

State-Boston Retirement System

Actuarial Valuation and Review as of
January 1, 2014





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February 11, 2015

Retirement Board

State-Boston Retirement System

City Hall, Room 816

Boston, MA 02201

Dear Board Members:

We are pleased to submit this Actuarial Valuation and Review as of January 1, 2014. It summarizes the actuarial data used in the valuation, establishes the funding requirements for fiscal 2015 and later years and analyzes the preceding two years' experience.

The report shows the results of the valuation for the State-Boston Retirement System as a whole, and separately for the Teachers and the State-Boston Retirement System excluding the Teachers.

This report was prepared in accordance with generally accepted actuarial principles and practices at the request of the Board to assist in administering the Retirement System. The census information and financial information on which our calculations were based was prepared by the staff of the State-Boston Retirement System. That assistance is gratefully acknowledged.

The measurements shown in this actuarial valuation may not be applicable for other purposes. 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 the natural operation of the methodology used for these measurements (such as the end of an amortization period); and changes in plan provisions or applicable law.

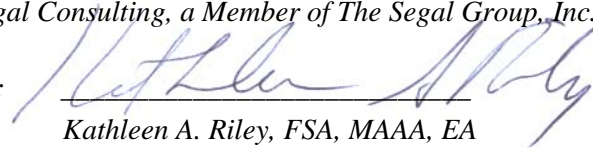
The actuarial calculations were directed under my supervision. I am a member of the American Academy of Actuaries and I meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the best of my knowledge, the information supplied in the actuarial valuation is complete and accurate. Further, in my opinion, the assumptions as approved by the Board are reasonably related to the experience of and the expectations for the Plan.

We look forward to reviewing this report at your next meeting and to answering any questions.

Sincerely,

Segal Consulting, a Member of The Segal Group, Inc.

By:

A handwritten signature in blue ink, appearing to read 'Kathleen Riley', written over a horizontal line.

Kathleen A. Riley, FSA, MAAA, EA

Senior Vice President and Actuary

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SECTION 1: Valuation Summary for the State-Boston Retirement System

Purpose

This report has been prepared by Segal Consulting to present a valuation of the State-Boston Retirement System as of January 1, 2014. The valuation was performed to determine whether the assets and contributions are sufficient to provide the prescribed benefits. The contribution requirements presented in this report are based on:

- The benefit provisions Massachusetts General Law Chapter 32;
- The characteristics of covered active participants, inactive participants, and retired participants and beneficiaries as of January 1, 2014;
- The assets of the Plan as of December 31, 2013;
- Economic assumptions regarding future salary increases and investment earnings; and
- Other actuarial assumptions, regarding employee terminations, retirement, death, etc.

Significant Issues in Valuation Year

The following key findings were the result of this actuarial valuation:

1. The actuarial valuation report as of January 1, 2014 is based on financial information as of that date. Changes in the value of assets subsequent to that date are not reflected.
2. The report shows the results of the valuation for the State-Boston Retirement System (SBRS) as a whole and separately for the Teachers and the SBRS excluding Teachers.
3. In accordance with Chapter 112 of the Acts of 2010, the assets attributable to Teachers (27% of the market value of assets) were transferred to the PRIT Fund in 2010. The obligation to fund the liabilities of the Teachers and a share of the administrative cost of the SBRS related to the Teachers remains an obligation of the Commonwealth. Beginning in December 2010, appropriations have been received by the SBRS from the Commonwealth for the Teachers and have been transferred to the PRIT Fund. Transfers are made from the PRIT Fund on a monthly basis to cover the excess of benefit payments to the Teachers and a share of administrative expenses over the Teachers' employee contributions.

SECTION 1: Valuation Summary for the State-Boston Retirement System

4. During the plan years ended 2012 and 2013, the market value rates of return for the SBRS were 12.65% and 14.26%, respectively. Because the actuarial value of assets gradually recognizes market value fluctuations, the actuarial rates of return for the plan years ended 2012 and 2013 were 7.03% and 8.41%, respectively. The actuarial value of assets as of December 31, 2013 was \$5.384 billion, or 98.0% of the market value of assets of \$5.491 billion (as reported by Ernst & Young). As of December 31, 2011, the actuarial value of assets was 108.6% of the market value.
5. The total unrecognized investment gain as of December 31, 2013 is \$107,305,774. This investment gain will be recognized in the determination of the actuarial value of assets in the next few years, to the extent it is not offset by recognition of investment losses derived from future experience. This implies that earning the assumed rate of investment return (net of investment expenses) on a market value basis will result in investment gains on the actuarial value of assets in the next few years. The funding schedule for the SBRS excluding Teachers shown in this report reflects the deferred investment gains in accordance with the asset valuation method adopted by the Board.
6. The data received for the 2014 valuation reflected some significant changes compared to the data received for the prior valuation, as follows:
 - Creditable service now includes such items as service with other retirement boards. In addition, unreasonable service was adjusted as described in the attached summary of actuarial assumptions.
 - Approximately 400 active employees reported as non-Teachers in the prior valuation were reported as Teachers in this valuation.
 - For all non-retired participants, Annuity Savings Fund balances were estimated based on the balances reported in the prior valuation plus an adjustment for additional contributions and interest over the last two-years.
 - Salaries reported in the prior valuation were missing 1 of 26 pay periods.
 - Salaries for police officers and firefighters were increased to reflect bargaining contracts settled in 2014. Salaries for other employees were adjusted to remove amounts for grievance awards and to remove retroactive payments made in 2013 for years prior to 2013.
 - Vested employees who were active in the prior valuation and not reported in this year's data were assumed to be in transition and treated as active employees as of December 31, 2013. Non-vested active and inactive records included in the prior valuation and not reported this year were assumed to have taken a refund of their employee contributions or were assumed to be ineligible for benefits and were excluded from the valuation.
 - A number of beneficiaries in the prior valuation were reported as disabled retirees in this valuation. The staff of the SBRS has confirmed these participants are beneficiaries.

SECTION 1: Valuation Summary for the State-Boston Retirement System

7. We have reviewed the experience of the SBRS for the two-year period ending December 31, 2013 and recommend the following changes in actuarial assumptions and methods:
 - The actuarial cost method was changed to better reflect the impact of the plan changes effective for employees hired on or after April 2, 2012.
 - Mortality assumption for SBRS excluding Teachers:
 - The pre-retirement mortality assumption was changed from the RP-2000 Employee Mortality Table projected 20 years using Scale AA to the RP-2000 Employee Mortality Table projected generationally using Scale AA from 2014.
 - The mortality assumption for non-disabled retirees was changed from the RP-2000 Healthy Annuitant Mortality Table projected 15 years using Scale AA to the RP-2000 Healthy Annuitant Mortality Table projected generationally with Scale AA from 2014.
 - The mortality assumption for disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table set forward three years for males only projected five years using Scale AA to the RP-2000 Healthy Annuitant Mortality Table set forward three years for males only projected generationally with Scale AA from 2014.
 - Mortality assumption for Teachers:
 - The pre-retirement mortality assumption was changed from the RP-2000 Employee Mortality Table projected 10 years using Scale AA with an additional 1.25% load on the actuarial accrued liability and normal cost to the RP-2000 Combined Healthy White Collar Mortality Table projected 22 years using Scale AA.
 - The mortality assumption for non-disabled retirees was changed from the RP-2000 Healthy Annuitant Mortality Table projected 10 years using Scale AA with an additional 1.25% load on the actuarial accrued liability and normal cost to the RP-2000 Healthy Annuitant Large Benefit Amount Mortality Table projected 17 years using Scale AA.
 - The mortality assumption for disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table set forward three years for males only and an additional 1.25% load on the actuarial accrued liability and normal cost to the RP-2000 Healthy Annuitant Large Benefit Amount Mortality Table set forward three years for males only projected 7 years using Scale AA.
 - The investment return assumption was lowered from 8.25% to 8.00% for the Teachers.

SECTION 1: Valuation Summary for the State-Boston Retirement System

- The salary increase assumption for SBRS excluding Teachers was lowered from 5.00% per year for all members, including an allowance for inflation of 4.50% per year, to rates of 4.50% per year for Group 1 members, 4.75% per year for Group 2 members, and 5.00% per year for Group 4 members, including an allowance for inflation of 4.50% per year.
- The service-based salary increase assumption for Teachers has been changed, as shown below:

Years of Service	Teachers	
	Current	Previously
0	7.50%	8.00%
1	7.10%	7.75%
2	7.00%	7.50%
3	6.90%	7.25%
4	6.80%	7.00%
5	6.70%	6.75%
6	6.60%	6.50%
7	6.50%	6.25%
8	6.30%	6.00%
9	6.10%	5.75%
10	5.90%	5.50%
11	5.70%	5.25%
12	5.20%	5.00%
13	4.70%	4.75%
14	4.35%	4.75%
15-16	4.20%	4.75%
17-19	4.10%	4.75%
20 and later	4.00%	4.75%

- The assumed retirement age for inactive vested participants was changed from age 65 to age 60 for Group 1 members and remained the same at age 60 for Group 2 members and at age 55 for Group 4 members hired prior to April 2, 2012. For participants hired April 2, 2012 or later, the assumption is 60 for Group 1 members, 55 for Group 2 members, and 50 for Group 4 members.

SECTION 1: Valuation Summary for the State-Boston Retirement System

- The administrative expense assumption was increased from \$5,000,000 for calendar 2012 to \$8,417,000 for calendar 2014, with 70%, or \$5,891,900 assigned to the SBRS excluding Teachers, and 30%, or \$2,525,100, assigned to the Teachers.
- The retirement, turnover, and disability assumptions for Teachers have been changed to reflect the assumptions being used in the January 1, 2014 Actuarial Valuation Report of the Teachers' Retirement System dated September 12, 2014.

The changes in assumptions and methods increased the unfunded liability by \$146.8 million and increased the normal cost by \$0.8 million for the SBRS excluding Teachers. These changes increased the unfunded liability by \$193.1 million and decreased the normal cost by \$2.5 million for the Teachers.

8. The following plan changes are included in this valuation:
 - Members hired on or after April 2, 2012 are covered by the provisions of Chapter 32 as amended by of Chapter 176 of the Acts of 2011 and Chapter 139 of the Acts of 2012.
 - As permitted by Section 63 of Chapter 139 of the Acts of 2012, the Board has increased the Section 101 annual allowance from \$6,000 to \$12,000.
9. The recommended contributions for the SBRS excluding Teachers are based on a funding schedule that fully funds the liabilities of the SBRS excluding Teachers by June 30, 2025 with total increases in the appropriation of 7.75% per year. The fiscal 2015 appropriation is \$203,074,621 and the fiscal 2016 appropriation is \$218,812,904. The funding schedule for the SBRS excluding Teachers is shown in Chart 2 – 16.
10. The Commonwealth appropriation for the Teachers is \$109,485,000 for fiscal 2015 and is expected to increase by 10% for fiscal 2016.
11. Section 2 shows participant and asset information, the experience analysis, liabilities and a funding schedule for the SBRS excluding Teachers, with comparisons to 2012. Section 3 shows the same information for the Teachers with comparisons to 2012. Section 4 shows participant and asset information for all employees of the SBRS.
12. On a market value basis, the funded ratio has increased from 56.59% as of January 1, 2012 to 60.64% as of January 1, 2014. On an actuarial basis, the funded ratio has decreased from 61.45% as of January 1, 2012 to 59.46% as of January 1, 2014.

SECTION 1: Valuation Summary for the State-Boston Retirement System

13. Section 5 includes the disclosure information required by Governmental Accounting Standards Board (GASB) Statements No. 25 and 27. Section 6 shows the format of the disclosure information required by GASB Statements No. 67 and 68. The exhibits in Section 6 will be completed after December 31, 2014 financial information is available. At that time, the liabilities will be projected to the end of the year and the allocations to each employer will be determined.

SECTION 1: Valuation Summary for the State-Boston Retirement System

Summary of Key Valuation Results – SBRs excluding Teachers

	January 1, 2014	January 1, 2012
Contributions for fiscal year beginning July 1:		
Recommended for fiscal 2015 and 2013	\$203,074,621	\$170,142,481
Recommended for fiscal 2016 and 2014	218,812,904	185,880,660
Recommended for fiscal 2017 and 2015	235,770,904	203,074,621
Funding elements for plan year beginning January 1:		
Normal cost, including administrative expenses	\$135,877,055	\$128,503,757
Market value of assets	4,044,721,329	3,260,503,002
Actuarial value of assets	3,989,921,913	3,575,387,127
Actuarial accrued liability	5,682,673,119	5,060,071,300
Unfunded actuarial accrued liability	1,692,751,206	1,484,684,173
Funded ratio based on market value of assets	71.18%	64.44%
Funded ratio based on actuarial value of assets	70.21%	70.66%
Demographic data for plan year beginning January 1:		
Number of retired participants and beneficiaries	9,925	10,000
Number of inactive participants entitled to a return of their employee contributions	6,194	6,196
Number of inactive participants with a vested right to a deferred or immediate benefit	557	627
Number of active participants	14,235	13,951
Total payroll*	\$869,004,192	\$802,947,807
Average payroll*	61,047	57,555

* Payroll figures are for the prior calendar year and reflect annualized salaries for participants hired during the year. Calendar year 2011 payroll figures were increased by 2.5% for police officers to reflect an unsettled bargaining contract. Calendar year 2013 payroll figures were increased by 7.7% for police officers, plus a one-time \$2,000 parity increase for approximately 83% of police officers and by 6.1% for firefighters to reflect bargaining contracts that were settled in 2014. Calendar year 2013 payroll figures were reduced to reflect retroactive payments that were included in the salary data. Payments made as part of grievance settlements were assumed to be one-time payments and were removed from reported salaries. For non-grievance retroactive amounts, salaries were reduced by the lesser of the retroactive amount provided or 1% of salary.

SECTION 1: Valuation Summary for the State-Boston Retirement System

Summary of Key Valuation Results - Teachers

	January 1, 2014	January 1, 2012
Funding elements for plan year beginning January 1:		
Normal cost, including administrative expenses	\$57,478,566	\$53,145,171
Market value of assets	1,446,475,671	1,211,096,998
Actuarial value of assets	1,393,969,313	1,279,812,942
Actuarial accrued liability	3,372,057,014	2,842,103,544
Unfunded actuarial accrued liability	1,978,087,701	1,562,290,602
Funded ratio based on market value of assets	42.90%	42.61%
Funded ratio based on actuarial value of assets	41.34%	45.03%
Demographic data for plan year beginning January 1:		
Number of retired participants and beneficiaries	4,416	4,189
Number of inactive participants entitled to a return of their employee contributions	1,789	1,713
Number of inactive participants with a vested right to a deferred or immediate benefit	251	251
Number of active participants	6,043	5,448
Total payroll*	\$510,053,668	\$436,451,621
Average payroll*	84,404	80,112

* Payroll figures are for the prior calendar year and reflect annualized salaries for participants hired during the year. Calendar year 2013 payroll figures were reduced to reflect retroactive payments that were included in the salary data. Payments made as part of grievance settlements were assumed to be one-time payments and were removed from reported salaries. For non-grievance retroactive amounts, salaries were reduced by the lesser of the retroactive amount provided or 1% of salary.

SECTION 1: Valuation Summary for the State-Boston Retirement System

Summary of Key Valuation Results – All SBRS Employees

	January 1, 2014	January 1, 2012
Funding elements for plan year beginning January 1:		
Normal cost, including administrative expenses	\$193,355,621	\$181,648,929
Market value of assets	5,491,197,000	4,471,600,000
Actuarial value of assets	5,383,891,226	4,855,200,069
Actuarial accrued liability	9,054,730,133	7,902,174,844
Unfunded actuarial accrued liability	3,670,838,907	3,046,974,775
Funded ratio based on market value of assets	60.64%	56.59%
Funded ratio based on actuarial value of assets	59.46%	61.45%
Demographic data for plan year beginning January 1:		
Number of retired participants and beneficiaries	14,341	14,189
Number of inactive participants entitled to a return of their employee contributions	7,983	7,909
Number of inactive participants with a vested right to a deferred or immediate benefit	808	878
Number of active participants	20,278	19,399
Total payroll*	\$1,379,057,860	\$1,239,399,428
Average payroll*	68,008	63,890

* Payroll figures are for the prior calendar year and reflect annualized salaries for participants hired during the year. Calendar year 2011 payroll figures were increased by 2.5% for police officers to reflect an unsettled bargaining contract. Calendar year 2013 payroll figures were increased by 7.7% for police officers, plus a one-time \$2,000 parity increase for approximately 83% of police officers and by 6.1% for firefighters to reflect bargaining contracts that were settled in 2014. Calendar year 2013 payroll figures were reduced to reflect retroactive payments that were included in the salary data. Payments made as part of grievance settlements were assumed to be one-time payments and were removed from reported salaries. For non-grievance retroactive amounts, salaries were reduced by the lesser of the retroactive amount provided or 1% of salary.

SECTION 2: Valuation Results for the State-Boston Retirement System – SBRS excluding Teachers

A. PARTICIPANT DATA

The Actuarial Valuation and Review considers the number and demographic characteristics of covered participants, including active participants, inactive participants, retired participants and beneficiaries.

This section presents a summary of significant statistical data on these participant groups for the SBRS excluding Teachers.

More detailed information for this valuation year and the preceding valuation can be found in Chart 2 – 2 and Section 4, Exhibit A.

A historical perspective of how the participant population has changed over the past four valuations can be seen in this chart.

CHART 2 – 1
Participant Population: 2007 – 2013

Year Ended December 31	Active Participants	Inactive Participants	Retired Participants and Beneficiaries
2007	15,943	4,959	10,246
2009	14,449	6,189	10,044
2011	13,951	6,823	10,000
2013	14,235	6,751	9,925

SECTION 2: Valuation Results for the State-Boston Retirement System – SBRS excluding Teachers

Participant Data

Below is a summary of the participant data used in this valuation for the SBRS excluding Teachers.

