

FINANCIAL STATEMENTS AND REQUIRED
SUPPLEMENTARY INFORMATION

Boston Retirement System
(A Component Unit of the City of Boston, Massachusetts)
Year Ended December 31, 2022
With Report of Independent Auditors

Ernst & Young LLP



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

Financial Statements and Required
Supplementary Information

Year Ended December 31, 2022

Contents

Report of Independent Auditors.....	1
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 <i>Government Auditing Standards</i>	4
Financial Statements	
Required Supplementary Information – Management’s Discussion and Analysis	6
Statement of Fiduciary Net Position	11
Statement of Changes in Fiduciary Net Position	12
Notes to Financial Statements.....	13
Required Supplementary Information	
Schedule of Changes in the Net Pension Liability – Last Ten Years	38
Schedule of Contributions – Last Ten Years	39
Schedule of Investment Returns – Last Ten Years	40
Notes to Required Supplementary Information	41



Report of Independent Auditors

Management and The Boston Retirement Board

Report on the Audit of the Financial Statements

Opinion

We have audited the accompanying 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, 2022, and the related notes to the financial statements, which collectively comprise the System's basic financial statements as listed in the table of contents (collectively referred to as the "financial statements").

In our opinion, the accompanying financial statements referred to above present fairly, in all material respects, the fiduciary net position of the Boston Retirement System as of December 31, 2022, and the changes in fiduciary net position for the year then ended in accordance with accounting principles generally accepted in the United States of America.

Basis for Opinion

We conducted our audit in accordance with auditing standards generally accepted in the United States of America (GAAS) and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States (*Government Auditing Standards*). Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We are required to be independent of the System, and to meet our other ethical responsibilities, in accordance with the relevant ethical requirements relating to our audit. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Responsibilities of Management for the Financial Statements

Management is responsible for the preparation and fair presentation of the financial statements in accordance with accounting principles generally accepted in the United States of America, and for 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.

In preparing the financial statements, management is required to evaluate whether there are conditions or events, considered in the aggregate, that raise substantial doubt about the System's ability to continue as a going concern for 12 months beyond the financial statement date, including any currently known information that may raise substantial doubt shortly thereafter.

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance but is not absolute assurance and therefore is not a guarantee that an audit conducted in accordance with GAAS and *Government Auditing Standards* will always detect a material misstatement when it exists. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control. Misstatements are considered material if there is a substantial likelihood that, individually or in the aggregate, they would influence the judgment made by a reasonable user based on the financial statements.

In performing an audit in accordance with GAAS and *Government Auditing Standards*, we:

- Exercise professional judgment and maintain professional skepticism throughout the audit.
- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, and design and perform audit procedures responsive to those risks. Such procedures include examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements.
- Obtain an understanding of internal control relevant to the audit 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 System's internal control. Accordingly, no such opinion is expressed.
- Evaluate the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluate the overall presentation of the financial statements.
- Conclude whether, in our judgment, there are conditions or events, considered in the aggregate, that raise substantial doubt about the System's ability to continue as a going concern for a reasonable period of time.

We are required to communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit, significant audit findings, and certain internal control-related matters that we identified during the audit.

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that the Management's Discussion and Analysis on pages 6 through 10 and the schedules of changes in the net pension liability, contributions, and investment returns on pages 38 through 40 be presented to supplement the financial statements. Such information is the responsibility of management and, although not a part of the financial statements, is required by the Governmental Accounting Standards Board, who considers it to be an essential part of financial reporting for placing the financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with GAAS, 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 financial statements, and other knowledge we obtained during our audit of the 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 have also issued our report dated July 19, 2023 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 solely 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 effectiveness of the System's 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.

Ernst + Young LLP

July 19, 2023

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 of America and the standards applicable to financial audits contained in *Government Auditing Standards* issued by the Comptroller General of the United States (*Government Auditing Standards*), the financial statements of the Boston Retirement System (the System), which comprise the statement of fiduciary net position as of December 31, 2022, and the related statement of changes in fiduciary net position for the year then ended, and the related notes (collectively referred to as the “financial statements”), and have issued our report thereon dated July 19, 2023.

Report on 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) as a basis for designing 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 a 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 or significant deficiencies may exist that were not identified.

Report on 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 financial statements. 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 results of that testing, and not to provide an opinion on the effectiveness of 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

July 19, 2023

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

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

December 31, 2022

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, 2022.

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 Financial Statements.

The Statement of Fiduciary Net Position presents information on the System’s assets and liabilities and the resulting net position restricted 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, 2022. 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 the 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 \$8.5 billion at December 31, 2022, compared to \$9.5 billion at December 31, 2021. The decrease in net position of \$1 billion resulted primarily from a decrease in the fair value of portfolio investments and investment income.

