MBTA Retirement Fund

A Pension Trust Fund between the Massachusetts Bay Transportation Authority and its Employees

2022 Annual Comprehensive Financial Report

For the years ended December 31, 2022 & 2021
Boston, Massachusetts

Issued by:

John P. Barry, Interim-Executive Director

MBTA Retirement Fund

A Pension Trust Fund administering benefits earned by employees of the Massachusetts Bay Transportation Authority

ANNUAL COMPREHENSIVE FINANCIAL REPORT

For the Years Ended December 31, 2022 and 2021

Prepared By
The MBTA Retirement Fund Staff

The Massachusetts Bay Transportation Authority Retirement Fund is a private trust created in 1948 by the Metropolitan Transit Authority, the predecessor agency to the Massachusetts Bay Transportation Authority ("MBTA"), and The Boston Carmen's Union, Amalgamated Transit Union Local 589. Our mission then, as now, is to provide retirement benefits to the membership consisting of the transit workers and others employed by the MBTA. To ensure that the pensions earned by active and retired members, and their beneficiaries, remain secure, we are dedicated to managing a strong and diversified investment program.

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INTRODUCTORY SECTION

(Unaudited)

June 19, 2023

Board of Trustees
Massachusetts Bay Transportation Authority Retirement Fund
One Washington Mall, 4th Floor
Boston, MA 02108

On behalf of the Board of Trustees I am pleased to submit the Massachusetts Bay Transportation Authority Retirement Fund's Annual Comprehensive Financial Report (ACFR) for the fiscal year ended December 31, 2022. The ACFR reflects that our commitment to accurate and transparent financial reporting is as strong as our commitment to excellence in customer service. The document presented today is the seventh consecutive ACFR produced by the MBTA Retirement Fund.

The ultimate responsibility for the integrity of the data presented within this report and the fair presentation of the financial statements, in all material respects lies with Management. This report is intended to provide complete and reliable information of the Fund's investments, financial statements and performance returns.

To provide a reasonable basis for making these representations, management maintains a sufficient set of internal control procedures designed to implement reasonable assurance that assets are properly safeguarded, transactions are properly executed and reliable information is utilized for the preparation of the Fund's financial statements in conformity with Generally Accepted Accounting Principles (GAAP), as promulgated by the Governmental Accounting Standards Board (GASB). The Fund's transactions are reported on the accrual basis of accounting. The objective of the internal control framework is to obtain reasonable rather than absolute assurance that the financial statements will be free from material misstatement since the cost of controls should not exceed anticipated benefits to be derived.

Our independent external auditors, KPMG LLP, have conducted an audit of the Basic Financial Statements in accordance with auditing standards generally accepted in the United States, performing tests and procedures as they deem necessary to express opinions on the Basic Financial Statements in their report to the Board.

Within the financial section, the Management Discussion & Analysis (MD&A) follows the independent auditors' report and provides an overview of the Fund's financial statement and financial results. The MD&A complements this letter of transmittal and should be read in conjunction with this letter.

Profile of the MBTA Retirement Fund

The Fund was established on January 1, 1948, under an agreement and declaration of trust (restated on July 19, 2019) by and among the Massachusetts Bay Transportation Authority (the Authority),

(Continued)

and Local 589, Amalgamated Transit Union, Boston Carmen's Union, AFL CIO (collectively, the Union). The Fund is a single employer plan. It was established as a contributory defined benefit retirement plan in accordance with the Pension Agreement; effective July 1, 1970, (restated thereafter) adopted by the Authority and the Union for the purpose of receiving contributions and providing pension benefits for its Members and qualified beneficiaries.

The MBTA Retirement Fund Board seeks to utilize its assets under management to the benefit of the membership by strategically and methodically allocating financial resources to a differentiated portfolio of investments while applying the knowledge and experience of a broad range of investment managers. An overview of the Investment Policy Statement is included in the Investment Section, on page 107.

The Board determines investment objectives, strategies and policies of the Fund. The Executive Director of the Fund is accountable for the Fund's general management and operations. In addition, the Executive Director reports to and advises the six-member Board of Trustees. The staff of the Fund work diligently to uphold the original mission of serving Members and their families.

As of December 31, 2022, the Fund had approximately $1,622.5 million in net position restricted for pension benefits compared to $1,939.9 million for the prior calendar year, representing a decrease of $317.3 million in net position. The MBTA Retirement Fund Board utilizes the services of a third-party custodian institution to assist with the settlement and accounting for investment and cash transactions.

Interim-Executive Director Discussion

The MBTA Retirement Fund portfolio was up 4.3% in the final quarter of 2022 which was welcome news after a very tough year in the financial markets. Equity and Bond Indices were negative globally over the 12-month period. The S&P 500 was down (18.1%), international stocks (MSCI EAFE) were down (14.5%) and emerging market equities trailed (18.4%). Usually, bonds provide some modicum of protection when equities sell off, but bonds failed to provide any shelter, as the Bloomberg Aggregate was (13.0%) for 2022. The bellwether 60/40 mix of stocks and bonds was down (15.9%) for the year, the MBTA Retirement Fund fared better, down (13.4%) net of fees. The loss in 2022 follows a very strong 2021 where the Fund returned 13.9% net of fees. The Board continues to monitor the investment environment and makes prudent decisions on behalf of the Members.

Operational Changes

After seven months of intense bargaining between the negotiating parties to the Pension Agreement, Local 589, Amalgamated Transit Union, AFL-CIO (Union) and the Massachusetts Bay Transportation Authority (Authority), on March 31, 2023, the Union and the Authority reached an agreement and entered into a Memorandum of Understanding (MOU) that resulted in important changes to the Pension Agreement. These changes supersede the interest arbitration award of August 26, 2022, which has been vacated in full and is of no further effect. The term of the new Pension Agreement runs from June 30, 2018 through June 30, 2028.

(Continued)

The MOU and the new Pension Agreement are both available on the Fund's website. The Fund's benefits department stands ready to answer questions. They continue to offer walk-in capabilities for select services and appointments for services that take longer than 15 minutes. The latest operational amendments are posted on the Fund's website and are continuously updated as needed.

In order to educate the membership on the changes to the Pension Agreement, several in-person information sessions will be offered in June 2023. Details regarding these sessions will be posted on the Fund's website.

Objectives and Goals

In an effort to focus on our sustainability for the future and safeguarding our member's assets, the Fund maintains a Strategic Plan that outlines many goals and objectives. The Retirement Board is in the final year of the current 4-year strategic plan that commenced in 2020 and culminates in 2023 with the 75th Anniversary of the MBTARF's founding in 1948. Much work has been accomplished and many projects have been completed over the past three years executing the Strategic Plan initiatives all while meeting the challenges posed by the pandemic.

Project 2023 is designed to prioritize fulfilling certain goals of the existing Strategic Plan in a coordinated and focused manner, identifying initiatives yet to be completed while adjusting due to evolving circumstances, such as the pandemic and changes to the benefit structure mandated by the MOU for the Pension Agreement that was agreed upon in March 2023.

The Fund seeks to enhance financial technology capabilities to support a secure and high performing customer service environment. To improve and modernize the Fund's IT infrastructure, the Fund is implementing technological improvements consistent with legal standards and best practices, such as encryption, cyber security training and vulnerability scans, to better protect confidential information. In addition, the Fund is in the process of a complete migration to electronic records management and retention to improve storage and retrieval.

The Fund is in the process of producing a webinar series illustrating features and functionality of the PTG Member Self-Service Portal, the first of which was posted to the Fund website in 2022. In the future the webinars will cover changes to the Pension Agreement. In addition to webinars, the staff will conduct in-person information sessions to continue outreach to, and education of, affected members regarding changes to the benefits required by the MOU.

