.

Based on the current funding schedule and the results of this valuation, if going forward, the actuarial assumptions are exactly realized and there are no changes in the assumptions or plan provisions each year, the funded ratio is expected to reach 100% in FY37.

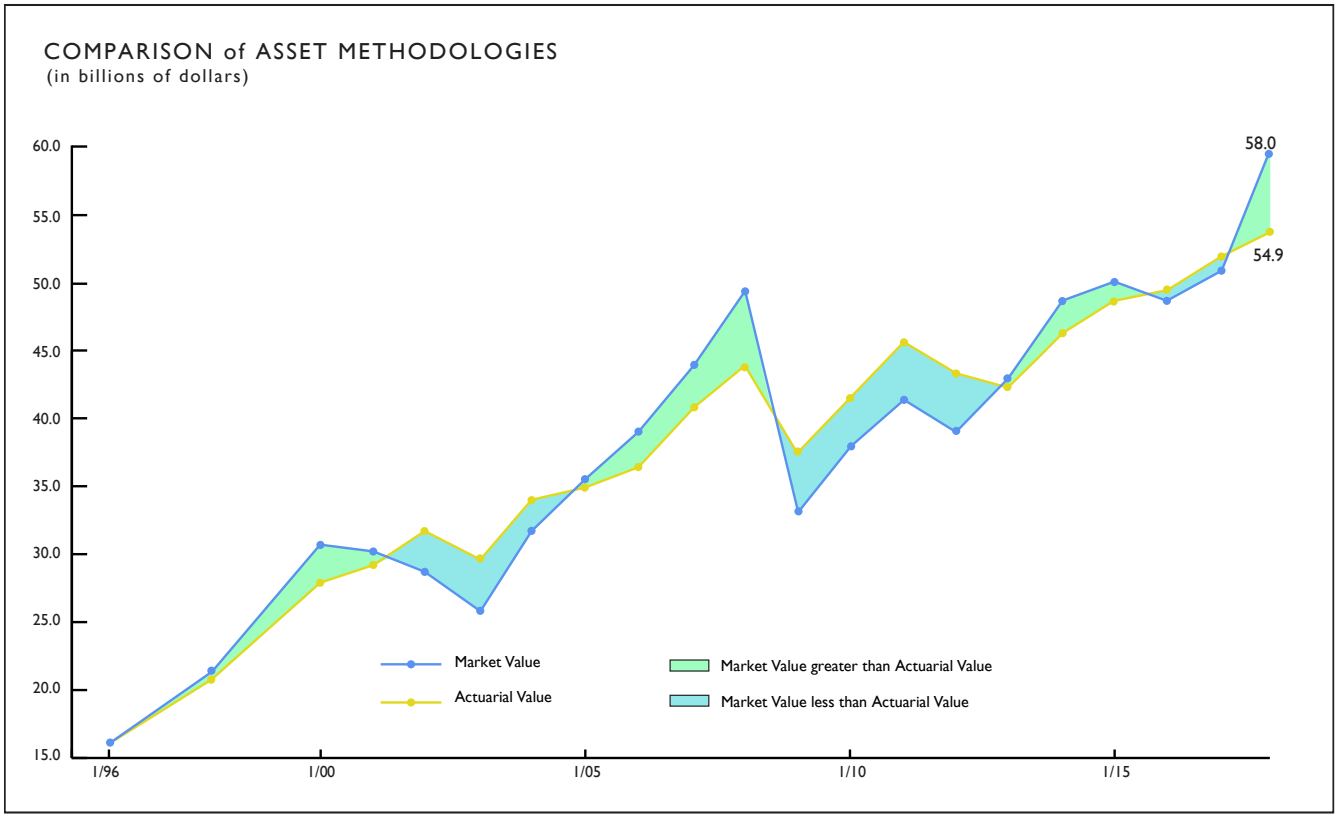


2. EXECUTIVE SUMMARY *(continued)*

PART C | FUNDING PROGRESS *(continued)*

COMPARISON OF MARKET AND ACTUARIAL VALUE OF ASSETS

In valuations prior to 1998, plan assets were determined at market value. As part of the 1998 valuation, this methodology was adjusted to reduce the potential volatility in the market value approach from year to year. The actuarial value of assets recognizes investment gains and losses over a five-year period. Therefore, in some years the actuarial value will be less than the market value, and in other years, the actuarial value will exceed the market value.



2. EXECUTIVE SUMMARY *(continued)*

PART D | RISK

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

Going forward, we will be identifying and assessing risks that, in our professional judgment, may reasonably be anticipated to significantly affect the plan's future financial condition.