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

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

- The System’s equity and fixed income investments comprised 54% of invested assets; the remaining 46% of investments were invested in real estate investments of 8.3%, alternative investments, including private equity and hedge fund of funds investments of 12.6%, PRIT general allocation account of 23.9% and short-term investments of 1.2%.
- Receivables decreased by \$9.3 million at December 31, 2022. This is primarily due to the decrease in investment receivables.
- Liabilities decreased by \$56.6 million at December 31, 2022 predominantly due to the decrease in payables for securities purchased.

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, 2022, the funding ratio was 86.77%. All employers fully met the required funding amounts in 2022.

	As of December 31		Percentage
	2022	2021	Change
	<i>(In Thousands)</i>		2022–2021
Assets			
Cash and cash equivalents	\$ 566,374	\$ 490,246	16%
Receivables	49,012	58,279	(16)%
Investments	7,976,113	9,031,636	(12)%
Prepaid expenses	954	1,726	(45)%
Securities lending collateral investment pool	158,416	176,478	(10)%
Total assets	8,750,869	9,758,365	(10)%
Liabilities			
Payables	61,339	98,298	(38)%
Obligation to return securities lending collateral	156,770	176,437	(11)%
Total liabilities	218,109	274,735	(21)%
Net position restricted for pensions	\$ 8,532,760	\$ 9,483,630	(10)%

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

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

	Year Ended December 31		Percentage
	2022	2021	Change
	<i>(In Thousands)</i>		2022–2021
Additions			
Total contributions	\$ 796,008	\$ 730,704	9%
Net investment income	(1,008,529)	1,152,859	(187)%
Intergovernmental reimbursements	8,805	9,311	(5)%
Miscellaneous income	98	4	2350%
Total additions	<u>(203,618)</u>	1,892,878	(111)%
Deductions			
Benefit payments	711,615	678,879	5%
Other	35,637	35,244	1%
Total deductions	<u>747,252</u>	714,123	5%
Net (decrease) increase in net position	<u>(950,870)</u>	1,178,755	(181)%
Net position at beginning of year	<u>9,483,630</u>	8,304,875	14%
Net position at end of year	<u>\$ 8,532,760</u>	<u>\$ 9,483,630</u>	(10)%

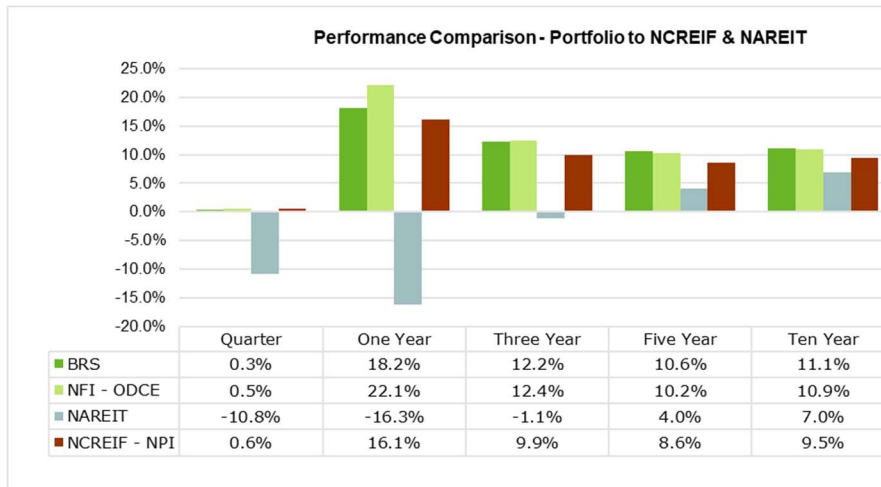
Plan Investments

- The total investment return for 2022 was approximately -9.3%. While it was a challenging year for the markets, it was a positive year for the portfolio on a relative basis, which ranked in the 11th percentile of its universe. The portfolio outperformed both the allocation index and policy index by 80 basis points.
- In 2022, the large cap equity composite returned -19.6%, while the S&P 500 Index returned -18.1%. The small cap equity composite returned -17.3%, outperforming the Russell 2000 Index by 310 basis points.
- The international equity portfolio posted a return of -14.9%, trailing the MSCI EAFE Index which returned 14.5% for the year. The emerging market equity portfolio returned -19.3% and outperformed the MSCI EM, which returned -20.1%.

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

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

- Domestic fixed income returned -9.7%, outperforming the Bloomberg Aggregate Index which returned -13.0% for the year.
- Value added fixed income returned -10.2% in 2022. The System’s high yield investments returned -6.2%, outperforming the Barclays High Yield Index by 500 basis points. The System’s emerging market debt portfolio had a return of -16.1%. The emerging market debt portfolio outperformed its respective benchmark, the JP Morgan EMBI Global Diversified Index, which returned -17.8%.
- The real estate portfolio is a combination of core, value add and opportunistic investment strategies and yielded a return of 18.2% in 2022, as summarized below.



