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# Massachusetts Teachers' Retirement System

## Actuarial Valuation Report

January 1, 2018

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**PUBLIC EMPLOYEE RETIREMENT ADMINISTRATION COMMISSION**  
COMMONWEALTH OF MASSACHUSETTS



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# I. INTRODUCTION & CERTIFICATION

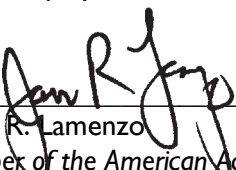
This report presents the results of the actuarial valuation of the Massachusetts Teachers' Retirement System (TRS). The valuation was performed as of January 1, 2018, pursuant to Chapter 32 of the General Laws of the Commonwealth of Massachusetts and based on the plan provisions at that time. The actuarial assumptions used to calculate the accrued liability and the normal cost primarily reflect our most recent Experience Study Analysis report which was 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 reduced from 7.50% to 7.35%.

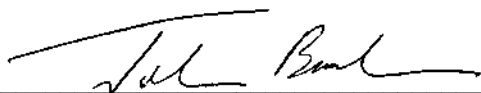
This valuation was based on member data as of December 31, 2017, which was supplied by the Retirement Board. We performed a number of tests on the data and made specific assumptions and determinations for a number of data items. We provide more detail on these issues in Section 6. Asset information as of December 31, 2017 was provided by the Pension Reserves Investment Management Board. We reviewed both the membership data and financial information for reasonableness but we did not audit this information.

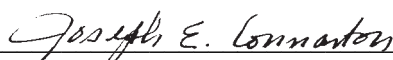
Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or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

  
\_\_\_\_\_  
James R. Lamenzo  
Member of the American Academy of Actuaries  
Associate of the Society of Actuaries  
Enrolled Actuary Number 17-4709

  
\_\_\_\_\_  
John F. Boorack  
Member of the American Academy of Actuaries  
Associate of the Conference of Consulting Actuaries  
Enrolled Actuary Number 17-8562

  
\_\_\_\_\_  
Joseph E. Connarton  
Executive Director

October 10, 2018

## 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 Massachusetts Teachers' Retirement System (TRS) reflects one component of the Commonwealth schedule. The other components have been the State Retirement System (SRS), liabilities for Boston teachers, and State reimbursements to local systems to reflect COLAs granted from 1982 through 1996 (determined on an actuarial basis). 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) for SRS under Section 40 of Chapter 15A, and a modification to the 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 Massachusetts Teachers' Retirement System's portion of the FY19 Commonwealth appropriation is \$1.423 billion.

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

Total Normal Cost	\$934,354
Expected Employee Contributions	<u>691,864</u>
Net Normal Cost	\$242,490
Total Expenses and Transfers	<u>\$29,500</u>
Net Normal Cost Plus Expenses	<u>\$271,990</u>

Total Actuarial Liability	\$51,653,285
Assets	<u>\$27,057,700</u>
Unfunded Actuarial Liability	<u>\$24,595,585</u>
Funded Ratio	52.4%

## 2. EXECUTIVE SUMMARY *(continued)*

### PART B | COMPARISON WITH PRIOR VALUATION AND EXPERIENCE ANALYSIS

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

	1/1/18	1/1/17	Increase (Decrease)	Increase (Decrease)
Total Normal Cost	\$934,354	\$896,704	\$37,650	4.2%
Expected Employee Contributions	<u>691,864</u>	<u>664,890</u>	<u>26,974</u>	4.1%
Net Normal Cost	\$242,490	\$231,814	\$10,676	4.6%
Administrative Expenses	\$25,300	\$24,200	\$1,100	4.5%
3(8)(c) Amounts Transferred to Other Systems	<u>4,200</u>	<u>4,300</u>	<u>(100)</u>	(2.3)%
Total Expenses and Transfers	\$29,500	\$28,500	\$1,000	3.5%
Net Normal Cost Plus Expenses and Transfers	<u>\$271,990</u>	<u>\$260,314</u>	<u>\$11,676</u>	4.5%
Actuarial Liability				
Actives	\$21,097,850	\$19,795,825	\$1,302,025	6.6%
Retirees and Inactives	<u>30,555,435</u>	<u>29,397,678</u>	<u>1,157,757</u>	3.9%
Total	\$51,653,285	\$49,193,503	\$2,459,782	5.0%
Assets (Actuarial Value)	<u>\$27,057,700</u>	<u>\$25,638,136</u>	<u>\$1,419,564</u>	5.5%
Unfunded Actuarial Liability	<u>\$24,595,585</u>	<u>\$23,555,367</u>	<u>\$1,040,218</u>	4.4%
Funded Ratio	52.4%	52.1%	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 Statement excluding investment related expenses. In addition, \$4.2 million is included for amounts transferred to other systems under Section 3(8)(c) for members with 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)*

