

FINANCIAL STATEMENTS AND REQUIRED  
SUPPLEMENTARY INFORMATION

Boston Retirement System  
(A Component Unit of the City of Boston, Massachusetts)  
Year Ended December 31, 2016  
With Report of Independent Auditors

Ernst & Young LLP



Building a better  
working world

Boston Retirement System  
(A Component Unit of the City of Boston, Massachusetts)

Financial Statements and Required Supplementary Information

Year Ended December 31, 2016

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## Report of Independent Auditors

Management and The Boston Retirement Board

### **Report on the Financial Statements**

We have audited the accompanying financial statements of fiduciary net position and changes in fiduciary net position of the Boston Retirement System (the System), a component unit of the City of Boston, Massachusetts, as of and for the year ended December 31, 2016, and the related notes to the financial statements, which collectively comprise the Boston Retirement System's basic financial statements as listed in the table of contents.

#### ***Management's Responsibility for the Financial Statements***

Management is responsible for the preparation and fair presentation of these financial statements in conformity with U.S. generally accepted accounting principles; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free of material misstatement, whether due to fraud or error.

#### ***Auditor's Responsibility***

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

### ***Opinions***

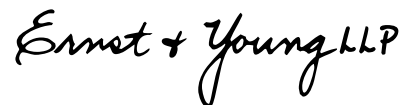
In our opinion, the financial statements referred to above present fairly, in all material respects, the fiduciary net position of the Boston Retirement System as of December 31, 2016, and the changes in fiduciary net position for the year then ended in conformity with U.S. generally accepted accounting principles.

### ***Required Supplementary Information***

U.S. generally accepted accounting principles require that Management's Discussion and Analysis on pages 5 through 9 and the schedules of changes in the net pension liability, contributions, and investment returns on pages 37 through 39 be presented to supplement the basic financial statements. Such information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board which considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

### ***Other Reporting Required by Government Auditing Standards***

In accordance with *Government Auditing Standards*, we also have issued our report dated December 1, 2017 on our consideration of the System's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements and other matters. The purpose of that report is to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on the internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the System's internal control over financial reporting and compliance.



December 1, 2017

## Report of Independent Auditors on Internal Control Over Financial Reporting and on Compliance and Other Matters Based on an Audit of Financial Statements Performed in Accordance with *Government Auditing Standards*

### Management and The Boston Retirement Board

We have audited, in accordance with auditing standards generally accepted in the United States and the standards applicable to financial audits contained in *Government Auditing Standards* issued by the Comptroller General of the United States, the financial statements of the Boston Retirement System (the System), which comprise the statement of fiduciary net position as of December 31, 2016, and the related statement of changes in fiduciary net position for the year then ended, and the related notes to the financial statements, and have issued our report thereon dated December 1, 2017.

### **Internal Control Over Financial Reporting**

In planning and performing our audit of the financial statements, we considered the System's internal control over financial reporting (internal control) to determine the audit procedures that are appropriate in the circumstances for the purpose of expressing our opinion on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of the System's internal control. Accordingly, we do not express an opinion on the effectiveness of the System's internal control.

*A deficiency in internal control* exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct misstatements on a timely basis. *A material weakness* is a deficiency, or combination of deficiencies, in internal control, such that there is a reasonable possibility that a material misstatement of the entity's financial statements will not be prevented, or detected and corrected on a timely basis. *A significant deficiency* is a deficiency, or a combination of deficiencies, in internal control that is less severe than a material weakness, yet important enough to merit attention by those charged with governance.

Our consideration of internal control was for the limited purpose described in the first paragraph of this section and was not designed to identify all deficiencies in internal control that might be material weaknesses or significant deficiencies. Given these limitations, during our audit we did not identify any deficiencies in internal control that we consider to be material weaknesses. However, material weaknesses may exist that have not been identified.

## **Compliance and Other Matters**

As part of obtaining reasonable assurance about whether the System's financial statements are free of material misstatement, we performed tests of its compliance with certain provisions of laws, regulations, contracts and grant agreements, noncompliance with which could have a direct and material effect on the determination of financial statement amounts. However, providing an opinion on compliance with those provisions was not an objective of our audit, and accordingly, we do not express such an opinion. The results of our tests disclosed no instances of noncompliance or other matters that are required to be reported under *Government Auditing Standards*.

## **Purpose of This Report**

The purpose of this report is solely to describe the scope of our testing of internal control and compliance and the result of that testing, and not to provide an opinion on the entity's internal control or on compliance. This report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the entity's internal control and compliance. Accordingly, this communication is not suitable for any other purpose.

*Ernst + Young LLP*

December 1, 2017

**Boston Retirement System**  
(A Component Unit of the City of Boston, Massachusetts)

**Required Supplementary Information –  
Management’s Discussion and Analysis**

December 31, 2016

The following discussion provides an overview and analysis of the fiduciary net position and changes in fiduciary net position of the Boston Retirement System (the System or Plan) by management for the year ended December 31, 2016.

**Overview of the Financial Statements**

The System’s financial statements comprise a statement of fiduciary net position, statement of changes in fiduciary net position, and notes to the financial statements.

The Statement of Fiduciary Net Position presents information on the System’s assets and liabilities and the resulting net position held in trust for pension benefits. This statement reflects the System’s investments at fair value, as well as cash, receivables, and other assets and liabilities.

The Statement of Changes in Fiduciary Net Position presents information showing how the System’s net position restricted for pension benefits changed during the year ended December 31, 2016. It reflects contributions by members and participating employers, along with deductions for retirement benefits, refunds and withdrawals, and administrative expenses. Investment income from investing and securities lending activities is also presented.

The Notes to Financial Statements provide additional information that is essential for the reader to gain a full understanding of the data provided in the financial statements.

The Required Supplementary Information includes management’s discussion and analysis and schedules of changes in the net pension liability, contributions, and investment returns.

**Financial Highlights and Analysis**

- Net position is available for payment of monthly retirement benefits and other qualified distributions to the System’s participants. Net position restricted for pension benefits was \$5.85 billion at December 31, 2016, compared to \$5.56 billion at December 31, 2015. The increase in net position of \$.29 billion resulted primarily from an increase in the fair value of portfolio investments and investment income.

**Boston Retirement System**  
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**Required Supplementary Information –  
Management’s Discussion and Analysis (continued)**

- The System’s equity and fixed income investments comprised 56.7% of invested assets; the remaining 43.3% of investments were invested in real estate investments (7.7%), alternative investments, including private equity and hedge fund of funds investments (9.9%), PRIT general allocation account (24.7%) and short-term investments (1.0%).
- Receivables decreased by \$11 million at December 31, 2016, while more than three-quarters is due to the other receivables having been collected and the receivables for securities sold were reduced by 20%.
- Liabilities were relatively unchanged at December 31, 2016.

Employers’ contributions are made in accordance with a funding schedule approved by the Massachusetts Public Employee Retirement Administration Commission. The System’s funding objective is to meet long-term benefit obligations through contributions and investment income. As of January 1, 2016, the funding ratio was 58.44%. All employers fully met the required funding amounts in 2016.