3. SUMMARY OF VALUATION RESULTS

(Dollars in thousands)

A. Number of Members	State	Mass. Teachers	Boston Teachers	Local COLA	Total
Active	87,822	93,119	6,355		187,296
Vested Terminated	4,424	0	0		4,424
Retired/ Beneficiaries	63,194	66,078	4,725		133,997
Total	155,440	159,197	11,080		325,717
B. Total Payroll	$6,155,194	$6,829,012	$547,639		$13,531,845
C. Normal Cost					
Superannuation	$624,913	$796,734	$63,198		$1,484,845
Death	70,486	25,660	1,927		98,073
Disability	92,656	11,833	895		105,384
Termination	99,583	100,127	9,344		209,054
Total Normal Cost	$887,638	$934,354	$75,364		$1,897,356
Expected Employee Contributions	558,047	691,864	55,379		1,305,290
Net Employer Normal Cost	$329,591	$242,490	$19,985		$592,066
Administrative Expenses	$31,300	$25,300	$8,000		$64,600
Optional Retirement Plan Payment	13,500	0	0		13,500
3(8)(c) Amounts Transferred to Other Systems	15,200	4,200	0		19,400
Total Expenses and Transfers	$60,000	$29,500	$8,000		$97,500
Net Normal Cost Plus Expenses & Transfers	$389,591	$271,990	$27,985		$689,566
D. Actuarial Liability					
Active					
Superannuation	$16,180,266	$20,268,077	$1,404,467		$37,852,810
Death	443,051	204,223	14,622		661,896
Disability	457,059	116,525	8,182		581,766
Termination	429,717	509,025	40,590		979,332
Total Active	$17,510,093	$21,097,850	$1,467,861		$40,075,804
Vested Terminated (a)	969,875	650,000	125,000		1,744,875
Non-Vested Terminated	194,941	0	0		194,941
Retirees and Survivors	21,781,702	29,905,435	2,482,137	132,000	54,301,274
Total Actuarial Liability	$40,456,611	$51,653,285	$4,074,998	$132,000	$96,316,894
E. Actuarial Value of Assets	26,248,250	27,057,700	1,612,175	0	54,918,125
F. Unfunded Actuarial Liability	$14,208,361	$24,595,585	$2,462,823	$132,000	$41,398,769
G. Funded Ratio: E/D	64.9%	52.4%	39.6%	0.0%	57.0%

(a) Massachusetts Teachers' and Boston teachers' amounts are estimated and includes non-vested terminated members.

4. DEVELOPMENT OF THE ACTUARIAL GAIN OR LOSS *(in millions)*

		State	Mass. Teachers	Boston Teachers	Local COLA	Total
A.	Gain/(loss) on Actuarial Liability					
1.	Actuarial Liability 1/1/17	38,317	49,194	3,917	146	91,574
2.	Total Normal Cost 1/1/17	832	897	73		1,802
3.	Interest on (1) and (2) at 7.50%	2,936	3,757	299	11	7,003
4.	Benefits paid during 2017 [a]	2,150	2,900	242	21	5,313
5.	Interest on (4) assuming mid year payment	81	109	9	1	199
6.	Expected Actuarial Liability before adjustments: (1)+(2)+(3)-(4)-(5)	39,855	50,839	4,038	135	94,867
7.	Increase due to changes in assumptions	622	845	61		1,528
8.	Increase due to plan amendment			14		14
9.	Expected Actuarial Liability 1/1/18: (6)+(7)+(8)	40,477	51,684	4,113	135	96,409
10.	Actuarial Liability 1/1/18	40,456	51,653	4,075	132	96,316
11.	Gain/(loss): (9)-(10)	21	31	38	3	93
B.	Gain/(loss) on assets					
1.	Actuarial Value of Assets (AVA) 1/1/17	24,773	25,638	1,541		51,952
2.	Interest on (1) at 7.50%	1,858	1,923	116		3,896
3.	Net Receipts [b]	740	779	131		1,650
4.	Net Disbursements [b]	1,644	1,828	195		3,667
5.	Net Cash Flow: (3)-(4)	(904)	(1,049)	(64)		(2,017)
6.	Interest on (5) [c]	(34)	(39)	(7)		(81)
7.	Expected AVA 1/1/18: (1)+(2)+(5)+(6)	25,693	26,473	1,586		53,751
8.	AVA 1/1/18	26,248	27,058	1,612		54,918
9.	Gain/(loss): (8)-(7)	555	585	26		1,166
C.	Total Gain/(loss): (A11)+(B9)	576	616	64	3	1,259

Figures may not add due to rounding.

[a] Estimated

[b] Amounts actually received or disbursed by the fund.

[c] Assumes time weighting based on monthly cash flow. Boston Teachers assumed mid-year.

5. AUDIT INFORMATION

The Commonwealth valuation reports prior to 2015 included information required under Governmental Accounting Standards Board (GASB) Statement No. 27 (GASB 27). The Commonwealth began implementing GASB 27 in Fiscal Year 1996. GASB 27 has been replaced by GASB 68. In addition, GASB 67 replaces the requirements under GASB 25.

GASB 67 reflects plan financial statement reporting and was first effective for the plan year ending June 30, 2014. GASB 68 reflects employer financial statement reporting and was first effective for the fiscal year ending June 30, 2015.

We have not provided any GASB 67 or GASB 68 exhibits in this valuation report. These exhibits are provided separately.

6. ASSETS

PART A | STATE AND MASSACHUSETTS TEACHERS'

(Dollars in thousands)

	State	Mass. Teachers
Pension Reserves Investment Trust		
Market Value	$27,735,916	$28,597,562
Actuarial Value	$26,248,250	$27,057,700
Actuarial Value as a Percentage of Market Value	94.6%	94.6%

The actuarial value of assets (AVA) is determined so that 20% of the investment gain and loss in a given year is recognized annually for the next five years. Therefore, these investment gains and losses are fully recognized after five years. In addition to this treatment of gains and losses, we use a "corridor" approach so that the actuarial value of assets can never be too far from the market value of assets. Under our approach for the Commonwealth, the actuarial value cannot be less than 90% nor greater than 110% of the market value.