Actives	1/1/18	1/1/17	% Difference
Number	93,119	92,128	1.1%
Total Payroll	\$6,829,012,047	\$6,583,871,474	3.7%
Average Salary	\$73,336	\$71,464	2.6%
Average Age	43.6	43.6	0.0%
Average Service	13.1	13.0	0.8%

Retirees and Survivors	1/1/18	1/1/17	% Difference
Number	66,078	65,036	1.6%
Total Benefits	\$2,933,142,426	\$2,838,298,388	3.3%
Average Benefits	\$44,389	\$43,642	1.7%
Average Age	72.6	72.4	0.3%

#### *Gain/(Loss) and Change in Unfunded Actuarial Liability (UAL)*

The development of the actuarial gain/(loss) is shown on page 12. During 2017, there was an overall actuarial gain of \$615 million. There was a gain on the actuarial liability of approximately \$30 million and a gain of approximately \$585 million on the actuarial value of assets. The return on assets was approximately 9.8% on an actuarial basis compared to 17.7% on a market value basis.

The UAL increased from \$23.6 billion as of January 1, 2017 to \$24.6 billion as of January 1, 2018. The UAL would have only increased to \$23.8 billion and the funded ratio would have been 53.3% had there been no changes in the actuarial assumptions (see next section).

#### *Actuarial Assumptions*

##### *Investment Return*

The January 1, 2018 valuation reflects a 7.35% investment return assumption (reduced from 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 could 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.

## 2. EXECUTIVE SUMMARY *(continued)*

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

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 \$33 million and the actuarial liability by \$845 million.

#### *Mortality*

In our 2011 actuarial valuation, we began reflecting future mortality improvement (increasing 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 in early 2015 of retiree mortality during 2012, 2013, and 2014, we adopted a fully generational assumption in the 2015 valuation. Based on our 2017 analysis of retiree mortality during 2015 and 2016, we further adjusted the mortality assumption by adopting the RP-2014 white collar table as of January 1, 2017. We maintained this assumption in this valuation.

#### *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 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, 2018, there were approximately 27,620 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 \$50 million lower than it would have been if the prior provisions were in place for these members. The actuarial liability is approximately \$220 million lower than it would have been if the prior provisions were in place.

#### *Data Assumptions*

We have detailed a number of the assumptions we made for missing or questionable data for active members of the TRS in Section 6. 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.



## 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 Teachers' 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. As of January 1, 1990, the actuarial liability was \$9.7 billion and assets were \$3.8 billion. The difference of \$5.9 billion is the UAL. As of January 1, 2018, the actuarial liability is \$51.7 billion and the actuarial value of assets is \$27.1 billion. The difference of \$24.6 billion is the UAL. The actuarial liability has grown 5.3 times over this period ( $\$51.7B / \$9.7B$ ). But assets have grown 7.1 times over this same period ( $\$27.1B / \$3.8B$ ).

For this reason, we believe the funded ratio represents a better measure of funding progress. If you draw a straight line from the 1990 funded ratio of 39.2% to the January 1, 2018 amount of 52.4%, the line is moving upward to the right. This demonstrates the funding progress to date. Although the funded ratio reached 83.3% 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.

#### *Impact of assumption and plan changes since 2009*

As noted earlier, the actuarial liability as of January 1, 2018 increased \$845 million to reflect a revised investment return assumption. There have been a number of other plan and assumption changes since 2009 that have increased the actuarial liability. These changes include three 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, the update to the mortality assumption as of January 1, 2017 and the adoption of a \$13,000 COLA base. Including the reduction in the investment return assumption as of January 1, 2018, the unfunded actuarial liability is approximately \$7.2 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 \$17.4 billion and the funded ratio would be 60.9%.

## 2. EXECUTIVE SUMMARY *(continued)*

### PART C | FUNDING PROGRESS *(continued)*

The chart below provides further detail on these changes.