- The private equity portfolio earned a return of 6.2% for 2022 and is a combination of a variety of private equity and debt strategies designed to provide a diversified portfolio of assets that can outperform the liquid market counterparts over time.
- The System’s hedge fund composite returned -2.7% in 2022, outperforming the HFRI Fund of Funds Index, which returned -5.2%.
- During calendar year 2022, the PRIT Core Fund (the fund) returned -10.8%. At year end, the estimated fair value of the PRIT investment was \$1.9 billion.

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

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

- Over a 3-, 5-, and 10-year horizon, the System’s investments have earned 4.8%, 4.9%, and 6.8%, respectively. These returns are roughly in line with other public funds of a similar size. For perspective, the median public fund earned 7.1% over the 10-year period. Over that same 10-year period, domestic investments such as the S&P 500 and Barclays Aggregate Bond Index, were up 12.6% and 1.1%, respectively, while non-U.S. investments, such as the MSCI EAFE Index and MSCI Emerging Market Index, returned 4.7% and 1.8%, respectively.
- The portfolio remains intentionally invested in a broad array of asset classes and not concentrated from an asset or risk perspective in any one area. This diversification is designed to maximize returns, while minimizing risk to help the System achieve its long-term expected rate of return.
- Since August 1994, the average annual return for the fund has been 7.5%.
- On a forward-looking basis, the portfolio’s target expected return over a long-term cycle (30 years) is 7.5%. The fund undertakes a formal asset allocation review each year to evaluate the current market landscape and, if necessary, 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, 2022

Assets	
Cash and cash equivalents	\$ 566,374
Investments, at fair value:	
Short-term:	
Domestic	80,116
International	11,621
Equity:	
Domestic	1,384,994
International	1,384,063
Fixed income:	
Domestic	1,188,757
International	352,560
PRIT external investment pooled fund	1,907,914
Real estate	661,671
Alternative	1,004,417
Total investments, at fair value	<u>7,976,113</u>
Securities lending collateral investment pool	158,416
Receivables:	
Receivable for securities sold	6,468
Accrued interest and dividends	13,926
Other receivables	7,152
Contributions receivable from employers	21,466
Total receivables	<u>49,012</u>
Prepaid expenses	954
Total assets	<u>8,750,869</u>
Liabilities	
Payable for securities purchased	28,219
Accounts payable, accrued expenses and other liabilities	33,120
Obligation to return securities lending collateral	156,770
Total liabilities	<u>218,109</u>
Net position restricted for pensions	<u>\$ 8,532,760</u>

See accompanying notes.

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

Statement of Changes in Fiduciary Net Position
(In Thousands)

Year Ended December 31, 2022

Additions

Contributions:

Employers	\$ 410,093
Commonwealth of Massachusetts	196,833
Employees	189,082
Total contributions	<u>796,008</u>

Investment income:

Interest and dividends	182,727
Net depreciation in fair value of investments	(1,128,596)
Less management and related fees	<u>(63,450)</u>
Net investment income (loss), other than from securities lending	(1,009,319)

Securities lending activities:

Securities lending income	3,470
Less borrower rebates and fees	<u>(2,680)</u>
Net income from securities lending activities	<u>790</u>
Total net investment income (loss)	(1,008,529)

Intergovernmental reimbursements	8,805
Miscellaneous income	<u>98</u>
Total additions, net of investment loss	(203,618)

Deductions

Benefit payments to plan members and beneficiaries	711,615
Reimbursements to other systems	10,181
Refunds of contributions and transfers to other systems	16,920
Administrative and other expenses	<u>8,536</u>
Total deductions	<u>747,252</u>

Net decrease in net position	(950,870)
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Net position restricted for pensions:

Beginning of year	<u>9,483,630</u>
End of year	<u>\$ 8,532,760</u>

See accompanying notes.

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

Notes to Financial Statements

December 31, 2022

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 Planning and Development Agency*
- 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, 2022, System membership consisted of the following:

Active plan members	20,884
Retirees and beneficiaries receiving benefits	14,819
Inactive members entitled to, but not yet receiving benefits	1,303
Inactive members entitled to a return of contributions	12,821
Total membership	<u>49,827</u>
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, 2022).

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 that 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 Governmental 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 in 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 member's pension benefits (based on years of service) upon retirement.

Valuation of Investments and Income Recognition

The Plan's investments are reported 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.

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 <https://www.mass.gov/service-details/boston-retirement-board-investment-regulations>) 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.