PART B | BOSTON TEACHERS

Based on the enactment of Chapter 112 of the Acts of 2010, the assets of the Boston Teachers are maintained by PRIM. The transfer of these assets occurred during 2010. We set the actuarial value of assets to 94.6% of the market value based on the results for State and Massachusetts Teachers.

Market Value	$1,704,202
Actuarial Value	$1,612,175

6. ASSETS *(continued)*

PART C | DEVELOPMENT OF ACTUARIAL VALUE OF ASSETS

(Dollars in thousands)

A. Development of 12/31/17 expected actuarial value of assets (AVA)	State	Mass. Teachers	Total
1. Market Value (MV) 12/31/16	24,366,420	25,225,451	49,591,871
2. Actuarial Value 12/31/16 (as calculated)	24,773,042	25,638,136	50,411,178
3. Net Receipts 2017 *	739,710	779,226	1,518,936
4. Net Disbursements 2017 *	1,644,630	1,827,800	3,472,430
5. Net Cash Flow: (3)-(4)	(904,920)	(1,048,574)	(1,953,494)
6. Expected Investment Return on (2): 0.0750 x (2)	1,857,978	1,922,860	3,780,838
7. Expected Investment Return on (5): ½x 0.0750 x (5)	(33,935)	(39,322)	(73,256)
8. Expected AVA 12/31/17: (2)+(5)+(6)+(7)	25,692,166	26,473,101	52,165,266
B. Previous differences not yet amortized			
1. Unrecognized amount of 12/31/16 difference			
a. .2 x 2013 Gain/(loss)	298,734	318,887	617,620
b. .4 x 2014 Gain/(loss)	63,242	67,395	130,637
c. .6 x 2015 Gain/(loss)	(866,348)	(908,071)	(1,774,420)
d. .8 x 2016 Gain/(loss)	97,750	109,105	206,855
e. Total	(406,622)	(412,685)	(819,307)
C. Gain/(loss) from 2017			
1. Market Value 12/31/17	27,735,916	28,597,562	56,333,478
2. Expected Market Value 12/31/17: A(8)+B(1e)	25,285,543	26,060,416	51,345,959
3. Gain/ (loss) from 2017 investment: (1)-(2)	2,450,373	2,537,146	4,987,519
D. Development of AVA 12/31/17			
1. 2017 Gain/(loss)	2,450,373	2,537,146	4,987,519
2. 2016 Gain/(loss)	122,188	136,381	258,569
3. 2015 Gain/(loss)	(1,443,914)	(1,513,452)	(2,957,366)
4. 2014 Gain/(loss)	158,105	168,488	326,593
5. 2013 Gain/(loss)	1,493,668	1,594,433	3,088,101
6. 20% of 2017 Gain/(loss)	490,075	507,429	997,504
7. 20% of 2016 Gain/(loss)	24,438	27,276	51,714
8. 20% of 2015 Gain/(loss)	(288,783)	(302,690)	(591,473)
9. 20% of 2014 Gain/(loss)	31,621	33,698	65,319
10. 20% of 2013 Gain/(loss)	298,734	318,887	617,620
11. Total	556,084	584,599	1,140,683
12. Actuarial Value 12/31/17: A(8)+D(11)	26,248,250	27,057,700	53,305,949
13. Percentage of Market Value	94.6%	94.6%	94.6%
14. Actuarial Value: (12) but not less than 90% nor greater than 110% of C(1)	26,248,250	27,057,700	53,305,949

*Reflects actual cash flow of PRIT Fund

7. SYSTEM MEMBERSHIP

PART A | STATE ACTIVE MEMBERS

A critical element of an actuarial valuation is accurate and up-to-date membership information. As part of this valuation, PERAC analyzed the member data provided by the State Retirement System.

	Actives	Vested Terminations
Number of Members	87,822	4,424
Average Age	47.0	54.1
Average Service	12.5	15.8
Average Salary	$70,087	$64,317
Average Annuity Savings Fund Balance	$66,085	$70,929

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	2,016	4						2,020
25 - 29	6,450	817	11					7,278
30 - 34	5,473	2,925	931	7				9,336
35 - 39	3,851	2,356	2,586	557	6			9,356
40 - 44	2,746	1,818	1,991	2,075	461	8		9,099
45 - 49	2,512	1,752	2,086	2,338	2,043	793	48	11,572
50 - 54	2,234	1,668	1,973	1,902	1,816	1,992	1,181	12,766
55 - 59	1,839	1,494	1,741	1,771	1,539	1,646	2,657	12,687
60 - 64	1,060	1,044	1,313	1,401	1,199	1,019	1,884	8,920
65+	420	578	766	711	653	492	1,168	4,788
Total	28,601	14,456	13,398	10,762	7,717	5,950	6,938	87,822