	<b>2016</b>	<b>2015</b>	<b>Percentage Change 2016–2015</b>
<i>(In Thousands)</i>			
<b>Assets</b>			
Cash and cash equivalents	\$ 253,687	\$ 230,341	10%
Receivables	40,804	51,852	-21%
Investments	5,606,574	5,333,599	5%
Securities lending collateral investment pool	191,892	184,295	4%
Total assets	6,092,957	5,800,087	5%
<b>Liabilities</b>			
Payables	50,048	56,446	-11%
Obligation to return securities lending collateral	191,826	184,348	4%
Total liabilities	241,874	240,794	0%
Net position restricted for pensions	\$ 5,851,083	\$ 5,559,293	5%



**Boston Retirement System**  
(A Component Unit of the City of Boston, Massachusetts)

**Required Supplementary Information –  
Management’s Discussion and Analysis (continued)**

	<b>2016</b>	<b>2015</b>	<b>Percentage Change 2016–2015</b>
<i>(In Thousands)</i>			
<b>Additions</b>			
Total contributions	\$ 534,191	\$ 486,337	10%
Net investment income	360,051	(15,257)	2460%
Intergovernmental reimbursements	7,566	6,929	9%
Miscellaneous income	89	-	n/a
Total additions	901,897	478,009	89%
<b>Deductions</b>			
Benefit payments	566,850	548,605	3%
Other	43,257	44,258	-2%
Total deductions	610,107	592,863	3%
Net increase (decrease) in net position	291,790	(114,854)	354%
Net position at beginning of year	5,559,293	5,674,147	-2%
Net position at end of year	\$ 5,851,083	\$ 5,559,293	5%

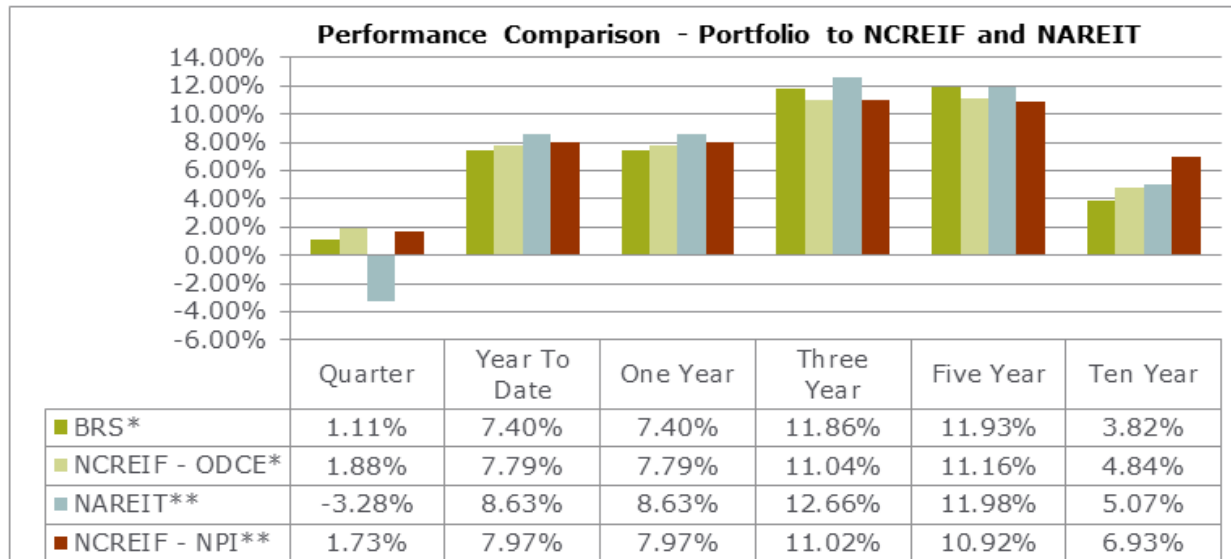
**Plan Investments**

- The total investment return for 2016 was approximately 7.3%. Short-term deviations away from long-term policy targets had a negative impact on performance and active management detracted 70 basis points relative to the allocation index. Most active managers faced headwinds throughout the fiscal year.
- In 2016, the large cap equity composite returned 12% matching the S&P 500 Index for the year. The small cap equity composite returned 12.7%, underperforming the Russell 2000 Index, which gained 21.3%.
- The international equity portfolio posted a return of 0.2% underperforming the MSCI EAFE index by 80 basis points. The emerging market equity portfolio gained 11%, but underperformed the MSCI EM, which gained 11.2%.
- Domestic fixed income had a positive return of 3.9%, beating the benchmark, Barclays Aggregate Bond Index, which returned 2.6%.

**Boston Retirement System**  
(A Component Unit of the City of Boston, Massachusetts)

**Required Supplementary Information –  
Management’s Discussion and Analysis (continued)**

- Value added fixed income results were mixed. The System’s high yield investments gained 12.1%, but underperformed the Barclays High Yield index by 500 basis points. The System’s global bond manager gained 4.4 % and the emerging market debt portfolio gained 9.7%. Both portfolios had a strong rebound in 2016. The System’s global bond manager beat its respective benchmark, the Citigroup World Government Bond Index, by 280 basis points. However, the emerging market debt portfolio slightly underperformed its Custom Emerging Market Debt benchmark by 50 basis points.



- The real estate portfolio yielded a return of 7.40% in 2016 and the portfolio is a combination of core, value-add and opportunistic investment strategies.
- The private equity portfolio earned a return of 3.10% for 2016 and is a combination of a variety of private equity and debt strategies designed to provide a diversified portfolio of assets that can beat the liquid market counterparts over time.
- The System’s hedge fund composite lagged in 2016, with the portfolio returning 0.4% versus HFRI Fund of Funds Index which returned 0.5%.

**Boston Retirement System**  
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**Required Supplementary Information –  
Management’s Discussion and Analysis (continued)**

- During calendar year 2016, the PRIT Core Fund returned 8.1%. At year end, the estimated fair value of the PRIT investment was \$1.38 billion.
- Over a 3, 5, and 10-year horizon, the investments have earned 3.8%, 7.8%, and 4.9%, respectively. These returns are roughly in line with other public funds of a similar size. For perspective, the median public fund earned 5.2% over the ten-year period. Over that same 10-year period, domestic investments such as the S&P 500 and Barclays Aggregate Bond Index were up 6.9% and 4.3%, respectively. While non U.S. investments such as the MSCI EAFE and MSCI Emerging Mkt. Index returned 0.7% and 1.8%, respectively.
- The portfolio has been intentionally invested in a broad array of asset classes and not concentrated from an asset or risk perspective in any one area. This diversification has hurt relative returns recently and is designed to help in down markets. As noted above, 2016 was bullish on domestic equities while markets outside of the U.S. were lukewarm.
- Since August 1994, the average annual return for the fund has been 7.7%.
- On a forward-looking basis, the portfolio’s target expected return over a long-term cycle (30 years) is 7.75%. The fund undertakes a formal asset allocation review each year to evaluate the current market landscape and, if necessary, to adjust the target allocations to reflect current opportunities.

**Other Information**

This financial report is designed to provide a general overview of the System’s finances. Questions concerning the information provided in this report or requests for additional financial information should be addressed to the Boston Retirement Board, Boston City Hall, Room 816, Boston, Massachusetts 02201.