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 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.

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 pooled fund (PRIT fund) and hedge funds.

The following was the adopted asset allocation policy as of December 31, 2022:

Asset Class	BRS Excluding Boston Teachers – Target Allocation	Boston Teachers – Target Allocation
Domestic equity	24.00%	21.00%
International developed markets equity	17.00	12.00
International emerging markets equity	8.00	5.00
Core fixed income	16.00	15.00
High yield fixed income	5.00	8.00
Emerging market debt	4.00	–
Real estate	10.00	10.00
Commodities	–	4.00
Hedge fund, Global tactical asset allocation, risk parity	5.00	10.00
Private equity	11.00	15.00
Total	<u>100.00%</u>	<u>100.00%</u>

Rate of Return

For the year ended December 31, 2022, the annual money-weighted rate of return on pension plan investments, net of pension plan investment expense, was -10.2%. 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, 2022:

Investment Type	Fair Value	Less Than 1	1-5	6-10	More Than 10
U.S. treasury notes and bonds	\$ 224,035	\$ 1,206	\$ 107,450	\$ 70,491	\$ 44,888
U.S. agencies	137,984	-	7,173	2,188	128,623
Corporate debt securities	1,023,138	2,720	103,615	135,956	780,847
Municipal	4,326	-	1,078	1,150	2,098
International corporate	9,376	-	5,309	3,271	796
International government	23,895	829	10,527	8,138	4,401
Asset-backed:					
CMOs ¹	43,079	-	35	1,918	41,126
Other ¹	75,484	3,061	17,257	13,623	41,543
	<u>\$ 1,541,317</u>	<u>\$ 7,816</u>	<u>\$ 252,444</u>	<u>\$ 236,735</u>	<u>\$ 1,044,322</u>

¹. Includes domestic and international securities.

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, 2022 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
(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's fixed income investments as of December 31, 2022 were rated by Standard & Poor's and/or an equivalent national rating organization and the ratings are presented below using the Standard & Poor's rating scale (in thousands):

Investment Type	Fair Value	AAA	AA	A	BBB	BB	B	CCC	CC	Not Rated
U.S. agencies	\$ 137,984	\$ 6,040	\$ 661	\$ 203	\$ -	\$ -	\$ -	\$ -	\$ -	\$131,080
Corporate debt securities	1,023,138	1,119	5,606	41,635	63,709	36,183	25,841	26,167	523	822,355
Municipal	4,326	60	3,178	936	-	-	-	-	-	152
International corporate	9,376	-	156	1,075	977	1,636	5,114	404	-	14
International government	23,895	398	960	5,553	10,788	3,169	2,764	150	-	113
Asset-backed:										
CMOs ¹	43,079	22,007	188	-	-	-	-	-	-	20,884
Other ¹	75,484	44,558	711	3,547	2,736	6,376	1,806	-	-	15,750
	<u>\$1,317,282</u>	<u>\$74,182</u>	<u>\$ 11,460</u>	<u>\$ 52,949</u>	<u>\$ 78,210</u>	<u>\$ 47,364</u>	<u>\$ 35,525</u>	<u>\$ 26,721</u>	<u>\$ 523</u>	<u>\$990,348</u>

¹. Includes domestic and international securities.

In addition to the above schedule, the System has approximately \$224.0 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 5.7% of the System's total investments as of December 31, 2022.

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 in the following table (in thousands):

Currency	Cash and Short-Term Investments	Fixed Income	Equity	Alternative	Total
Australian dollar	\$ 176	\$ —	\$ 30,201	\$ —	\$ 30,377
Austria	—	—	3,171	—	3,171
Belgium	—	—	3,297	—	3,297
Canadian dollar	1	—	14,768	—	14,769
Danish krone	6	—	39,226	—	39,232
Euro currency	1,968	—	—	240	2,208
Finland	—	—	16,705	—	16,705
France	—	—	60,092	—	60,092
Germany	—	—	35,576	—	35,576
Hong Kong dollar	—	—	21,167	—	21,167
Ireland	—	—	1,988	—	1,988
Israel	30	—	821	—	851
Italy	—	—	9,037	—	9,037
Japanese yen	7	—	106,936	—	106,943
Korea	46	—	—	—	46
Luxembourg	—	—	1,062	—	1,062
Netherlands	—	—	25,395	—	25,395
New Zealand dollar	—	—	407	—	407
Norwegian krone	—	—	141	—	141
Pound sterling	86	—	69,422	6,790	76,298
Singapore dollar	3	—	8,931	—	8,934
Spain	—	—	9,699	—	9,699
Swedish krona	15	—	14,646	—	14,661
Swiss franc	86	—	63,854	—	63,940
Total securities subject to foreign currency risk	2,424	—	536,542	7,030	545,996
U.S. dollars (securities held by international investment managers)	—	34,069	324,048	—	358,117
Total international investment securities	\$ 2,424	\$ 34,069	\$ 860,590	\$ 7,030	\$ 904,113