7. SYSTEM MEMBERSHIP *(continued)*

PART A | STATE ACTIVE MEMBERS *(continued)*

Salary by Age Distribution of Active Members

Present Age	Number of Members	Total Salary	Average Salary
0 - 24	2,020	$82,810,072	$40,995
25 - 29	7,278	$370,501,648	$50,907
30 - 34	9,336	$555,023,813	$59,450
35 - 39	9,356	$616,431,876	$65,886
40 - 44	9,099	$637,972,393	$70,115
45 - 49	11,572	$858,159,904	$74,158
50 - 54	12,766	$964,400,960	$75,544
55 - 59	12,687	$970,459,139	$76,492
60 - 64	8,920	$706,370,753	$79,190
65+	4,788	$393,063,879	$82,094
Total	87,822	$6,155,194,437	$70,087

7. SYSTEM MEMBERSHIP *(continued)*

PART B | STATE RETIREES AND SURVIVORS

	Superannuation	Ordinary Disability	Accidental Disability	Survivors	Total
Number of Members	52,797	610	3,278	6,509	63,194
Average Age	72.0	64.8	64.6	75.0	71.9
Average Annual Benefit	$36,526	$20,338	$41,941	$19,379	$34,884

Benefit by Retirement Type

	Superannuation	Ordinary Disability	Accidental Disability	Survivors	Total
Annuity	$378,902,062	$2,069,801	$10,621,246	$19,453,790	$411,046,899
Pension	$1,549,559,175	$10,336,098	$126,861,035	$106,683,750	$1,793,440,058
Total	$1,928,461,237	$12,405,899	$137,482,281	$126,137,540	$2,204,486,957

7. SYSTEM MEMBERSHIP *(continued)*

PART B | STATE RETIREES & SURVIVORS *(continued)*

Benefit by Age Distribution

Present Age	Number of Members	Total Benefits	Average Benefits
Less than 40	172	$4,010,304	$23,316
40 – 44	152	$4,936,786	$32,479
45 – 49	722	$26,682,137	$36,956
50 – 54	1,578	$59,548,046	$37,736
55 – 59	3,977	$141,770,930	$35,648
60 – 64	8,673	$334,252,345	$38,539
65 – 69	13,322	$522,314,527	$39,207
70 – 74	12,566	$464,715,715	$36,982
75 – 79	8,502	$286,895,520	$33,744
80 – 84	5,958	$176,895,033	$29,690
85 – 89	4,346	$114,455,292	$26,336
90+	3,226	$68,010,322	$21,082
Totals	63,194	$2,204,486,957	$34,884

7. SYSTEM MEMBERSHIP *(continued)*

PART C | MASSACHUSETTS TEACHERS' ACTIVE MEMBERS

A critical element of an actuarial valuation is accurate and up-to-date membership information. As part of this valuation, PERAC analyzed the member data provided by the TRS. We made several assumptions about missing, questionable, or unavailable data.

Until the January 1, 2006 actuarial valuation, we had estimated the total creditable service for each member for the actuarial valuation. The estimate was based on either the employment date (date of hire as a teacher) or the adjusted employment date and was set equal to the greater of the two calculated service amounts. We used this methodology, which we believed was conservative, because we had no way to assess additional costs for members who buy back service near retirement. In 2006, we compared the service estimated for valuation purposes with actual service for over 6,800 members who retired in 2004 and 2005. We found that, in total, our methodology slightly understated service. To estimate this additional cost, we increased the plan liabilities as of January 1, 2006. We have continued using this methodology in each valuation.

For members with a date of birth and/or date of hire that seemed questionable, we assumed (based on credited service or date of birth) the member was hired at age 30 (or at a younger age, if the member was under 30).

Based on our experience with prior years' data, buyback issues, and questions to TRS regarding specific members, we made several adjustments. Members whose pay was less than $5,000 were assumed to be inactive. For members with pay between $5,000 and $10,000, we used an estimated pay of $50,000. For members with submitted pay over $150,000, we compared this year's figure to the pay used in last year's valuation. We adjusted this year's figure based on the amount contributed if we believed it was overstated.

Determining valuation pay for members with reported pay less than $10,000 is difficult. Although we make the assumptions outlined above, we know there will always be a significant number of members that fall into this category for a variety of reasons including leaves of absence and part time employment. We believe our overall assumption is reasonable but know some members that we have deemed inactive are active members. To reflect this uncertainty, we made an additional increase to the calculated plan liabilities consistent with last year.

We increased the normal cost by 2.0% and the active actuarial liability by 1.0% to reflect the service buyback and various data issues.

Pay for all members hired in 2017 was annualized.

Because we could not determine the number of vested terminations, we estimated a combined inactive (terminated vested plus terminated with an ASF balance) liability. This is the same methodology we have used in prior valuations.