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

	Mass. Teachers
Assumption Changes	\$7.03
Plan Amendments	<u>0.15</u>
Total	\$7.18

Assumption changes (with valuation date reflected)

(In millions)

Reduction in investment return assumption from 8.25% to 8.0% (2013)	\$889
Reduction in investment return assumption from 8.0% to 7.75% (2015)	1,045
Reduction in investment return assumption from 7.75% to 7.50% (2016)	1,190
Reduction in investment return assumption from 7.50% to 7.35% (2018)	845
Adoption of fully generational mortality assumption (2015)	1,022
Other mortality adjustments (2012, 2013, 2014, 2017)	1,729
Other experience study changes (2013)	<u>311</u>
Total	7,031

Plan amendment (with valuation date reflected)

\$13,000 COLA base (2012)	\$148
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## 2. EXECUTIVE SUMMARY *(continued)*

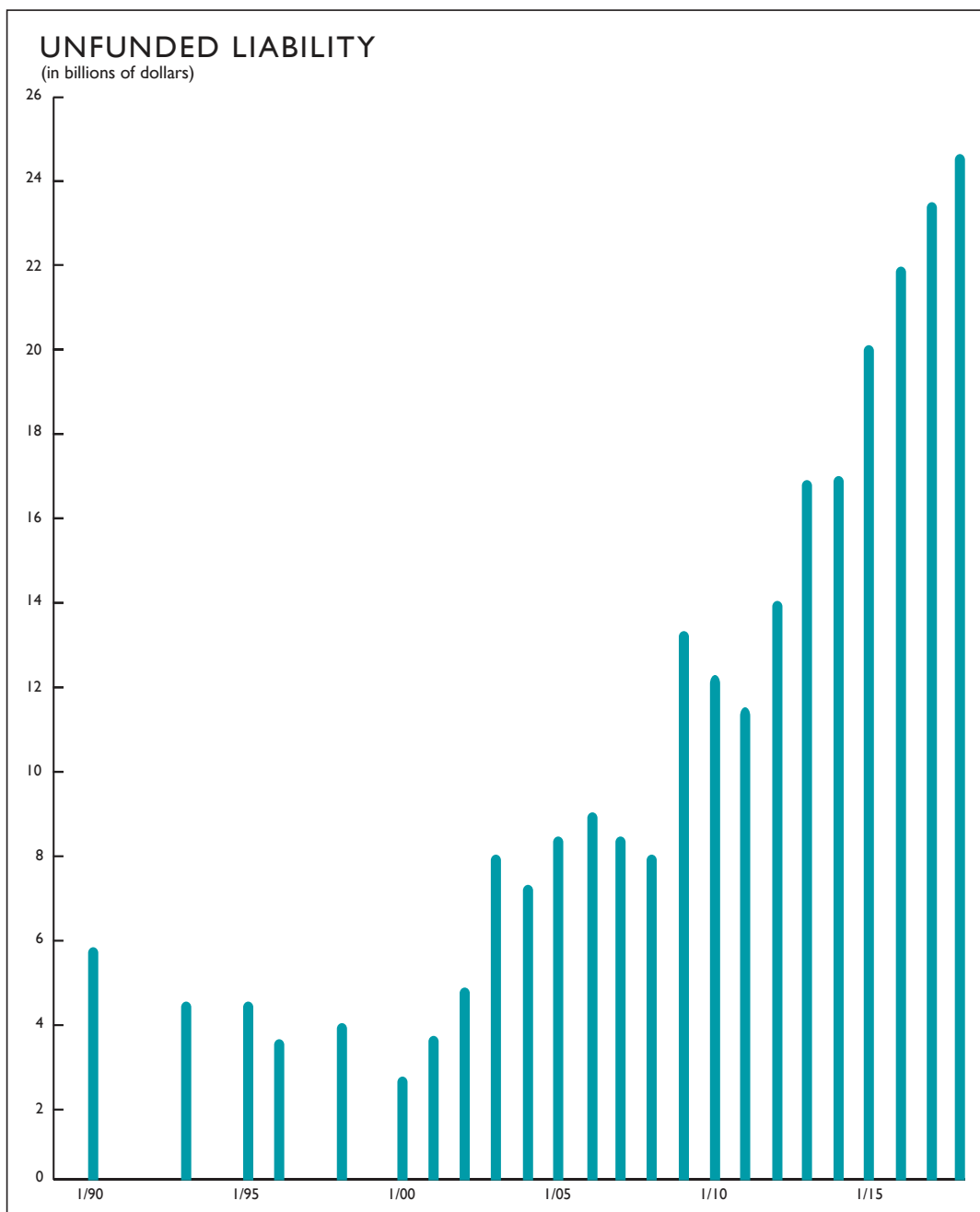
### PART C | FUNDING PROGRESS

#### UNFUNDED LIABILITY

The chart below shows the 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 implementation of updated actuarial software at that time.