CHART 2 – 2

Table of Plan Coverage

Category	Year Ended December 31		Change From Prior Year
	2013	2011	
Active participants in valuation:			
Number	14,235	13,951	2.0%
Average age	46.4	46.8	N/A
Average years of service	14.7	14.4	N/A
Total payroll*	\$869,004,192	\$802,947,807	8.2%
Average payroll*	61,047	57,555	6.1%
Member contributions	874,477,977	824,276,390	6.1%
Number with unknown age and/or service information	3	2	50.0%
Inactive participants with a vested right to a deferred or immediate benefit	557	627	-11.2%
Inactive participants entitled to a return of their employee contributions	6,194	6,196	-0.0%
Retired participants:			
Number in pay status	6,028	6,021	0.1%
Average age	74.3	74.3	N/A
Average monthly benefit	\$2,529	\$2,305	9.7%
Number with benefits in suspended status	1	0	N/A
Disabled participants:			
Number in pay status	1,749	1,735	0.8%
Average age	67.4	67.2	N/A
Average monthly benefit	\$3,682	\$3,296	11.7%
Beneficiaries in pay status:			
Number in pay status	2,147	2,244	-4.3%
Average age	77.3	76.9	N/A
Average monthly benefit	\$1,508	\$1,358	11.0%

* Payroll figures are for the prior calendar year and reflect annualized salaries for participants hired during the year. Calendar year 2011 payroll figures were increased by 2.5% for police officers to reflect an unsettled bargaining contract. Calendar year 2013 payroll figures were increased by 7.7% for police officers, plus a one-time \$2,000 parity increase for approximately 83% of police officers and by 6.1% for firefighters to reflect bargaining contracts that were settled in 2014. Calendar year 2013 payroll figures were reduced to reflect retroactive payments that were included in the salary data. Payments made as part of grievance settlements were assumed to be one-time payments and were removed from reported salaries. For non-grievance retroactive amounts, salaries were reduced by the lesser of the retroactive amount provided or 1% of salary.

SECTION 2: Valuation Results for the State-Boston Retirement System – SBRS excluding Teachers

Active Participants

Plan costs are affected by the age, years of service and payroll of active participants. In this year’s valuation, there were 14,235 active participants with an average age of 46.4, average years of service of 14.7 years and average payroll of \$61,047. The 13,951 active participants in the prior valuation had an average age of 46.8, average service of 14.4 years and average payroll of \$57,555.

Among the active participants, there were three participants with unknown age. The actuarial calculations were adjusted for the missing information by assuming that it was the same as information provided for other active participants with similar known characteristics.

Inactive Participants

In this year’s valuation, there were 557 participants with a vested right to a deferred or immediate vested benefit and 6,194 participants entitled to a return of their employee contributions.

These graphs show a distribution of active participants by age and by years of service.

CHART 2 – 3
Distribution of Active Participants by Age as of December 31, 2013

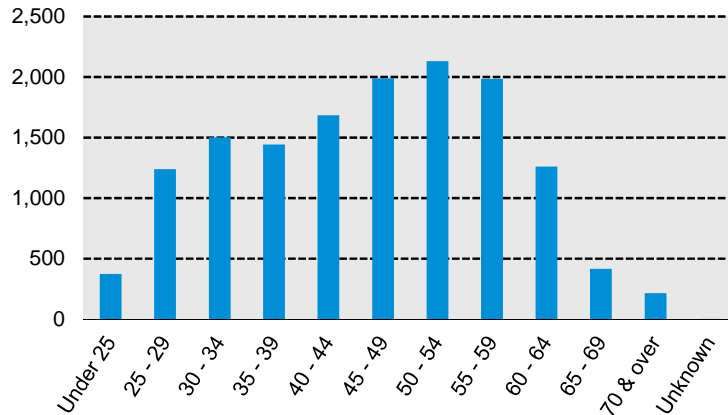
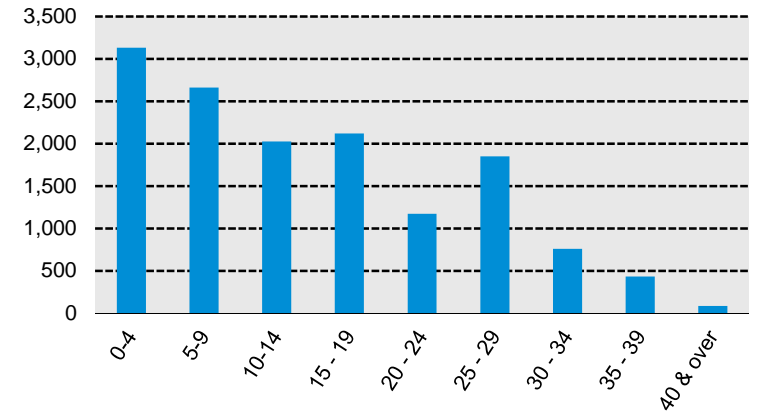


CHART 2 – 4
Distribution of Active Participants by Years of Service as of December 31, 2013



SECTION 2: Valuation Results for the State-Boston Retirement System – SBRS excluding Teachers

Retired Participants and Beneficiaries

As of December 31, 2013, 7,777 retired participants and 2,147 beneficiaries were receiving total monthly benefits of \$24,920,835, excluding COLAs reimbursed by the Commonwealth. For comparison, in the previous valuation, there were 7,756 retired participants and 2,244 beneficiaries receiving monthly benefits of \$22,644,880, excluding COLAs reimbursed by the Commonwealth. There was one retired participant in suspended status this year and none in the prior valuation.

These graphs show a distribution of the current retired participants and beneficiaries based on their monthly amount and age, by type of pension.

- Beneficiaries
- Accidental Disability
- Ordinary Disability
- Superannuation

CHART 2 – 5
Distribution of Retired Participants and Beneficiaries by Type and by Monthly Amount as of December 31, 2013

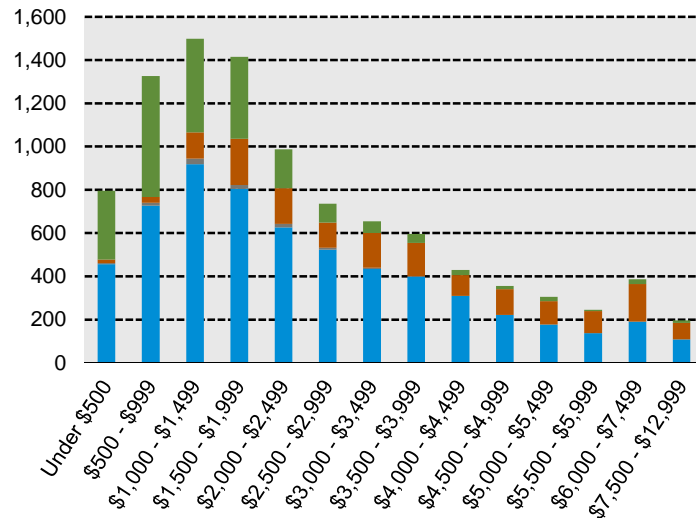
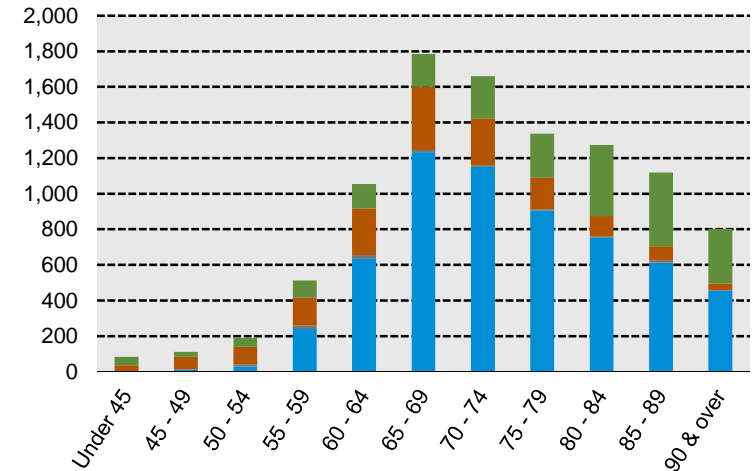


CHART 2 – 6
Distribution of Retired Participants and Beneficiaries by Type and by Age as of December 31, 2013



SECTION 2: Valuation Results for the State-Boston Retirement System – SBRS excluding Teachers

B. FINANCIAL INFORMATION

Retirement plan funding anticipates that, over the long term, both contributions (less administrative expenses) and net investment earnings (less investment fees) will be needed to cover benefit payments.

Retirement plan assets change as a result of the net impact of these income and expense components. Additional financial information, including a summary of these transactions for the valuation year, is presented in Section 4, Exhibit B.

It is desirable to have level and predictable plan costs from one year to the next. For this reason, the Board has approved an asset valuation method that gradually adjusts to market value. Under this valuation method, the full value of market fluctuations is not recognized in a single year and, as a result, the asset value and the plan costs are more stable.

The amount of the adjustment to recognize market value is treated as income, which may be positive or negative. Realized and unrealized gains and losses are treated equally and, therefore, the sale of assets has no immediate effect on the actuarial value.

The chart shows the determination of the actuarial value of assets as of the valuation date.

**CHART 2 – 7
Determination of Actuarial Value of Assets**

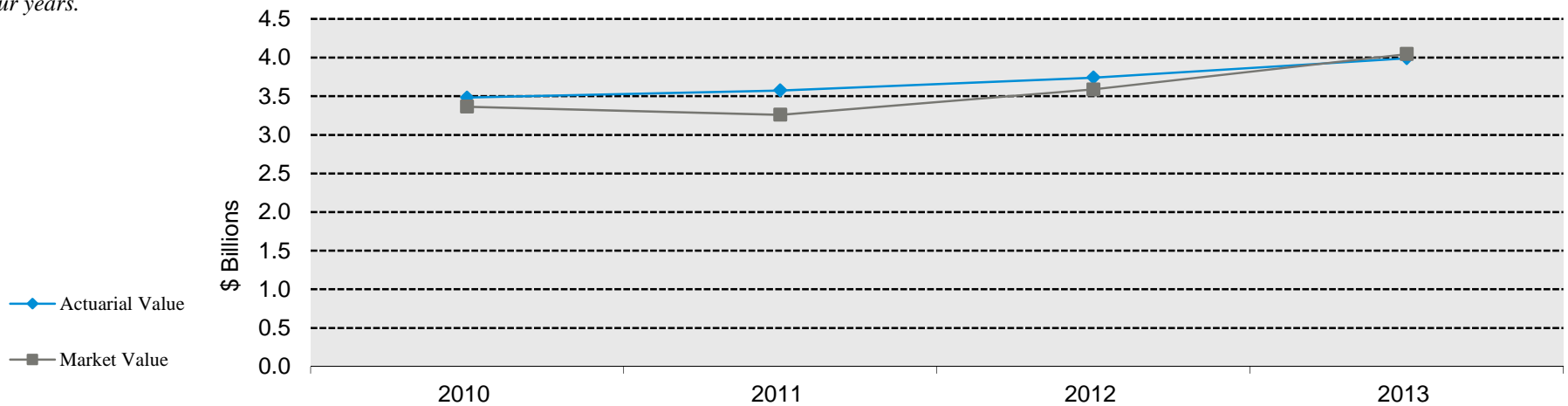
	Year Ended	
	December 31, 2013	December 31, 2012
1. Actuarial value of assets at the beginning of the year	\$3,740,270,938	\$3,575,387,127
2. Contributions, less benefit payments and expenses during the year	-51,908,425	-71,331,534
3. Average actuarial value of assets: (1) + 50% of (2)	3,714,316,725	3,539,721,360
4. Expected investment income: .0775 x (3)	287,859,546	274,328,406
5. Preliminary actuarial value of assets at the end of the year: (1) + (2) + (4)	3,976,222,059	3,778,383,999
6. Market value of assets at the end of the year	4,044,721,329	3,587,818,693
7. Adjustment toward market value: 20% of [(6) - (5)]	13,699,854	-38,113,061
8. Adjustment to be within 20% corridor	0	0
9. Final actuarial value of assets: (5) + (7) + (8)	<u>3,989,921,913</u>	<u>3,740,270,938</u>
10. Actuarial value as a percentage of market value: (9) ÷ (6)	98.7%	104.3%

SECTION 2: Valuation Results for the State-Boston Retirement System – SBRS excluding Teachers

Both the actuarial value and market value of assets are representations of the financial status of the SBRS. As investment gains and losses are gradually taken into account, the actuarial value of assets tracks the market value of assets. The actuarial asset value is significant because liabilities are compared to these assets to determine what portion, if any, remains unfunded. Amortization of the unfunded actuarial accrued liability is an important element in determining the contribution requirement.

This chart shows the change in the actuarial value of assets versus the market value over the past four years.

CHART 2 – 8
Actuarial Value of Assets vs. Market Value of Assets as of December 31, 2010 – 2013



SECTION 2: Valuation Results for the State-Boston Retirement System – SBRS excluding Teachers

C. ACTUARIAL EXPERIENCE

To calculate the required contribution, assumptions are made about future events that affect the amount and timing of benefits to be paid and assets to be accumulated. Each year actual experience is measured against the assumptions. If overall experience is more favorable than anticipated (an actuarial gain), the contribution requirement will decrease from the previous year. On the other hand, the contribution requirement will increase if overall actuarial experience is less favorable than expected (an actuarial loss).

Taking account of experience gains or losses in one year without making a change in assumptions reflects the belief that the single year’s experience was a short-term

development and that, over the long term, experience will return to the original assumptions. For contribution requirements to remain stable, assumptions should approximate experience.

If assumptions are changed, the contribution requirement is adjusted to take into account a change in experience anticipated for all future years.

The total experience loss for the two-year period ended December 31, 2013 is \$81,972,114. A discussion of the major components of the actuarial experience is on the following pages.

This chart provides a summary of the actuarial experience over the past two years.

**CHART 2 – 9
Actuarial Experience for Two-Year Period Ended December 31, 2013**

1. Net loss from investments*	-\$24,413,207
2. Net loss from administrative expenses	-2,680,131
3. Net loss from other experience**	<u>-54,878,776</u>
4. Net experience loss: (1) + (2) + (3)	-\$81,972,114

* Details in Chart 2 – 10

** Details in Chart 2 – 13

SECTION 2: Valuation Results for the State-Boston Retirement System – SBRS excluding Teachers

Investment Rate of Return

A major component of projected asset growth is the assumed rate of return. The assumed return should represent the expected long-term rate of return, based on the investment policy of the SBRS. For valuation purposes, the assumed rate of return on the actuarial value of assets is 7.75%. The actual rates of return on an actuarial basis for the 2013 and 2012 plan years were 8.12% and 6.67%, respectively.

Since the actual return for the two-year period was less than the assumed return, there was an actuarial loss of \$24,413,207 during the two-year period ending December 31, 2013 with regard to its investments.

This chart shows the gain/(loss) due to investment experience.

**CHART 2 – 10
Actuarial Value Investment Experience**

	Year Ended	
	December 31, 2013	December 31, 2012
1. Actual return	\$301,559,400	\$236,215,344
2. Average value of assets	3,714,316,725	3,539,721,360
3. Actual rate of return: (1) ÷ (2)	8.12%	6.67%
4. Assumed rate of return	7.75%	7.75%
5. Expected return: (2) x (4)	\$287,859,546	\$274,328,405
6. Actuarial gain/(loss): (1) – (5)	<u>\$13,699,854</u>	<u>-\$38,113,061</u>

SECTION 2: Valuation Results for the State-Boston Retirement System – SBRS excluding Teachers

Because actuarial planning is long term, it is useful to see how the assumed investment rate of return has followed actual experience over time. The chart below shows the rate of return on an actuarial basis compared to the market value investment return for the last four years.

Based upon this experience and future expectations, we have maintained the assumed rate of return of 7.75% for the SBRS excluding Teachers.

CHART 2 – 11

Investment Return – Actuarial Value vs. Market Value: 2010 - 2013

Year Ended December 31	Actuarial Value Investment Return		Market Value Investment Return	
	Amount	Percent	Amount	Percent
2010	\$227,907,602	7.08%	\$331,718,631	11.07%
2011	195,775,161	5.71	-843,146	-0.03
2012	236,215,344	6.67	398,647,225	12.36
2013	<u>301,559,400</u>	8.12	<u>508,811,061</u>	14.28
Total	\$961,457,507		\$1,238,333,771	

Note: Each year's yield is weighted by the average asset value in that year.

SECTION 2: Valuation Results for the State-Boston Retirement System – SBRS excluding Teachers

Subsection B described the actuarial asset valuation method that gradually takes into account fluctuations in the market value rate of return. The effect of this is to stabilize the actuarial rate of return, which contributes to leveling pension plan costs.

Administrative Expenses

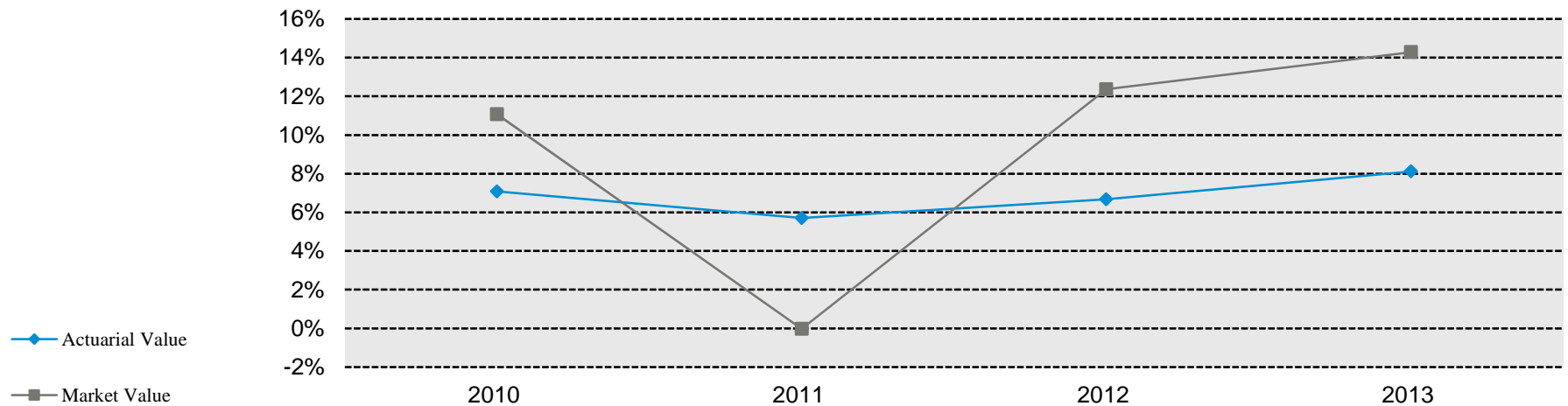
Administrative expenses for the SBRS excluding Teachers for the years ended December 31, 2012 and 2013 were \$4,891,373 and \$4,206,878, respectively, compared to the assumption of \$3,232,709 for calendar 2012 and \$3,378,181 for calendar 2013. This resulted in a loss of \$2,680,131 for the two-year period, including an adjustment for interest.