**Boston Retirement System**  
(A Component Unit of the City of Boston, Massachusetts)

**Statement of Fiduciary Net Position**  
(In Thousands)

December 31, 2016

**Assets**

Cash and cash equivalents	\$ <u>253,687</u>
Investments, at fair value:	
Short-term:	
Domestic	50,398
International	3,866
Equity:	
Domestic	1,109,817
International	1,064,600
Fixed income:	
Domestic	748,731
International	260,754
PRIT external investment pooled fund	1,382,745
Real estate	431,091
Alternative	<u>554,572</u>
Total investments, at fair value	<u>5,606,574</u>
Securities lending collateral investment pool	<u>191,892</u>
Receivables:	
Receivable for securities sold	15,183
Accrued interest and dividends	7,184
Other receivables	5,303
Contributions receivable from employers	<u>13,134</u>
Total receivables	<u>40,804</u>
Total assets	<u>6,092,957</u>
<b>Liabilities</b>	
Payable for securities purchased	34,166
Accounts payable, accrued expenses and other liabilities	15,882
Obligation to return securities lending collateral	<u>191,826</u>
Total liabilities	<u>241,874</u>
Net position restricted for pensions	<u>\$ 5,851,083</u>

*See accompanying notes.*

Boston Retirement System  
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Statement of Changes in Fiduciary Net Position  
(In Thousands)

Year Ended December 31, 2016

**Additions**

Contributions:

Employers	\$ 247,771
Commonwealth of Massachusetts	132,477
Employees	<u>153,943</u>
Total contributions	<u>534,191</u>

Investment income:

Interest and dividends	188,572
Net appreciation in fair value of investments	198,838
Less management and related fees	<u>(28,940)</u>
Net income from investing, other than from securities lending	<u>358,470</u>

Securities lending activities:

Securities lending income	2,704
Less borrower rebates and fees	<u>(1,123)</u>
Net income from securities lending activities	<u>1,581</u>
Total net investment income	360,051

Intergovernmental reimbursements	7,566
Miscellaneous income	<u>89</u>
Total additions	<u>901,897</u>

**Deductions**

Benefit payments to plan members and beneficiaries	566,850
Reimbursements to other systems	12,662
Refunds of contributions and transfers to other systems	23,005
Administrative and other expenses	<u>7,590</u>
Total deductions	<u>610,107</u>

Net increase in net position	291,790
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Net position restricted for pensions:

Beginning of year	<u>5,559,293</u>
End of year	<u>\$ 5,851,083</u>

*See accompanying notes.*

**Boston Retirement System**  
(A Component Unit of the City of Boston, Massachusetts)

**Notes to Financial Statements**

December 31, 2016

**1. Plan Description**

The following description of the Boston Retirement System (formerly, the State-Boston Retirement System) (the System, BRS, or the Plan) is provided for general information purposes only. Participants should refer to Chapter 32 of the Massachusetts General Law (M.G.L.) for more detailed information. The Board of Trustees is primarily responsible for the administration of the System and consists of five members as follows: the City Auditor (who serves as an ex officio member), a second member appointed by the Mayor, a third and fourth member elected by active or retired members, and a fifth member chosen by the other four members (or appointed by the Mayor if the other four members do not agree on a selection within 30 days of a vacancy).

**General**

The Plan is a cost-sharing, multiple-employer qualified defined benefit governmental pension plan established under Chapter 32 of the M.G.L. The Plan provides pension benefits for participating employees of the following plan member governmental units:

- City of Boston (the City)\*
- Commonwealth of Massachusetts (Other contributing entity – contributing towards City of Boston Teachers pensions)
- Boston Redevelopment Authority\*
- Boston Housing Authority\*
- Boston Water and Sewer Commission\*
- Boston Public Health Commission\*
- Sheriff of Suffolk County (Retirees as of December 31, 2009, funded by the City)\*

\* Indicates participating employer of the Plan

**Boston Retirement System**  
(A Component Unit of the City of Boston, Massachusetts)

Notes to Financial Statements (continued)

**1. Plan Description (continued)**

At January 1, 2016, System membership consisted of the following:

Active plan members	20,498
Retirees and beneficiaries receiving benefits	14,485
Inactive members entitled to a return of contributions	8,690
Inactive members entitled to, but not yet receiving benefits	1,050
Total membership	44,723
 Number of participating employers	 6

The Commonwealth of Massachusetts (the Commonwealth) is responsible for funding the employer portion of all teacher pensions in the Commonwealth. All teachers in the Commonwealth are members of the Massachusetts Teachers Retirement System, with the exception of teachers employed by the City (Boston Teachers), who are members of the System. Although Boston Teachers are members of the System, the Commonwealth is the responsible contributing entity. Additionally, the Commonwealth reimburses the Plan for all cost-of-living increases paid to recipients that were awarded before 1997.

**Benefits Provided**

Participation in the System is mandatory for all permanent, full-time, and certain part-time employees immediately upon the commencement of employment. Participants who resign from employment or are receiving workers' compensation benefits and who are not eligible to receive a retirement allowance are entitled to request a refund of their accumulated total deductions. In addition, those participants who resign voluntarily with less than ten years of service are entitled to receive 3% per year interest; all others receive interest that has accrued on their cumulative deductions at the regular interest rate (0.10% at December 31, 2016).

Employees with ten or more years of service having attained age 55 are entitled to pension benefits; an earlier retirement is allowed upon completion of 20 years of service. The System provides for retirement allowance benefits up to a maximum of 80% of a participant's highest consecutive three-year average annual rate of regular compensation (highest consecutive five-year average for those members who join the System on or after April 2, 2012). Benefit payments are based upon a participant's age, length of creditable service, regular compensation, and group classification.

**Boston Retirement System**  
(A Component Unit of the City of Boston, Massachusetts)

**Notes to Financial Statements (continued)**

**1. Plan Description (continued)**

Participants become vested after ten years of creditable service. Effective July 1, 1998, Chapter 32 of the M.G.L. assigned the authority to establish and amend benefit provisions and grant cost-of-living increases for the Plan to the Boston Retirement Board.

If a member in service dies due to causes unrelated to his or her job, the surviving spouse and/or surviving dependent children may receive retirement allowance benefits, either in a lump sum or in the form of an annuity, based on the length of service, contributions, and age. In the event there is no spouse and/or dependent children named, other beneficiaries may be entitled to a lump-sum distribution. Participants who become permanently and totally disabled from further duty may be eligible to receive accidental or ordinary disability retirement benefits.

Accidental disability is provided to members with incapacitation resulting from a work-related injury or hazard. Generally, annual pension benefits are provided based on 72% of the annual rate of regular compensation a member earned while an active employee on date of injury or average annual rate of regular compensation. Ordinary disability is available to any member whose permanent incapacitation is not work-related and has attained ten years of creditable service. Such benefits are provided as if the member had attained the age of 55 (or actual age if over 55) based on the amount of creditable service actually earned. Limits are placed on how much a disability employee can earn from other sources while collecting a disability retirement pension.

**2. Summary of Significant Accounting Policies**

**Financial Reporting Entity**

Because of the significance of its operational and financial relationship with the City, the System is included as a component unit reported as a pension trust fund in the City's basic financial statements. The System adheres to reporting requirements established by the Government Accounting Standards Board (GASB).

**Basis of Accounting**

The accompanying financial statements are presented on the accrual basis of accounting.



Boston Retirement System  
(A Component Unit of the City of Boston, Massachusetts)

Notes to Financial Statements (continued)

**2. Summary of Significant Accounting Policies (continued)**

**Cash Equivalents**

Highly liquid investments with maturities of three months or less at date of purchase are considered to be cash equivalents.

**Short-Term Investment Funds**

Cash balances maintained by investment managers are recorded as short-term investments on the statement of fiduciary net position.

**Revenue Recognition**

Contributions are recognized as additions in the period when they become due pursuant to formal statutory obligations. Investment income is recognized when earned.

**Benefit Payments and Refunds of Contributions**

Benefits and refunds to plan members and beneficiaries are recognized as expenses when due and payable in accordance with the terms of the Plan.

**Intergovernmental, Reimbursements, and Transfers to Other Systems**

When members transfer to or from other Massachusetts public retirement systems, their cumulative contributions are transferred from the prior employer to the respective Massachusetts public retirement system, and are recognized as receipts or expenses when paid. Additionally, the prior employer reimburses the respective system for a pro rata portion of such members' pension benefits (based on years of service) upon retirement.

**Valuation of Investments and Income Recognition**

The Plan's investments are stated at fair value. Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date (an exit price). See Note 4 for further discussion and disclosures related to fair value measurements.