The UAL is \$24.6 billion. On a market value basis the UAL is \$23.1 billion.

The UAL increased \$1.0 billion since January 1, 2017. The revised assumptions increased the UAL by \$845 million. If the 2018 valuation reflected the 2017 valuation assumptions, the UAL would be \$23.8 billion.



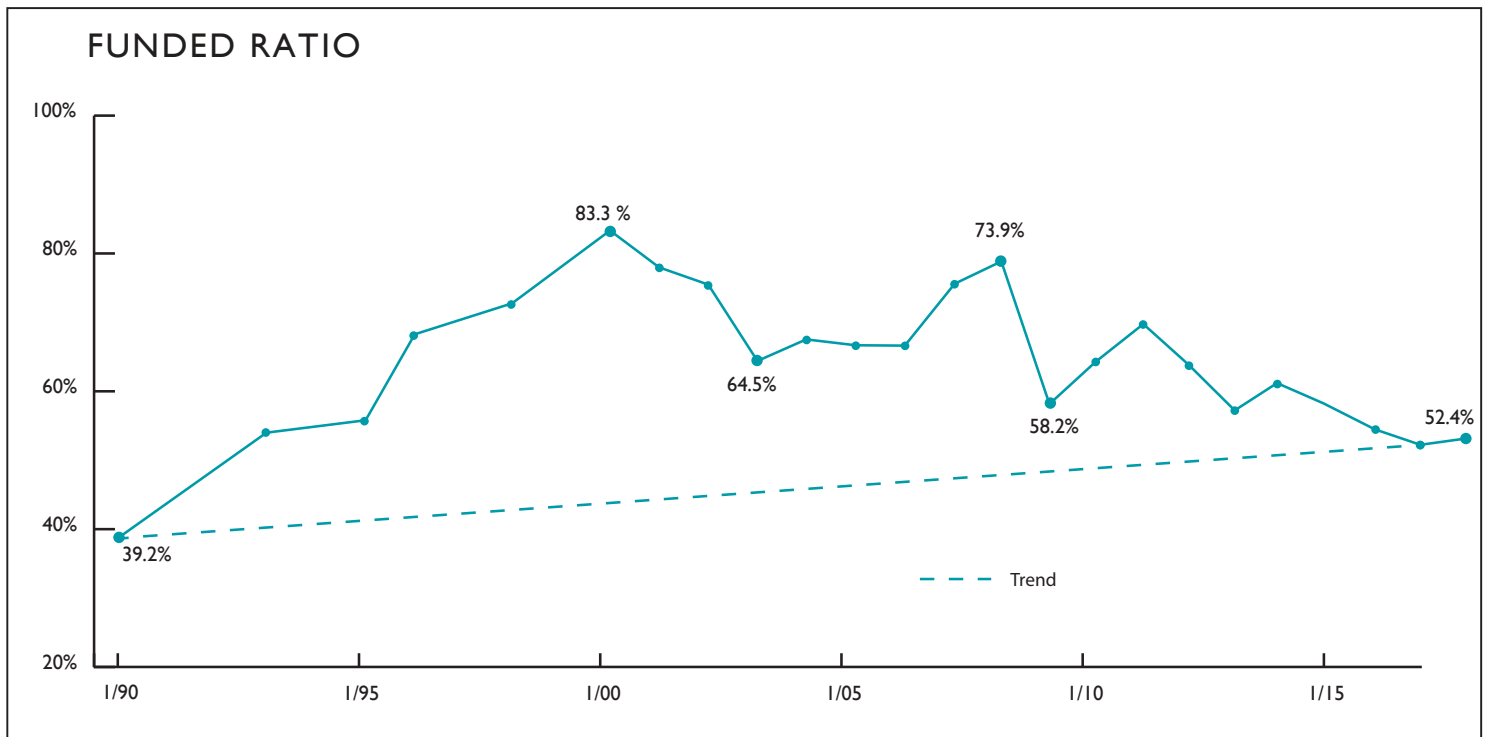
## 2. EXECUTIVE SUMMARY *(continued)*

### PART C | FUNDING PROGRESS *(continued)* FUNDED RATIO

The chart below shows the 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 52.4%. On a market value basis the funded ratio is 55.4%.