Based on discussions with the staff of the SBRS, we have increased the assumption for the SBRS from \$5,000,000 to \$8,417,000 for calendar 2014, with 70%, or \$5,891,900, assigned to the SBRS excluding Teachers.

This chart illustrates how this leveling effect has actually worked over the years 2010 - 2013.

CHART 2 – 12

Market and Actuarial Rates of Return for Years Ended December 31, 2010 - 2013



SECTION 2: Valuation Results for the State-Boston Retirement System – SBRS excluding Teachers

Other Experience

There are other differences between the expected and the actual experience that appear when the new valuation is compared with the projections from the previous valuation. These include:

- the extent of turnover among the participants,
- retirement experience (earlier or later than expected),
- mortality (more or fewer deaths than expected),
- the number of disability retirements, and
- salary increases different than assumed.

The net loss from this other experience for the two-year period ending December 31, 2013 amounted to \$54,878,776, which is 1.0% of the actuarial accrued liability.

A brief summary of the demographic gain/(loss) experience of the SBRS excluding Teachers for the two-year period ending December 31, 2013 is shown in the chart below.

We have reviewed the experience of the SBRS excluding Teachers for the two-year period ending December 31, 2013 and recommend the following changes in actuarial assumptions and methods:

- The actuarial cost method was changed to better reflect the impact of the plan changes effective for employees hired on or after April 2, 2012.
- The pre-retirement mortality assumption was changed from the RP-2000 Employee Mortality Table projected 20 years using Scale AA to the RP-2000 Employee Mortality Table projected generationally using Scale AA from 2014.
- The mortality assumption for non-disabled retirees was changed from the RP-2000 Healthy Annuitant Mortality Table projected 15 years using Scale AA to the RP-2000 Healthy Annuitant Mortality Table projected generationally with Scale AA from 2014.

The chart shows elements of the experience gain/(loss) for the most recent years.

CHART 2 – 13

Experience Due to Changes in Demographics for Two-Year Period Ended December 31, 2013

1. More deaths than expected among retired members and beneficiaries	\$8,019,115
2. Salary increases greater than expected for continuing actives	-8,420,983
3. Gain due to transfers from SBRS excluding Teachers	58,981,479
4. Loss due to change in service methodology	-64,499,569
5. Loss from retiree benefit increases greater than expected, including Section 101 increases	-39,256,425
6. Miscellaneous loss	<u>-9,702,393</u>
7. Net experience loss	-\$54,878,776

SECTION 2: Valuation Results for the State-Boston Retirement System – SBRS excluding Teachers

- The mortality assumption for disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table set forward three years for males only projected five years using Scale AA to the RP-2000 Healthy Annuitant Mortality Table set forward three years for males only projected generationally with Scale AA from 2014.
- The salary increase assumption was lowered from 5.00% per year for all members, including an allowance for inflation of 4.50% per year, to rates of 4.50% per year for Group 1 members, 4.75% per year for Group 2 members, and 5.00% per year for Group 4 members, including an allowance for inflation of 4.50% per year.
- The assumed retirement age for inactive vested participants was changed from age 65 to age 60 for Group 1 members and remained the same at age 60 for Group 2 members and at age 55 for Group 4 members hired prior to April 2, 2012. For participants hired April 2, 2012 or later, the assumption is 60 for Group 1 members, 55 for Group 2 members, and 50 for Group 4 members.
- The administrative expense assumption for the SBRS was increased from \$5,000,000 for calendar 2012 to \$8,417,000 for calendar 2014, with 70%, or \$5,891,900 assigned to the SBRS excluding Teachers.

The changes in assumptions and methods increased the unfunded liability by \$146.8 million and increased the normal cost by \$0.8 million for the SBRS excluding Teachers.

The following plan changes are included in this valuation:

- Members hired on or after April 2, 2012 are covered by the provisions of Chapter 32 as amended by of Chapter 176 of the Acts of 2011 and Chapter 139 of the Acts of 2012.
- As permitted by Section 63 of Chapter 139 of the Acts of 2012, the Board has increased the Section 101 annual allowance from \$6,000 to \$12,000.

SECTION 2: Valuation Results for the State-Boston Retirement System – SBRS excluding Teachers

Chart 2 – 14 below provides a reconciliation of the unfunded liability from the prior valuation to the current valuation.

The unfunded liability was expected to decrease from \$1.485 billion as of January 1, 2012 to \$1.464 billion as of January 1, 2014 if there were no experience gains or losses. The actual unfunded liability as of January 1, 2014 of \$1.693 billion is \$228.7 million higher than expected as detailed in Chart 2 – 14 below.

CHART 2 – 14

Development of Unfunded Actuarial Accrued Liability and (Gain)/Loss

	Year Ended	
	December 31, 2013	December 31, 2012
1. Unfunded actuarial accrued liability at beginning of year	\$1,484,296,107	\$1,484,684,173
2. Normal cost at beginning of year	134,286,427	128,503,757
3. Total contributions	-269,556,720	-244,441,769
4. Interest		
(a) For whole year on (1) + (2)	\$125,440,146	\$125,022,065
(b) For half year on (3)	<u>-10,445,323</u>	<u>-9,472,119</u>
(c) Total interest	<u>114,994,823</u>	<u>115,549,946</u>
5. Expected unfunded actuarial accrued liability	\$1,464,020,637	\$1,484,296,107
6. Changes due to:		
(a) Experience loss	\$81,972,114	--
(b) Assumption and method changes	<u>146,758,455</u>	--
(c) Total changes	<u>228,730,569</u>	--
7. Unfunded actuarial accrued liability at end of year: (5) + (6c)	<u>\$1,692,751,206</u>	--

SECTION 2: Valuation Results for the State-Boston Retirement System – SBRS excluding Teachers

D. RECOMMENDED CONTRIBUTION

The amount of annual contribution required to fund the System is comprised of an employer normal cost payment and a payment on the unfunded actuarial accrued liability.

Chart 2 – 15 compares the actuarial cost factors for the current and prior valuations. The contribution for fiscal 2015 is equal to the previously budgeted amount of \$203,074,621.

The funding schedule shown in Chart 2 – 16 fully funds the liabilities of the SBRS excluding Teachers by June 30, 2025 with total increases in the appropriation of 7.75% per year and annual recognition of the deferred investment gains. The fiscal 2016 appropriation is \$218,812,904.

The chart compares this valuation's recommended contribution with the prior valuation.

**CHART 2 – 15
Recommended Contribution**

	Year Beginning January 1			
	2014		2012	
	Amount	% of Payroll	Amount	% of Payroll
1. Total normal cost	\$129,985,155	14.31%	\$125,271,048	14.89%
2. Administrative expenses	5,891,900	0.65%	3,232,709	0.38%
3. Expected employee contributions	<u>-86,122,777</u>	<u>-9.48%</u>	<u>-78,243,958</u>	<u>-9.30%</u>
4. Employer normal cost: (1) + (2) + (3)	\$49,754,278	5.48%	\$50,529,799	5.97%
5. Actuarial accrued liability	5,682,673,119		5,060,071,300	
6. Actuarial value of assets	<u>3,989,921,913</u>		<u>3,575,387,127</u>	
7. Unfunded actuarial accrued liability: (5) - (6)	\$1,692,751,206		\$1,484,684,173	
8. Employer normal cost projected to July 1, 2014 and 2012	50,861,431	5.48%	51,378,201	5.97%
9. Projected unfunded actuarial accrued liability	1,757,121,413		1,541,142,220	
10. Payment on projected unfunded actuarial accrued liability	152,213,190	16.38%	118,764,280	13.80%
11. Budgeted appropriation for fiscal 2015 and 2013: (8) + (10)	<u>\$203,074,621</u>	<u>21.86%</u>	<u>\$170,142,481</u>	<u>19.77%</u>
12. Projected payroll for fiscal 2015 and 2013	\$928,882,815		\$860,399,640	

Note: Contributions are assumed to be paid on July 1.

SECTION 2: Valuation Results for the State-Boston Retirement System – SBRS excluding Teachers

CHART 2 – 16
Funding Schedule

(1) Fiscal Year Ended June 30	(2) Employer Normal Cost	(3) Amortization of Unfunded Inactive Sheriff Liability	(4) Amortization of Remaining Unfunded Liability	(5) Crossover Payment Savings	(6) Savings from Additional Payment in Fiscal 2011	(7) Total Employer Contributions: (2) + (3) + (4) + (5) + (6)	(8) Unfunded Actuarial Accrued Liability at Beginning of Fiscal Year	(9) Percent Increase in Total Cost
2015	\$50,861,431	\$3,874,533	\$172,467,403	\$(14,679,118)	\$(9,449,628)	\$203,074,621	\$1,757,121,413	9.25%
2016	53,358,481	3,874,532	185,708,637	(14,679,118)	(9,449,628)	218,812,904	1,721,238,454	7.75%
2017	55,977,598	3,874,532	200,047,520	(14,679,118)	(9,449,628)	235,770,904	1,670,222,908	7.75%
2018	58,724,726	3,874,532	215,572,637	(14,679,118)	(9,449,628)	254,043,149	1,601,493,522	7.75%
2019	61,606,099	3,874,532	232,379,608	(14,679,118)	(9,449,628)	273,731,493	1,512,205,236	7.75%
2020	64,628,252	3,874,532	250,571,646	(14,679,118)	(9,449,628)	294,945,684	1,399,216,721	7.75%
2021	67,798,037	3,874,532	270,260,152	(14,679,118)	(9,449,628)	317,803,975	1,259,057,686	7.75%
2022	71,122,641	3,874,532	291,565,356	(14,679,118)	(9,449,628)	342,433,783	1,087,889,765	7.75%
2023	74,609,598	3,874,532	314,617,017	(14,679,118)	(9,449,628)	368,972,401	879,863,466	7.75%
2024	78,266,806	3,874,532	339,555,170	(14,679,118)	(9,449,628)	397,567,762	630,876,964	7.75%
2025	82,102,549	3,874,532	355,977,372	(14,679,118)	(9,449,628)	417,825,707	335,723,149	5.10%
2026	86,125,509	--	--	--	--	86,125,509	--	-79.39%
2027	90,344,794	--	--	--	--	90,344,794	--	4.90%
2028	94,769,948	--	--	--	--	94,769,948	--	4.90%
2029	99,410,982	--	--	--	--	99,410,982	--	4.90%
2030	104,278,390	--	--	--	--	104,278,390	--	4.90%

Notes: Recommended contribution is assumed to be paid on July 1.

Item (2) reflects 4.5% growth in payroll and 0.15% adjustment to total normal cost to reflect the effect of mortality improvements due to generational mortality assumption.

Anticipates deferred investment gains.

Recommended contribution for fiscal 2015 reflects budgeted amount.

Projected normal cost does not reflect the future impact of pension reform for new hires.

SECTION 3: Valuation Results for the State-Boston Retirement System – Teachers

A. PARTICIPANT DATA

The Actuarial Valuation and Review considers the number and demographic characteristics of covered participants, including active participants, inactive participants, retired participants and beneficiaries.

This section presents a summary of significant statistical data on these participant groups for the Teachers of the SBRS.

More detailed information for this valuation year and the preceding valuation can be found in Chart 3 – 2 and Section 4, Exhibit C.

A historical perspective of how the participant population has changed over the past four valuations can be seen in this chart.

CHART 3 – 1
Participant Population: 2007 – 2013

Year Ended December 31	Active Participants	Inactive Participants	Retired Participants and Beneficiaries
2007	5,805	1,281	3,693
2009	5,566	1,424	3,914
2011	5,448	1,964	4,189
2013	6,043	2,040	4,416

SECTION 3: Valuation Results for the State-Boston Retirement System – Teachers

Participant Data

Below is a summary of the participant data used in this valuation for the Teachers.

CHART 3 – 2

Table of Plan Coverage

Category	Year Ended December 31		Change From Prior Year
	2013	2011	
Active participants in valuation:			
Number	6,043	5,448	10.9%
Average age	43.2	43.6	N/A
Average years of service	13.0	12.7	N/A
Total payroll*	\$510,053,668	\$436,451,621	16.9%
Average payroll*	84,404	80,112	5.4%
Member contributions	466,027,611	408,602,061	14.1%
Number with unknown age	2	0	N/A
Inactive participants with a vested right to a deferred or immediate benefit	251	251	0.0%
Inactive participants entitled to a return of their employee contributions	1,789	1,713	4.4%
Retired participants:			
Number in pay status	4,015	3,805	5.5%
Average age	71.2	70.7	N/A
Average monthly benefit	\$4,188	\$3,968	5.5%
Disabled participants:			
Number in pay status	113	112	0.9%
Average age	69.9	69.2	N/A
Average monthly benefit	\$2,940	\$2,755	6.7%
Beneficiaries in pay status:			
Number in pay status	288	272	5.9%
Average age	74.4	73.3	N/A
Average monthly benefit	\$1,606	\$1,530	5.0%

* Payroll figures are for the prior calendar year and reflect annualized salaries for participants hired during the year. Calendar year 2013 payroll figures were reduced to reflect retroactive payments that were included in the salary data. Payments made as part of grievance settlements were assumed to be one-time payments and were removed from reported salaries. For non-grievance retroactive amounts, salaries were reduced by the lesser of the retroactive amount provided or 1% of salary.

SECTION 3: Valuation Results for the State-Boston Retirement System – Teachers

Active Participants

Plan costs are affected by the age, years of service and payroll of active participants. In this year’s valuation, there were 6,043 active participants with an average age of 43.2, average years of service of 13.0 years and average payroll of \$84,404. The 5,448 active participants in the prior valuation had an average age of 43.6, average service of 12.7 years and average payroll of \$80,112.

Among the active participants, there were two participants with unknown age. The actuarial calculations were adjusted for the missing information by assuming that it was the same as information provided for other active participants with similar known characteristics.

Inactive Participants

In this year’s valuation, there were 251 participants with a vested right to a deferred or immediate vested benefit and 1,789 participants entitled to a return of their employee contributions.

These graphs show a distribution of active participants by age and by years of service.

CHART 3 – 3
Distribution of Active Participants by Age as of December 31, 2013

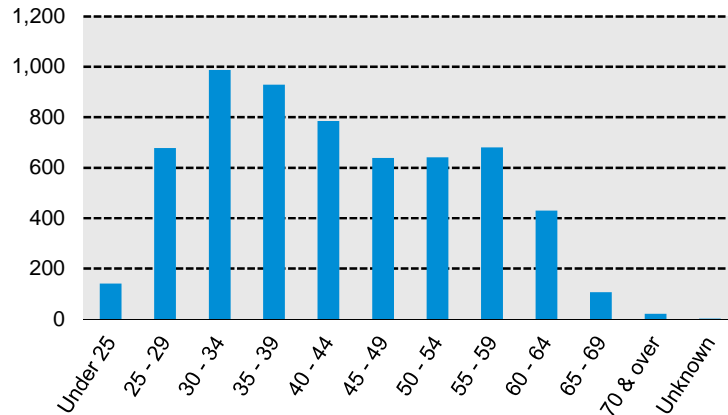
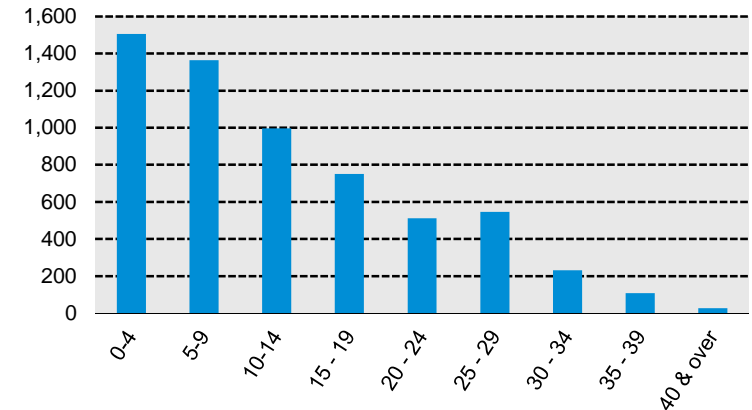


CHART 3 – 4
Distribution of Active Participants by Years of Service as of December 31, 2013



SECTION 3: Valuation Results for the State-Boston Retirement System – Teachers

Retired Participants and Beneficiaries

As of December 31, 2013, 4,128 retired participants and 288 beneficiaries were receiving total monthly benefits of \$17,608,811. For comparison, in the previous valuation, there were 3,917 retired participants and 272 beneficiaries receiving monthly benefits of \$15,824,119.

These graphs show a distribution of the current retired participants and beneficiaries based on their monthly amount and age, by type of pension.