Boston Retirement System  
(A Component Unit of the City of Boston, Massachusetts)

Notes to Financial Statements (continued)

**2. Summary of Significant Accounting Policies (continued)**

Following is a description of the valuation techniques and inputs used for each major class of assets and liabilities measured at fair value.

*Short-Term, Equity and Fixed Income Investments*

Securities traded on a national or international exchange are valued at the last reported sales price at current exchange rates. Certain fixed income securities not traded on an exchange are valued using a matrix pricing technique. Matrix pricing is used to value securities based on the securities' relationship to benchmark quoted prices.

*Pooled Funds*

The fair value of shares in managed investment pools is based on unit values reported by the funds.

*Alternative Investments*

Alternative investments include hedge funds, holdings through commingled limited partnerships of venture capital funds, including equity interests in early, middle, and later stage companies, as well as debt and equity interests in buyouts, acquisitions, restructurings, mezzanine structures and special situations, such as litigation or spin-off activities. These investments are carried at the limited partnership interest or redemption value, the equivalent of net asset value, which approximates fair value. Values assigned to such investments are based on available information and do not necessarily represent amounts that may ultimately be realized in liquidation. Liquidation values depend largely on future circumstances, including marketability, and frequently cannot reasonably be estimated until at, or near, the liquidation date.

*Real Estate*

Real estate investments consist of interests in commercial properties held by various partnerships and other limited liability entities, some of which utilize debt financing. Fair values of such holdings are reported based on the net asset values of the entities, which are estimated using third-party appraisals and other information provided by property managers.

Boston Retirement System  
(A Component Unit of the City of Boston, Massachusetts)

Notes to Financial Statements (continued)

**2. Summary of Significant Accounting Policies (continued)**

**Basis of Investment Transactions**

Purchases and sales of investments are recorded on the trade date. Transactions unsettled as of the measurement date are recorded as payables for securities purchased and as receivables for securities sold.

**Foreign Currency Contracts**

The System's investment policy permits it to enter into forward foreign currency contracts for the purpose of hedging foreign currency fluctuations. A forward foreign currency contract is an agreement between two parties to buy or sell a fixed quantity of currency at a set price on a future date. The System may enter into forward foreign currency contracts to hedge its exposure to the effect of changes in foreign currency exchange rates upon its non-U.S. dollar-denominated investments. The contracts are valued daily, and the changes in fair value are recorded by the System as investment income in the statement of changes in fiduciary net position. When the contract is closed, the System records a realized gain or loss equal to the difference between the cost of the contract at the time it was opened and the value at the time it was closed.

**Adoption of Recent Accounting Pronouncements**

In 2015, the System elected to early adopt GASB Statement No. 72, *Fair Value Measurement and Application* (GASB 72). The objective of GASB 72 is to improve financial reporting by clarifying the definition of fair value for financial reporting purposes, establishing general principles for measuring fair value, providing additional fair value application guidance, and enhancing disclosures about concepts and definitions established in Concepts Statement No. 6, *Measurement of Elements of Financial Statements*, and other relevant literature. GASB 72 is effective for fiscal years beginning after June 15, 2015. The adoption of GASB 72 had no effect on the presentation of the financial statements, but resulted in additional disclosures in the notes to the financial statements.

In 2015, the System elected to early adopt GASB Statement No. 82, *Pension Issues, an amendment of GASB Statements No. 67, No. 68, and No. 73* (GASB 82). The objective of GASB 82 is to address certain issues that have been raised with respect to GASB Statements No. 67, *Financial Reporting for Pension Plans*, No. 68, *Accounting and Financial Reporting for Pensions*, and No. 73, *Accounting and Financial Reporting for Pensions and Related Assets That Are Not within the*

Boston Retirement System  
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Notes to Financial Statements (continued)

**2. Summary of Significant Accounting Policies (continued)**

*Scope of GASB Statement 68, and Amendments to Certain Provisions of GASB Statements 67 and 68.* Specifically, GASB 82 addresses issues regarding (1) the presentation of payroll-related measures in required supplementary information, (2) the selection of assumptions and the treatment of deviations from the guidance in an Actuarial Standard of Practice for financial reporting purposes, and (3) the classification of payments made by employers to satisfy employee (plan member) contribution requirements. The provisions of this statement are effective for fiscal years beginning after June 15, 2016. The adoption of GASB 82 had no effect on the presentation of the financial statements, but resulted in the presentation of covered payroll for the year ended December 31, 2014 in the Schedules of Changes in the Net Pension Liability and of Contributions, which are presented as required supplementary information.

**3. Cash Deposits, Investments, Securities Lending, and Derivatives**

The following disclosures represent essential risk information about the System's deposits and investments.

**Investment Policy**

The provisions of M.G.L. chapter 32 § 23(2); 840 C.M.R. 16-19, 21, 23, 26; and, the Plan's own investment regulations (stated at <http://www.mass.gov/perac/board-info/profiles/investment/bostonintsup.html>) govern the System's investment practice.

Diversification is attained through varied investment management styles that comply with Massachusetts state law. This is accomplished through the retention of investment managers that adhere to M.G.L. chapter 32, § 3(3), the Prudent Person rule.

The System has retained an investment consultant to work with The Boston Retirement Board in a fiduciary capacity to assure that strategic investment diversification is attained, to employ investment managers with expertise in their respective asset classes, and to closely monitor the implementation and performance of the respective investment strategies.

**Boston Retirement System**  
(A Component Unit of the City of Boston, Massachusetts)

Notes to Financial Statements (continued)

**3. Cash Deposits, Investments, Securities Lending, and Derivatives (continued)**

The System is currently invested in stocks (domestic and foreign), fixed income securities (domestic and foreign), real estate, private equity, the Commonwealth's Pension Reserve Investment Trust (PRIT) and hedge funds.

The following was the adopted asset allocation policy as of December 31, 2016:

<b>Asset Class</b>	<b>BRS Excluding Boston Teachers – Target Allocation</b>	<b>Boston Teachers – Target Allocation</b>
Domestic equity	25%	18%
International developed markets equity	19%	16%
International emerging markets equity	8%	6%
Core fixed income	11%	13%
High yield fixed income	13%	10%
Real estate	10%	10%
Commodities	0%	4%
Hedge fund, GTAA, Risk parity	7%	13%
Private Equity	7%	10%
Total	100%	100%

**Rate of Return**

For the year ended December 31, 2016, the annual money-weighted rate of return on pension plan investments, net of pension plan investment expense, was 7.15 percent. The money-weighted rate of return expresses investment performance, net of investment expense, adjusted for the changing amounts actually invested.

**Boston Retirement System**  
(A Component Unit of the City of Boston, Massachusetts)

**Notes to Financial Statements (continued)**

**3. Cash Deposits, Investments, Securities Lending, and Derivatives (continued)**

**Interest Rate Risk**

The following is a listing of the System's fixed income investments (in thousands) and related maturity schedule (in years) as of December 31, 2016:

<b>Investment Type</b>	<b>Fair Value</b>	<b>Less Than 1</b>	<b>1-5</b>	<b>6-10</b>	<b>More Than 10</b>
U.S. Treasury notes and bonds	\$ 73,823	\$ 2,540	\$ 41,750	\$ 10,302	\$ 19,231
U.S. agencies	74,157	1,462	1,180	1,120	70,395
Domestic corporate	581,704	4,494	107,737	170,080	299,393
Municipal	5,254	-	3,176	-	2,078
International corporate	36,353	-	11,706	20,634	4,013
International government	171,742	268	3,240	4,996	163,238
Asset-backed:					
CMOs	24,301	-	256	-	24,045
Other	42,150	-	16,806	4,820	20,524
	<u>\$ 1,009,484</u>	<u>\$ 8,764</u>	<u>\$ 185,851</u>	<u>\$ 211,952</u>	<u>\$ 602,917</u>

The System's guidelines do not specifically address limits on maturities as a means of managing its exposure to fair value losses arising from increasing interest rates. The managers of each fixed income portfolio are responsible for determining the maturity and commensurate returns of their portfolio.