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)

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 fund. The PRIT 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 fund is based on unit value as reported by management of the PRIT 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 fund. As of December 31, 2022, the System had the following amounts invested in the PRIT fund (in thousands):

General allocation account	\$ 1,907,914
Cash fund	<u>197,309</u>
Total PRIT fund	<u><u>\$ 2,105,223</u></u>

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)

As of December 31, 2022, the general allocation account is diversified into the following:

<u>Asset Class</u>	<u>Percentage</u>
Core fixed income	14.06%
Domestic equity	21.66
Emerging markets	4.63
Hedge funds	7.40
Other credit opportunities	1.29
International equity	12.48
Global equity emerging – diverse manager program	0.11
Liquidating portfolio	0.04
Private equity	17.05
Real assets	0.86
Real estate	10.81
Cash overlay	0.41
Private debt	1.34
Timber natural resources	3.35
Value-added fixed income	4.51
Total	<u>100.00%</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.

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)

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 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 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.

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, 2022. 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, recognizes the amount of collateral received as investments, with a corresponding obligation to return such collateral on the statement of fiduciary net position. At December 31, 2022, the fair value of securities loaned by the System amounted to \$244.4 million, against which was held collateral at fair value of \$252.1 million as follows (in thousands):

Short-term collateral investment pool	\$ 156,770
Noncash collateral	95,336
	<u>\$ 252,106</u>

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)

Securities lending income earned by the Plan is recorded on the accrual basis and was approximately \$3.5 million for the year ended December 31, 2022.

Commitments

At December 31, 2022, the System had contractual commitments to provide \$483.0 million of additional funding to private equity and private debt funds, and \$224.0 million to real estate funds.

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 and spot foreign currency contracts to hedge against the risk of future foreign currency fluctuations. As of December 31, 2022, there were two pending forward currency contracts with a net notional amount of \$64 thousand and fair value of \$0.1 thousand.

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

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

Notes to Financial Statements (continued)

4. Fair Value Measurements (continued)

- 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 assumptions about the assumptions that market participants would use in pricing the asset or liability (including assumptions about risk).

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

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

Notes to Financial Statements (continued)

4. Fair Value Measurements (continued)

The following table sets forth, by fair value hierarchy level, the Plan's assets carried at fair value at December 31, 2022 (in thousands):

	Fair Value Measurements Using:		
	Quoted Prices in Active Markets for Identical Assets	Significant Other Observable Inputs	Significant Unobservable Inputs
Total at December 31, 2022	(Level 1)	(Level 2)	(Level 3)
Short-term:			
Domestic	\$ 80,116	\$ 80,116	\$ —
International	11,621	11,621	—
Total short-term	91,737	91,737	—
U.S. equities:			
Large cap core	588,314	588,314	—
Large cap growth	69,782	69,782	—
Large cap value	330,516	330,516	—
Small cap core	179,210	179,210	—
Small cap growth	113,154	113,154	—
Small cap value	104,018	104,018	—
Total U.S. equities	1,384,994	1,384,994	—
International equities	1,384,063	1,384,063	—
Fixed income securities:			
U.S. treasury securities	224,035	224,035	—
Corporate debt securities	1,023,138	1,023,138	—
Global multi-sector fixed income	33,271	—	33,271
Municipal	4,326	—	4,326

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

Notes to Financial Statements (continued)

4. Fair Value Measurements (continued)

	Total at December 31, 2022	Fair Value Measurements Using:		
		Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Fixed income securities (cont'd):				
CMO	\$ 43,079	\$ —	\$ 43,079	\$ —
Other asset backed securities	75,484	—	75,484	—
U.S. agencies	137,984	—	137,984	—
Total fixed income securities	<u>1,541,317</u>	<u>1,247,173</u>	<u>294,144</u>	<u>—</u>
Total investments by fair value level	4,402,111	<u>\$ 4,107,967</u>	<u>\$ 294,144</u>	<u>\$ —</u>
Government external investment pool measured at the net asset value (NAV):				
PRIT fund	1,907,914			
Alternative investments measured at NAV:				
Hedge fund of funds	328,745			
Private equity funds	675,672			
Private real estate funds	<u>661,671</u>			
Total alternative investments measured at NAV	<u>1,666,088</u>			
Total investments at fair value	<u>\$ 7,976,113</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.

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

Notes to Financial Statements (continued)

4. Fair Value Measurements (continued)

The fair value of the PRIT fund is based on unit value as reported by management of the PRIT fund. The PRIT fund issues separately available audited financial statements with a year-end of June 30 (available at <http://www.mapension.com>). The Plan is required to provide a 30-day redemption notice for this investment.