- Beneficiaries
- Accidental Disability
- Ordinary Disability
- Superannuation

CHART 3 – 5
Distribution of Retired Participants and Beneficiaries by Type and by Monthly Amount as of December 31, 2013

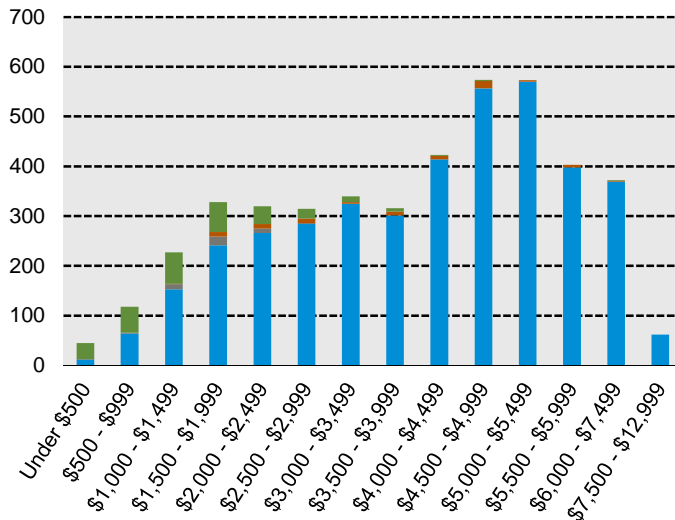
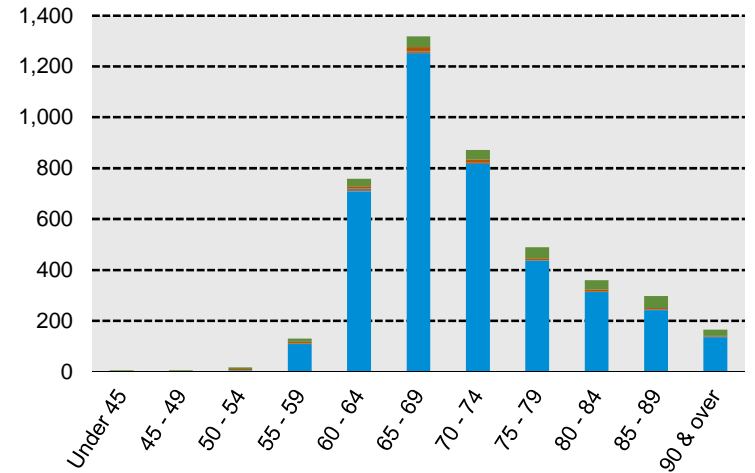


CHART 3 – 6
Distribution of Retired Participants and Beneficiaries by Type and by Age as of December 31, 2013



SECTION 3: Valuation Results for the State-Boston Retirement System – Teachers

B. FINANCIAL INFORMATION

Retirement plan funding anticipates that, over the long term, both contributions (less administrative expenses) and net investment earnings (less investment fees) will be needed to cover benefit payments.

Retirement plan assets change as a result of the net impact of these income and expense components. Additional financial information, including a summary of these transactions for the valuation year, is presented in Section 4, Exhibit D.

It is desirable to have level and predictable plan costs from one year to the next. For this reason, the Board has approved an asset valuation method that gradually adjusts to market value. Under this valuation method, the full value of market fluctuations is not recognized in a single year and, as a result, the asset value and the plan costs are more stable.

The amount of the adjustment to recognize market value is treated as income, which may be positive or negative. Realized and unrealized gains and losses are treated equally and, therefore, the sale of assets has no immediate effect on the actuarial value.

The chart shows the determination of the actuarial value of assets as of the valuation date.

**CHART 3 – 7
Determination of Actuarial Value of Assets**

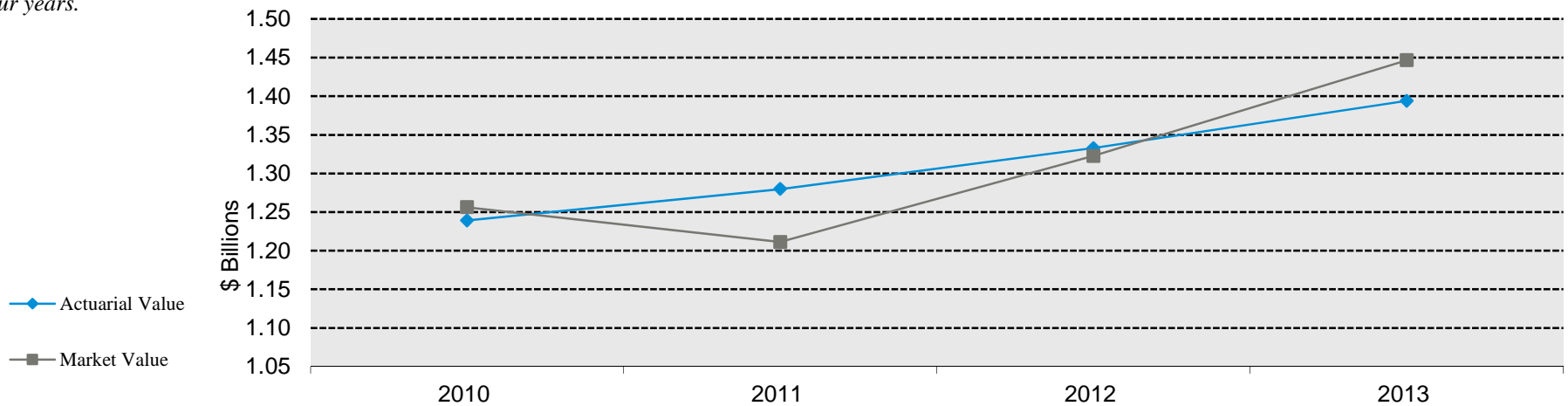
	Year Ended	
	December 31, 2013	December 31, 2012
1. Actuarial value of assets at the beginning of the year	\$1,332,826,675	\$1,279,812,942
2. Contributions, less benefit payments and expenses during the year	-59,488,261	-48,054,903
3. Average actuarial value of assets: (1) + 50% of (2)	1,303,082,544	1,255,785,491
4. Expected investment income: .0825 x (3)	107,504,311	103,602,304
5. Preliminary actuarial value of assets at the end of the year: (1) + (2) + (4)	1,380,842,724	1,335,360,343
6. Market value of assets at the end of the year	1,446,475,671	1,322,692,003
7. Adjustment toward market value: 20% of [(6) - (5)]	13,126,589	-2,533,668
8. Adjustment to be within 20% corridor	0	0
9. Final actuarial value of assets: (5) + (7) + (8)	<u>1,393,969,313</u>	<u>1,332,826,675</u>
10. Actuarial value as a percentage of market value: (9) ÷ (6)	96.4%	100.8%

SECTION 3: Valuation Results for the State-Boston Retirement System – Teachers

Both the actuarial value and market value of assets are representations of the financial status of the SBRS. As investment gains and losses are gradually taken into account, the actuarial value of assets tracks the market value of assets. The actuarial asset value is significant because the liabilities are compared to these assets to determine what portion, if any, remains unfunded. Amortization of the unfunded actuarial accrued liability is an important element in determining the contribution requirement.

This chart shows the change in the actuarial value of assets versus the market value over the past four years.

CHART 3 – 8
Actuarial Value of Assets vs. Market Value of Assets as of December 31, 2010 – 2013



SECTION 3: Valuation Results for the State-Boston Retirement System – Teachers

C. ACTUARIAL EXPERIENCE

To calculate the required contribution, assumptions are made about future events that affect the amount and timing of benefits to be paid and assets to be accumulated. Each year actual experience is measured against the assumptions. If overall experience is more favorable than anticipated (an actuarial gain), the contribution requirement will decrease from the previous year. On the other hand, the contribution requirement will increase if overall actuarial experience is less favorable than expected (an actuarial loss).

Taking account of experience gains or losses in one year without making a change in assumptions reflects the belief that the single year’s experience was a short-term

development and that, over the long term, experience will return to the original assumptions. For contribution requirements to remain stable, assumptions should approximate experience.

If assumptions are changed, the contribution requirement is adjusted to take into account a change in experience anticipated for all future years.

The total experience loss for the two-year period ended December 31, 2013 is \$148,500,897. A discussion of the major components of the actuarial experience is on the following pages.

This chart provides a summary of the actuarial experience over the past two years.

CHART 3 – 9
Actuarial Experience for Two-Year Period Ended December 31, 2013

1. Net gain from investments*	\$10,592,921
2. Net loss from administrative expenses	-1,198,543
3. Net loss from other experience**	<u>-157,895,275</u>
4. Net experience loss: (1) + (2) + (3)	-\$148,500,897

* Details in Chart 3 – 10

** Details in Chart 3 – 13

SECTION 3: Valuation Results for the State-Boston Retirement System – Teachers

Investment Rate of Return

A major component of projected asset growth is the assumed rate of return. The assumed return should represent the expected long-term rate of return, based on the investment policy of the PRIM Board. For valuation purposes, the assumed rate of return on the actuarial value of assets is 8.25% for 2013 and 2012. The actual rates of return on an actuarial basis for the 2013 and 2012 plan years were 9.26% and 8.05%, respectively.

Since the actual return for the two-year period was greater than the assumed return, there was an actuarial gain of \$10,592,921 during the two-year period ending December 31, 2013 with regard to its investments.

This chart shows the gain/(loss) due to investment experience.

**CHART 3 – 10
Actuarial Value Investment Experience**

	Year Ended	
	December 31, 2013	December 31, 2012
1. Actual return	\$120,630,899	\$101,068,635
2. Average value of assets	1,303,082,544	1,255,785,491
3. Actual rate of return: (1) ÷ (2)	9.26%	8.05%
4. Assumed rate of return	8.25%	8.25%
5. Expected return: (2) x (4)	\$107,504,310	\$103,602,303
6. Actuarial gain/(loss): (1) – (5)	<u>\$13,126,589</u>	<u>-\$2,533,668</u>

SECTION 3: Valuation Results for the State-Boston Retirement System – Teachers

Because actuarial planning is long term, it is useful to see how the assumed investment rate of return has followed actual experience over time. The chart below shows the rate of return on an actuarial basis compared to the market value investment return for the last four years.

We have decreased the assumed rate of return from 8.25% to 8.00% for the Teachers of the SBRS to be consistent with the assumptions used in the January 1, 2014 Actuarial Valuation Report of the Teachers’ Retirement System dated September 12, 2014.

CHART 3 – 11
Investment Return – Actuarial Value vs. Market Value: 2010 - 2013

Year Ended December 31	Actuarial Value Investment Return		Market Value Investment Return	
	Amount	Percent	Amount	Percent
2010	\$95,270,615	8.64%	\$154,709,657	14.59%
2011	83,285,518	6.84	-2,647,747	-0.21
2012	101,068,635	8.05	159,649,908	13.45
2013	<u>120,630,899</u>	9.26	<u>183,271,929</u>	14.17
Total	\$400,255,667		\$494,983,747	

Note: Each year’s yield is weighted by the average asset value in that year.

SECTION 3: Valuation Results for the State-Boston Retirement System – Teachers

Subsection B described the actuarial asset valuation method that gradually takes into account fluctuations in the market value rate of return. The effect of this is to stabilize the actuarial rate of return, which contributes to leveling pension plan costs.

Administrative Expenses

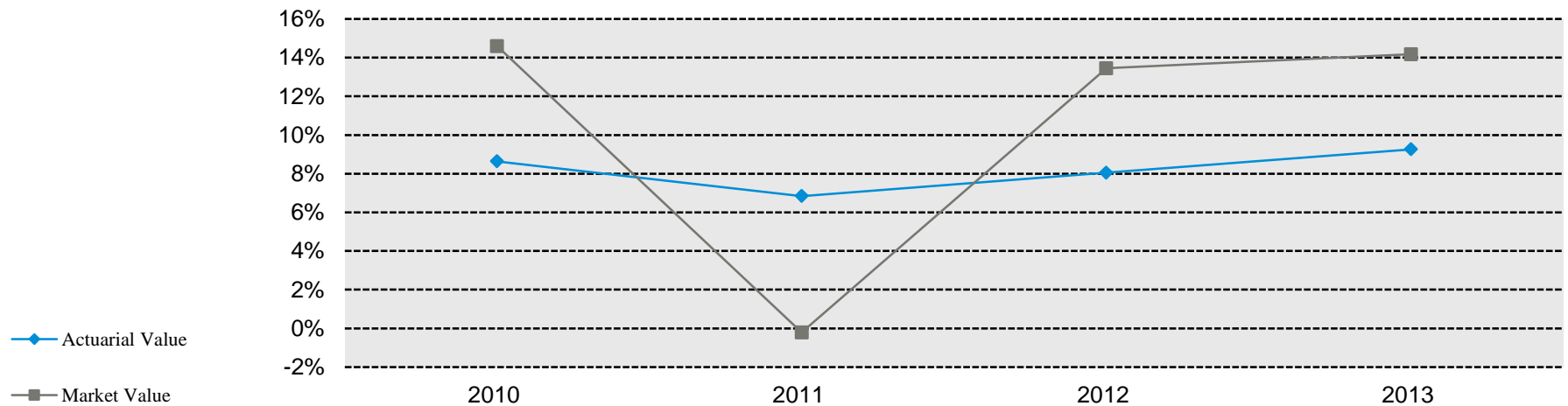
Administrative expenses for the Teachers for the years ended December 31, 2012 and 2013 were \$2,048,417 and \$2,863,786, respectively, compared to the assumption of \$1,767,291 for calendar 2012 and \$1,846,819 for calendar 2013. This resulted in a loss of \$1,198,543 for the two-year period, including an adjustment for interest.

Based on discussions with the staff of the SBRS, we have increased the assumption for the SBRS from \$5,000,000 to \$8,417,000 for calendar 2014, with 30%, or \$2,525,100, assigned to the Teachers.

This chart illustrates how this leveling effect has actually worked over the years 2010 - 2013.

CHART 3 – 12

Market and Actuarial Rates of Return for Years Ended December 31, 2010 - 2013



SECTION 3: Valuation Results for the State-Boston Retirement System – Teachers

Other Experience

There are other differences between the expected and the actual experience that appear when the new valuation is compared with the projections from the previous valuation. These include:

- the extent of turnover among the participants,
- retirement experience (earlier or later than expected),
- mortality (more or fewer deaths than expected),
- the number of disability retirements, and
- salary increases different than assumed.

The net loss from this other experience for the two-year period ending December 31, 2013 amounted to \$157,895,275, which is 4.7% of the actuarial accrued liability.

A brief summary of the demographic gain/(loss) experience of the Teachers of the SBRS for the two-year period ending December 31, 2013 is shown in the chart below.

We have reviewed the experience of the Teachers for the two-year period ending December 31, 2013 and recommend the following changes in actuarial assumptions and methods:

- The actuarial cost method was changed to better reflect the impact of the plan changes effective for employees hired on or after April 2, 2012.
- The pre-retirement mortality assumption was changed from the RP-2000 Employee Mortality Table projected 10 years using Scale AA with an additional 1.25% load on the actuarial accrued liability and normal cost to the RP-2000 Combined Healthy White Collar Mortality Table projected 22 years using Scale AA.
- The mortality assumption for non-disabled retirees was changed from the RP-2000 Healthy Annuitant Mortality Table projected 10 years using Scale AA with an additional 1.25% load on the actuarial accrued liability and normal cost to the RP-2000 Healthy Annuitant Large Benefit Amount Mortality Table projected 17 years using Scale AA.

The chart shows elements of the experience gain/(loss) for the most recent years.

CHART 3 – 13

Experience Due to Changes in Demographics for Two-Year Period Ended December 31, 2013

1. Fewer deaths than expected among retired members and beneficiaries	-\$16,278,305
2. Salary increases greater than expected for continuing actives	-5,781,172
3. Loss due to transfers to Teachers	-59,718,747
4. Loss due to change in service methodology	-48,744,235
5. Loss from retiree benefit increases greater than expected, including Section 101 increases	-8,630,490
6. Miscellaneous loss	<u>-18,742,326</u>
7. Net experience loss	-\$157,895,275

SECTION 3: Valuation Results for the State-Boston Retirement System – Teachers

- The mortality assumption for disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table set forward three years for males only and an additional 1.25% load on the actuarial accrued liability and normal cost to the RP-2000 Healthy Annuitant Large Benefit Amount Mortality Table set forward three years for males only projected 7 years using Scale AA.
- The investment return assumption was lowered from 8.25% to 8.00%.
- The service-based salary increase assumption has been changed, as shown below:

Years of Service	Teachers	
	Current	Previously
0	7.50%	8.00%
1	7.10%	7.75%
2	7.00%	7.50%
3	6.90%	7.25%
4	6.80%	7.00%
5	6.70%	6.75%
6	6.60%	6.50%
7	6.50%	6.25%
8	6.30%	6.00%
9	6.10%	5.75%
10	5.90%	5.50%
11	5.70%	5.25%
12	5.20%	5.00%

Years of Service	Teachers	
	Current	Previously
13	4.70%	4.75%
14	4.35%	4.75%
15-16	4.20%	4.75%
17-19	4.10%	4.75%
20 and later	4.00%	4.75%

- The assumed retirement age for inactive vested participants was changed from age 65 to age 60 for Group 1 members hired prior to April 2, 2012. For participants hired April 2, 2012 or later, the assumption is 60 for Group 1 members.
- The administrative expense assumption for the SBRS was increased from \$5,000,000 for calendar 2012 to \$8,417,000 for calendar 2014, with 30%, or \$2,525,100, assigned to the Teachers.
- The retirement, turnover, and disability assumptions for Teachers have been changed to reflect the assumptions being used in the January 1, 2014 Actuarial Valuation Report of the Teachers' Retirement System dated September 12, 2014.

These changes increased the unfunded liability by \$193.1 million and decreased the normal cost by \$2.5 million for the Teachers.

SECTION 3: Valuation Results for the State-Boston Retirement System – Teachers

Chart 3 – 14 below provides a reconciliation of the unfunded liability from the prior valuation to the current valuation.

The unfunded liability was expected to increase from \$1.562 billion as of January 1, 2012 to \$1.636 billion as of January 1, 2014. The actual unfunded liability as of January 1, 2014 of \$1.978 billion is \$341.6 million higher than expected as detailed in Chart 3 – 14 below.