The funded ratio increased from 52.1% as of January 1, 2017 to 52.4% as of January 1, 2018. The revised assumptions decreased the funded ratio as of January 1, 2018. If the 2018 valuation reflected the 2017 valuation assumptions, the funded ratio would be 53.3%.



## 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 actuarially 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	
Active	93,119
Vested Terminated	0
Retired/ Beneficiaries	<u>66,078</u>
Total	159,197
B. Total Payroll	\$6,829,012
C. Normal Cost	
Superannuation	\$796,734
Death	25,660
Disability	11,833
Termination	<u>100,127</u>
Total Normal Cost	\$934,354
Expected Employee Contributions	<u>691,864</u>
Net Employer Normal Cost	\$242,490
Administrative Expenses	\$25,300
3(8)(c) Amounts Transferred to Other Systems	<u>4,200</u>
Total Expenses and Transfers	\$29,500
Net Normal Cost Plus Expenses & Transfers	<u>\$271,990</u>
D. Actuarial Liability	
Active	
Superannuation	\$20,268,077
Death	204,223
Disability	116,525
Termination	<u>509,025</u>
Total Active	\$21,097,850
Vested Terminated (a)	650,000
Non-Vested Terminated	0
Retirees and Survivors	<u>29,905,435</u>
Total Actuarial Liability	\$51,653,285
E. Actuarial Value of Assets	27,057,700
F. Unfunded Actuarial Liability	\$24,595,585
G. Funded Ratio: E/D	52.4%

(a) estimated and includes non-vested terminated members.

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

A. Gain/(loss) on Actuarial Liability	
1. Actuarial Liability 1/1/17	49,194
2. Total Normal Cost 1/1/17	897
3. Interest on (1) and (2) at 7.50%	3,757
4. Benefits paid during 2017 [a]	2,900
5. Interest on (4) assuming mid-year payment	109
6. Expected Actuarial Liability before adjustments: (1)+(2)+(3)-(4)-(5)	50,839
7. Increase due to change in assumptions	845
8. Expected Actuarial Liability 1/1/18: (6)+(7)	51,684
9. Actuarial Liability 1/1/18	51,654
10. Gain/(loss): (8)-(9)	30
B. Gain/(loss) on assets	
1. Actuarial Value of Assets (AVA) 1/1/17	25,638
2. Interest on (1) at 7.50%	1,923
3. Net Receipts [b]	779
4. Net Disbursements [b]	1,828
5. Net Cash Flow: (3)-(4)	(1,049)
6. Interest on (5) [c]	(39)
7. Expected AVA 1/1/18: (1)+(2)+(5)+(6)	26,473
8. AVA 1/1/18	27,058
9. Gain/(loss): (8)-(7)	585
C. Total Gain/(loss): (A10)+(B9)	615

[a] Estimated

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

[c] Assumes time weighting based on monthly cash flow.

Figures may not add due to rounding.

## 5. ASSETS

### PART A | SUMMARY OF ASSETS

(Dollars in thousands)

Pension Reserve Investment Trust (Teachers' Retirement System)	
Market Value	\$28,597,562
Actuarial Value	\$27,057,700
Actuarial Value as Percentage of Market Value	94.6%

The actuarial value of assets (AVA) is determined so that 20% of the investment gain or 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.



## 5. ASSETS *(continued)*

### PART B | DEVELOPMENT OF ACTUARIAL VALUE OF ASSETS

(Dollars in thousands)