The collateralized mortgage obligations (CMOs) held by the System as of December 31, 2016, are highly sensitive to changes in interest rates.

**Credit Risk**

The System allows investment managers to apply discretion under the Prudent Person rule. Investments are made, as a prudent person would be expected to act with discretion and intelligence, to seek reasonable income, preserve capital and, in general, avoid speculative investments.

**Boston Retirement System**  
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Notes to Financial Statements (continued)

**3. Cash Deposits, Investments, Securities Lending, and Derivatives (continued)**

The System's fixed income investments as of December 31, 2016, were rated by Standard & Poor's and/or an equivalent national rating organization and the ratings are presented below (in thousands) using the Standard & Poor's rating scale:

Investment Type	Fair Value	AAA	AA	A	BBB	BB	B	CCC	Not Rated
U.S. agencies	\$ 74,157	\$ -	\$ 1,122	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 73,035
Domestic									
corporate	581,704	615	4,850	21,528	54,758	28,291	62,929	36,174	372,559
Municipal	5,254	-	3,181	1,215	858	-	-	-	-
International									
corporate	36,353	990	457	6,750	9,103	4,633	6,583	3,340	4,497
International government	171,742	2,155	2,369	4,867	1,291	-	1,443	-	159,617
Asset-backed:									
CMOs	24,301	19,118	1,443	1,139	-	-	-	-	2,601
Other	42,150	31,111	2,019	2,053	-	-	303	-	6,664
	<u>\$ 935,661</u>	<u>\$ 53,989</u>	<u>\$ 15,441</u>	<u>\$ 37,552</u>	<u>\$ 66,010</u>	<u>\$ 32,924</u>	<u>\$ 71,258</u>	<u>\$ 39,514</u>	<u>\$618,973</u>

In addition to the above schedule, the System has approximately \$73.8 million invested in U.S. government securities, which are explicitly guaranteed by the U.S. government.

**Concentration Risk**

Other than the PRIT fund, the System has no investments at fair value that exceed 5% of the System's total investments as of December 31, 2016.

The System adheres to the provisions of M.G.L. chapter 32 § 23(2); 840 C.M.R. 16-19, 21, 23, 26; and the Plan's own investment regulations when managing concentration risk.

**Foreign Currency Risk**

Foreign currency risk is the risk that changes in exchange rates will adversely affect the fair value of an investment or a deposit. Similar to the investments in domestic equities, the System employs or encourages its investment advisor to employ diversification, asset allocation, and quality strategies.

**Boston Retirement System**  
(A Component Unit of the City of Boston, Massachusetts)

**Notes to Financial Statements (continued)**

**3. Cash Deposits, Investments, Securities Lending, and Derivatives (continued)**

Risk of loss arises from changes in currency exchange rates. The System's exposure to foreign currency risk is presented on the following table (in thousands):

<b>Currency</b>	<b>Cash and Short-Term Investments</b>	<b>Fixed Income</b>	<b>Equity</b>	<b>Alternative</b>	<b>Total</b>
Australian dollar	\$ 186	\$ 641	\$ 24,994	\$ –	\$ 25,821
Brazilian real	–	142	–	–	142
Canadian dollar	109	434	216	–	759
Columbian peso	–	111	–	–	111
Danish krone	25	149	9,227	–	9,401
Euro currency	163	3,308	186,712	7,670	197,853
Hong Kong dollar	51	–	17,370	–	17,421
Indonesian rupiah	7	227	171	–	405
Japanese yen	144	2,450	79,650	–	82,244
Malaysian ringgit	3	63	–	–	66
Mexican peso	43	465	–	–	508
New Israeli sheqel	3	–	–	–	3
New Zealand dollar	21	–	1,179	–	1,200
Norwegian krone	29	552	230	–	811
Polish zloty	9	251	–	–	260
Pound sterling	248	1,027	81,459	8,880	91,614
Singapore dollar	43	148	5,771	–	5,962
South African rand	11	252	–	–	263
South Korean won	51	268	5,872	–	6,191
Swedish krona	19	126	11,141	–	11,286
Swiss franc	12	147	43,720	–	43,879
Thailand Baht	28	–	–	–	28
Total securities subject to foreign currency risk	1,205	10,761	467,712	16,550	496,228
U.S. dollars (securities held by international investment managers)	–	35,476	207,020	–	242,496
Total international investment securities	<u>\$ 1,205</u>	<u>\$ 46,237</u>	<u>\$ 674,732</u>	<u>\$ 16,550</u>	<u>\$ 738,724</u>



Boston Retirement System  
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Notes to Financial Statements (continued)

**3. Cash Deposits, Investments, Securities Lending, and Derivatives (continued)**

**PRIT External Investment Pooled Fund**

The Massachusetts legislature enacted Section 17 of Chapter 112 of the Acts of 2010 that requires the System to invest all assets, current and future, related to Boston Teachers in the PRIT pooled fund. The PRIT pooled fund is an external investment pool that is not registered with the Securities and Exchange Commission, but is subject to oversight provided by the Pension Reserves Investment Management Board (the PRIM Board). The PRIM Board was created by legislation to provide general supervision of the investments and management of PRIT. PRIT is not a rated fund.

The fair value of the PRIT pooled fund is based on unit value as reported by management of the PRIT pooled fund. The PRIT fund issues separately available audited financial statements with a year-end of June 30.

On July 1, 2010, the System transferred 27% of its assets, or \$1.1 billion, to the PRIT pooled fund. As of December 31, 2016, the System had the following amounts invested in the PRIT fund (in thousands):

General allocation account	\$ 1,382,745
Cash fund	<u>132,523</u>
Total PRIT pooled funds	<u>\$ 1,515,268</u>

**Boston Retirement System**  
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Notes to Financial Statements (continued)

**3. Cash Deposits, Investments, Securities Lending, and Derivatives (continued)**

As of December 31, 2016, the general allocation account is diversified into the following:

<u>Asset Class</u>	<u>Percentage</u>
Core fixed income	12.3%
Domestic equity	19.8
Emerging markets	6.9
Hedge funds	8.5
International equity	17.0
Liquidating portfolio	0.4
Portfolio completion	1.1
Private equity	11.1
Real estate	9.6
Cash overlay	1.0
Distressed debt	2.1
Timber natural resources	3.7
Value-added fixed income	6.5
Total	<u>100.0%</u>

**Securities Lending Transactions**

The Public Employee Retirement Administration Commission (PERAC) has issued supplemental regulations that permit the System to engage in securities lending transactions. Securities lending is an investment management enhancement that utilizes certain existing securities of the Plan to earn additional income. These transactions are conducted by the System's custodian, who lends certain securities owned by the System to broker-dealers and banks pursuant to a form of loan agreement. The System and the borrowers maintain the right to terminate all securities lending transactions on demand.

Securities lending involves the loaning of securities to approved banks and broker-dealers. In return for the loaned securities, the custodian, prior to or simultaneous with delivery of the loaned securities to the borrower, receives collateral in the form of cash (including both U.S. and foreign currency) or U.S. government securities, sovereign debt of foreign countries, and irrevocable bank letters of credit as collateral to serve as a safeguard against possible default of any borrower on the return of the loan. The custodian does not have the ability to pledge or sell collateral unless the borrower defaults. Borrowers are required to deliver collateral in amounts equal to not less than

Boston Retirement System  
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Notes to Financial Statements (continued)

**3. Cash Deposits, Investments, Securities Lending, and Derivatives (continued)**

100% of the market value of the loaned securities. The collateral is marked to market on a daily basis. In the event the counterparty is unable to meet its contractual obligation under the securities lending arrangement, the Plan may incur losses equal to the amount by which the market value of the securities differs from the amount of collateral held. The Plan mitigates credit risk associated with securities lending arrangements by monitoring the fair value of the securities loaned on a daily basis, with additional collateral obtained or refunded as necessary. At December 31, 2016, the System had no credit risk exposure to borrowers because the amounts the System owed the borrowers exceeded the amounts owed to the System.