CHART 3 – 14

Development of Unfunded Actuarial Accrued Liability and (Gain)/Loss

	Year Ended	
	December 31, 2013	December 31, 2012
1. Unfunded actuarial accrued liability at beginning of year	\$1,599,997,417	\$1,562,290,601
2. Normal cost at beginning of year	55,536,703	53,145,171
3. Total contributions	-149,472,971	-142,820,462
4. Interest		
(a) For whole year on (1) + (2)	\$136,581,565	\$133,273,451
(b) For half year on (3)	<u>-6,165,760</u>	<u>-5,891,344</u>
(c) Total interest	<u>130,415,805</u>	<u>127,382,107</u>
5. Expected unfunded actuarial accrued liability	\$1,636,476,954	\$1,599,997,417
6. Changes due to:		
(a) Experience loss	\$148,500,897	--
(b) Assumption and method changes	<u>193,109,850</u>	--
(c) Total changes	<u>341,610,747</u>	--
7. Unfunded actuarial accrued liability at end of year: (5) + (6c)	<u>\$1,978,087,701</u>	--

SECTION 3: Valuation Results for the State-Boston Retirement System – Teachers

D. RECOMMENDED CONTRIBUTION

The amount of annual contribution required to fund the System is comprised of an employer normal cost payment and a payment on the unfunded actuarial accrued liability.

The fiscal 2015 appropriation for the Teachers has already been budgeted at \$109,485,000 by the Commonwealth. The fiscal 2016 appropriation is expected to increase by 10% and the pension obligations of the Commonwealth are expected to be fully funded by June 30, 2036.

The chart compares this valuation's recommended contribution with the prior valuation.

CHART 3 – 15
Recommended Contribution

	Year Beginning January 1			
	2014		2012	
	Amount	% of Payroll	Amount	% of Payroll
1. Total normal cost	\$54,953,466	10.25%	\$51,377,880	11.17%
2. Administrative expenses	2,525,100	0.47%	1,767,291	0.38%
3. Expected employee contributions	<u>-56,736,062</u>	<u>-10.59%</u>	<u>-48,411,917</u>	<u>-10.52%</u>
4. Employer normal cost: (1) + (2) + (3)	\$742,504	0.14%	\$4,733,254	1.03%
5. Actuarial accrued liability	3,372,057,014		2,842,103,544	
6. Actuarial value of assets	<u>1,393,969,313</u>		<u>1,279,812,942</u>	
7. Unfunded actuarial accrued liability: (5) - (6)	\$1,978,087,701		\$1,562,290,602	
8. Employer normal cost projected to July 1, 2014 and 2012	788,803	0.14%	5,034,217	1.07%
9. Projected unfunded actuarial accrued liability	2,055,689,041		1,625,458,077	
10. Payment on projected unfunded actuarial accrued liability	108,696,197	19.84%	89,811,783	19.09%
11. Budgeted appropriation for fiscal 2015 and 2013: (8) + (10)	<u>\$109,485,000</u>	<u>19.98%</u>	<u>\$94,846,000</u>	<u>20.16%</u>
12. Projected payroll for fiscal 2015 and 2013	\$547,920,611		\$470,372,057	

SECTION 4: Supplemental Information for the State-Boston Retirement System

EXHIBIT A

**Participants in Active Service as of December 31, 2013 – SBRS excluding Teachers
By Age, Years of Service, and Average Payroll**

Age	Years of Service									
	Total	0-4	5-9	10-14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 & over
Under 25	373	355	18	--	--	--	--	--	--	--
	\$35,522	\$35,992	\$26,255	--	--	--	--	--	--	--
25 - 29	1,239	907	308	24	--	--	--	--	--	--
	\$48,121	\$46,148	\$53,933	\$48,066	--	--	--	--	--	--
30 - 34	1,502	604	661	211	26	--	--	--	--	--
	\$57,898	\$49,257	\$64,636	\$61,641	\$56,964	--	--	--	--	--
35 - 39	1,442	362	437	387	240	16	--	--	--	--
	\$61,224	\$43,385	\$64,381	\$68,406	\$70,426	\$66,910	--	--	--	--
40 - 44	1,683	265	310	346	519	178	65	--	--	--
	\$63,636	\$37,039	\$51,037	\$60,819	\$80,323	\$77,459	\$76,055	--	--	--
45 - 49	1,988	226	271	290	391	331	429	50	--	--
	\$66,580	\$39,586	\$44,060	\$54,652	\$70,866	\$83,553	\$84,518	\$80,056	--	--
50 - 54	2,130	176	255	269	330	224	617	228	31	--
	\$67,245	\$37,264	\$41,985	\$45,285	\$60,056	\$74,856	\$88,197	\$86,241	\$100,623	--
55 - 59	1,984	134	192	248	302	226	402	291	184	5
	\$65,150	\$40,051	\$41,751	\$44,163	\$54,238	\$62,006	\$81,482	\$85,753	\$89,131	\$83,774
60 - 64	1,260	70	145	150	188	124	215	146	183	39
	\$63,498	\$34,242	\$39,353	\$49,536	\$51,870	\$52,396	\$65,400	\$80,577	\$102,514	\$93,326
65 - 69	415	20	40	66	77	57	84	30	20	21
	\$49,714	\$17,762	\$36,665	\$38,506	\$47,245	\$53,880	\$55,580	\$70,707	\$59,625	\$75,067
70 & over	216	10	24	35	45	18	36	13	13	22
	\$37,613	\$28,967	\$20,393	\$25,127	\$31,919	\$45,652	\$45,114	\$58,135	\$50,128	\$53,462
Unknown	3	2	--	--	--	--	--	--	--	1
	\$57,274	\$41,296	--	--	--	--	--	--	--	\$89,231
Total	14,235	3,131	2,661	2,026	2,118	1,174	1,848	758	431	88
	\$61,047	\$42,766	\$53,397	\$55,040	\$65,535	\$71,282	\$80,481	\$83,458	\$93,094	\$78,414

* Payroll figures are for the prior calendar year and reflect annualized salaries for participants hired during the year. Calendar year 2013 payroll figures were increased by 7.7% for police officers, plus a one-time \$2,000 parity increase for approximately 83% of police officers and by 6.1% for firefighters to reflect bargaining contracts that were settled in 2014. Calendar year 2013 payroll figures were reduced to reflect retroactive payments that were included in the salary data. Payments made as part of grievance settlements were assumed to be one-time payments and were removed from reported salaries. For non-grievance retroactive amounts, salaries were reduced by the lesser of the retroactive amount provided or 1% of salary.

SECTION 4: Supplemental Information for the State-Boston Retirement System

EXHIBIT B

Summary Statement of Income and Expenses on an Actuarial Value Basis – SBRS excluding Teachers

	Year Ended December 31, 2013	Year Ended December 31, 2012
Net assets at actuarial value at the beginning of the year	\$3,740,270,938	\$3,575,387,127
Contribution income:		
Employer contributions	\$185,153,156	\$167,082,780
Employee contributions	84,403,564	77,358,989
Less administrative expenses	<u>-4,206,878</u>	<u>-4,891,373</u>
Net contribution income	265,349,842	239,550,396
Net investment income	<u>301,559,400</u>	<u>236,215,344</u>
Total income available for benefits	\$566,909,242	\$475,765,740
Net benefit payments	-\$317,258,267	-\$354,996,832
Transfer of assets from the PRIT Fund for Teachers' benefit payments and administrative expenses not previously reimbursed	\$0	\$44,114,903
Change in reserve for future benefits	\$249,650,975	\$164,883,811
Net assets at actuarial value at the end of the year	\$3,989,921,913	\$3,740,270,938

SECTION 4: Supplemental Information for the State-Boston Retirement System

EXHIBIT C

**Participants in Active Service as of December 31, 2013 - Teachers
By Age, Years of Service, and Average Payroll**

Age	Years of Service									
	Total	0-4	5-9	10-14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 & over
Under 25	141	141	--	--	--	--	--	--	--	--
	\$55,864	\$55,864	--	--	--	--	--	--	--	--
25 - 29	678	563	115	--	--	--	--	--	--	--
	\$65,424	\$63,321	\$75,721	--	--	--	--	--	--	--
30 - 34	988	359	509	110	10	--	--	--	--	--
	\$78,908	\$68,852	\$83,670	\$88,393	\$93,143	--	--	--	--	--
35 - 39	930	164	341	336	82	7	--	--	--	--
	\$84,141	\$68,755	\$84,363	\$89,142	\$91,865	\$103,296	--	--	--	--
40 - 44	785	102	142	205	243	86	7	--	--	--
	\$87,817	\$71,679	\$84,341	\$88,243	\$94,214	\$94,120	\$81,563	--	--	--
45 - 49	639	64	84	122	139	140	79	11	--	--
	\$89,588	\$74,435	\$82,858	\$88,979	\$93,228	\$95,467	\$94,270	\$81,463	--	--
50 - 54	641	49	84	87	97	103	175	40	6	--
	\$90,725	\$64,606	\$83,178	\$88,819	\$90,096	\$97,796	\$97,714	\$93,987	\$100,523	--
55 - 59	681	36	57	76	96	98	166	104	48	--
	\$94,523	\$70,618	\$85,418	\$90,134	\$90,535	\$94,847	\$99,158	\$101,749	\$105,847	--
60 - 64	430	20	27	48	67	55	100	55	50	8
	\$95,139	\$79,546	\$79,563	\$92,472	\$90,495	\$98,463	\$98,806	\$99,978	\$101,489	\$99,965
65 - 69	107	5	4	8	16	20	19	18	5	12
	\$93,748	\$64,864	\$68,862	\$91,048	\$94,254	\$84,085	\$102,476	\$98,199	\$103,238	\$106,861
70 & over	21	--	2	4	--	3	1	4	--	7
	\$84,896	--	\$62,361	\$52,468	--	\$96,163	\$35,395	\$95,141	--	\$106,253
Unknown	2	2	--	--	--	--	--	--	--	--
	\$87,453	\$87,453	--	--	--	--	--	--	--	--
Total	6,043	1,505	1,365	996	750	512	547	232	109	27
	\$84,404	\$66,042	\$83,080	\$88,930	\$92,425	\$95,579	\$97,699	\$98,640	\$103,435	\$104,660

* Payroll figures are for the prior calendar year and reflect annualized salaries for participants hired during the year. Calendar year 2013 payroll figures were reduced to reflect retroactive payments that were included in the salary data. Payments made as part of grievance settlements were assumed to be one-time payments and were removed from reported salaries. For non-grievance retroactive amounts, salaries were reduced by the lesser of the retroactive amount provided or 1% of salary.

SECTION 4: Supplemental Information for the State-Boston Retirement System

EXHIBIT D

Summary Statement of Income and Expenses on an Actuarial Value Basis – Teachers

	Year Ended December 31, 2013	Year Ended December 31, 2012
Net assets at actuarial value at the beginning of the year	\$1,332,826,675	\$1,279,812,942
Contribution income:		
Employer contributions	\$99,532,000	\$94,860,000
Employee contributions	49,940,971	47,960,462
Less administrative expenses	<u>-2,863,786</u>	<u>-2,048,417</u>
Net contribution income	146,609,185	140,772,045
Net investment income	<u>120,630,899</u>	<u>101,068,635</u>
Total income available for benefits	\$267,240,084	\$241,840,680
Less benefit payments	-\$206,097,446	-\$144,712,045
Transfer of assets from the PRIT Fund for Teachers' benefit payments and administrative expenses not previously reimbursed	\$0	-\$44,114,903
Change in reserve for future benefits	\$61,142,638	\$53,013,732
Net assets at actuarial value at the end of the year	\$1,393,969,313	\$1,332,826,675

SECTION 4: Supplemental Information for the State-Boston Retirement System

A historical perspective of how the participant population has changed over the past ten valuations can be seen in this chart.

EXHIBIT E

Participant Population – All Employees: 1995 – 2013

Year Ended December 31	Active Participants	Inactive Participants	Retired Participants and Beneficiaries
1995	21,128	1,425	13,339
1996	18,651	3,703	13,492
1999	19,953	1,459	13,381
2001	22,003	3,560	13,144
2003	20,456	5,294	14,034
2005	20,917	6,178	13,783
2007	21,748	6,240	13,939
2009	20,015	7,613	13,958
2011	19,399	8,787	14,189
2013	20,278	8,791	14,341

SECTION 4: Supplemental Information for the State-Boston Retirement System

EXHIBIT F

Table of Plan Coverage – All Employees

Category	Year Ended December 31		Change From Prior Year
	2013	2011	
Active participants in valuation:			
Number	20,278	19,399	4.5%
Average age	45.4	45.9	N/A
Average years of service	14.2	13.9	N/A
Total payroll*	\$1,379,057,860	\$1,239,399,428	11.3%
Average payroll*	68,008	63,890	6.4%
Member contributions	1,340,505,588	1,232,878,451	8.7%
Number with unknown age and/or service information	5	2	N/A
Inactive participants with a vested right to a deferred or immediate benefit	808	878	-8.0%
Inactive participants entitled to a return of their employee contributions	7,983	7,909	0.9%
Retired participants:			
Number in pay status	10,043	9,826	2.2%
Average age	73.1	72.9	N/A
Average monthly benefit	\$3,192	\$2,949	8.2%
Number in suspended status	1	0	N/A
Disabled participants:			
Number in pay status	1,862	1,847	0.8%
Average age	67.5	67.3	N/A
Average monthly benefit	\$3,637	\$3,264	11.4%
Beneficiaries in pay status:			
Number in pay status	2,435	2,516	-3.2%
Average age	77.0	76.5	N/A
Average monthly benefit	\$1,520	\$1,377	10.4%

* Payroll figures are for the prior calendar year and reflect annualized salaries for participants hired during the year. Calendar year 2011 payroll figures were increased by 2.5% for police officers to reflect an unsettled bargaining contract. Calendar year 2013 payroll figures were increased by 7.7% for police officers, plus a one-time \$2,000 parity increase for approximately 83% of police officers and by 6.1% for firefighters to reflect bargaining contracts that were settled in 2014. Calendar year 2013 payroll figures were reduced to reflect retroactive payments that were included in the salary data. Payments made as part of grievance settlements were assumed to be one-time payments and were removed from reported salaries. For non-grievance retroactive amounts, salaries were reduced by the lesser of the retroactive amount provided or 1% of salary.

SECTION 4: Supplemental Information for the State-Boston Retirement System

EXHIBIT G

Investment Return – Actuarial Value vs. Market Value – All Assets: 2004 - 2013

Year Ended December 31	Actuarial Value Investment Return		Market Value Investment Return	
	Amount	Percent	Amount	Percent
2004	\$258,709,415	7.71%	\$367,429,123	11.45%
2005	273,445,360	7.65	262,427,939	7.42
2006	335,622,622	8.79	506,115,642	13.43
2007	368,013,791	8.95	403,369,820	9.53
2008	-330,344,896	-7.44	-1,167,563,433	-25.41
2009	251,082,864	6.17	635,296,107	18.76
2010	323,178,217	7.48	486,428,288	11.99
2011	279,060,679	6.00	-3,490,893	-0.08
2012	337,283,979	7.03	558,297,133	12.65
2013	<u>422,190,299</u>	8.41	<u>692,082,990</u>	14.26
Total	\$2,518,242,330		\$2,740,392,717	
	Five-year average return	7.06%		11.14%
	Ten-year average return	5.97%		6.75%

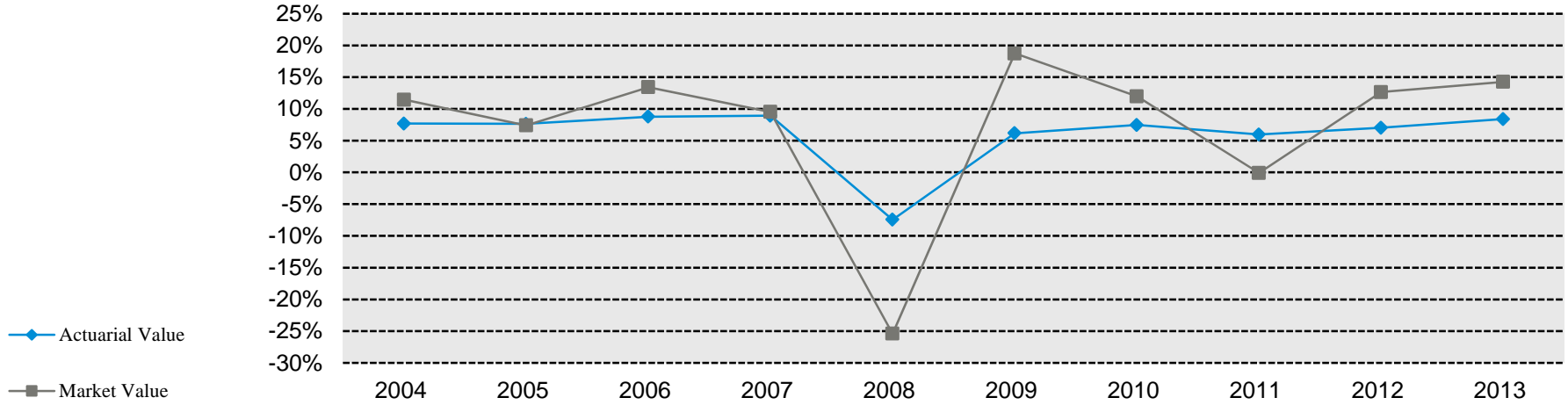
Note: Each year's yield is weighted by the average asset value in that year.

SECTION 4: Supplemental Information for the State-Boston Retirement System

This chart illustrates how this leveling effect has actually worked over the years 2004 - 2013.

EXHIBIT H

Market and Actuarial Rates of Return for Years Ended December 31, 2004 - 2013 – All Assets



SECTION 4: Supplemental Information for the State-Boston Retirement System

EXHIBIT I

Definitions of Pension Terms

The following list defines certain technical terms for the convenience of the reader:

Assumptions or actuarial assumptions:

The estimates on which the cost of the Plan is calculated including:

- (a) Investment return — the rate of investment yield that the Plan will earn over the long-term future;
- (b) Mortality rates — the death rates of employees and pensioners; life expectancy is based on these rates;
- (c) Retirement rates — the rate or probability of retirement at a given age;
- (d) Withdrawal rates — the rates at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement.