7. SYSTEM MEMBERSHIP *(continued)*

PART C | MASSACHUSETTS TEACHERS' ACTIVE MEMBERS *(continued)*

	Actives
Number of Members	93,119
Average Age	43.6
Average Service	13.1
Average Salary	$73,336
Average Annuity Savings Fund Balance	$74,580

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	2,206							2,206
25 - 29	8,360	1,629	1					9,990
30 - 34	4,759	6,160	2,039	1				12,959
35 - 39	2,278	2,917	6,427	1,826	4			13,452
40 - 44	1,520	1,472	2,950	5,531	1,056	4		12,533
45 - 49	1,407	1,328	1,942	3,776	4,383	651	33	13,520
50 - 54	882	1,163	1,826	2,283	2,236	1,776	743	10,909
55 - 59	480	662	1,473	2,163	1,566	993	2,178	9,515
60 - 64	193	334	742	1,415	1,204	710	1,565	6,163
65+	51	86	241	367	335	183	609	1,872
Total	22,136	15,751	17,641	17,362	10,784	4,317	5,128	93,119

7. SYSTEM MEMBERSHIP *(continued)*

PART C | MASSACHUSETTS TEACHERS' ACTIVE MEMBERS *(continued)*

Salary by Age Distribution of Active Members

Present Age	Number of Members	Total Salary	Average Salary
0 - 24	2,206	$100,473,341	$45,545
25 - 29	9,990	$527,330,116	$52,786
30 - 34	12,959	$808,962,392	$62,425
35 - 39	13,452	$985,819,881	$73,284
40 - 44	12,533	$981,632,271	$78,324
45 - 49	13,520	$1,082,992,301	$80,103
50 - 54	10,909	$878,799,714	$80,557
55 - 59	9,515	$785,910,456	$82,597
60 - 64	6,163	$517,321,458	$83,940
65+	1,872	$159,770,118	$85,347
Total	93,119	$6,829,012,047	$73,336

7. SYSTEM MEMBERSHIP *(continued)*

PART D | MASSACHUSETTS TEACHERS' RETIREES AND SURVIVORS

	Superannuation	Ordinary Disability	Accidental Disability	Survivors	Total
Number of Members	61,659	392	307	3,720	66,078
Average Age	72.4	67.6	71.3	76.7	72.6
Average Annual Benefit	$45,965	$22,782	$42,410	$20,705	$44,389

Benefit by Retirement Type

	Superannuation	Ordinary Disability	Accidental Disability	Survivors	Total
Annuity	$548,637,685	$1,644,505	$1,160,119	$13,956,999	$565,399,308
Pension	$2,285,529,902	$7,286,051	$11,859,732	$63,067,433	$2,367,743,118
Total	$2,834,167,587	$8,930,556	$13,019,851	$77,024,432	$2,933,142,426

7. SYSTEM MEMBERSHIP *(continued)*

PART D | MASSACHUSETTS TEACHERS' RETIREES & SURVIVORS *(continued)*

Benefit by Age Distribution

Present Age	Number of Members	Total Benefits	Average Benefits
Less than 40	26	$349,908	$13,458
40 – 44	39	$532,185	$13,646
45 – 49	73	$1,051,857	$14,409
50 – 54	186	$4,041,031	$21,726
55 – 59	1,427	$55,779,122	$39,088
60 – 64	7,641	$377,153,177	$49,359
65 – 69	18,931	$946,699,677	$50,008
70 – 74	16,722	$788,844,660	$47,174
75 – 79	9,233	$385,736,330	$41,778
80 – 84	5,672	$203,790,422	$35,929
85 – 89	3,787	$115,910,688	$30,608
90+	2,341	$53,253,369	$22,748
Totals	66,078	$2,933,142,426	$44,389

7. SYSTEM MEMBERSHIP *(continued)*

PART E | BOSTON TEACHERS' ACTIVE MEMBERS

A critical element of an actuarial valuation is accurate and up-to-date membership information. As part of this valuation, PERAC analyzed the member data provided by the Boston Retirement System.

	Actives
Number of Members	6,355
Average Age	42.5
Average Service	11.5
Average Salary	$86,175
Average Annuity Savings Fund Balance	$83,171

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	149							149
25 - 29	708	75	1					784
30 - 34	527	397	91					1,015
35 - 39	235	297	426	83	4			1,045
40 - 44	123	127	279	281	47	5		862
45 - 49	118	99	127	202	195	42	6	789
50 - 54	58	53	82	120	109	129	53	604
55 - 59	53	53	86	102	96	84	122	596
60 - 64	15	18	47	71	69	58	90	368
65+	10	11	18	32	22	19	31	143
Total	1,996	1,130	1,157	891	542	337	302	6,355

7. SYSTEM MEMBERSHIP *(continued)*

PART E | BOSTON TEACHERS' ACTIVE MEMBERS *(continued)*

Salary by Age Distribution of Active Members

Present Age	Number of Members	Total Salary	Average Salary
0 - 24	149	$7,722,454	$51,829
25 - 29	784	$49,885,583	$63,630
30 - 34	1,015	$79,667,007	$78,490
35 - 39	1,045	$92,746,571	$88,753
40 - 44	862	$80,667,484	$93,582
45 - 49	789	$73,648,038	$93,344
50 - 54	604	$57,444,129	$95,106
55 - 59	596	$56,924,102	$95,510
60 - 64	368	$35,469,213	$96,384
65+	143	$13,464,565	$94,158
Total	6,355	$547,639,147	$86,175

7. SYSTEM MEMBERSHIP *(continued)*

PART F | BOSTON TEACHERS' RETIREES AND SURVIVORS

	Superannuation	Ordinary Disability	Accidental Disability	Survivors	Total
Number of Members	4,299	47	74	305	4,725
Average Age	72.6	67.1	72.8	74.6	72.7
Average Annual Benefit	$54,265	$24,887	$48,054	$24,213	$51,936