The Fund is constantly advancing toward its goal of cultivating a sophisticated, professional, risk-intelligent organization dedicated to customer service. To promote this culture, the Fund conducts routine employee training and offers development opportunities for its staff. The Fund must continually evaluate, revise and refine internal policies governing operations management and risk. To that end, the Benefit Department Standard Operating Procedures (SOPs) have been updated and peer reviewed in 2022. These will be updated as necessary to accommodate changes to the Pension Agreement.

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As always, the Fund works to attain the goal of sustaining and preserving a financially sound pension fund for its membership. The Fund provides the annual ACFR report and monthly financial reports on the Fund's website regularly. The Investment Compliance Working Group (ICWG) meets at least annually to continuously review and improve Finance Department policies and procedures. In 2023, an asset liability modeling study will be conducted to consider alternatives to the current Policy asset mix with the objective of identifying potential opportunities for improved Fund financial results.

On behalf of the Fund, the staff will continue to work toward its ongoing strategic planning goals as it celebrates its 75th Anniversary.

Investment Policy Overview

The Fund's portfolio is broadly diversified, holding investments ranging from publicly traded stocks and bonds to privately held partnerships. The scale and scope of these investments makes oversight of these assets highly complex and requires an investment policy. The Retirement Board of the Fund adopts an Investment Policy Statement (IPS) which establishes investment objectives and policy, obtains expert advice and assistance, and oversees the employment of qualified and competent investment staff. In addition, the IPS is designed to obtain optimal risk-adjusted returns and ensure that investments are made for the exclusive benefits of the Members of the Fund. The Board also monitors the actions of staff, consultants and advisors to ensure compliance with its policies. In 2022, the Fund convened its Investment Compliance Working Group for their annual review the IPS, Investment Selection Process, Investment Management Compliance Policies and Financial Reporting. The ICWG did not recommend any formal changes to these policies in 2022. The current Investment Policy Statement has been in effect since July 2020. The Board's primary goal is to maintain a financially sound pension fund in order to provide financial security for its Members.

MBTA Retirement Fund Performance

Following a difficult year in 2022, the Board and management continues to be focused on long-term performance. As of December 31, 2022, the total Fund return gross of fees with the exception of hedge funds which are net of fees was (12.97%) and the annualized three, five and ten-year returns were 4.54%, 5.56% and 7.30%, respectively. For more detailed information regarding the Fund's investment policies, guidelines and results please see the Investment Section of this report, starting on page 67.

Year Ended December 31, 2022:

- The Fund's total gross return is (12.97%) compared to the total policy benchmark (8.32%).
- The Fund's inception to date gross return is 8.97%.
- The return equates to an investment loss of ($257.3) million.
- Net total outflows to pay benefits for the calendar year were approximately $226.3 million.
- The 10-year gross return and since inception return outperformed the actuarial rate of return of 7.25%.