Normal cost:

The amount of contributions required to fund the benefit allocated to the current year of service.

Actuarial accrued liability for actives:

The value of all projected benefit payments for current members less the portion that will be paid by future normal costs.

Actuarial accrued liability for pensioners:

The single-sum value of lifetime benefits to existing pensioners. This sum takes account of life expectancies appropriate to the ages of the pensioners and the interest that the sum is expected to earn before it is entirely paid out in benefits.

Unfunded actuarial accrued liability:

The extent to which the actuarial accrued liability of the Plan exceeds the assets of the Plan. There are many approaches to paying off the unfunded actuarial accrued liability, from meeting the interest accrual only to amortizing it over a specific period of time.

SECTION 4: Supplemental Information for the State-Boston Retirement System

Amortization of the unfunded actuarial accrued liability:

Payments made over a period of years equal in value to the Plan's unfunded actuarial accrued liability.

Investment return:

The rate of earnings of the Plan from its investments, including interest, dividends and capital gain and loss adjustments, computed as a percentage of the average value of the fund. For actuarial purposes, the investment return often reflects a smoothing of the capital gains and losses to avoid significant swings in the value of assets from one year to the next.

SECTION 5: Reporting Information for the State-Boston Retirement System

EXHIBIT I

Summary of Actuarial Valuation Results

The valuation was made with respect to the following data supplied to us:

1. Retired participants as of the valuation date (including 2,435 beneficiaries in pay status and 1 in suspended status)	14,341
2. Participants active during the year ended December 31, 2013 (including 5 participants with unknown age, total accumulated contributions of \$1,340,505,588 and projected 2014 payroll of \$1,444,652,177)	20,278
3. Inactive participants as of December 31, 2013 with a right to a return of their employee contribution	7,983
4. Inactive participants as of December 31, 2013 with a vested right to a deferred or immediate vested benefit	808

The actuarial factors as of January 1, 2014 are as follows:

1. Total normal cost		\$184,938,621
2. Administrative expenses		8,417,000
3. Expected employee contributions		<u>-142,858,389</u>
4. Employer normal cost: (1) + (2) + (3)		\$50,496,782
5. Actuarial accrued liability		9,054,730,133
Retired participants and beneficiaries	\$4,818,007,125	
Active participants	4,071,223,481	
Inactive participants	165,599,527	
6. Actuarial value of assets (\$5,491,197,000 at market value as reported by Ernst & Young)		5,383,891,226
7. Unfunded actuarial accrued liability: (5) – (6)		3,670,838,907

The actuarial factors projected to July 1, 2014 are as follows:

1. Projected employer normal cost	\$51,650,234
2. Projected unfunded actuarial accrued liability	3,812,810,454
3. Budgeted appropriation	312,559,621
4. Projected payroll	1,476,803,426

SECTION 5: Reporting Information for the State-Boston Retirement System

EXHIBIT II

Supplementary Information Required by the GASB - History of Employer Contributions

Plan Year Ended December 31	Annual Required Contributions	Actual Contributions	Percentage Contributed
2004	\$164,069,000	\$164,069,000	100.0%
2005	191,132,000	191,132,000	100.0%
2006	217,088,000	217,088,000	100.0%
2007	227,822,000	227,822,000	100.0%
2008	239,039,000	239,039,000	100.0%
2009	250,823,000	250,823,000	100.0%
2010	463,656,000	463,656,000	100.0%
2011	245,280,000	245,280,000	100.0%
2012	261,943,000	261,943,000	100.0%
2013	288,458,000	288,458,000	100.0%

SECTION 5: Reporting Information for the State-Boston Retirement System

EXHIBIT III

Supplementary Information Required by the GASB - Schedule of Funding Progress

Actuarial Valuation Date	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded/ (Overfunded) AAL (UAAL) (b) - (a)	Funded Ratio (a) / (b)	Covered Payroll (c)	UAAL as a Percentage of Covered Payroll [(b) - (a)] / (c)
01/01/2005	\$3,587,118,000	\$5,664,288,000	\$2,077,170,000	63.33%	\$1,115,529,000	186.20%
01/01/2006	3,836,807,000	5,957,373,000	2,120,566,000	64.40%	1,168,808,000	181.43%
01/01/2007	4,138,146,000	6,223,154,000	2,085,008,000	66.50%	1,221,404,000	170.71%
01/01/2008	4,458,002,000	6,596,148,000	2,138,146,000	67.58%	1,299,112,000	164.59%
01/01/2009	4,089,989,000	6,900,229,000	2,810,240,000	59.27%	1,364,068,000	206.02%
01/01/2010	4,270,893,000	7,091,018,000	2,820,124,000	60.23%	1,306,060,000	215.93%
01/01/2011	4,592,675,000	7,283,907,000	2,790,232,000	62.21%	1,371,363,000	203.46%
01/01/2012	4,855,200,000	7,902,175,000	3,046,975,000	61.45%	1,301,803,000	234.06%
01/01/2013	5,073,098,000	8,199,808,000	3,126,710,000	61.87%	1,360,385,000	229.84%
01/01/2014	5,383,891,000	9,054,730,000	3,670,839,000	59.46%	1,444,652,000	254.10%

SECTION 5: Reporting Information for the State-Boston Retirement System

EXHIBIT IV

Supplementary Information Required by the GASB

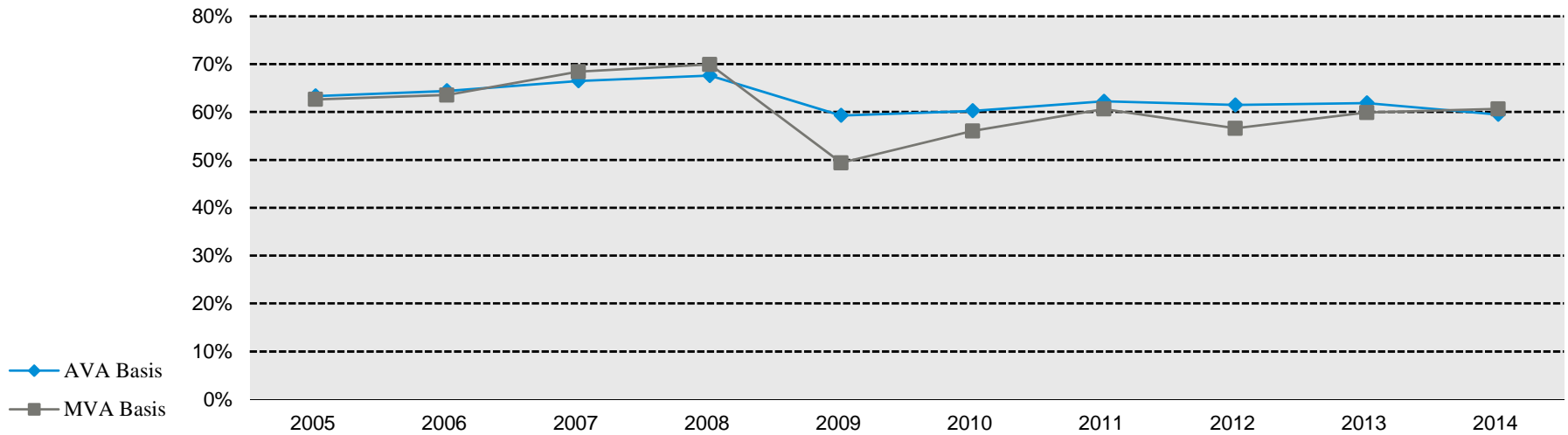
Valuation date	January 1, 2014
Actuarial cost method	Entry Age Normal Cost Method
Amortization method	Prior year's contribution increased by 7.75% for SBRS excluding Teachers; prior year's contribution increased by 10% for fiscal 2015, 2016 and 2017, and by 7% per year thereafter for Teachers.
Remaining amortization period	11 years remaining as of January 1, 2014 for SBRS excluding Teachers; 22 years remaining as of January 1, 2014 for Teachers.
Asset valuation method	Sum of actuarial value at beginning of the year, contributions and investment earnings based on the actuarial interest assumption less benefit payments and operating expenses plus 20% of market value at end of year in excess of that sum, plus additional adjustment toward market value as necessary so that final actuarial value is within 20% of market value. Similar formula used for negative adjustment toward market value if actuarial value exceeds market value.
Actuarial assumptions:	
Investment rate of return	7.75% for SBRS excluding Teachers; 8.00% (previously, 8.25%) for Teachers.
Projected salary increases	4.50% for Group 1, 4.75% for Group 2 and 5.00% for Group 4 (previously, 5.00% per year) for SBRS excluding Teachers; varies by length of service with ultimate rate of 4.00% (previously, varied by length of service with ultimate rate of 4.75%) for Teachers.
Cost of living adjustments	3.00% for the first \$13,000 of retirement income
Plan membership:	
Retired participants and beneficiaries receiving benefits	14,341
Inactive participants entitled to a return of their employee contributions	7,983
Inactive participants with a vested right to a deferred or immediate benefit	808
Active participants	<u>20,278</u>
Total	43,410

SECTION 5: Reporting Information for the State-Boston Retirement System

**EXHIBIT 5 – V
Funded Ratio**

A critical piece of information regarding the Plan's financial status is the funded ratio. This ratio compares the actuarial value of assets to the actuarial accrued liabilities of the Plan as calculated. High ratios indicate a well-funded plan with assets sufficient to cover the plan's actuarial accrued liabilities. Lower ratios may indicate recent changes to benefit structures, funding of the plan below actuarial requirements, poor asset performance, or a variety of other factors.

The chart below depicts a history of the funded ratios for this plan. On a market value basis, the funded ratio has increased from 56.59% as of January 1, 2012 to 60.64% as of January 1, 2014. On an actuarial basis, the funded ratio has decreased from 61.45% as of January 1, 2012 to 59.46% as of January 1, 2014.



SECTION 5: Reporting Information for the State-Boston Retirement System

EXHIBIT 5 – VI

Actuarial Assumptions and Actuarial Cost Method

Mortality Rates:

Pre-Retirement:

RP-2000 Employee Mortality Table projected generationally using Scale AA from 2014 for SBRS excluding Teachers and RP-2000 Combined Healthy White Collar Mortality Table projected 22 years using Scale AA for Teachers (Previously, RP-2000 Employee Mortality Table projected 20 years using Scale AA for SBRS excluding Teachers and RP-2000 Employee Mortality Table projected 10 years using Scale AA with an additional 1.25% load on the actuarial accrued liability and normal cost for Teachers)

Healthy Retiree:

RP-2000 Healthy Annuitant Mortality Table projected generationally with Scale AA from 2014 for SBRS excluding Teachers and RP-2000 Healthy Annuitant Large Benefit Amount Mortality Table projected 17 years using Scale AA for Teachers (Previously, RP-2000 Healthy Annuitant Mortality Table projected 15 years using Scale AA for SBRS excluding Teachers and RP-2000 Healthy Annuitant Mortality Table projected 10 years using Scale AA with an additional 1.25% load on the actuarial accrued liability and normal cost for Teachers)

Disabled Retiree:

RP-2000 Healthy Annuitant Mortality Table set forward three years for males only projected generationally with Scale AA from 2014 for SBRS excluding Teachers and RP-2000 Healthy Annuitant Large Benefit Amount Mortality Table set forward three years for males only projected 7 years using Scale AA for Teachers (Previously, RP-2000 Healthy Annuitant Mortality Table set forward three years for males only projected 5 years using Scale AA for SBRS excluding Teachers and RP-2000 Healthy Annuitant Mortality Table set forward three years for males only and an additional 1.25% load on the actuarial accrued liability and normal cost for Teachers)

The mortality tables were determined to contain provisions appropriate to reasonably reflect future mortality improvement, based on a review of the mortality experience of the plan.

SECTION 5: Reporting Information for the State-Boston Retirement System

Termination Rates before Retirement:

Groups 1 and 2 - Rate (%) – SBRS Excluding Teachers

Age	Mortality				Disability	Withdrawal
	Current		Previously			
	Male	Female	Male	Female		
20	0.03	0.02	0.02	0.01	0.03	6.58
25	0.04	0.02	0.03	0.02	0.04	5.27
30	0.04	0.03	0.04	0.02	0.06	4.83
35	0.08	0.05	0.07	0.04	0.07	4.47
40	0.11	0.07	0.09	0.05	0.11	3.84
45	0.15	0.11	0.12	0.08	0.18	3.21
50	0.21	0.17	0.15	0.12	0.30	1.52
55	0.30	0.25	0.21	0.22	0.50	0.33
60	0.49	0.39	0.35	0.36	0.81	0.00

*Notes: Current mortality rates do not reflect generational projection.
 50% of the disability rates shown represent accidental disability.
 20% of the accidental disabilities will die from the same cause as the disability.
 20% of the death rates shown represent accidental death.*

SECTION 5: Reporting Information for the State-Boston Retirement System

Group 4 - Rate (%), SBRS Excluding Teachers

Mortality

Age	Current		Previously		Disability	Withdrawal
	Male	Female	Male	Female		
20	0.03	0.02	0.02	0.01	0.15	0.00
25	0.04	0.02	0.03	0.02	0.21	0.00
30	0.04	0.03	0.04	0.02	0.28	0.00
35	0.08	0.05	0.07	0.04	0.37	0.00
40	0.11	0.07	0.09	0.05	0.55	0.00
45	0.15	0.11	0.12	0.08	0.90	0.00
50	0.21	0.17	0.15	0.12	1.51	0.00
55	0.30	0.25	0.21	0.22	2.52	0.00
60	0.49	0.39	0.35	0.36	0.00	0.00

*Notes: Current mortality rates do not reflect generational projection.
 90% of the disability rates shown represent accidental disability.
 60% of the accidental disabilities will die from the same cause as the disability.
 50% of the death rates shown represent accidental death.*

SECTION 5: Reporting Information for the State-Boston Retirement System

Termination Rates before Retirement:

Age	Rate (%) – Teachers					
	Mortality				Disability	
	Current		Previously		Current	Previously
	Male	Female	Male	Female		
20	0.02	0.01	0.03	0.02	0.04	0.04
25	0.03	0.02	0.03	0.02	0.05	0.05
30	0.03	0.02	0.04	0.02	0.06	0.06
35	0.05	0.04	0.07	0.04	0.06	0.06
40	0.07	0.05	0.10	0.06	0.10	0.10
45	0.10	0.07	0.13	0.10	0.30	0.30
50	0.13	0.11	0.18	0.14	0.50	0.50
55	0.22	0.22	0.25	0.23	0.70	0.80
60	0.39	0.42	0.42	0.37	0.70	1.00

*Notes: In 2012, a 1.25% load on actuarial accrued liability and normal cost was added as an additional mortality assumption.
 35% of the disability rates shown represent accidental disability.
 40% of the accidental disabilities will die from the same cause as the disability.
 55% of the death rates shown represent accidental death.*

SECTION 5: Reporting Information for the State-Boston Retirement System

Withdrawal Rates:

		Rate (%) - Teachers									
		Years of Service									
		0 - 1		2		3		4		5	
Age		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
20		13.0	10.0	11.5	10.5	8.3	7.5	6.6	7.3	5.5	7.0
30		15.0	15.0	11.0	11.5	8.9	10.0	7.0	10.0	5.4	8.8
40		13.3	10.5	13.0	8.5	7.1	6.6	7.5	5.2	5.2	5.0
50		16.2	9.8	12.2	12.0	8.8	7.0	9.0	6.6	7.0	5.0

		Years of Service									
		6		7		8		9		10+	
Age		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
20		4.0	5.0	4.0	6.0	3.3	7.0	1.5	7.0	1.5	5.0
30		4.5	7.3	4.0	6.0	3.3	7.0	1.5	6.0	1.5	4.5
40		5.5	5.0	3.0	4.5	3.4	3.5	2.5	3.0	1.7	2.2
50		6.5	3.0	5.0	4.0	2.2	2.4	2.5	3.0	2.3	2.0

Previously,

		Years of Service									
		0 - 1		2		3		4		5	
Age		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
20		12.0	10.0	10.5	9.5	7.9	9.0	6.5	9.0	4.5	9.0
30		11.4	12.0	10.2	10.8	7.7	10.2	6.3	10.2	4.5	9.0
40		9.7	11.0	8.3	8.8	7.0	7.7	5.8	7.5	5.4	6.5
50		10.0	8.2	7.5	7.2	7.4	5.7	5.3	5.0	4.8	4.2

		Years of Service									
		6		7		8		9		10+	
Age		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
20		4.0	8.0	3.5	7.5	2.5	7.5	1.5	7.0	1.0	5.0
30		3.9	7.7	3.2	7.5	2.5	7.5	1.5	7.0	1.0	5.0
40		3.7	4.6	3.5	4.5	3.4	4.5	2.0	4.1	1.7	2.9
50		4.0	2.6	3.8	2.5	3.5	2.0	2.4	2.0	2.2	2.1

SECTION 5: Reporting Information for the State-Boston Retirement System

Retirement Rates:

Rate (%) – SBRS excluding Teachers			
Age	Groups 1 and 2	Age	Group 4
55	3.0	50	1.0
56	3.0	51	1.0
57	3.0	52	1.0
58	3.0	53	1.0
59	3.0	54	1.0
60	8.0	55	10.0
61	8.0	56	5.0
62	15.0	57	5.0
63	10.0	58	5.0
64	10.0	59	5.0
65	35.0	60	10.0
66	20.0	61	15.0
67	20.0	62	15.0
68	20.0	63	15.0
69	20.0	64	25.0
70	100.0	65	100.0

SECTION 5: Reporting Information for the State-Boston Retirement System

Retirement Rates:

Age	Rate (%) – Non-TARP Teachers			
	Years of Service		Years of Service	
	Less than 20		20 or more	
	Male	Female	Male	Female
50	0.0	0.0	2.0	1.0
51	0.0	0.0	2.0	1.0
52	0.0	0.0	2.0	1.5
53	0.0	0.0	2.0	2.0
54	0.0	0.0	3.0	2.0
55	3.5	3.5	3.0	4.0
56	3.5	3.5	3.5	4.0
57	5.0	3.5	4.0	4.0
58	5.5	5.0	5.0	6.0
59	6.0	6.5	6.0	8.0
60	7.5	8.5	15.0	15.0
61	12.0	10.0	25.0	20.0
62	14.0	12.0	30.0	20.0
63	14.0	12.0	30.0	25.0
64	14.0	20.0	30.0	30.0
65	30.0	30.0	30.0	40.0
66	30.0	30.0	25.0	30.0
67	30.0	30.0	25.0	30.0
68	30.0	30.0	25.0	30.0
69	30.0	30.0	25.0	30.0
70	100.0	100.0	100.0	100.0

SECTION 5: Reporting Information for the State-Boston Retirement System

Previously,

Age	Rate (%) – Non-TARP Teachers			
	Years of Service		Years of Service	
	Less than 20	Less than 20	20 or more	20 or more
	Male	Female	Male	Female
50 – 53	0.0	0.0	2.0	2.0
54	0.0	0.0	2.0	2.0
55	6.0	6.0	5.0	5.0
56	6.0	6.0	5.0	5.0
57	7.0	7.0	5.0	5.0
58	7.0	7.0	6.0	7.0
59	10.0	10.0	7.0	10.0
60	15.0	15.0	20.0	20.0
61	20.0	20.0	35.0	30.0
62	20.0	20.0	35.0	30.0
63	20.0	20.0	35.0	30.0
64	25.0	25.0	35.0	30.0
65	30.0	30.0	40.0	40.0
66	30.0	30.0	30.0	40.0
67	30.0	30.0	30.0	40.0
68	30.0	30.0	30.0	40.0
69	30.0	30.0	30.0	40.0
70	100.0	100.0	100.0	100.0

SECTION 5: Reporting Information for the State-Boston Retirement System

Retirement Rates:

Age	Rate (%) – TARP Teachers					
	Years of Service					
	Less than 20		20 – 29		30 or more	
	Male	Female	Male	Female	Male	Female
50	0.0	0.0	1.0	1.0	2.0	1.5
51	0.0	0.0	1.0	1.0	2.0	1.5
52	0.0	0.0	1.0	1.0	2.0	1.5
53	0.0	0.0	1.5	1.0	2.0	1.5
54	0.0	0.0	2.5	1.0	2.0	2.0
55	5.0	3.0	3.0	3.0	6.0	5.0
56	5.0	3.0	6.0	5.0	20.0	15.0
57	5.0	4.0	10.0	8.0	40.0	35.0
58	5.0	8.0	15.0	10.0	50.0	35.0
59	10.0	8.0	20.0	15.0	50.0	35.0
60	10.0	10.0	25.0	20.0	40.0	35.0
61	20.0	12.0	30.0	25.0	40.0	35.0
62	20.0	12.0	35.0	30.0	35.0	35.0
63	25.0	15.0	40.0	30.0	35.0	35.0
64	25.0	20.0	40.0	30.0	35.0	35.0
65	25.0	25.0	40.0	40.0	35.0	35.0
66	30.0	25.0	30.0	30.0	40.0	35.0
67	30.0	30.0	30.0	30.0	40.0	30.0
68	30.0	30.0	30.0	30.0	40.0	30.0
69	30.0	30.0	30.0	30.0	40.0	30.0
70	100.0	100.0	100.0	100.0	100.0	100.0

SECTION 5: Reporting Information for the State-Boston Retirement System

Previously,

Age	Rate (%) – TARP Teachers					
	Years of Service					
	Less than 20		20 – 29		30 or more	
	Male	Female	Male	Female	Male	Female
50 – 53	0.0	0.0	1.0	1.5	2.0	2.0
54	0.0	0.0	1.0	1.5	2.0	2.0
55	3.0	2.0	3.0	3.0	6.0	6.0
56	8.0	2.0	5.0	3.0	20.0	15.0
57	15.0	8.0	8.0	7.0	35.0	30.0
58	15.0	10.0	10.0	7.0	50.0	35.0
59	20.0	15.0	20.0	11.0	50.0	35.0
60	15.0	20.0	20.0	16.0	50.0	35.0
61	30.0	20.0	25.0	20.0	50.0	35.0
62	20.0	25.0	30.0	30.0	40.0	40.0
63	30.0	24.0	30.0	30.0	40.0	30.0
64	40.0	20.0	30.0	30.0	40.0	35.0
65	40.0	30.0	40.0	30.0	50.0	35.0
66	40.0	30.0	30.0	30.0	50.0	35.0
67	40.0	30.0	30.0	30.0	50.0	30.0
68	40.0	30.0	30.0	30.0	50.0	30.0
69	40.0	30.0	30.0	30.0	50.0	30.0
70	100.0	100.0	100.0	100.0	100.0	100.0

Retirement Age for Inactive Vested Participants:

Age 60 for Group 1 and Group 2 members (previously, age 65 for Group 1 members) and age 55 for Group 4 members hired prior to April 2, 2012. For members hired April 2, 2012 or later, age 60 for Group 1 members, age 55 for Group 2 members and age 50 for Group 4 members.

SECTION 5: Reporting Information for the State-Boston Retirement System

Unknown Data for Participants: Same as those exhibited by participants with similar known characteristics.

Family Composition: 75% of participants are assumed to be married for SBRS excluding Teachers, 80% for Teachers. None are assumed to have dependent children. Females are assumed to be three years younger than their spouses.

Benefit Election: All participants are assumed to elect Option A.

Net Investment Return: 7.75% for SBRS excluding Teachers and 8.00% for Teachers (previously, 8.25% for Teachers)

Salary Increases:

Years of Service	Teachers		SBRS Excluding Teachers		
	Current	Previously	Group 1	Group 2	Group 4
0	7.50%	8.00%	4.50%	4.75%	5.00%
1	7.10%	7.75%	4.50%	4.75%	5.00%
2	7.00%	7.50%	4.50%	4.75%	5.00%
3	6.90%	7.25%	4.50%	4.75%	5.00%
4	6.80%	7.00%	4.50%	4.75%	5.00%
5	6.70%	6.75%	4.50%	4.75%	5.00%
6	6.60%	6.50%	4.50%	4.75%	5.00%
7	6.50%	6.25%	4.50%	4.75%	5.00%
8	6.30%	6.00%	4.50%	4.75%	5.00%
9	6.10%	5.75%	4.50%	4.75%	5.00%
10	5.90%	5.50%	4.50%	4.75%	5.00%
11	5.70%	5.25%	4.50%	4.75%	5.00%
12	5.20%	5.00%	4.50%	4.75%	5.00%
13	4.70%	4.75%	4.50%	4.75%	5.00%
14	4.35%	4.75%	4.50%	4.75%	5.00%
15-16	4.20%	4.75%	4.50%	4.75%	5.00%
17-19	4.10%	4.75%	4.50%	4.75%	5.00%
20 and later	4.00%	4.75%	4.50%	4.75%	5.00%

Includes allowance for inflation of 4½%.

(Previously, 5.0% for all members of SBRS excluding Teachers.)

SECTION 5: Reporting Information for the State-Boston Retirement System

Interest on Employee Contributions: 3.5%

Administrative Expenses: \$8,417,000 for calendar 2014, increasing 4.5% per year, with 30% allocated to Teachers (previously, \$5,000,000 for calendar 2012, increasing 4.5% per year, allocated in proportion to projected payroll).

2013 Salary: 2013 salary equal to salaries provided in the data, except salaries for new hires were annualized.

Calendar year 2013 salaries were increased by 7.7% for police officers to reflect a bargaining contract that was settled in 2014. Salaries were increased an additional \$2,000 for those who received a one-time parity increase, which the City has estimated to be 83% of police officers.

Calendar year 2013 salaries were increased by 6.1% for firefighters to reflect a bargaining contract that was settled in 2014.

The Staff of the SBRS provided a listing of one-time retroactive payments made during 2013, which had been included in the calendar 2013 salaries in the data. Payments made as part of grievance settlements were assumed to be one-time payments and were removed from reported salaries. For all non-grievance retroactive amounts, salaries were reduced by the lesser of the retroactive amount provided or 1% of salary.

Total Service: Total creditable service reported in the data, except for those with greater than 40 years of service and those for whom the difference between age and service reported was less than 16 years, where total creditable service was based on date of hire. Previously, total creditable service based on date of hire for all.

Data Adjustments: For all non-retired participants, Annuity Savings Fund balances were estimated based on the balances reported in the prior valuation plus an adjustment for additional contributions and interest over the last two-years. Vested employees who were active in the prior valuation and not reported in this year's data were treated as active employees as of December 31, 2013. Non-vested active and inactive records included in the prior valuation and not reported this year were assumed to have taken a refund of their employee contributions or to be otherwise ineligible for benefits. A number of retirees were reported as disabled retirees who were reported as beneficiaries in the prior valuation. These participants were valued as beneficiaries.

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Net 3(8)(c) Liability:	No liability is valued for benefits paid or received from other municipal systems.
Actuarial Value of Assets:	A preliminary actuarial value is first determined by taking the actuarial value of assets at the beginning of the year and adding assumed investment earnings (at the assumed actuarial rate of return) and the net new money during the year (contributions less benefit payments and administrative expenses). Twenty percent of the difference between the market value of assets (as reported by Ernst & Young) and the preliminary actuarial value of assets is added to the preliminary actuarial value. In order that the actuarial value not differ too significantly from the market value of assets, the final actuarial value of assets must be within 20% of the market value of assets.
Actuarial Cost Method:	Entry Age Normal Actuarial Cost Method. Entry Age is the age of the participant less total creditable service. Normal Cost and Actuarial Accrued Liability are calculated on an individual basis and are allocated by salary. Normal Cost is determined by using the plan of benefits applicable to each participant (previously, Normal Cost determined as if the current plan of benefits had always been in effect).
Changes in Assumptions:	<p>Based on past experience and future expectations, the following actuarial assumptions were changed:</p> <ul style="list-style-type: none">➤ The actuarial cost method was changed to better reflect the impact of the plan changes effective for employees hired on or after April 2, 2012.➤ Mortality assumption for SBRS excluding Teachers:<ul style="list-style-type: none">• The pre-retirement mortality assumption was changed from the RP-2000 Employee Mortality Table projected 20 years using Scale AA to the RP-2000 Employee Mortality Table projected generationally using Scale AA from 2014.• The mortality assumption for non-disabled retirees was changed from the RP-2000 Healthy Annuitant Mortality Table projected 15 years using Scale AA to the RP-2000 Healthy Annuitant Mortality Table projected generationally with Scale AA from 2014.

SECTION 5: Reporting Information for the State-Boston Retirement System

- The mortality assumption for disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table set forward three years for males only projected five years using Scale AA to the RP-2000 Healthy Annuitant Mortality Table set forward three years for males only projected generationally with Scale AA from 2014.
- Mortality assumption for Teachers:
 - The pre-retirement mortality assumption was changed from the RP-2000 Employee Mortality Table projected 10 years using Scale AA with an additional 1.25% load on the actuarial accrued liability and normal cost to the RP-2000 Combined Healthy White Collar Mortality Table projected 22 years using Scale AA.
 - The mortality assumption for non-disabled retirees was changed from the RP-2000 Healthy Annuitant Mortality Table projected 10 years using Scale AA with an additional 1.25% load on the actuarial accrued liability and normal cost to the RP-2000 Healthy Annuitant Large Benefit Amount Mortality Table projected 17 years using Scale AA.
 - The mortality assumption for disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table set forward three years for males only and an additional 1.25% load on the actuarial accrued liability and normal cost to the RP-2000 Healthy Annuitant Large Benefit Amount Mortality Table set forward three years for males only projected 7 years using Scale AA.
- The investment return assumption was lowered from 8.25% to 8.00% for the Teachers.
- The salary increase assumption for SBRS excluding Teachers was lowered from 5.00% per year for all members, including an allowance for inflation of 4.50% per year, to rates of 4.50% per year for Group 1 members, 4.75% per year for Group 2 members, and 5.00% per year for Group 4 members, including an allowance for inflation of 4.50% per year.

SECTION 5: Reporting Information for the State-Boston Retirement System

- The service-based salary increase assumption for Teachers has been changed as shown below:

Years of Service	Teachers	
	Current	Previously
0	7.50%	8.00%
1	7.10%	7.75%
2	7.00%	7.50%
3	6.90%	7.25%
4	6.80%	7.00%
5	6.70%	6.75%
6	6.60%	6.50%
7	6.50%	6.25%
8	6.30%	6.00%
9	6.10%	5.75%
10	5.90%	5.50%
11	5.70%	5.25%
12	5.20%	5.00%
13	4.70%	4.75%
14	4.35%	4.75%
15-16	4.20%	4.75%
17-19	4.10%	4.75%
20 and later	4.00%	4.75%

- The assumed retirement age for inactive vested participants was changed from age 65 to age 60 for Group 1 members and remained the same at age 60 for Group 2 members and at age 55 for Group 4 members hired prior to April 2, 2012. For participants hired April 2, 2012 or later, the assumption is 60 for Group 1 members, 55 for Group 2 members, and 50 for Group 4 members.
- The administrative expense assumption was increased from \$5,000,000 for calendar 2012 to \$8,417,000 for calendar 2014, with 70%, or \$5,891,900 assigned to the SBRS excluding Teachers, and 30%, or \$2,525,100, assigned to the Teachers.

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- The retirement, turnover, and disability assumptions for Teachers have been changed to reflect the assumptions being used in the January 1, 2014 Actuarial Valuation Report of the Teachers' Retirement System dated September 12, 2014.

SECTION 5: Reporting Information for the State-Boston Retirement System

EXHIBIT 5 – VII

Summary of Plan Provisions

This exhibit summarizes the major provisions of Chapter 32 of the Laws of Massachusetts.

Plan Year: January 1 – December 31

Retirement Benefits

Employees covered by the Contributory Retirement Law are classified into one of four groups depending on job classification. Group 1 comprises most positions in state and local government. It is the general category of public employees. Group 4 comprises mainly police and firefighters. Group 2 is for other specified hazardous occupations. (Officers and inspectors of the State Police are classified as Group 3.)

For employees hired prior to April 2, 2012, the annual amount of the retirement allowance is based on the member’s final three-year average salary multiplied by the number of years and full months of creditable service at the time of retirement and multiplied by a percentage according to the following table based on the age of the member at retirement:

Age Last Birthday at Date of Retirement			
Percent	Group 1	Group 2	Group 4
2.5	65 or over	60 or over	55 or over
2.4	64	59	54
2.3	63	58	53
2.2	62	57	52
2.1	61	56	51
2.0	60	55	50
1.9	59	--	49
1.8	58	--	48
1.7	57	--	47
1.6	56	--	46
1.5	55	--	45

TARP – Chapter 114 of the Acts of 2000 provides enhanced retirement benefits to teachers who elect to participate in the program and to all teachers hired on or after

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July 1, 2001. The retirement allowance of a participating teacher with 30 or more years of service is increased by an additional 2 percent for each full year of creditable service in excess of 24 years, up to the statutory maximum of 80 percent of the member's three-year salary average.

A member's final three-year average salary is defined as the greater of the highest consecutive three-year average annual rate of regular compensation and the average annual rate of regular compensation received during the last three years of creditable service prior to retirement.

For employees hired on April 2, 2012 or later, the annual amount of the retirement allowance is based on the member's final five-year average salary multiplied by the number of years and full months of creditable service at the time of retirement and multiplied by a percentage according to the following tables based on the age and years of creditable service of the member at retirement:

For members with less than 30 years of creditable service:

Age Last Birthday at Date of Retirement

Percent	Group 1	Group 2	Group 4
2.50	67 or over	62 or over	57 or over
2.35	66	61	56
2.20	65	60	55
2.05	64	59	54
1.90	63	58	53
1.75	62	57	52
1.60	61	56	51
1.45	60	55	50

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**For members with 30 years of creditable service or greater:
Age Last Birthday at Date of Retirement**

Percent	Group 1	Group 2	Group 4
2.500	67 or over	62 or over	57 or over
2.375	66	61	56
2.250	65	60	55
2.125	64	59	54
2.000	63	58	53
1.875	62	57	52
1.750	61	56	51
1.625	60	55	50

A member’s final five-year average salary is defined as the greater of the highest consecutive five-year average annual rate of regular compensation and the average annual rate of regular compensation received during the last five years of creditable service prior to retirement.

For employees who became members after January 1, 2011, regular compensation is limited to 64% of the federal limit found in 26 U.S.C. 401(a)(17). 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 all employees, the maximum annual amount of the retirement allowance is 80 percent of the member’s final average salary. Any member who is a veteran also receives an additional yearly retirement allowance of \$15 per year of creditable service, not exceeding \$300. The veteran allowance is paid in addition to the 80 percent maximum.

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Employee Contributions

<u>Date of Hire</u>	<u>Contribution Rate</u>
Prior to January 1, 1975	5%
January 1, 1975 – December 31, 1983	7%
January 1, 1984 – June 30, 1996	8%
July 1, 1996 onward	9%

In addition, employees hired after December 31, 1978 contribute an additional 2 percent of salary in excess of \$30,000.

Employees hired after 1983 who voluntarily withdraw their contributions with less than 10 ten years of credited service receive 3% interest on their contributions.

Employees in Group 1 hired on or after April 2, 2012 with 30 years of creditable service or greater will pay a base contribution rate of 6%.

Retirement Benefits (Superannuation)

Members of Group 1, 2 or 4 hired prior to April 2, 2012 may retire upon the attainment of age 55. For retirement at ages below 55, twenty years of creditable service is required.

Members hired prior to April 2, 2012 who terminate before age 55 with ten or more years of creditable service are eligible for a retirement allowance upon the attainment of age 55 (provided they have not withdrawn their accumulated deductions from the Annuity Savings Fund of the System).