Benefit by Retirement Type

	Superannuation	Ordinary Disability	Accidental Disability	Survivors	Total
Annuity	$46,209,383	$251,004	$355,013	$1,356,543	$48,171,943
Pension	$187,075,568	$918,686	$3,201,008	$6,028,469	$197,223,731
Total	$233,284,951	$1,169,690	$3,556,021	$7,385,012	$245,395,674

7. SYSTEM MEMBERSHIP *(continued)*

PART F | BOSTON TEACHERS' RETIREES & SURVIVORS *(continued)*

Benefit by Age Distribution

Present Age	Number of Members	Total Benefits	Average Benefits
Less than 40	7	$220,854	$31,551
40 - 44	2	$29,067	$14,533
45 - 49	5	$114,388	$22,878
50 - 54	27	$674,429	$24,979
55 - 59	118	$5,082,757	$43,074
60 - 64	521	$29,934,373	$57,456
65 - 69	1,247	$74,936,512	$60,093
70 - 74	1,267	$69,966,992	$55,223
75 - 79	691	$32,997,106	$47,753
80 - 84	369	$15,412,006	$41,767
85 - 89	285	$10,340,239	$36,282
90+	186	$5,686,951	$30,575
Totals	4,725	$245,395,674	$51,936

8. VALUATION COST METHODS

PART 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 retirement system member, 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 inactives, retirees, and survivors is simply equal to the present value of all projected benefits. 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 be changed by the addition of new members or the retirement, death, disability, 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 change.

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 an *Actuarial Loss* and one which decreases the Unfunded Actuarial Liability is called an *Actuarial Gain*.

PART B | ASSET VALUATION METHOD

In valuations prior to 1998, plan assets were determined at market value. As part of the 1998 valuation this methodology was adjusted so that investment gains and losses for a given year would not be fully recognized until five years have passed. This calculation recognizes 20% of the gain or loss occurring in the prior year, 40% of those gains or losses occurring two years ago, etc., so that 100% of the gain or loss occurring 5 or more years ago is recognized. This approach reduces the potential volatility in the market value approach from year to year. Under our corridor approach, the actuarial value of assets cannot be less than 90% nor greater than 110% of market value. The actuarial value of assets as of January 1, 2018 is 94.6% of the market value.

9. ACTUARIAL ASSUMPTIONS

Investment Return

7.35% per year net of investment expenses (*prior assumption: 7.50%*)

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.

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 $13,000 of an allowance)

Mortality

State: Pre-retirement mortality reflects RP-2014 Blue Collar Employees table projected generationally with Scale MP-2016 set forward 1 year for females.

Teachers: Pre-retirement mortality reflects RP-2014 White Collar Employees table projected generationally with Scale MP-2016 (gender distinct).

State: Post-retirement mortality reflects RP-2014 Blue Collar Healthy Annuitant table projected generationally with Scale MP-2016 set forward 1 year for females.

Teachers: Post-retirement mortality reflects RP-2014 White Collar Healthy Annuitant table projected generationally with Scale MP-2016 (gender distinct).

State: For disabled retirees, mortality reflects the post-retirement mortality described in the previous paragraph, set forward 1 year. (*Prior assumption reflects the RP-2000 Healthy Annuitant Table projected generationally with Scale BB and a base year of 2015 (gender distinct)).*

Teachers: For disabled members, the mortality rate is assumed to be in accordance with the RP-2014 White Collar Healthy Annuitant Table projected generationally with Scale MP-2016 (gender distinct).

It is assumed that 75% 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.

The mortality assumptions reflect our recent experience analysis published in 2014 (based on the years 2006-2011), updated to reflect actual experience from 2012 through 2016 for post-retirement mortality, and professional judgment. This assumption reflects observed current mortality as well as expected mortality improvement.

9. ACTUARIAL ASSUMPTIONS *(continued)*

Salary Increase

Based on an analysis of past experience. Annual rates are based on service as shown below.

Service	Groups 1& 2	Group 3	Group 4
0	7.00%	7.00%	9.00%
1	6.50%	7.00%	8.00%
2	6.00%	7.00%	7.50%
3	5.50%	7.00%	7.00%
4	5.50%	6.75%	6.75%
5	5.25%	6.25%	6.25%
6	5.00%	5.25%	5.75%
7	4.75%	4.75%	5.25%
8-12	4.75%	4.75%	4.75%
13-15	4.50%	4.75%	4.75%
16-19	4.25%	4.75%	4.75%
20+	4.00%	4.50%	4.50%

Service	Teachers
0	7.50%
1	7.10%
2	7.00%
3	6.90%
4	6.80%
5	6.70%
6	6.60%
7	6.50%
8	6.30%
9	6.10%
10	5.90%
11	5.70%
12	5.20%
13	4.70%
14	4.35%
15-16	4.20%
17-19	4.10%
20+	4.00%

The salary increase assumption reflects both prior experience (2014 studies) and professional judgment.