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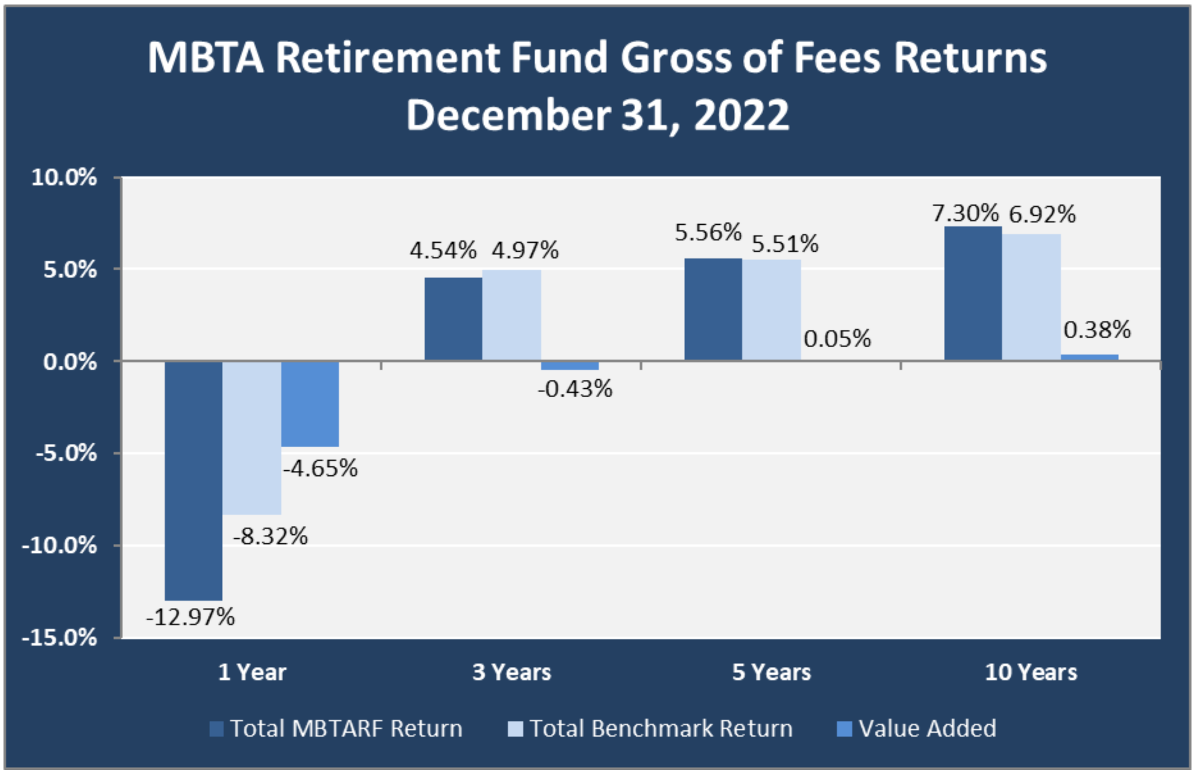
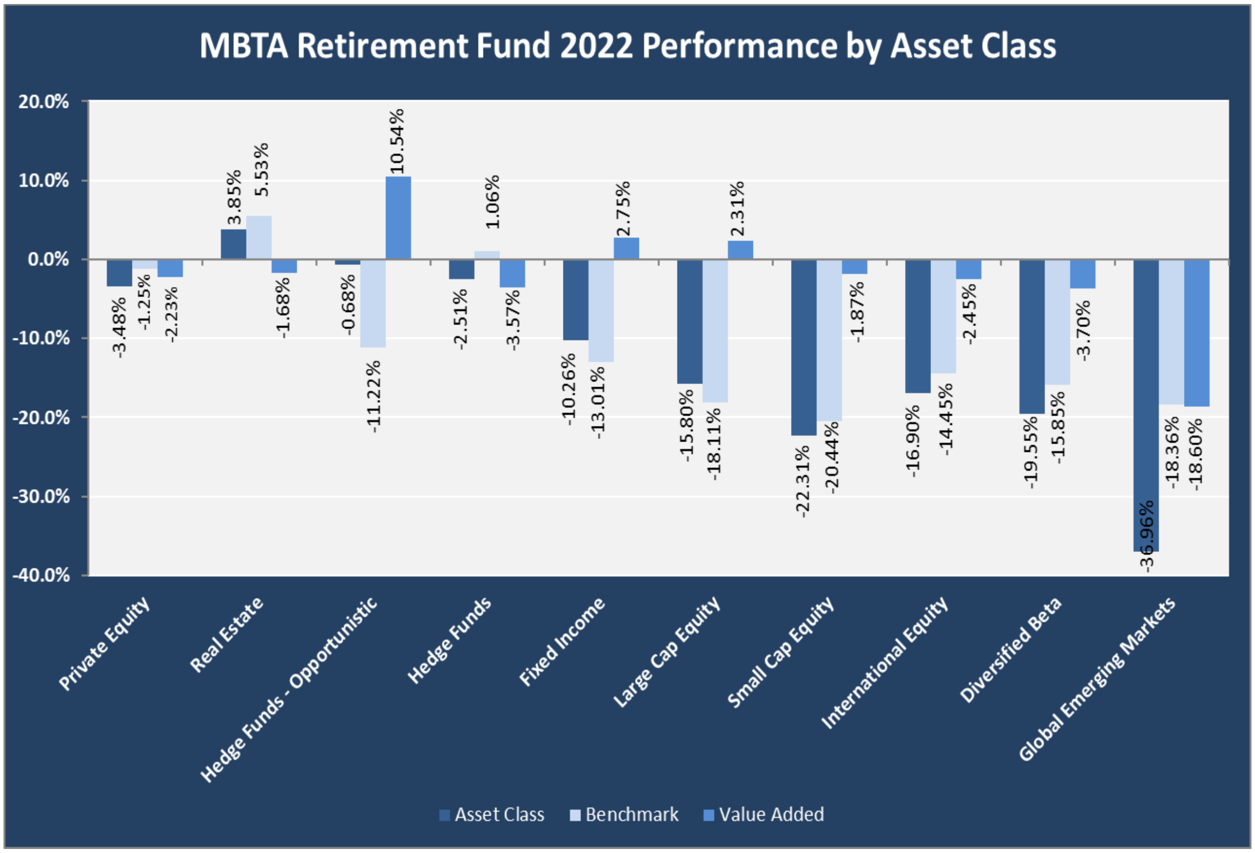
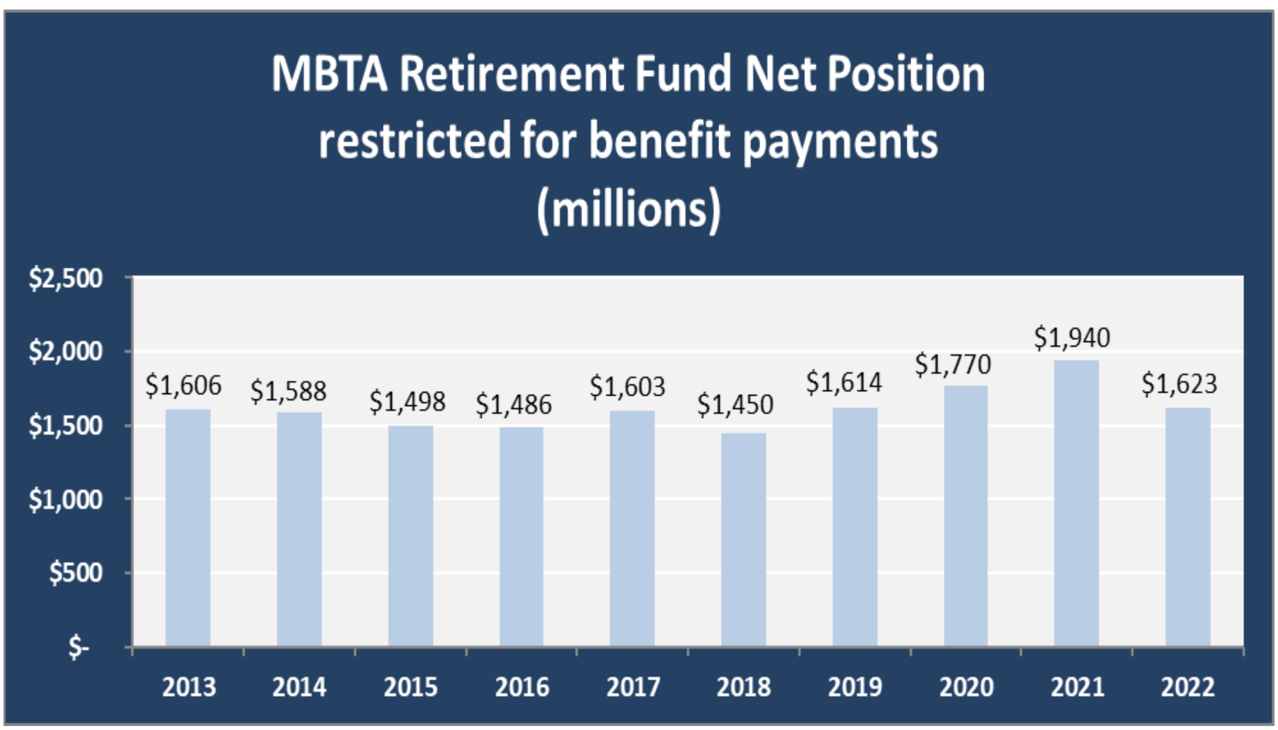

MBTA Retirement Fund Gross of Fees Returns
December 31, 2022
10.0%
5.0%
0.0%
-5.0%
-10.0%
-15.0%
-12.97%
-8.32%
-4.65%
4.54%
4.97%
-0.43%
5.56%
5.51%
0.05%
7.30%
6.92%
0.38%
1 Year
3 Years
5 Years
10 Years
Total MBTARF Return
Total Benchmark Return
Value Added

(Continued)


MBTA Retirement Fund 2022 Performance by Asset Class
20.0%
10.0%
0.0%
-10.0%
-20.0%
-30.0%
-40.0%
Private Equity: -3.48% -1.25% -2.23%
Real Estate: 3.85% 5.53% -1.68%
Hedge Funds - Opportunistic: -0.68% -11.22% 10.54%
Hedge Funds: -2.51% 1.06% -3.57%
Fixed Income: -10.26% -13.01% 2.75%
Large Cap Equity: -15.80% -18.11% 2.31%
Small Cap Equity: -22.31% -20.44% -1.87%
International Equity: -16.90% -14.45% -2.45%
Diversified Beta: -19.55% -15.85% -3.70%
Global Emerging Markets: -36.96% -18.36% -18.60%
Asset Class
Benchmark
Value Added


MBTA Retirement Fund Net Position restricted for benefit payments (millions)
$2,500
$2,000
$1,500
$1,000
$500
$-
2013 $1,606
2014 $1,588
2015 $1,498
2016 $1,486
2017 $1,603
2018 $1,450
2019 $1,614
2020 $1,770
2021 $1,940
2022 $1,623

(Continued)

Management's Discussion and Analysis

The Management's Discussion and Analysis (MD&A), beginning on page 29, provides an overview and analysis of the Fund's basic financial statements. This letter of transmittal is intended to complement the MD&A, and should be read in conjunction with the MD&A.

Markets and Outlook

Inflation was a clear driving factor of the markets in 2022. It surged to a 40-year high, which led the U.S. Federal Reserve to raise the interest rate seven times over the course of the year. The series of increases were in hopes of combating rising prices and similar actions were taken by other nations' central banks globally. In February 2022, Russia invaded Ukraine which brought about concerns of energy prices and political stability. Despite the attempt of a rally toward the end of 2022, the equity and bond markets both fell for the year.

There were not many places to hide in 2022, the S&P 500 was down (18.11%) for the year, which was the worst annual return since the 2008 financial crisis. Global equities, as measured by the MSCI All Country World Index fell (18.36%) in 2022 and the MSCI EAFE fell (14.45%). Investors typically view bonds as safe haven when equities are down, however this was not the case in 2022. The Bloomberg Aggregate fell (13.01%) for the year. By the end of 2022, there was relief over a potential slowing in Federal Reserve interest rate increases, which lead to a positive fourth quarter.