Members of Group 1 hired April 2, 2012 or later may retire upon the attainment of age 60. Members of Group 2 or 4 hired April 2, 2012 or later may retire upon the attainment of age 55. Members of Group 4 may retire upon attainment of age 50 with ten years of creditable service.

Members hired April 2, 2012 or later who terminate before age 55 (60 for members of Group 1) with ten or more years of creditable service are eligible for a retirement allowance upon the attainment of age 55 (60 for members of Group 1) provided they have not withdrawn their accumulated deductions from the Annuity Savings Fund of the System.

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Ordinary Disability Benefits

A member who is unable to perform his or her job due to a non-occupational disability will receive a retirement allowance if he or she has ten or more years of creditable service and has not reached age 55. The annual amount of such allowance shall be determined as if the member retired for superannuation at age 55 (age 60 for Group 1 members hired on or after April 2, 2012), based on the amount of creditable service at the date of disability. For veterans, there is a minimum benefit of 50 percent of the member's most recent year's pay plus an annuity based on his or her own contributions.

Accidental Disability Benefit

For a job-connected disability, the benefit is 72 percent of the member's most recent annual pay plus an annuity based on his or her own contributions, plus additional amounts for surviving children. Benefits are capped at 75 percent of annual rate of regular compensation for employees who become members after January 1, 1988.

Death Benefits

In general, the beneficiary of an employee who dies in active service will receive a refund of the employee's own contributions. Alternatively, if the employee were eligible to retire on the date of death, a spouse's benefit will be paid equal to the amount the employee would have received under Option C. The surviving spouse of a member who dies with two or more years of credited service has the option of a refund of the employee's contributions or a monthly benefit regardless of eligibility to retire, if they were married for at least one year. There is also a minimum widow's pension of \$500 per month, and there are additional amounts for surviving children.

If an employee's death is job-connected, the spouse will receive 72 percent of the member's most recent annual pay, in addition to a refund of the member's accumulated deductions, plus additional amounts for surviving children. However, in accordance with Section 100 of Chapter 32, the surviving spouse of a police officer, firefighter or corrections officer is killed in the line of duty will be eligible to receive an annual benefit equal to the maximum salary held by the member at the time of death.

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Upon the death of a job-connected disability retiree who retired prior to November 7, 1996 and could not elect an Option C benefit, a surviving spouse will receive an allowance of \$12,000 per year (previously, \$6,000) if the member dies for a reason unrelated to cause of disability.

"Heart And Lung Law" And Cancer Presumption

Any case of hypertension or heart disease resulting in total or partial disability or death to a uniformed fireman, permanent member of a police department, or certain employees of a county correctional facility is presumed to have been suffered in the line of duty, unless the contrary is shown by competent evidence. Any case of disease of the lungs or respiratory tract resulting in total disability or death to a uniformed fireman is presumed to have been suffered in the line of duty, unless the contrary is shown by competent evidence. There is an additional presumption for uniformed firemen that certain types of cancer are job-related if onset occurs while actively employed or within five years of retirement.

Options

Members may elect to receive a full retirement allowance payable for life under Option A. Under Option B a member may elect to receive a lower monthly allowance in exchange for a guarantee that at the time of death any contributions not expended for annuity payments will be refunded to the beneficiary. Option C allows the member to take a lesser retirement allowance in exchange for providing a survivor with two-thirds of the lesser amount. Option C pensioners will have benefits converted from a reduced to a full retirement if the beneficiary predeceases the retiree.

Post-Retirement Benefits

The Board has adopted the provisions of Section 51 of Chapter 127 of the Acts of 1999, which provide that the Retirement Board may approve an annual COLA in excess of the Consumer Price Index but not to exceed a 3% COLA on the first \$13,000 of a retirement allowance. Cost-of-living increases granted prior to July 1, 1998 are reimbursed by the Commonwealth and not reflected in this report.

SECTION 5: Reporting Information for the State-Boston Retirement System

Changes in Plan Provisions

Members hired on or after April 2, 2012 are covered by the provisions of Chapter 32 as amended by of Chapter 176 of the Acts of 2011 and Chapter 139 of the Acts of 2012.

As permitted by Section 63 of Chapter 139 of the Acts of 2012, the Board has increased the Section 101 annual allowance from \$6,000 to \$12,000.

SECTION 6: GASB 67/68 Information for the State-Boston Retirement System

EXHIBIT 6 – 1

Net Pension Liability

The components of the net pension liability of the State-Boston Retirement System at December 31, 2013 were as follows:

Total pension liability	\$9,054,730,133
Plan fiduciary net position	5,491,197,000
System’s net pension liability	3,563,533,133
Plan fiduciary net position as a percentage of the total pension liability	60.64%

Actuarial assumptions. The total pension liability was determined by an actuarial valuation as of December 31, 2013, using the following actuarial assumptions, applied to all periods included in the measurement:

Inflation 4.50%
 Salary increases

Years of Service	Teachers		SBRS Excluding Teachers		
	Current	Previously	Group 1	Group 2	Group 4
0	7.50%	8.00%	4.50%	4.75%	5.00%
1	7.10%	7.75%	4.50%	4.75%	5.00%
2	7.00%	7.50%	4.50%	4.75%	5.00%
3	6.90%	7.25%	4.50%	4.75%	5.00%
4	6.80%	7.00%	4.50%	4.75%	5.00%
5	6.70%	6.75%	4.50%	4.75%	5.00%
6	6.60%	6.50%	4.50%	4.75%	5.00%
7	6.50%	6.25%	4.50%	4.75%	5.00%
8	6.30%	6.00%	4.50%	4.75%	5.00%
9	6.10%	5.75%	4.50%	4.75%	5.00%
10	5.90%	5.50%	4.50%	4.75%	5.00%
11	5.70%	5.25%	4.50%	4.75%	5.00%
12	5.20%	5.00%	4.50%	4.75%	5.00%

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Years of Service	Teachers		SBRS Excluding Teachers		
	Current	Previously	Group 1	Group 2	Group 4
13	4.70%	4.75%	4.50%	4.75%	5.00%
14	4.35%	4.75%	4.50%	4.75%	5.00%
15-16	4.20%	4.75%	4.50%	4.75%	5.00%
17-19	4.10%	4.75%	4.50%	4.75%	5.00%
20 and later	4.00%	4.75%	4.50%	4.75%	5.00%

Investment rate of return 7.75% for SBRS excluding Teachers and 8.0% for Teachers, net of investment expenses, including inflation

Cost of Living Adjustments 3% of first \$13,000

Mortality Rates:

Healthy:

Pre-Retirement

RP-2000 Employee Mortality Table projected generationally using Scale AA from 2014 for SBRS excluding Teachers and RP-2000 Combined Healthy White Collar Mortality Table projected 22 years using Scale AA for Teachers

Post-Retirement

RP-2000 Healthy Annuitant Mortality Table projected generationally with Scale AA from 2014 for SBRS excluding Teachers and RP-2000 Healthy Annuitant Large Benefit Amount Mortality Table projected 17 years using Scale AA for Teachers

Disabled:

RP-2000 Healthy Annuitant Mortality Table set forward three years for males only projected generationally with Scale AA from 2014 for SBRS excluding Teachers and RP-2000 Healthy Annuitant Large Benefit Amount Mortality Table set forward three years for males only projected 7 years using Scale AA for Teachers

The long-term expected rate of return on pension plan investments was determined using a building-block method in which best-estimate ranges of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and by adding expected inflation. Best estimates of arithmetic real rates of return for each major asset class included in the pension plan's target asset allocation as of December 31, 2013 are summarized in the following table:

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Asset Class	Long-Term Expected Real Rate of Return
Domestic equity	6.60%
International developed markets equity	7.10%
Core fixed income	2.20%
High yield fixed income	4.70%
Real estate	4.40%
Short-term government money market	1.80%
Hedge fund, GTAA, Risk parity	3.90%

Discount rate: The discount rate used to measure the total pension liability was 7.75% for the SBRS excluding Teachers and 8.00% for Teachers. The projection of cash flows used to determine the discount rate assumed plan member contributions will be made at the current contribution rate and that the State-Boston Retirement System contributions will be made at rates equal to the actuarially determined contribution rates. Based on those assumptions, the pension plan's fiduciary net position was projected to be available to make all projected future benefit payments of current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

Sensitivity of the net pension liability to changes in the discount rate. The following presents the net pension liability of the State-Boston Retirement System, calculated using the discount rate of 7.75% for the SBRS excluding Teachers and 8.00% for the Teachers, as well as what the State-Boston Retirement System's net pension liability would be if it were calculated using a discount rate that is 1-percentage-point lower (6.75% for the SBRS excluding Teachers and 7.00% for the Teachers) or 1-percentage-point higher (8.75% for the SBRS excluding Teachers and 9.00% for the Teachers) than the current rate:

	1% Decrease	Current Discount	1% Increase
State-Boston Retirement System's net pension liability as of December 31, 2013	\$4,572,665,820	\$3,563,533,133	\$2,708,208,323

SECTION 6: GASB 67/68 Information for the State-Boston Retirement System

EXHIBIT 6 – 2

Pension Expense and Deferred Outflows/Inflows of Resources Related to Pensions

A. Pension expense for the year ended June 30, 2015

Service cost	\$184,938,621
Interest	--
Recognized portion of current-period difference between expected and actual experience	--
Contributions – employee	--
Projected earnings on pension plan investments	--
Recognized portion of current-period difference between projected and actual earnings on pension plan investments	--
Recognition of deferred outflows of resources	--
Recognition of deferred inflows of resources	--
Pension expense for fiscal year ended June 30, 2015	To be determined

B. Deferred outflows/inflows of resources related to pensions

	Deferred Outflows of Resources	Deferred Inflows of Resources
Differences between expected and actual experience	--	--
Changes of assumptions	--	--
Changes of benefit terms	--	--
Net difference between projected and actual earnings on pension plan investments	--	--
Total	To be determined	To be determined

C. Projected recognition of deferred outflows/(inflows)

	Year Ended June 30,	Recognition
	2016	--
	2017	--
	2018	--
	2019	--
	2020	--
	Thereafter	--

Note: Entry Age Normal liabilities calculated using ages and service amounts as of January 1, 2014 are used to measure the pension expense for fiscal year ended June 30, 2015.

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EXHIBIT 6 – 3

Schedule of Changes in the Net Pension Liability – Last Ten Years

	Year End December 31,									
	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
Total pension liability										
Service cost	\$184,938,621									
Interest	--									
Differences between expected and actual experience	--									
Changes of assumptions	--									
Changes of benefit terms	--									
Benefit payments, including refunds of employee contributions	--									
Net change in total pension liability	TBD									
Total pension liability - beginning	9,054,730,133									
Total pension liability - ending (a)	TBD									
Plan fiduciary net position										
Contributions - employer	--									
Contributions - employee	--									
Net investment income	--									
Benefit payments, including refunds of employee contributions	--									
Other	--									
Net change in fiduciary net position	TBD									
Plan fiduciary net position - beginning	5,491,197,000									
Plan fiduciary net position - ending (b)	TBD									
Net pension liability – ending: (a)-(b)	TBD									
Plan's fiduciary net position as a percentage of the total pension liability	TBD									
Covered-employee payroll	\$1,444,652,177									
Net pension liability as a percentage of covered-employee payroll	TBD									

*Covered-employee payroll is projected for 2014 as reported in the January 1, 2014 funding valuation report.

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EXHIBIT 6 – 4

Schedule of Contributions – Last Ten Years

	Year End December 31,									
	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
Actuarially determined contribution*	\$312,559,621									
Contributions in relation to the actuarially determined contribution	TBD									
Contribution deficiency (excess)	TBD									
Covered-employee payroll	\$1,444,652,177									
Contributions as a percentage of covered-employee payroll	21.64%									

(Historical information prior to implementation of GASB 67/68 is not required)

* Based on the results of the January 1, 2012 actuarial valuation (including assumptions and methods) which determined budgeted appropriation for fiscal 2015 for the SBRS excluding Teachers. For the Teachers, the fiscal 2015 appropriation is included as shown in the January 1, 2014 Actuarial Valuation Report of the Teachers' Retirement System dated September 12, 2014.

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EXHIBIT 6 – 5

Notes to Required Supplementary Information

Valuation date	January 1, 2014
Actuarial cost method	Entry Age Normal Cost Method
Amortization method	Prior year’s contribution increased by 7.75% for SBRS excluding Teachers; prior year’s contribution increased by 10% for fiscal 2015, 2016 and 2017, and by 7% per year thereafter for Teachers
Remaining amortization period	11 years remaining as of January 1, 2014 for SBRS excluding Teachers; 22 years remaining as of January 1, 2014 for Teachers
Asset valuation method	Sum of actuarial value at beginning of the year, contributions and investment earnings based on the actuarial interest assumption less benefit payments and operating expenses plus 20% of market value at end of year in excess of that sum, plus additional adjustment toward market value as necessary so that final actuarial value is within 20% of market value. Similar formula used for negative adjustment toward market value if actuarial value exceeds market value.
Actuarial assumptions:	
Investment rate of return	7.75% for SBRS excluding Teachers; 8.00% for Teachers (previously, 8.25%)
Discount rate	7.75% for SBRS excluding Teachers; 8.00% for Teachers (previously, 8.25%)
Inflation rate	4.50%
Projected salary increases	4.50% for Group 1, 4.75% for Group 2 and 5.00% for Group 4 (previously, 5.00% per year) for SBRS excluding Teachers; varies by length of service with ultimate rate of 4.00% (previously, varied by length of service with ultimate rate of 4.75%) for Teachers.
Cost of living adjustments	3.00% for the first \$13,000 of retirement income
Plan membership:	
Retired participants and beneficiaries in pay status or with suspended benefits	14,341
Inactive participants entitled to a return of their employee contributions	7,983
Inactive participants with a vested right to a deferred or immediate benefit	808
Active participants	<u>20,278</u>
Total	43,410

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Changes in Assumptions:

The actuarial cost method was changed to better reflect the impact of the plan changes effective for employees hired on or after April 2, 2012.

Mortality assumption for SBRS excluding Teachers:

- The pre-retirement mortality assumption was changed from the RP-2000 Employee Mortality Table projected 20 years using Scale AA to the RP-2000 Employee Mortality Table projected generationally using Scale AA from 2014.
- The mortality assumption for non-disabled retirees was changed from the RP-2000 Healthy Annuitant Mortality Table projected 15 years using Scale AA to the RP-2000 Healthy Annuitant Mortality Table projected generationally with Scale AA from 2014.
- The mortality assumption for disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table set forward three years for males only projected five years using Scale AA to the RP-2000 Healthy Annuitant Mortality Table set forward three years for males only projected generationally with Scale AA from 2014.

Mortality assumption for Teachers:

- The pre-retirement mortality assumption was changed from the RP-2000 Employee Mortality Table projected 10 years using Scale AA with an additional 1.25% load on the actuarial accrued liability and normal cost to the RP-2000 Combined Healthy White Collar Mortality Table projected 22 years using Scale AA.
- The mortality assumption for non-disabled retirees was changed from the RP-2000 Healthy Annuitant Mortality Table projected 10 years using Scale AA with an additional 1.25% load on the actuarial accrued liability and normal cost to the RP-2000 Healthy Annuitant Large Benefit Amount Mortality Table projected 17 years using Scale AA.
- The mortality assumption for disabled participants was changed from the RP-2000 Healthy Annuitant Mortality Table set forward three years for males only and an additional 1.25% load on the actuarial accrued liability and normal cost to the RP-2000 Healthy Annuitant Large Benefit Amount Mortality Table set forward three years for males only projected 7 years using Scale AA.

The investment return assumption was lowered from 8.25% to 8.00% for the Teachers.

The salary increase assumption for SBRS excluding Teachers was lowered from 5.00% per year for all members, including an allowance for inflation of 4.50% per year, to rates of 4.50% per year for Group 1 members, 4.75% per year for Group 2 members, and 5.00% per year for Group 4 members, including an allowance for inflation of 4.50% per year.

SECTION 6: GASB 67/68 Information for the State-Boston Retirement System

The service-based salary increase assumption for Teachers has been changed, as shown below:

Years of Service	Teachers	
	Current	Previously
0	7.50%	8.00%
1	7.10%	7.75%
2	7.00%	7.50%
3	6.90%	7.25%
4	6.80%	7.00%
5	6.70%	6.75%
6	6.60%	6.50%
7	6.50%	6.25%
8	6.30%	6.00%
9	6.10%	5.75%
10	5.90%	5.50%
11	5.70%	5.25%
12	5.20%	5.00%
13	4.70%	4.75%
14	4.35%	4.75%
15-16	4.20%	4.75%
17-19	4.10%	4.75%
20 and later	4.00%	4.75%

The assumed retirement age for inactive vested participants was changed from age 65 to age 60 for Group 1 members and remained the same at age 60 for Group 2 members and at age 55 for Group 4 members hired prior to April 2, 2012. For participants hired April 2, 2012 or later, the assumption is 60 for Group 1 members, 55 for Group 2 members, and 50 for Group 4 members.

The administrative expense assumption was increased from \$5,000,000 for calendar 2012 to \$8,417,000 for calendar 2014, with 70%, or \$5,891,900 assigned to the SBRS excluding Teachers, and 30%, or \$2,525,100, assigned to the Teachers.

The retirement, turnover, and disability assumptions for Teachers have been changed to reflect the assumptions being used in the January 1, 2014 Actuarial Valuation Report of the Teachers' Retirement System dated September 12, 2014.

SECTION 6: GASB 67/68 Information for the State-Boston Retirement System

Changes in Plan Provisions:

Members hired on or after April 2, 2012 are covered by the provisions of Chapter 32 as amended by of Chapter 176 of the Acts of 2011 and Chapter 139 of the Acts of 2012.

As permitted by Section 63 of Chapter 139 of the Acts of 2012, the Board has increased the Section 101 annual allowance from \$6,000 to \$12,000.