A. Development of 12/31/17 expected actuarial value of assets (AVA)	
1. Market Value (MV) 12/31/16	25,225,451
2. Actuarial Value 12/31/16 (as calculated)	25,638,136
3. Net Receipts 2017 *	779,226
4. Net Disbursements 2017 *	1,827,800
5. Net Cash Flow: (3)-(4)	(1,048,574)
6. Expected Investment Return on (2): 0.0750 x (2)	1,922,860
7. Expected Investment Return on (5): 1/2 x 0.0750 x (5)	(39,322)
8. Expected AVA 12/31/17: (2)+(5)+(6)+(7)	26,473,101
B. Previous differences not yet amortized	
1. Unrecognized amount of 12/31/16 difference	
a. .2 x 2013 Gain/(loss)	318,887
b. .4 x 2014 Gain/(loss)	67,395
c. .6 x 2015 Gain/(loss)	(908,071)
d. .8 x 2016 Gain/(loss)	109,105
e. Total	(412,685)
C. Gain/(loss) from 2017	
1. Market Value 12/31/17	28,597,562
2. Expected Market Value 12/31/17: A(8)+B(1e)	26,060,416
3. Gain/ (loss) from 2017 investment: (1)-(2)	2,537,146
D. Development of AVA 12/31/17	
1. 2017 Gain/(loss)	2,537,146
2. 2016 Gain/(loss)	136,381
3. 2015 Gain/(loss)	(1,513,452)
4. 2014 Gain/(loss)	168,488
5. 2013 Gain/(loss)	1,594,433
6. 20% of 2017 Gain/(loss)	507,429
7. 20% of 2016 Gain/(loss)	27,276
8. 20% of 2015 Gain/(loss)	(302,690)
9. 20% of 2014 Gain/(loss)	33,698
10. 20% of 2013 Gain/(loss)	<u>318,887</u>
11. Total (6) + (7) + (8) + (9) + (10)	584,599
12. Actuarial Value 12/31/17: A(8)+D(11)	27,057,700
13. Percentage of Market Value	94.6%
14. Actuarial value: (12) but not less than 90% nor greater than 110% of C(1)	\$27,057,700

\*Reflects actual cash flow of PRIT Fund

## 6. SYSTEM MEMBERSHIP

### PART A | 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.

## 6. SYSTEM MEMBERSHIP *(continued)*

### PART A | 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

Present Age	Years of Service							Total
	0 – 4	5 – 9	10 – 14	15 – 19	20 – 24	25 – 29	30+	
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

## 6. SYSTEM MEMBERSHIP *(continued)*

### PART A | 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

## 6. SYSTEM MEMBERSHIP *(continued)*

### PART B | 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

## 6. SYSTEM MEMBERSHIP *(continued)*

### PART B | 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. 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 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, 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*.

### 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.

## 8. 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**

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

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

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 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 post-retirement mortality through January 1, 2017 and professional judgment. This assumption reflects observed current mortality as well as expected mortality improvement. The disabled member assumption does not reflect this most recent work. This assumption will be reviewed before the next valuation.



# 8. ACTUARIAL ASSUMPTIONS *(continued)*

## **Salary Increase**

Increases are based on service as shown below.

<u>Service</u>	<u>Teachers</u>
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 study) and professional judgment.

## 8. ACTUARIAL ASSUMPTIONS *(continued)*

### Retirement

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

## 8. ACTUARIAL ASSUMPTIONS *(continued)*

### Retirement

Females

	Not in Retirement Plus		Retirement Plus		
	Less than 20	20+	Less than 20	20-30	30+
47	0.000	0.000	0.00	0.00	0.000
48	0.000	0.000	0.00	0.00	0.000
49	0.000	0.000	0.00	0.00	0.000
50	0.000	0.010	0.00	0.01	0.015
51	0.000	0.010	0.00	0.01	0.015
52	0.000	0.015	0.00	0.01	0.015
53	0.000	0.020	0.00	0.01	0.015
54	0.000	0.020	0.00	0.01	0.020
55	0.035	0.040	0.03	0.03	0.050
56	0.035	0.040	0.03	0.05	0.150
57	0.035	0.040	0.04	0.08	0.350
58	0.050	0.060	0.08	0.10	0.350
59	0.065	0.080	0.08	0.15	0.350
60	0.085	0.150	0.10	0.20	0.350
61	0.100	0.200	0.12	0.25	0.350
62	0.120	0.200	0.12	0.30	0.350
63	0.120	0.250	0.15	0.30	0.350
64	0.200	0.300	0.20	0.30	0.350
65	0.300	0.400	0.25	0.40	0.350
66	0.300	0.300	0.25	0.30	0.350
67	0.300	0.300	0.30	0.30	0.300
68	0.300	0.300	0.30	0.30	0.300
69	0.300	0.300	0.30	0.30	0.300
70+	1.000	1.000	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.