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

	Investments Measured at the NAV			
	Fair Value	Unfunded Commitments	Redemption Frequency	Redemption Notice Period
Hedge fund of funds ¹	\$ 328,745	\$ –	Quarterly	60-90 days
Private equity fund ²	675,672	483,000	2	2
Real estate funds ³	661,671	224,000	3	3

¹ *Hedge fund of funds*: This type includes investments in six global multi-strategy 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 *Private equity funds*: This type includes 63 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.

³ *Real estate funds*: This type includes 39 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.

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

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, 2022 were as follows (in thousands):

City of Boston	\$ 343,826
Military Service Credit Appropriation from the City	1,187
Sheriff of Suffolk County	2,898
Boston Housing Authority	16,864
Boston Public Health Commission	27,217
Boston Planning and Development Agency	3,287
Boston Water and Sewer Commission	14,718
	409,997
Employer reimbursements	96
Total employers' contributions	410,093
Commonwealth of Massachusetts (Boston Teachers)	196,833
Total	\$ 606,926

As a condition of participation, employees are required to contribute 5% of their salary if hired prior to January 1, 1975, 7% if hired on or after January 1, 1975 and before January 1, 1984, 8% if hired on or after January 1, 1984 and before July 1, 1996, and 9% if hired on or after July 1, 1996. Employees hired on or 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 on or 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
(A Component Unit of the City of Boston, Massachusetts)

Notes to Financial Statements (continued)

6. Legally Required Reserve Accounts

The balances in the System's legally required reserves at December 31, 2022 were as follows (in thousands):

	Balance	Purpose
Annuity Savings Fund	\$ 2,112,390	Active members' contribution balance
Annuity Reserve Fund	433,103	Retired members' contribution account
Military Service Fund	1,238	Members' contribution account while on military leave
Pension Reserve Fund	811,024	Amounts appropriated to fund future retirement benefits
Pension Fund	5,175,005	Remaining net position
	<u>\$ 8,532,760</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 (in thousands):

	December 31	
	2022	2021
Total pension liability	\$ 13,307,350	\$ 12,945,028
Plan fiduciary net position	8,532,760	9,483,630
Employers' net pension liability	<u>\$ 4,774,590</u>	<u>\$ 3,461,398</u>
Plan fiduciary net position as a percentage of the total pension liability	64.12%	73.26%

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

Notes to Financial Statements (continued)

7. Net Pension Liability of Participating Employers (continued)

Actuarial assumptions: The total pension liability was measured by an actuarial valuation as of January 1, 2020 and January 1, 2022, respectively, with update procedures used to roll forward the total pension liability to December 31, 2021 and 2022, respectively, using the following actuarial assumptions, applied to all periods included in the measurement:

Inflation 3.25% for BRS excluding Boston Teachers, 3.25% for Boston Teachers

Salary increases:

Years of Service	Boston Teachers	BRS Excluding Boston Teachers		
		Group 1	Group 2	Group 4
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 6.9% for BRS excluding Boston Teachers and 7.0% for Boston Teachers, net of investment expenses, including inflation

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

Notes to Financial Statements (continued)

7. Net Pension Liability of Participating Employers (continued)

Cost of living adjustments	5% of first \$15,000 (previously, 3% of \$15,000 at December 31, 2021)
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Mortality Rates

December 31, 2021 and December 31, 2022 Total Pension Liability (TPL)

Healthy	Pub-2010 General Employee, Healthy Retiree and Contingent Survivor Amount-Weighted Mortality Tables set forward one year projected generationally using Scale MP-2021 (previously, Scale MP-2019) for Groups 1 and 2 and Pub-2010 Safety Employee, Healthy Retiree and Contingent Survivor Amount-Weighted Mortality Tables projected generationally using Scale MP-2021 for Group 4 for BRS excluding Boston Teachers and Pub-2010 Teacher Employee, Healthy Retiree and Contingent Survivor Headcount-Weighted Mortality Tables projected generationally using Scale MP-2021 for Boston Teachers.
Disabled	Pub-2010 General Healthy Retiree Amount-Weighted Mortality Table set forward one year projected generationally using Scale MP-2021 (previously, Scale MP-2019) for Groups 1 and 2 and the Pub-2010 Disabled Retiree Amount-Weighted Mortality Table projected generationally using Scale MP-2021 for Group 4 for BRS excluding Boston Teachers and Pub-2010 Teacher Healthy Retiree Headcount-Weighted Mortality Table projected generationally using Scale MP-2021 for Boston Teachers.