9. ACTUARIAL ASSUMPTIONS *(continued)*

Retirement

State

	Group 1		Group 2	Group 3	Group 4
Age	Male	Female			
45	0.000	0.000	0.000	0.020	0.060
46	0.000	0.000	0.000	0.020	0.060
47	0.000	0.000	0.000	0.050	0.060
48	0.000	0.000	0.000	0.050	0.060
49	0.000	0.000	0.000	0.050	0.060
50	0.030	0.030	0.020	0.050	0.060
51	0.030	0.030	0.020	0.060	0.060
52	0.030	0.030	0.020	0.070	0.060
53	0.030	0.030	0.030	0.080	0.075
54	0.030	0.035	0.040	0.090	0.150
55	0.035	0.050	0.075	0.100	0.250
56	0.035	0.050	0.075	0.100	0.150
57	0.040	0.055	0.080	0.110	0.150
58	0.050	0.060	0.100	0.110	0.150
59	0.060	0.065	0.120	0.120	0.150
60	0.090	0.075	0.150	0.140	0.200
61	0.110	0.100	0.150	0.150	0.200
62	0.150	0.150	0.150	0.150	0.200
63	0.150	0.150	0.150	0.150	0.200
64	0.160	0.150	0.200	0.250	0.300
65	0.200	0.200	0.200	0.250	0.500
66	0.200	0.200	0.200	0.250	0.250
67	0.200	0.200	0.200	0.250	0.250
68	0.200	0.200	0.200	0.250	0.250
69	0.200	0.200	0.200	0.250	0.250
70	1.000	1.000	1.000	1.000	1.000

9. ACTUARIAL ASSUMPTIONS *(continued)*

Teachers

Males

	Not in Retirement Plus	
	Less than 20	20+
47	0.000	0.000
48	0.000	0.000
49	0.000	0.000
50	0.000	0.020
51	0.000	0.020
52	0.000	0.020
53	0.000	0.020
54	0.000	0.030
55	0.035	0.030
56	0.035	0.035
57	0.050	0.040
58	0.055	0.050
59	0.060	0.060
60	0.075	0.150
61	0.120	0.250
62	0.140	0.300
63	0.140	0.300
64	0.140	0.300
65	0.300	0.300
66	0.300	0.250
67	0.300	0.250
68	0.300	0.250
69	0.300	0.250
70+	1.000	1.000

	Retirement Plus		
	Less than 20	20-30	30+
47	0.00	0.000	0.00
48	0.00	0.000	0.00
49	0.00	0.000	0.00
50	0.00	0.010	0.02
51	0.00	0.010	0.02
52	0.00	0.010	0.02
53	0.00	0.015	0.02
54	0.00	0.025	0.02
55	0.05	0.030	0.06
56	0.05	0.060	0.20
57	0.05	0.100	0.40
58	0.05	0.150	0.50
59	0.10	0.200	0.50
60	0.10	0.250	0.40
61	0.20	0.300	0.40
62	0.20	0.350	0.35
63	0.25	0.400	0.35
64	0.25	0.400	0.35
65	0.25	0.400	0.35
66	0.30	0.300	0.40
67	0.30	0.300	0.40
68	0.30	0.300	0.40
69	0.30	0.300	0.40
70+	1.00	1.000	1.00

9. ACTUARIAL ASSUMPTIONS *(continued)*

Teachers

Females

	Not in Retirement Plus	
	Less than 20	20+
47	0.000	0.000
48	0.000	0.000
49	0.000	0.000
50	0.000	0.010
51	0.000	0.010
52	0.000	0.015
53	0.000	0.020
54	0.000	0.020
55	0.035	0.040
56	0.035	0.040
57	0.035	0.040
58	0.050	0.060
59	0.065	0.080
60	0.085	0.150
61	0.100	0.200
62	0.120	0.200
63	0.120	0.250
64	0.200	0.300
65	0.300	0.400
66	0.300	0.300
67	0.300	0.300
68	0.300	0.300
69	0.300	0.300
70+	1.000	1.000

	Retirement Plus		
	Less than 20	20-30	30+
47	0.00	0.00	0.000
48	0.00	0.00	0.000
49	0.00	0.00	0.000
50	0.00	0.01	0.015
51	0.00	0.01	0.015
52	0.00	0.01	0.015
53	0.00	0.01	0.015
54	0.00	0.01	0.020
55	0.03	0.03	0.050
56	0.03	0.05	0.150
57	0.04	0.08	0.350
58	0.08	0.10	0.350
59	0.08	0.15	0.350
60	0.10	0.20	0.350
61	0.12	0.25	0.350
62	0.12	0.30	0.350
63	0.15	0.30	0.350
64	0.20	0.30	0.350
65	0.25	0.40	0.350
66	0.25	0.30	0.350
67	0.30	0.30	0.300
68	0.30	0.30	0.300
69	0.30	0.30	0.300
70+	1.00	1.00	1.000

Retirement rates are based on our most recent experience analysis (2014) which reviewed age, service, gender, and job group. The assumption reflects this analysis and professional judgment.

9. ACTUARIAL ASSUMPTIONS *(continued)*

Disability

Based on an analysis of past experience. Sample annual rates are shown below.

Age	Group 1	Group 2	Group 3	Group 4	Teachers
20	0.00010	0.00052	0.0010	0.0020	0.00004
30	0.00010	0.00072	0.0016	0.0021	0.00006
40	0.00068	0.00210	0.0036	0.0071	0.00010
50	0.00133	0.00420	0.0094	0.0110	0.00050
60	0.00120	0.00500	0.0430	0.0080	0.00070

It is also assumed that 75% of disabilities will be job-related for Group 1 and 2 members (other than Teachers), and 95% will be job-related for Group 3 and 4 members, and 35% will be job-related for Teachers.