The System does not impose any restrictions on the amount of securities lent on its behalf by the custodian. There were no failures by any borrowers to return loaned securities or pay distributions thereon and there were no losses from a default of the borrowers or the custodian for the year ended December 31, 2016. The cash collateral received by the custodian on each loan was invested, together with the cash collateral of other qualified tax-exempt plan lenders, in a collective investment pool. The relationship between the average maturities of the investment pool and loans was affected by the maturities of the loans made by other plans that invested cash collateral in the collective investment pool, which the System could not determine.

The Plan maintains full ownership rights to the securities loaned and, accordingly, classifies loaned securities as investments. At December 31, 2016, the fair value of securities loaned by the System amounted to \$271,263,139, against which was held collateral at fair value of \$279,838,166 as follows (in thousands):

Short-term collateral investment pool	\$ 191,826
Noncash collateral	<u>88,012</u>
	<u>\$ 279,838</u>

**Commitments**

At December 31, 2016, the System had contractual commitments to provide \$243 million of additional funding to private equity funds and \$69 million to real estate funds.

**Boston Retirement System**  
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**Notes to Financial Statements (continued)**

**3. Cash Deposits, Investments, Securities Lending, and Derivatives (continued)**

**Derivatives**

The System trades financial instruments with off-balance sheet risk in the normal course of its investing activities to assist in managing exposure to market risks. The System uses forward foreign currency contracts to hedge against the risk of future foreign currency fluctuations.

**4. Fair Value Measurements**

The fair value framework establishes a fair value hierarchy that prioritizes the inputs to valuation techniques used to measure fair value. The fair value hierarchy gives the highest priority to unadjusted quoted prices in active markets for identical assets and liabilities (Level 1) and the lowest priority to unobservable inputs (Level 3). The three levels of the fair value hierarchy are described below:

- Level 1 – Unadjusted quoted prices in active markets that are accessible to the reporting entity at the measurement date for identical assets and liabilities.
- Level 2 – Inputs other than quoted prices in active markets for identical assets and liabilities that are observable either directly or indirectly for substantially the full term of the asset or liability. Level 2 inputs include the following:
  - Quoted prices for similar assets and liabilities in active markets
  - Quoted prices for identical or similar assets or liabilities in markets that are not active
  - Observable inputs other than quoted prices that are used in the valuation of the asset or liabilities (e.g., interest rate and yield curve quotes at commonly quoted intervals)
  - Inputs that are derived principally from or corroborated by observable market data by correlation or other means
- Level 3 – Unobservable inputs for the asset or liability (i.e., supported by little or no market activity). Level 3 inputs include management’s own assumption about the assumptions that market participants would use in pricing the asset or liability (including assumptions about risk).

**Boston Retirement System**  
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Notes to Financial Statements (continued)

**4. Fair Value Measurements (continued)**

The level in the fair value hierarchy within which the fair value measurement is classified is determined based the lowest level input that is significant to the fair value measure in its entirety.

The following table sets forth by fair value hierarchy level, the Plan's assets carried at fair value at December 31, 2016 (in thousands):

	<b>Total at December 31, 2016</b>	<b>Fair Value Measurements Using:</b>		
		<b>Quoted Prices in Active Markets for Identical Assets (Level 1)</b>	<b>Significant Other Observable Inputs (Level 2)</b>	<b>Significant Unobservable Inputs (Level 3)</b>
Short-term:				
Domestic	\$ 50,398	\$ 50,398	\$ —	\$ —
International	3,866	3,866	—	—
Total short-term	54,264	54,264	—	—
U.S. equities:				
Large cap core	626,295	626,295	—	—
Large cap growth	116,912	116,912	—	—
Large cap value	100,733	100,733	—	—
Small cap core	83,856	83,856	—	—
Small cap growth	103,165	103,165	—	—
Small cap value	78,856	78,856	—	—
Total U.S. equities	1,109,817	1,109,817	—	—
International equities	1,064,600	1,064,600	—	—
Fixed income securities:				
U.S. treasury securities	73,823	73,823	—	—
Corporate debt securities	581,704	498,441	83,263	—
Global multi-sector fixed income	208,095	—	208,095	—
Municipal	5,254	—	5,254	—

**Boston Retirement System**  
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Notes to Financial Statements (continued)

**4. Fair Value Measurements (continued)**

	<b>Total at December 31, 2016</b>	<b>Fair Value Measurements Using:</b>		
		<b>Quoted Prices in Active Markets for Identical Assets (Level 1)</b>	<b>Significant Other Observable Inputs (Level 2)</b>	<b>Significant Unobservable Inputs (Level 3)</b>
Fixed income securities: (cont'd)				
CMO	\$ 24,301	\$ —	\$ 24,301	\$ —
Other asset backed securities	42,150	—	42,150	—
Agencies	74,158	—	74,158	—
Total fixed income securities	<u>1,009,485</u>	<u>572,264</u>	<u>437,221</u>	<u>—</u>
Total investments by fair value level	<u>3,238,166</u>	<u>\$ 2,800,945</u>	<u>\$ 437,221</u>	<u>\$ —</u>
Government external investment pool:				
PRIT fund	1,382,745			
Investments measured at the net asset value (NAV):				
Hedge fund of funds	324,902			
Private equity funds	229,670			
Private real estate funds	<u>431,091</u>			
Total investments measured at the NAV	<u>985,663</u>			
Total investments at fair value	<u>\$ 5,606,574</u>			

Fixed income and equity securities classified in Level 1 of the fair value hierarchy are valued using prices quoted in active markets for those securities. Fixed income securities classified in Level 2 of the fair value hierarchy are valued using a matrix pricing technique. Matrix pricing is used to value securities based on the securities' relationship to benchmark quoted prices.

The PRIT pooled fund is an external investment pool that is not registered with the Securities and Exchange Commission, but is subject to oversight provided by the Pension Reserves Investment Management Board (the PRIM Board). The PRIM Board was created by legislation to provide general supervision of the investments and management of PRIT. PRIT is not a rated fund. The fair value of the PRIT pooled fund is based on unit value as reported by management of the PRIT pooled fund. The PRIT fund issues separately available audited financial statements with a year-end of June 30. The Plan is required to provide a 30-day redemption notice for this investment.

**Boston Retirement System**  
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**Notes to Financial Statements (continued)**

**4. Fair Value Measurements (continued)**

The valuation method for investments measured at the net asset value (NAV) per share (or its equivalent) is presented on the following table (in thousands).

	<b>Investments Measured at the NAV</b>			
	<b>Fair Value</b>	<b>Unfunded Commitments</b>	<b>Redemption Frequency</b>	<b>Redemption Notice Period</b>
Global multi-strategy hedge fund of funds <sup>1</sup>	\$ 324,091	\$ —	Quarterly	60-90 days
Real estate funds <sup>2</sup>	431,091	68,559		
Private equity funds <sup>3</sup>	229,670	242,817		

1. Global Multi-strategy Hedge Fund of Funds. This type includes investments in 6 hedge funds that invest in other hedge fund managers. Management of each hedge fund is given full discretion to invest with direct hedge fund managers. The fair value of the investments in this type has been determined using the NAV per share of the investments.
2. Real Estate Funds. This type includes 31 real estate funds that invest primarily in U.S. commercial real estate. The fair values of the investments in this type have been determined using the NAV per share (or its equivalent) of the System's ownership interest in partners' capital. Distributions from each fund will be received as the underlying investments of the funds are liquidated. It is expected that the underlying assets of the funds will be liquidated over the next 7 to 10 years.
3. Private Equity Funds. This type includes 58 private equity funds that invest primarily in U.S. companies. These investments can never be redeemed with the funds; instead, the nature of the investments in this type is that distributions are received through the liquidation of the underlying assets of the funds. It is expected that the underlying assets of the funds will be liquidated over the next 7 to 10 years.