The long-term expected rate of return on pension plan investments was determined using a building-block method in which expected future real rates of return (expected returns, net of inflation) are developed for each major asset class. These returns 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. The target allocation (approved by

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

Notes to Financial Statements (continued)

7. Net Pension Liability of Participating Employers (continued)

the Boston Retirement Board) and projected arithmetic real rates of return for each major asset class, after deducting inflation, but before investment expenses, used in the derivation of the long-term expected investment rate of return assumption, are summarized in the following table:

<u>Asset Class</u>	<u>Long-Term Expected Real Rate of Return</u>
Domestic equity	6.59%
International developed markets equity	6.87
International emerging markets equity	8.30
Core fixed income	1.53
High yield fixed income	3.54
Emerging market debt	3.54
Real estate	3.44
Timber	4.01
Hedge fund, GTAA, risk parity	3.06
Private equity	9.49

Discount rate: The discount rates used to measure the TPL as of December 31, 2022 and 2021 were 6.90% for the BRS excluding Boston Teachers and 7.00% 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 employer contributions will be made at rates equal to the actuarially determined contribution rates. For this purpose, only employer contributions that are intended to fund benefits for the current plan members and their beneficiaries are included. Projected employer contributions that are intended to fund the service costs for future plan members and their beneficiaries, as well as projected contributions from future plan members, are not included. Based on those assumptions, the Plan Fiduciary Net Position (FNP) was projected to be available to make all projected future benefit payments for 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 TPL as of both December 31, 2022 and 2021.

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

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 System as of December 31, 2022, calculated using the discount rate of 6.90% for the BRS excluding Boston Teachers and 7.00% for Boston Teachers, as well as what the System’s net pension liability would be if it were calculated using a discount rate that is 1-percentage-point lower (5.90% for the BRS excluding Boston Teachers and 6.00% for the Boston Teachers) or 1-percentage-point higher (7.90% for the BRS excluding Boston Teachers and 8.00% for the Boston Teachers) than the current rate (in thousands):

	1% Decrease	Current Discount	1% Increase
System’s net pension liability as of December 31, 2022	\$ 6,336,079	\$ 4,774,590	\$ 3,467,685

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 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 \$4.9 million and, therefore, is committed to repaying the City \$20.9 million in principal, along with related interest of \$5.3 million. As of December 31, 2022, approximately \$25.2 million in principal and interest 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 July 19, 2023, 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, 2022

	2022	2021	2020	2019	2018	2017	2016	2015	2014
Total pension liability									
Service cost	\$ 293,446,938	\$ 273,411,830	\$ 263,917,290	\$ 231,992,044	\$ 224,582,327	\$ 204,906,499	\$ 200,166,141	\$ 194,996,031	\$ 184,938,621
Interest	892,855,969	864,789,974	843,236,212	810,769,244	795,871,906	758,643,816	755,579,729	739,499,439	705,610,897
Differences between expected and actual experience	(94,070,909)	–	(134,303,882)	–	(182,529,598)	–	(318,650,369)	–	–
Changes of assumptions	–	171,736,036	–	589,891,742	–	377,158,333	–	89,776,142	94,626,461
Changes of benefit terms	–	50,979,593	–	–	–	45,062,181	–	–	–
Benefit payments, including refunds of employee contributions	(729,910,852)	(694,274,683)	(659,134,697)	(657,077,672)	(634,983,862)	(611,304,014)	(594,950,681)	(576,941,443)	(550,984,406)
Net change in total pension liability	362,321,146	666,642,750	313,714,923	975,575,358	202,940,773	774,466,815	42,144,820	447,330,169	434,191,573
Total pension liability – beginning	12,945,028,516	12,278,385,766	11,964,670,843	10,989,095,485	10,786,154,712	10,011,687,897	9,969,543,077	9,522,212,908	9,088,021,335
Total pension liability – ending (a)	\$ 13,307,349,662	\$ 12,945,028,516	\$ 12,278,385,766	\$ 11,964,670,843	\$ 10,989,095,485	\$ 10,786,154,712	\$ 10,011,687,897	\$ 9,969,543,077	\$ 9,522,212,908
Plan fiduciary net position									
Contributions – employer	\$ 410,092,886	\$ 371,335,512	\$ 350,532,120	\$ 329,252,048	\$ 295,188,770	\$ 260,164,547	\$ 247,770,904	\$ 218,812,904	\$ 203,074,621
Contributions – non-employer contributing entity	196,832,959	179,369,000	162,976,000	157,040,000	143,146,000	131,298,000	132,477,000	120,434,000	114,335,385
Contributions – employee	189,081,630	179,998,741	185,582,460	175,694,009	168,425,188	154,937,098	153,879,817	147,090,451	143,397,524
Net investment income	(1,008,431,366)	1,152,863,622	867,577,794	1,008,373,732	(326,077,449)	987,384,683	360,333,280	(15,257,000)	283,342,371
Benefit payments, including refunds of employee contributions	(729,910,852)	(694,812,302)	(659,134,697)	(657,077,672)	(634,983,862)	(611,304,014)	(594,950,681)	(576,982,464)	(550,984,406)
Administrative expenses	(8,535,492)	(9,998,783)	(9,734,070)	(9,161,172)	(9,235,803)	(7,072,347)	(7,720,520)	(8,951,662)	(10,215,495)
Net change in fiduciary net position	(950,870,235)	1,178,755,790	897,799,607	1,004,120,945	(363,537,156)	915,407,967	291,789,800	(114,853,771)	182,950,000
Plan fiduciary net position – beginning	9,483,630,323	8,304,874,533	7,407,074,926	6,402,953,981	6,766,491,137	5,851,083,170	5,559,293,370	5,674,147,141	5,491,197,000
Plan fiduciary net position – ending (b)	\$ 8,532,760,088	\$ 9,483,630,323	\$ 8,304,874,533	\$ 7,407,074,926	\$ 6,402,953,981	\$ 6,766,491,137	\$ 5,851,083,170	\$ 5,559,293,370	\$ 5,674,147,000
Net pension liability – ending: (a)-(b)	\$ 4,774,589,574	\$ 3,461,398,193	\$ 3,973,511,233	\$ 4,557,595,917	\$ 4,586,141,504	\$ 4,019,663,575	\$ 4,160,604,727	\$ 4,410,249,707	\$ 3,848,065,908
Plan's fiduciary net position as a percentage of the total pension liability	64.12 %	73.26 %	67.64 %	61.91 %	58.27 %	62.73 %	58.44 %	55.76 %	59.59 %
Covered-employee payroll	\$ 1,863,973,445	\$ 1,775,725,453	\$ 1,719,830,947	\$ 1,660,821,914	\$ 1,608,544,227	\$ 1,547,478,524	\$ 1,498,768,546	\$ 1,493,958,273	\$ 1,444,652,177
Net pension liability as a percentage of covered payroll	256.15 %	194.93 %	231.04 %	274.42 %	285.11 %	259.76 %	277.60 %	295.21 %	266.37 %