Disability rates are based on our most recent experience analysis (2014) which reviewed age, gender and job group. The assumption reflects this analysis and professional judgment.

Withdrawal

Rates are based on an analysis of past experience and professional judgment. For Groups 1 and 2, rates are both age and service based for service up to 10 years. After 10 years of service, rates are age based. In addition to being age and service based, Teacher rates are also gender based. For Groups 3 and 4, rates are service based. Sample annual rates are shown below.

Groups 1 & 2

Age	Service		
	0	5	10+
20	0.270	0.000	0.000
30	0.230	0.100	0.045
40	0.160	0.080	0.030
50	0.180	0.060	0.030

Groups 3 & 4

Service	Group 3	Group 4
0	0.007	0.090
5	0.007	0.060
10	0.005	0.035
15	0.005	0.020
20+	0.005	0.015

9. ACTUARIAL ASSUMPTIONS *(continued)*

Teachers

Age	Service					
	0		5		10+	
	Male	Female	Male	Female	Male	Female
20	0.130	0.100	0.055	0.070	0.015	0.050
30	0.150	0.150	0.054	0.088	0.015	0.045
40	0.133	0.105	0.052	0.050	0.017	0.022
50	0.162	0.098	0.070	0.050	0.023	0.020

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.

Family Composition

It is assumed that 80% of plan participants are married and that the male spouse in 3 years older than the female spouse.

Loading and Administrative Expenses

State

We increased the normal cost by 2% and the actuarial accrued liability of active members by $275 million to account for certain Chapter 32 benefits that cannot be readily valued with our software system. Such benefits include, but are not limited to, benefits provided under Sections10, 28M, 28N, 65D, and 100. In addition, we increased the normal cost by 1.5% and the actuarial accrued liability of active members by $125 million to estimate the impact of potential changes in job group status for certain members of DMH and Social Services.

Teachers

We increased the total normal cost by 2% and the actuarial accrued liability of active members by 1% to account for buybacks at retirement and various data issues including the status of members with reported pay of less than $10,000.

Boston Teachers

We increased the total normal cost by 2% and the actuarial accrued liability of active members by 1%. We also increased the pay provided by 2% to reflect the impact of a contract settlement retroactive to 2017.

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 in the Commonwealth. Members of the Massachusetts Teachers' Retirement System and Boston teachers are classified in Group 1.

Group 1:

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

Group 2:

Certain specified hazardous duty positions.

Group 3:

Officers and inspectors of the Department of State Police.

Group 4:

Police Officers, firefighters, corrections officers, and other specified hazardous positions.

MEMBER CONTRIBUTIONS

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

Date of Membership	Contribution Rate
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
7/1/96 to present:	12% of regular compensation (State Police)
7/1/01 to present:	11% of regular compensation (for teachers hired after 7/1/01 and those accepting provisions of Chapter 114 of the Acts of 2000)
1979 to present:	an additional 2% of regular compensation in excess of $30,000 except for teachers subject to Chapter 114 of the Acts of 2000.

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 at 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

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

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 hired prior to 1978, or if classified in Group 4.

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 or her 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.

10. SUMMARY OF PLAN PROVISIONS *(continued)*

• Salary is defined as gross regular compensation. For employees 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 three consecutive years that produce the highest average, or, if greater, during the last three 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 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 Group 4 employees who retire at or after age 55. A .125% reduction is applied for each year of age under the maximum age for the member's group.

• For a teacher who is subject to the provisions of Chapter 114 of the Acts of 2000 and who has completed at least 30 years of creditable service, the benefit rate is multiplied by the creditable service and the resulting percentage is increased by 2% per year for
each year of service in excess of 24. The amount determined cannot exceed 80% of the average salary.

The allowance of state police officers is calculated using a slightly different formula. Information regarding this formula can be obtained directly from the State Retirement Board.

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. Group 4 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 70½.

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 two 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 ten years of creditable service.

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.

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.

10. SUMMARY OF PLAN PROVISIONS *(continued)*

ACCIDENTAL DISABILITY

Eligibility: Applies to members who become permanently incapacitated from 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. However, 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 $897.72 per year, 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. 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 $897.72 per year, per child, 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 resulting 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 of a firefighter, public prosecutor, police officer or corrections officer killed in the line of duty may receive a one-time payment of $300,000 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 $12,000.

DEATH IN ACTIVE SERVICE

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 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 superannuation retirement age, the age 60 benefit rate is used. If the member died after age 60, the actual age is used. 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 $9,000, 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

A cost of living adjustment (COLA) is determined based upon the increase in the Consumer Price Index (CPI) used for indexing Social Security benefits, but cannot exceed 3.0% on the first $13,000 of a retiree's benefit.

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 remains unmarried 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 predeceases the retiree, the benefit payable increases (or "pops up") 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 predeceases the retiree, the benefit payable "pops up" 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, rather than 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 reduce 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 31 as well as 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, are 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 and inactive members.

ASSETS

The value of securities held by the plan.

COST OF BENEFITS

The estimated payment from the pension system for benefits for the fiscal year.

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 22C 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 that 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 an amount 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.

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