The relief was quickly replaced by concerns that the economy was too strong to allow inflation to come down in a meaningful way: at the same time, a recession in 2023 was becoming increasingly more likely. Despite the continued fears of recession, the first quarter of 2023 has produced positive returns. If inflation continues to decline, the markets should see this as good news and position the equity and bond markets for positive returns for the remainder of 2023. It is important that our Members know that the Fund's investment portfolio is broadly diversified, and we expect strong performance over the long-term.

Asset Allocation/Investments

The Fund is responsible for implementing an asset allocation with an appropriate balance of risk and return, it is a critical component for formulating investment strategies. An asset-liability study is conducted in three to five-year intervals. The last ALM Study was completed in 2019 and a 2023 study is currently underway. This approach allows for sufficient flexibility to capture investment opportunities as they may occur yet provide parameters to ensure prudence and care while managing the Fund's assets. The Board approved an updated asset allocation in February 2020, and it has been in effect since April 2020. The Board's primary goal is to maintain a financially sound pension fund in order to provide financial security for its Members.

The applicable asset allocation for year 2022 (below) is the result of an asset-liability study conducted by the Fund's actuary, Buck Global, LLC, and investment advisor, Segal Marco Advisors. At year end the Fund's actual asset allocation was within approved target ranges.

(Continued)

Asset Class	Target (%)	Minimum Exposure (%)	Maximum Exposure (%)
Equities	43	38	48
Domestic Large Cap	17	12	22
Domestic Small Cap	7	4	10
International Equity (unhedged)	9	5	13
International Small Cap	2	0	4
Global / Emerging Markets	8	4	12
Fixed Income	23	20	30
Core Fixed Income	8	4	12
Inflation Linked Securities	3	0	5
Mortgages	3	0	5
Global & Multi Sector	6	3	9
Bank Loans	3	0	5
Cash	2	0	3
Alternative Investments	32	20	39
Private Equity	8	4	12
Private Credit	2	0	4
Real Estate	9	5	12
Fund of Hedge Funds	5	2	8
Fund of Hedge Funds - Opportunistic	2	0	4
Risk Parity	6	3	9

The Board of Trustees and Fund Management are responsible for continually reviewing investment manager performance in order to ensure the Fund is utilizing the best investment managers possible.

Some 2022 Investment Highlights include:

- In January 2022, the Board of Trustees voted to invest $20 million in Hamilton Lane Strategic Opportunities Fund VII.
- In March 2022, the Board committed $7.5 million to a new private credit fund, Neuberger Berman Private Debt Fund IV.
- In May 2022, due to underperformance and fee structure, the Trustees terminated the international small-Cap equity manager, Principal Global Investors, and allocated approximately $30 million to Eaton Vance International Small-Cap Strategy.
- In the spring of 2022, Gryphon International announced its closing. The Board voted to allocate Gryphon International's assets to the SSGA MSCI EAFE Index Fund.
- Early in 2022, Fund Management submitted a $15 million partial redemption request to real estate manager, Bentall Kennedy Green, Multi-Employer Property Trust (MEPT). Following communication concerns regarding the redemption queue and the overallocation to real estate, in September 2022, the Board voted to terminate MEPT.
- During the annual review of private equity, in November 2022, the Trustees committed $15 million to the PRIM Private Equity Vintage Year 2023 Segmentation Program (PEVY 2023). In addition to allocating to PEVY 2023, the Board also committed $10 million to a new private equity fund with a long-standing investment manager, Lexington Capital Partners X.

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Administration

The Board of Trustees of the Retirement Fund is the highest authority within the organizational structure. As of December 31, 2022, the date of the Fund's most recent actuarial valuation, the Fund's membership included 5,555 members in active status, 6,714, retirees and beneficiaries receiving benefits and 3 terminated vested members who are not yet receiving benefits. Our pension management software enables the Fund to efficiently track demographics for both active and retired Members as well as facilitate benefit payments via an automated process. In addition, the Fund offers an employee self-service platform for active and retired Members which offers remote access to their personal retirement information. I encourage you to visit the portal at:
www.pensiontechnologygroup.com/mbta

Benefits

After seven months of intense bargaining between the negotiating parties to the Pension Agreement, Local 589, Amalgamated Transit Union, AFL-CIO (Union) and the Massachusetts Bay Transportation Authority (Authority), I am pleased to announce that on March 31, 2023, the Union and the Authority reached an agreement and entered into a Memorandum of Understanding (MOU) that resulted in important changes to the Pension Agreement. These changes supersede the interest arbitration award of August 26, 2022, which has been vacated in full and is of no further effect. The term of the new Pension Agreement runs from June 30, 2018 through June 30, 2028.

Membership

Membership in the Fund is available to most MBTA employees with the exception of MBTA Police Officers. Employees who are or may become members of the Union are included in the membership of the Fund. Employees who are not members of the Union but who are on the regular payroll of the Authority and Members of the Fund on the date of the execution of the Fund's Pension Agreement are also included in the membership of the Fund.

The new Pension Agreement created a two-tier pension benefit structure. Employees who are or become Members of the Fund on or before June 30, 2023, are in the Group A Plan unless a Member (i) elects to join the Group B Plan by providing written notification to the Fund between July 1, 2023, and December 31, 2023, and (ii) accumulates at least 24 months of creditable service after such election. Employees who are or become Members of the Fund on or after July 1, 2023 are automatically in the Group B Plan.

The retirement age for Group A Plan Members remains unchanged; those whose hire date is on or after December 6, 2012, will be required to complete at least twenty-five (25) years of creditable service and attain age 55 in order to be eligible for an early normal retirement allowance. For those members whose date of hire is prior to December 6, 2012, completion of at least twenty-three (23) years of creditable service is required to receive compensation under an early normal allowance.

Pension benefits for new hires, Group B, defined as those employees who become Members of the Fund on or after July 1, 2023, have adopted a sliding scale determined by the Member's age at the time of retirement

(Continued)

beginning at a rate of 1.75% at 55 years of age progressing to a rate of 2.46% at 61 years of age. Members, however, are fully vested after the Member accrues 10 years of creditable service.

Contributions

Benefits paid to Members are financed by employer contributions, employee contributions and earnings on investments made by the Fund. Effective July 1, 2020, Members are required to contribute at a rate of 9.3339% of their pensionable salary while the Authority contribution rate is 26.6561%. The 2021 Actuarial Report demonstrated strong investment performance, resulting in a reduction of the unfunded accrued liability. Therefore, there was minimal decrease to the contribution rates effective July 1, 2022. Due to this, on May 20, 2022, the MBTA Retirement Fund Board of Trustees unanimously voted to retain current 2019 contribution rates for the Authority and the Members. This vote was implemented in an effort to pay down the MBTA Retirement Fund's unfunded accrued liability and ultimately provide a more stable financial future for the retirees.

Per the updated Pension Agreement, Active Members' individual contributions are increased by 1.25% over the actuarial annual required contribution rate beginning with the first full pay period after July 1, 2023. The Active Members contribution rate will be 10.3489% beginning on July 1, 2023. Authority contributions will be maintained at a minimum floor of 25.8161% of payroll, paying increased amounts if prescribed by the actuarial annual required contribution rate until the unfunded amount of the plan is less than 20%, as determined by the MBTARF's actuary. Authority matching contributions will be 25.9511% beginning July 1, 2023.