Notes

1. 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.
2. Employer contributions include military service contributions.
3. Total pension liability and Plan fiduciary net position calculations were completed separately for the BRS, excluding Boston Teachers and the Boston Teachers.
4. Covered-employee payroll for 2022 as estimated in the January 1, 2022 valuation and for 2021 as estimated in the January 1, 2020 valuation

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

Schedule of Contributions – Last Ten Years
(In Thousands)

Year Ended December 31, 2022

Year Ended December 31	Actuarially Determined Contribution	Contributions in Relation to the Actuarially Determined Contribution	Contribution Deficiency (Excess)	Covered Payroll	Contributions as a Percentage of Covered Payroll
2022	\$ 606,926	\$ 606,926	\$ –	\$ 1,863,973	32.56%
2021	550,226	550,226	–	1,775,725	30.99
2020	498,508	513,508	(15,000)	1,719,831	29.86
2019	465,292	486,292	(21,000)	1,660,822	29.28
2018	426,335	438,335	(12,000)	1,608,544	27.25
2017	391,463	391,463	–	1,547,479	25.30
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

Boston Retirement System
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Schedule of Investment Returns – Last Ten Years

Year Ended December 31, 2022

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

2022	(10.20)%
2021	14.61%
2020	12.43%
2019	16.73%
2018	(4.30)%
2017	17.75%
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
(A Component Unit of the City of Boston, Massachusetts)

Notes to Required Supplementary Information

December 31, 2022

Changes of Assumptions

There were no significant changes in assumptions during the year ended December 31, 2022.

Methods 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, 2022. The funding requirements are established for the employers' fiscal year ended June 30, 2022, 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:

Valuation date	Actuarially Determined Contribution for 2022 is determined with the January 1, 2022 actuarial valuation.
Actuarial cost method	Entry age normal cost method
Amortization method	Prior year's contribution increased by 8.85% for BRS excluding Boston Teachers; contribution as reported by the State Actuary for Teachers.
Remaining amortization period	5 years remaining as of January 1, 2022 for BRS excluding Boston Teachers; 14 years remaining as of January 1, 2022 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
Salary increases	4.00% for Group 1, 4.25% for Group 2 and 4.50% for Group 4 for BRS excluding Boston Teachers; based on years of service; ranging from 7.5% at 0 years of service decreasing to 4.00% after 20 years of service for Boston Teachers
Investment rate of return	6.90% for BRS excluding Boston Teachers; 7.00% for Boston Teachers

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