**Boston Retirement System**  
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Notes to Financial Statements (continued)

**5. Contributions and Funding Policy**

Participating employers are required to pay into the System their share of the remaining actuarially determined contribution and plan administration costs, which are apportioned among the participating employers based on an actuarial computation.

The participating employers' actual contributions to the System for the year ended December 31, 2016 were as follows (in thousands):

City of Boston	\$ 201,491
Commonwealth of Massachusetts (Boston Teachers)	132,477
Sheriff of Suffolk County	3,875
Boston Housing Authority	11,904
Boston Public Health Commission	18,263
Boston Redevelopment Authority	2,316
Boston Water and Sewer Commission	9,922
	<u>\$ 380,248</u>

As a condition of participation, employees are required to contribute 5% of their salary if hired prior to January 1, 1975; 7% if hired after January 1, 1975, and before January 1, 1984; 8% if hired after January 1, 1984, and before July 1, 1996; and 9% if hired after July 1, 1996. Employees hired after January 1, 1979, contribute an additional 2% of earnings in excess of \$30,000 per year. Additionally, teachers who became members of the System after June 30, 2001, or other teachers who elect this option, are required by law to contribute 11% of their salary. Overtime and certain additional earnings are not subject to these assessments and are not considered in the determination of final average salary.



**Boston Retirement System**  
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Notes to Financial Statements (continued)

**6. Legally Required Reserve Accounts**

The balances in the System's legally required reserves at December 31, 2016, were as follows (in thousands):

		<u>Purpose</u>
Annuity Savings Fund	\$ 1,700,074	Active members' contribution balance
Annuity Reserve Fund	449,058	Retired members' contribution account
Military Service Fund	50	Members' contribution account while on military leave
Pension Reserve Fund	3,466,207	Amounts appropriated to fund future retirement benefits
Pension Fund	235,694	Remaining net position
	<u>\$ 5,851,083</u>	

All reserve accounts are funded at levels required by state statute.

**7. Net Pension Liability of Participating Employers**

The components of the net pension liability of the participating employers are as follows:

	<u>December 31, 2016</u>	<u>January 1, 2016</u>
Total pension liability	<b>\$ 10,011,687,897</b>	\$ 9,969,543,077
Plan fiduciary net position	<b>5,851,083,170</b>	5,559,293,370
Employers' net pension liability	<b>\$ 4,160,604,727</b>	<b>\$ 4,410,249,707</b>
Plan fiduciary net position as a percentage of the total pension liability	<b>58.44%</b>	55.76%

Boston Retirement System  
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Notes to Financial Statements (continued)

**7. Net Pension Liability of Participating Employers (continued)**

*Actuarial assumptions.* The total pension liability was determined by an actuarial valuation as of January 1, 2016, with update procedures used to roll forward the total pension liability to December 31, 2016 using the following actuarial assumptions, applied to all periods included in the measurement:

Inflation                                      3.25% for BRS excluding Teachers, 4.50% for Teachers  
Salary increases:

<b>Years of Service</b>	<b>Boston Teachers</b>	<b>BRS Excluding Boston Teachers</b>		
		<b>Group 1</b>	<b>Group 2</b>	<b>Group 4</b>
0	7.50%	4.00%	4.25%	4.50%
1	7.10	4.00	4.25	4.50
2	7.00	4.00	4.25	4.50
3	6.90	4.00	4.25	4.50
4	6.80	4.00	4.25	4.50
5	6.70	4.00	4.25	4.50
6	6.60	4.00	4.25	4.50
7	6.50	4.00	4.25	4.50
8	6.30	4.00	4.25	4.50
9	6.10	4.00	4.25	4.50
10	5.90	4.00	4.25	4.50
11	5.70	4.00	4.25	4.50
12	5.20	4.00	4.25	4.50
13	4.70	4.00	4.25	4.50
14	4.35	4.00	4.25	4.50
15–16	4.20	4.00	4.25	4.50
17–19	4.10	4.00	4.25	4.50
20 and later	4.00	4.00	4.25	4.50

Investment rate of return                      7.75% for BRS excluding Boston Teachers and 7.50% for Boston Teachers, net of investment expenses, including inflation

Boston Retirement System  
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Notes to Financial Statements (continued)

**7. Net Pension Liability of Participating Employers (continued)**

Cost of Living Adjustments                      3.00% of first \$13,000

**Mortality Rates**

*December 31, 2015 TPL*

Healthy	RP-2000 Employee and Healthy Annuitant Mortality Tables projected generationally using Scale BB2D from 2009 for BRS excluding Boston Teachers and RP-2014 Employee and Healthy Annuitant Mortality Tables projected generationally using Scale BB2D from 2014 for Boston Teachers
Disabled	RP-2000 Healthy Annuitant Mortality Table projected generationally with Scale BB2D from 2015 for BRS excluding Boston Teachers and RP-2014 Healthy Annuitant Mortality Table set forward four years projected generationally using Scale BB2D from 2014 for Boston Teachers

*December 31, 2016 TPL*

Healthy	RP-2000 Employee and Healthy Annuitant Mortality Tables projected generationally using Scale BB2D from 2009 for BRS excluding Boston Teachers and RP-2014 Employee and Healthy Annuitant Mortality Tables projected generationally using Scale BB2D from 2014 for Boston Teachers
Disabled	RP-2000 Healthy Annuitant Mortality Table projected generationally with Scale BB2D from 2015 for BRS excluding Boston Teachers and RP-2014 Healthy Annuitant Mortality Table set forward four years projected generationally using Scale BB2D from 2014 for Boston Teachers

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Notes to Financial Statements (continued)

**7. Net Pension Liability of Participating Employers (continued)**

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, 2016, are summarized in the following table:

<u>Asset Class</u>	<u>Long-Term Expected Real Rate of Return</u>
Domestic equity	6.44%
International developed markets equity	7.40%
Emerging markets equity	9.42%
Core fixed income	2.03%
High yield fixed income	4.43%
Real estate	5.00%
Commodities	4.43%
Short-term government money market	—
Hedge fund, GTAA, Risk parity	3.75%
Private equity	10.47%

*Discount rate:* The discount rate used to measure the total pension liability was 7.75% for the BRS excluding Boston Teachers and 7.50% for Boston 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 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.

Boston Retirement System  
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Notes to Financial Statements (continued)

**7. Net Pension Liability of Participating Employers (continued)**

*Sensitivity of the net pension liability to changes in the discount rate.* The following presents the net pension liability of the Boston Retirement System, calculated using the discount rate of 7.75% for the BRS excluding Boston Teachers and 7.50% for the Boston Teachers, as well as what the 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 BRS excluding Boston Teachers and 6.50% for the Boston Teachers) or 1-percentage-point higher (8.75% for the BRS excluding Boston Teachers and 8.50% for the Boston Teachers) than the current rate:

	1% Decrease	Current Discount	1% Increase
Boston Retirement System’s net pension liability as of December 31, 2016	\$ 5,284,808,018	\$ 4,160,604,727	\$ 3,213,943,278

**8. Contingencies**

There are various pending claims arising in the ordinary course of operations; however, management believes that the probable liability resulting from such claims and litigation would not materially affect the System’s financial position.