Funding

In setting contribution rates, the Board's principal objective is to set rates so the unfunded actuarial accrued liability (UAAL) will be amortized over a reasonable period from the most recent valuation date and set rates, so they remain relatively level over time. An actuarial valuation is performed annually. In the Spring of 2023, an Experience Study was conducted, and it resulted in new assumptions adopted for the Valuation Report as of December 31, 2022. Based on the Experience Study, Buck proposed updated assumptions for mortality tables, salary increases, termination rates and retirement rates. All assumptions were approved by the MBTA Retirement Board in April 2023.

Buck did not recommend a change for the investment return assumption of 7.25% or the inflation assumption of 2.75%. Assumptions for salary increases, mortality tables, termination rates and retirement rates were revised to align expected rates with actual rates based on recent experience. During the review of employee termination, Buck reported that rates of termination within an employee's first 5 years are higher than expected; service seems to be more predictive of termination than age during this period. The mortality table, Pri-2012 Blue Collar, was recommended as the best fit based on the makeup of the plan participants.

The most recent actuarial valuation report, dated December 31, 2022, calculated the Fund's unfunded actuarial pension liability at $1,367,546,343. As of December 31, 2022, the funded ratio is 56.83%. The adoption of the most recent asset allocation still supports a 7.25% discount rate.

(Continued)

However, the Board of Trustees is mindful of monitoring this rate to help facilitate financial solvency. In addition, investment managers' performance is reviewed monthly and, if needed, adjustments to the portfolio are made to help increase and limit decreases to the Fund's overall return.
The actuarial firm, Buck Global, LLC, completed the actuarial reviews and valuations. For more information on the actuarial assumptions of the Fund as part of the December 31, 2022 valuation, please see the Summary of Actuarial Assumptions and Methods found in the Actuarial Section of the ACFR, starting on page 112.

Membership Communications

The MBTA Retirement Fund continues its focus on member communication through Milestones and posting pertinent information to our website at www.mbtarf.com. We place a special emphasis on providing quality customer service to which we encourage feedback and welcome new ideas.

Awards

The Government Finance Officers Association (GFOA) awarded a Certificate of Achievement for Excellence in Financial Reporting to the Fund for its annual comprehensive financial report for the fiscal year that ended December 31, 2021. To be awarded a Certificate of Achievement, the Fund must publish an easily readable and efficiently organized ACFR, the contents of which conform to program standards. This report must satisfy both generally accepted accounting principles and applicable legal requirements. The Fund has received this prestigious award for the last five years.

A Certificate of Achievement is valid for a period of one year only. We believe our current ACFR continues to meet the Certificate of Achievement Program's requirements and we are submitting it to the GFOA to determine its eligibility for another certificate.

Acknowledgements

The compilation of the ACFR reflects the combined efforts of the Fund's staff, Actuary, and Investment Advisor. Our goal is to present a thorough and accurate report that is easy for our members to read and understand. It is intended to provide complete and reliable information as a basis for making management decisions.

We would like to take this opportunity to express our appreciation to the Board of Trustees, Staff, Investment Advisor, Actuary, and to the many members who are working diligently to ensure the continued success of the Fund. We recognize and appreciate the dedication of our Board of Trustees who voluntarily provide their expertise and oversight to protect the financial future of our membership.

Yours respectfully,

John P. Barry
Interim - Executive Director / Chief Financial Officer

Government Finance Officers Association

Certificate of Achievement for Excellence in Financial Reporting

Presented to

MBTA Retirement Fund
Massachusetts

For its Annual Comprehensive
Financial Report
For the Fiscal Year Ended

December 31, 2021

Christopher P. Morrill

Executive Director/CEO

MBTA Retirement Fund Board Trustees

Advisory Committees to the MBTA Retirement Fund Board

Audit and Actuary Committee

James Evers
Board Member

James Bradley
Board Member

Mary Ann O'Hara
Board Member

Patrick Landers
Alternate Board Member

Organizational Chart

Effective January 1, 2023

MBTA Retirement Fund Board

Elected
- James Evers, Interim-Chair
- James Bradley
- Timothy Long

Appointed
- Mary Ann O'Hara
- Paul Todisco

Jacquelyn Carey, Interim - Board Secretary

Interim-Executive Director
John P. Barry

Fund Staff/Counsel

Administrative
Maura Corso
Jena Hunt

- Executive Support
- Maintain Documentation
- Correspondence
- Customer Service

Finance
Jacquelyn Carey
Joseph D'Angelo
Michael Barrio

- Accounting / Reporting
- Monitoring Investments
- Payroll / Contributions
- Investment Compliance

Benefits
Dominique Sye
Sagine Gay
Siobhan Keeney

- Benefits Calculations
- Member Services
- Records Management
- Disability Requirements

Counsel
Holland & Knight

- Legal Advice
- Compliance
- Fiduciary Guidance

Info Technology
Robert Biga

- Information Governance
- Technology Oversight
- Cyber Risk Management

Contractors/Service Providers

Consulting
Segal-Marco

- Asset Allocation
- Monitor Performance
- Investment Policy
- Performance Reporting

Investment Managers

- Equity & Fixed Income
- Alternative Investments
- Diversified Beta

Custodian Bank
State Street

- Safekeeping
- Asset Valuations
- Benefit Payments
- Compliance Reporting

Actuary
Buck

- Actuarial Assumptions
- Project Financial Needs
- Earnings Assumptions
- Funded Status

Auditors
KPMG

- Audits
- Independent Testing

Please refer to the Investment Section, page 105 for the Summary Schedule of Broker Commission and Fees and page 106 for the Schedule of Direct Management Fees.

Historical MBTA Retirement Fund Board Members

	Period of Service	
	From	***To***
(A) Harold Ulrich **	08/48	01/49
(E) Irving F. Murray	08/48	08/49
(E) William A. Roche	08/49	07/56
(A) Thomas A. Dunbar **	08/48	01/59
(A) Charles A. McCarron **	08/48	05/60
(E) Thomas P. Dillon	08/48	03/61
(A) Ernest M. Flint	01/49	01/50
(E) Bartholomew P. Saunders	08/49	08/52
(A) Arthur V. Grimes	07/50	06/52
(A) Augustine Airola	06/52	04/53
(E) James J. Casey	08/52	08/64
(A) Harold Ulrich	04/53	04/57
(E) Michael J. Gormley	07/56	12/63
(A) William V. Ward **	08/57	08/64
(A) John J. Sullivan	01/59	07/59
(A) Willis B. Downey **	06/59	08/62
(A) William E. Ryan	06/60	02/72
(E) Edward S. Russell	03/61	01/62
(E) Matthew F. Ryan	01/62	12/69
(A) Edward F. McLaughlin, Jr.	08/62	03/70
(E) Walter H. Doyle	12/63	12/69
(E) Thomas F. Holland, Jr.	08/64	08/70
(A) Philip Kramer **	08/64	04/68
(A) Richard D. Buck **	04/68	07/79
(E) John J. Sugrue	12/69	12/71
(E) Albert F. Kelley	12/69	12/75
(A) Joseph C. Kelly	03/70	07/70
(A) John R. Launie	07/70	05/83
(E) Albert J. Fitzpatrick	08/70	07/80
(E) Patrick C. Quill	12/71	12/75
(A) Joseph H. Elcock	02/72	07/79
(E) John J. Sugrue	01/76	07/76
(E) Redmond R. Condon	01/76	02/78
(E) Joseph D. Fleming, Jr.	07/76	12/77
(E) Donald R. Abbott	12/77	08/79
(E) James J. Slattery	02/78	08/79
(A) Walter J. Ryan **	07/79	05/83
(A) Richard L. Taylor	07/79	05/83
(E) George P. Adams	08/79	11/79
(E) Richard J. Guiney	08/79	11/79
(E) John J. Gallahue, Jr.	11/79	01/83
(E) John J. O'Leary	03/80	01/93
(E) James T. Norton	07/80	10/90
(E) Paul M. Connolly	01/83	12/86