## 8. ACTUARIAL ASSUMPTIONS *(continued)*

### **Disability**

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

<u>Age</u>	
20	0.00004
30	0.00006
40	0.00010
50	0.00050
60	0.00070

It is also assumed that 35% of disabilities 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 as well as professional judgment.

### **Withdrawal**

Based on an analysis of past experience. In addition to being age and service based, Teacher rates are also gender based. Final rates reflect this analysis as well as professional judgment. Sample annual rates are shown below.

<u>Age</u>	<u>Service</u>					
	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 members of the MTRS. MTRS 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, we removed retirement rates for ages 50-59. Termination rates remain in effect for those years. We will monitor these assumptions going forward.

### **Loading and Administrative Expenses**

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.

## 9. SUMMARY OF PLAN PROVISIONS

### ADMINISTRATION

The Massachusetts Teachers' Retirement System is governed by a seven-member retirement board and Chapter 32 of the Massachusetts General Laws. This law establishes benefits, contribution requirements and an accounting and funds structure for the system.

### 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.

There are 4 classes of membership in the Commonwealth. Members of the Massachusetts Teachers' Retirement System are classified in Group I.

#### **Group I:**

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

### MEMBER CONTRIBUTIONS

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

<u>Date of Membership</u>	<u>Contribution Rate</u>
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
7/1/01 to present:	11% of regular compensation (for members 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 members subject to Chapter 114 of the Acts of 2000.

In addition, members of Group I who join the system on or after April 2, 2012 will have their withholding rate reduced by 3% after achieving 30 years of creditable service.

### RATE OF INTEREST

Interest on regular deductions made after January 1, 1984 is a rate established by PERAC in consultation with the Commissioner of Banks. The rate is obtained from the average rates paid on individual savings accounts by a representative sample of at least 10 financial institutions.

### RETIREMENT AGE

There is no mandatory retirement age for employees in Group I.

## 9. SUMMARY OF PLAN PROVISIONS *(continued)*

### 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
- attainment of age 55 with 10 years of service, if hired after 1977

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

### AMOUNT OF BENEFIT

A member's annual allowance is determined by multiplying a benefit rate related to the member's age at retirement by his or her years of creditable service, and then multiplying that product by final average salary. A member who is subject to the provisions of Chapter 114 of the acts of 2000, and who completes at least 30 years of creditable service will receive an additional 2% of his average salary for each full year of service above 24 (23 for members hired on or after 4/2/12). The amount determined by the benefit formula cannot exceed 80% of the member's highest three-year (or five-year 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 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 to April 2, 2012, average salary is the average annual rate of regular compensation received during the five consecutive years that produce the highest average, or, if greater, during the last five years (whether or not consecutive) preceding retirement.
- 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 I employees who retire at or after age 65. A 0.1% reduction is applied for each year of age under 65.

## 9. SUMMARY OF PLAN PROVISIONS *(continued)*

- 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 members who retire at or after age 67. A 0.15% reduction is applied for each year of age under 67.
- For persons who became members on or after April 2, 2012 and retire with 30 or more years of creditable service, the highest rate of 2.5% applies to members who retire at or after age 67. A 0.125% reduction is applied for each year of age under 67.

### 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. All inactive 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.

### 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.

**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 age 55 or older, he or she will receive not less than the superannuation allowance to which he or she is entitled.

For persons 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 age 60 or older, 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.

## 9. SUMMARY OF PLAN PROVISIONS *(continued)*

### 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 \$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.

### 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.



## 9. SUMMARY OF PLAN PROVISIONS *(continued)*

### 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 person 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. If the member died after age 55, the actual age is used. For a member 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 \$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

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.

### 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 pre-deceases 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 pre-deceases the retiree, the benefit payable "pops up" in the same fashion. The Option C became available to accidental disability retirees on November 7, 1996.

## 9. SUMMARY OF PLAN PROVISIONS *(continued)*

### 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.

## 10. 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.

### ANNUAL STATEMENT

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

## 10. GLOSSARY OF TERMS *(continued)*

### 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 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

### 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.

## 10. GLOSSARY OF TERMS *(continued)*

### 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.





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**PUBLIC EMPLOYEE RETIREMENT ADMINISTRATION COMMISSION**

Five Middlesex Avenue | Suite 304 | Somerville, MA 02145

Ph: 617.666.4446 | Fax: 617.628.4002

TTY: 617.591.8917 | Web: [www.mass.gov/perac](http://www.mass.gov/perac)