**9. Commitments**

During fiscal year 2008, the System signed a memorandum of understanding with the City for the purpose of financing the development, design, purchase, and installation of a pension management system of \$16.0 million. Subsequently, the System obtained an additional \$4.6 million and, therefore, is committed to repaying the City \$20.6 million. As of December 31, 2016, approximately \$14.0 million has been repaid. Refer to Note 3 for additional disclosures regarding commitments.

**Boston Retirement System**  
(A Component Unit of the City of Boston, Massachusetts)

**Notes to Financial Statements (continued)**

**10. Tax Status**

The Plan has received a determination letter from the Internal Revenue Service dated August 13, 2014, stating that the Plan is qualified under Section 401(a) of the Internal Revenue Code (the Code) and therefore, the related trust is exempt from taxation. Once qualified, the Plan is required to operate in conformity with the Code to maintain its qualified status. The plan administrator believes the Plan is being operated in compliance with the applicable requirements of the Code and therefore, believes the Plan is qualified and the related trust is tax exempt.

The Plan is subject to routine audits by taxing jurisdictions; however, there are currently no audits for any tax periods in progress.

**11. Subsequent Events**

Management has evaluated subsequent events through December 1, 2017, the date that the financial statements were available to be issued, and concluded that no material events have occurred that would require recognition or disclosure.

# Required Supplementary Information

**Boston Retirement System**  
(A Component Unit of the City of Boston, Massachusetts)

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

Year Ended December 31, 2016

	<b>2016</b>	<b>2015</b>	<b>2014</b>
Total pension liability			
Service cost	\$ 200,166,141	\$ 194,996,031	\$ 184,938,621
Interest	755,579,729	739,499,439	705,610,897
Differences between expected and actual experience	(318,650,369)	–	–
Changes of assumptions	–	89,776,142	94,626,461
Changes of benefit terms	–	–	–
Benefit payments, including refunds of employee contributions	(594,950,681)	(576,941,443)	(550,984,406)
Net change in total pension liability	42,144,820	447,330,169	434,191,573
Total pension liability – beginning	9,969,543,077	9,522,212,908	9,088,021,335
Total pension liability – ending (a)	<b>\$ 10,011,687,897</b>	<b>\$ 9,969,543,077</b>	<b>\$ 9,522,212,908</b>
Plan fiduciary net position			
Contributions – employer	\$ 247,770,904	\$ 218,812,904	\$ 203,074,621
Contributions – non employer contributing entity	132,477,000	120,434,000	114,335,385
Contributions – employee	153,879,817	147,090,451	143,397,524
Net investment income	360,333,280	(15,257,000)	283,342,371
Benefit payments, including refunds of employee contributions	(594,950,681)	(576,982,464)	(550,984,406)
Administrative expenses	(7,720,520)	(8,951,662)	(10,215,495)
Net change in fiduciary net position	291,789,800	(114,853,771)	182,950,000
Plan fiduciary net position – beginning	5,559,293,370	5,674,147,141	5,491,197,000
Plan fiduciary net position – ending (b)	<b>\$ 5,851,083,170</b>	<b>\$ 5,559,293,370</b>	<b>\$ 5,674,147,000</b>
Net pension liability – ending: (a)-(b)	<b>\$ 4,160,604,727</b>	<b>\$ 4,410,249,707</b>	<b>\$ 3,848,065,908</b>
Plan's fiduciary net position as a percentage of the total pension liability	<b>58.44%</b>	55.76%	59.59%
Covered payroll	<b>\$ 1,498,768,546</b>	<b>\$ 1,493,958,273</b>	<b>\$ 1,444,652,177</b>
Net pension liability as a percentage of covered payroll	<b>277.60%</b>	295.21%	266.37%

*Note: Schedule is intended to show information for ten years. Historical information prior to implementation of GASB 67 is not required if the information is not available. Additional years will be displayed as they become available.*

*Note: Total pension liability and Plan fiduciary net position calculations were completed separately for the BRS excluding Boston Teachers and the Boston Teachers.*

*Note: Covered payroll for 2014 has been revised to reflect a change in the definition of covered payroll under GASB Statement No. 82.*



**Boston Retirement System**  
(A Component Unit of the City of Boston, Massachusetts)

**Schedule of Contributions – Last Ten Years**

Year Ended December 31, 2016  
(In Thousands)

<b>Year Ended December 31</b>	<b>Actuarially Determined Contribution</b>	<b>Contributions in Relation to the Actuarially Determined Contribution</b>	<b>Contribution Deficiency (Excess)</b>	<b>Covered Payroll</b>	<b>Contributions as a Percentage of Covered Payroll</b>
2016	\$ 368,248	\$ 380,248	\$ (12,000)	\$ 1,498,769	25.37%
2015	339,247	339,247	–	1,493,958	22.71%
2014	312,560	312,560	–	1,444,652	21.64%
2013	288,458	288,458	–	N/A	N/A
2012	261,943	261,943	–	N/A	N/A
2011	245,280	245,280	–	N/A	N/A
2010	463,656	463,656	–	N/A	N/A
2009	250,823	250,823	–	N/A	N/A
2008	239,039	239,039	–	N/A	N/A
2007	227,822	227,822	–	N/A	N/A

*Note: Schedule is intended to show information for ten years. Historical information prior to implementation of GASB 67 is not required if the information is not available. Additional years will be displayed as they become available.*

Boston Retirement System  
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Schedule of Investment Returns – Last Ten Years

Year Ended December 31, 2016

Annual money-weighted rate of return, net of investment expense

2016	7.15%
2015	0.15%
2014	5.72%

*Note: Schedule is intended to show information for ten years. Historical information prior to implementation of GASB 67 is not required if the information is not available. Additional years will be displayed as they become available.*

Boston Retirement System  
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Notes to Required Supplementary Information

December 31, 2016

**Changes of Benefit Terms.**

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

**Changes of Assumptions.**

For non-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 Health 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 the Scale AA from 2014.

For Boston 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 salary increase assumption for non-teachers was lowered from 5.00% per year for all members, including an allowance for inflation of 4.50% per year to rates of 4.00% per year for Group 1 members, 4.25% per year for Group 2 members and 4.50% per year for Group 4 members, including an allowance for inflation of 3.25% per year for BRS excluding Teachers and 4.50% for Teachers.

The investment return assumption was lowered from 8.00% to 7.50% for the Boston Teachers.

Boston Retirement System  
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Notes to Required Supplementary Information (continued)

**Method and Assumptions Used in Calculations of Actuarially Determined Contributions.**

The actuarially determined contribution rates presented in the schedule of contributions are calculated as of December 31, 2013. The funding requirements are established for the employers' fiscal year ended June 30, 2015, and later years and are analyzed based on the preceding two years' experience. The following actuarial methods and assumptions were used to determine contribution rates reported in that schedule:

Actuarial cost method	Entry age normal cost method
Amortization method	Prior year's contribution increased by 7.75% for BRS excluding Boston Teachers; prior year's contribution increased by 10% for fiscal 2016, 2017, and 2018, and 7% per year thereafter for Boston Teachers
Remaining amortization period	10 years remaining as of January 1, 2015 for BRS excluding Boston Teachers; 21 years remaining as of January 1, 2015 for Boston 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
Inflation	3.25% for BRS excluding Teachers, 4.50% for Teachers
Salary increases	4.00% for Group 1, 4.25% for Group 2 and 4.50% for Group 4 for BRS excluding Boston Teachers; varies by length of service with ultimate rate of 4.00% for Boston Teachers
Investment rate of return	7.75% for BRS excluding Boston Teachers; 7.50% for Boston Teachers

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