	Period of Service	
	From	***To***
(A) Paul E. Means	05/83	01/84
(A) William F. Irvin **	05/83	04/91
(A) James E. Smith, Esq.	05/83	04/91
(A) Melissa A. Tillman	01/84	04/91
(E) Anthony B. Romano **	12/86	02/92
(E) John J. Connolly **	10/90	08/94
(A) Domenic M. Bozzotto	04/91	02/97
(A) Toye L. Brown, Ph.D.	04/91	10/93
(A) James A. Radley	04/91	11/92
(E) James W. Duchaney	02/92	01/93
(A) Michael P. Hogan	11/92	12/93
(E) Richard M. Murphy	01/93	08/96
(E) Edward F. Sheckleton **	01/93	12/01
(A) Oliver C. Mitchell, Jr.	10/93	05/98
(A) Albert Shaw	12/93	10/95
(E) Paul V. Buckley	08/94	04/98
(A) Boyce W. Slayman	10/95	03/00
(E) James E. Lydon	10/96	12/01
(A) Janice Loux**	10/97	03/15
(E) William A. Irvin	04/98	12/05
(A) William A. Mitchell, Jr.	12/98	10/00
(A) Joseph M. Trolla	08/00	10/08
(A) Hon. Baron H. Martin	11/00	10/04
(E) Stephan G. MacDougall	01/02	12/10
(E) John P. Barry	01/02	04/06
(A) Jonathan R. Davis	10/04	05/15
(E) James M. O'Connell	09/07	06/15
(E) Michael F. Mastrocola	07/06	01/12
(A) Darnell L. Williams	01/09	05/15
(E) John J. Lee	01/11	12/13
(E) James M. Evers **	04/12	Present
(E) James M. O'Brien	01/14	12/19
(A) Steven Grossman	06/15	12/19
(A) Betsy Taylor	06/15	04/23
(A) Michael J. Heffernan	06/15	09/17
(E) Craig S. Hughes	07/15	04/23
(A) Steven Kadish	10/17	09/18
(A) Michael Abramo	03/19	04/21
(E) James Bradley	01/20	Present
(A) Mary Ann O'Hara	01/22	Present
(A) Paul Todisco	06/22	Present
(E) Timothy Long	05/23	Present

(E) Employee Representative (A) Authority Representative ** Chairperson

Historical Executive Directors of the MBTA Retirement Fund

Name	Period of Service From	To	Name	Period of Service From	To
John H. Moran	01/48	11/51	Karl E. White	04/02	06/06
Michael J. Powell	11/51	12/82	Michael H. Mulhern	07/06	08/16
John J. "Jack" Gallahue, Jr.	01/83	03/02	John P. Barry - Interim	08/16	Present

1 Prior to 1968 the Executive Director position was referred to as Treasurer

Historical MBTA Retirement Fund Alternate Board Members

Name	Period of Service From	To	Name	Period of Service From	To
(A) Joseph Gannon	08/48	01/49	(A) Guido R. Perera, Jr.	10/78	7/79
(A) Richard A. Sullivan	08/48	01/49	(A) Paul E. Means	7/79	5/83
(A) Ernie B. Myott	08/48	08/64	(A) John J. McCarthy	7/79	5/83
(E) Philip E. Doyle	08/48	12/49	(A) Guy F. DeBenedetto	7/79	8/81
(E) John C. Carey	08/48	08/54	(E) Frederick W. Burt III	12/79	3/83
(E) Joseph P. Fahey	08/48	04/54	(E) Charles E. Smyth	7/80	10/90
(A) Edward Dana	01/49	02/51	(E) Donald J. Quinlan	3/83	7/85
(A) Edward R. Kelly	01/49	07/50	(E) Anthony B. Romano	1/84	12/86
(E) Thomas Freeman	12/49	08/52	(A) Melba F. Hamilton	5/84	4/91
(A) Ernest M. Flint	07/50	10/52	(A) Judith H. Robbins	6/84	4/91
(E) Thomas F. Holland, Jr.	08/52	08/64	(E) Stanley V. Stearns	7/85	1/87
(A) John J. Sullivan	10/52	01/59	(E) Albert Mastrocola	1/87	10/97
(A) Horace Schmerhorn	04/53	04/56	(E) Edward F. Sheckleton	1/87	1/93
(E) Edward S. Russell	04/54	03/61	(E) Paul V. Buckley	10/90	8/94
(E) Michael J. Gormley	04/54	07/56	(A) Michael P. Hogan	6/91	11/92
(A) Robert H. Ryan	05/56	08/57	(A) Gregory C. Flynn, Esq.	10/91	3/92
(E) Joseph P. Fahey	07/56	01/58	(A) Arthur D. Shea	11/91	2/92
(A) John J. Graham	08/57	08/64	(A) Wesley G. Wallace, Jr.	2/92	3/94
(E) Thomas J. Rush	01/58	12/69	(A) Esther R. Maletz, Esq.	3/92	3/94
(A) William J. Fitzsimons	01/59	07/70	(E) Robert F. Gosnell	1/93	3/96
(E) Richard R. Rodwell	03/61	01/62	(A) Carol A. Buckley	3/94	1/96
(E) Walter H. Doyle	01/62	12/63	(A) Francis X. McDonough	3/94	8/96
(E) Paul F. Halloran	12/63	12/69	(A) Clifford H. Straw	3/94	1/96
(E) Albert J. Fitzpatrick	08/64	08/70	(E) Robert H. Stearns	8/94	4/98
(A) Frederick J. Sheehan	08/64	03/67	(A) William A. Mitchell, Jr.	1/96	12/98
(A) George L. Anderson	08/64	04/68	(E) Daniel K. Burton	4/96	9/96
(A) Vincent M. Banks	03/67	01/74	(A) Sharna A. Small-Borsellino	4/96	5/00
(A) Forrest I. Neal, Jr.	04/68	01/78	(E) Francis X. Madden	10/96	1/99
(E) Patrick C. Quill	12/69	12/71	(E) James M. O'Connell	4/98	12/05
(E) Dennis F. Guiney	12/69	12/73	(A) Philip Puccia	2/97	3/99
(A) Joseph A. Emerson	07/70	01/74	(E) James D. Wyllie	11/97	12/98
(E) Charles H. Ward	08/70	02/77	(E) Daniel K. Burton	1/99	1/00
(E) Paul F. Sullivan	12/71	12/73	(A) Willie J. Davis	12/98	7/00
(E) Charles F. Cole, Jr.	12/73	12/75	(A) Michael Mulhern	4/99	4/02
(E) Edward J. Doherty	12/73	12/75	(E) Torrie Austin	5/99	4/00
(A) Daniel F. Dullea	01/74	02/76	(E) James D. Wyllie	1/99	11/00
(A) Francis A. Sullivan	01/74	07/79	(E) James M. Evers	5/00	9/00
(E) Joseph A. Dineen	01/76	12/77	(A) Alice A. Fernandes	5/00	12/06
(E) Joseph D. Fleming, Jr.	01/76	07/76	(A) Jonathan R. Davis	8/00	10/04
(E) James T. Norton	03/77	07/80	(E) Stephan G. MacDougall	10/00	11/00
(E) Redmond R. Condon	02/78	01/84	(E) James M. Evers	11/00	12/01
(E) George P. Adams	02/78	08/79	(E) James Knox	8/01	12/01
(A) Troy Y. Murray	10/78	07/79			

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(E) James Crowley	01/02	03/03	(E) John A. Clancy	01/12	12/13
(E) Roy L. Chance	02/02	12/02	(A) Gerald K. Kelley	06/12	Present
(A) Wesley G. Wallace, Jr.	05/02	10/06	(E) Margaret C. LaPaglia	01/14	02/18
(E) Robert L. Callahan	03/03	02/06	(E) Lawrence C. Kelly	01/14	12/16
(E) M. John Burr	03/03	12/03	(E) Timothy P. Long	07/15	04/23
(E) John S. Murray	01/04	02/05	(E) John D. Hunt	01/17	12/19
(A) Brian J. Donohue	10/04	05/09	(E) Patrick Hogan	04/18	12/21
(E) James M. O'Brien	03/05	12/10	(A) Paul Brandley	03/18	05/19
(E) Michael F. Mastrocola	02/06	06/06	(A) Mary Ann O'Hara	12/19	12/21
(E) Daniel K. Burton	07/06	09/07	(A) Patrick Landers	01/22	Present
(A) Jeanne M. Morrison	10/06	03/15	(E) Jose Cruz	01/22	Present
(E) Lawrence C. Kelly	02/10	04/11	(E) John Mersereau	01/22	Present
(E) Walter J. Novicki	01/11	12/11	(A) David Panagore	06/22	Present
(E) James M. O'Brien	05/11	12/13	(E) James Joyce	05/23	Present

(E) Employee Representative (A) Authority Representative

MBTA Retirement Fund Professional Services

KPMG LLP
Audit services

Segal Marco Advisors
Investment consulting services

Buck Global, LLC
Actuarial services

Holland & Knight
Legal Counsel

State Street Bank & Trust Company
Custodian

FINANCIAL SECTION

KPMG LLP
Two Financial Center
60 South Street
Boston, MA 02111

Independent Auditors' Report

The Retirement Board and Participants
Massachusetts Bay Transportation Authority Retirement Fund:

Opinion

We have audited the financial statements of the Massachusetts Bay Transportation Authority Retirement Fund (the Fund), as of and for the years ended December 31, 2022 and 2021 and the related notes to the financial statements, which collectively comprise the Fund's basic financial statements for the years then ended as listed in the table of contents.

In our opinion, the accompanying financial statements referred to above present fairly, in all material respects, the fiduciary net position of the Fund as of December 31, 2022 and 2021, and the changes in its fiduciary net position for the years then ended in accordance with U.S. generally accepted accounting principles.

Basis for Opinion

We conducted our audits in accordance with auditing standards generally accepted in the United States of America (GAAS). Our responsibilities under those standards are further described in the Auditors' Responsibilities for the Audit of the Financial Statements section of our report. We are required to be independent of the Fund and to meet our other ethical responsibilities, in accordance with the relevant ethical requirements relating to our audits. 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 U.S. generally accepted accounting principles, and for the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from 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 Fund's ability to continue as a going concern for twelve months beyond the financial statement date, including any currently known information that may raise substantial doubt shortly thereafter.

Auditors' 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 auditors' 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 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

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KPMG

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, 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 Fund'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 Fund'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

U.S. generally accepted accounting principles require that the management's discussion and analysis, the schedule of changes in net pension liability and related ratios, the schedule of investment returns, and the schedule of contributions be presented to supplement the basic financial statements. Such information is the responsibility of management and, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board who 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 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 basic financial statements, and other knowledge we obtained during our audits 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.

Supplementary Information

Our audits were conducted for the purpose of forming an opinion on the financial statements that collectively comprise the Fund's basic financial statements. The schedule of administrative expenses and the schedule of investment expenses and payments of consultants are presented for purposes of additional analysis and are not a required part of the basic financial statements. Such information is the responsibility of management and was derived from and relates directly to the underlying accounting and other records used to prepare the basic financial statements. The information has been subjected to the

(Continued)

auditing procedures applied in the audit of the basic financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the basic financial statements or to the basic financial statements themselves, and other additional procedures in accordance with GAAS. In our opinion, the schedule of administrative expenses and the schedule of investment expenses and payments to consultants are fairly stated, in all material respects, in relation to the basic financial statements as a whole.

Other Information

Management is responsible for the other information included in the annual comprehensive financial report. The other information comprises the Introductory, Investment, Actuarial, Statistical, and the Frequently Asked Questions sections but does not include the basic financial statements and our auditors' report thereon. Our opinion on the basic financial statements does not cover the other information, and we do not express an opinion or any form of assurance thereon.

In connection with our audits of the basic financial statements, our responsibility is to read the other information and consider whether a material inconsistency exists between the other information and the basic financial statements, or the other information otherwise appears to be materially misstated. If, based on the work performed, we conclude that an uncorrected material misstatement of the other information exists, we are required to describe it in our report.

KPMG LLP

Boston, Massachusetts
June 19, 2023

**MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND**

Required Supplementary Information

Management's Discussion and Analysis

December 31, 2022 and 2021

(Unaudited)

This section presents Management's Discussion and Analysis (MD&A) of the Massachusetts Bay Transportation Authority Retirement Fund's (the Fund or MBTARF) financial activity and performance as of and for the years ended December 31, 2022 and 2021. The MD&A is unaudited and is intended to serve as an introduction to the Fund's basic financial statements, as well as to offer readers of the Fund's financial statements a narrative view and analysis of MBTARF's financial activities.

Financial Reporting Structure

The financial statements include the statements of fiduciary net position and changes in fiduciary net position. They present the financial position of the Fund as of December 31, 2022, and 2021 and its financial activities for the years then ended. The notes to the financial statements provide further information that is essential to a full understanding of the financial statements. The notes describe the significant accounting policies of the Fund and provide detailed disclosures on certain account balances. The required supplementary information includes the schedules of changes in net pension liability and related ratios, investment returns, contributions and related notes as prescribed by the Governmental Accounting Standards Board (GASB).

The Fund's financial statements are prepared on an accrual basis of accounting. This method of accounting requires recognizing and recording financial transactions when they occur and not just in conjunction with the inflows and outflows of cash.

The total assets managed by the Fund are held in the trust for the payment of pension and related benefits to its members. The Fund's Board of Trustees, in its fiduciary capacity, with assistance from its consultants established the Fund's investment policies and oversees their implementation.

Financial Highlights

Year ended December 31, 2022

The net position of the Fund decreased $317.4 million, or (16.4%) from $1,939.9 million as of December 31, 2021 to $1,622.5 million as of December 31, 2022.

Net investment income decreased $489.7 million, or (210.7%), from $232.4 million for the year ended December 31, 2021 to ($257.3) million for the year ended December 31, 2022. The Fund had a (12.97%) rate of return for the year ended December 2022 compared to a 13.88% rate of return for the year ended December 31, 2021. The returns identified in the MD&A are gross of fees with the exception of hedge funds, which are net of fees.

The total contributions received during the year ended December 31, 2022 were $175.5 million compared to total contributions received during the year ended December 31, 2021 of $166.7 million.

Employer contributions during the year ended December 31, 2022 increased $6.5 million or 5.2% to $130.0 million from $123.5 million during the year ended December 31, 2021.Member contributions were $45.5 million during the year ended December 2022, an increase of $2.3 million or 5.3% over year ended December 31, 2021 member contributions of $43.2 million.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Required Supplementary Information

Management's Discussion and Analysis

December 31, 2022 and 2021

(Unaudited)

Benefits paid during the year ended December 31, 2022 were $226.3 million an increase of 4.7 million or 2.1% over year ended December 31, 2021 when benefits paid were $221.6 million. The increase in benefits is largely due to rising final average compensation.

Year ended December 31, 2021

The net position of the Fund increased $170.0 million, or 9.6%, from $1,769.9 million as of December 31, 2020 to $1,939.9 million as of December 31, 2021.

Net investment income increased $3.8 million, or 1.7%, from $228.6 million for the year ended December 31, 2020 to $232.4 million for the year ended December 31, 2021. The Fund had a 13.88% rate of return for the year ended December 2021 compared to a 15.26% rate of return for the year ended December 31, 2020. The returns identified in the MD&A are gross of fees with the exception of hedge funds, which are net of fees.

The total contributions received during the year ended December 31, 2021 were $166.7 million compared to total contributions received during the year ended December 31, 2020 of $157.1 million.

Employer contributions during the year ended December 31, 2021 increased $7.2 million or 6.2% to $123.5 million from $116.3 million during the year ended December 31, 2020.

Member contributions were $43.2 million during the year ended December 2021, an increase of $2.4 million or 5.9% over year ended December 31, 2020 member contributions of $40.8 million.

Benefits paid during the year ended December 31, 2021 were $221.6 million a slight increase over year ended December 31, 2020 when benefits paid were $221.4 million.

Year ended December 31, 2020

The net position of the Fund increased $155.8 million, or 9.7%, from $1,614.1 million as of December 31, 2019 to $1,769.9 million as of December 31, 2020.

Net investment income decreased $25 million, or 9.9%, from $253.7 million for the year ended December 31, 2019 to $228.6 million for the year ended December 31, 2020. The Fund had a 15.26% rate of return for the year ended December 2020 compared to a 18.4% rate of return for the year ended December 31, 2019. The returns identified in the MD&A are gross of fees with the exception of hedge funds, which are net of fees.

The total contributions received during the year ended December 31, 2020 were $157.1 million compared to total contributions received during the year ended December 31, 2019 of $139.6 million.

Employer contributions during the year ended December 31, 2020 increased $13 million or 12.6% to $116.3 million from $103.3 million during the year ended December 31, 2019.

Member contributions were $40.8 million during the year ended December 2020, an increase of $4.4 million or 12.1% over year ended December 31, 2019 member contributions of $36.4 million.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Required Supplementary Information

Management's Discussion and Analysis

December 31, 2022 and 2021

(Unaudited)

Benefits paid during the year ended December 31, 2020, were $221.4 million an increase of $0.8 million, or 0.4%, over the benefits paid during the year ended December 31, 2019 of $220.6 million. This increase is not as significant in comparison from 2018 to 2019. The increase in benefits is due to rising final average compensation largely offset by the mortality rates during the pandemic and the ending of the retirement incentives by the Authority.

Financial Analysis

The following schedules report the condensed comparative fiduciary net position and activities for the Fund as of and for the years ended December 31, 2022.

Condensed Comparative Fiduciary Net Position

(Dollar values expressed in millions)

		December 31		
		2022	2021	2020
Cash	$	1.2	1.3	2.0
Receivables		9.6	9.4	10.2
Investments		1,616.1	1,934.3	1,768.1
Cash collateral on securities lending		10.3	17.5	26.9
Total assets		1,637.2	1,962.5	1,807.2
Cash collateral on securities lending		10.3	17.5	26.9
Accounts payable and accrued expenses		2.4	2.3	4.7
Payable for investments purchased		1.9	2.8	5.7
Total liabilities		14.6	22.6	37.3
Net position – restricted for pension benefits	$	1,622.6	1,939.9	1,769.9

Total assets at fair value were $1,637.2 million as of December 31, 2022, a decrease of $325.3 million or (16.6%), over the year ended December 31, 2021 which were $1,962.5 million as of December 31, 2021, an increase of $155.3 million, or 8.6%, over the year ended December 31, 2020. At December 31, 2022, investments at fair value were $1,616.1 million, a decrease of $318.2 million, or (16.5%), over the year ended December 31, 2021, which were valued at $1,934.3 million, an increase of $155.3 million, or 8.6%, over the year ended December 31, 2020. This investment decrease in 2022 is due to a difficult year in all asset classes. Private equity, private credit, and real estate investments were significant drivers of this year's performance. Fixed income returns also declined in 2022, as the historically low interest rates started to rise after many periods of no increases. The Federal Reserve raised interest rates 7 times in 2022 and was projected to keep the rate hikes in effect for 2023.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Required Supplementary Information

Management's Discussion and Analysis

December 31, 2022 and 2021

(Unaudited)

As of December 31, 2022, cash collateral on securities lending decreased by $7.2 million or (41.3%), over the year ended December 31, 2021. The cash collateral on securities lending decreased by $9.4 million or (34.9%), between December 31, 2020, and December 31, 2021. 2022 receivables increased by $0.2 million, or 2.6%, over the prior calendar year. Between December 31, 2020 and December 31, 2021 receivables decreased by $0.8 million, or (7.8%).

Total liabilities as of December 31, 2022 decreased by $7.9 million, or (35.1%) over the prior year, and increased by $14.7 million, or 39.4% during calendar year 2021. The cash collateral on securities lending decreased by $7.2 million, or (41.3%) in calendar year 2022 and decreased by $9.4 million, or (34.9%) in calendar year 2021. From December 31, 2021 through December 31, 2022, payable for investment purchased decreased by $0.8 million, or (29.9%). From December 31, 2020 through December 31, 2021, payable for investment purchased decreased by $2.9 million, or (50.9%).

Condensed Comparative Statement of Changes in Fiduciary Net Position

(Dollar values expressed in millions)

		December 31		
		2022	2021	2020
Additions:				
Employer contributions	$	130.0	123.5	116.3
Member contributions		45.5	43.2	40.8
Income from investments		(257.3)	232.4	228.6
Total additions		(81.8)	399.1	385.7
Deductions:				
Retirement benefits		226.3	221.5	221.4
Refunds of contributions		4.8	3.2	4.0
Administrative expense		4.5	4.4	4.5
Total deductions		235.6	229.1	229.9
Total changes in fiduciary net position	$	(317.4)	170.0	155.8

Additions to Plan Fiduciary Position

For the calendar year ended December 31, 2022, employer contributions increased by $6.5 million and member contributions increased by $2.3 million. For the calendar year ended December 31, 2021, employer contributions increased by $7.2 million and member contributions increased by $2.4 million. For the year ending 2022, there were no changes to either the employer or the employee contribution rate and both were held at 26.6561% and 9.3339% respectively. The current rates were effective as of July 1, 2020, based on the 2019 actuarial report recommendation.

(Continued)

**MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND**

Required Supplementary Information

Management's Discussion and Analysis

December 31, 2022 and 2021

(Unaudited)

The Board of Directors voted in 2021 and 2022 to make no change to the contribution rates. Contributions are required to provide benefits and meet administrative expenses and are made jointly by the Massachusetts Bay Transportation Authority (the Authority) and members. The member contribution percentage is negotiated periodically as part of the collective bargaining agreement.

There was a net investment loss in 2022 of ($257.3) million compared to a $232.4 million net investment gain in 2021 and $228.6 million net investment gain in 2020. The loss in 2022 is a result of a decrease in the fair value of the investment portfolio from a sharp decline in overall market performance.

Deductions from Fiduciary Net Position

Benefits paid increased by $4.8 million and $0.1 million, or 2.17% and 0.05%, over the years ended 2021 and 2020, respectively. These increases are primarily due to the rising final average compensation and lengthening life span. Administrative expenses increased from $4.4 million to $4.5 million, an increase of $0.1 million or 2.3% over year 2021 and decreased $0.1 million, or (2.2%) over year 2020.

Net Pension Liability (NPL)

The Fund retains an independent actuarial firm, Buck Global, LLC, to conduct annual actuarial valuations to monitor the net pension liability.

As of December 31, 2022, and 2021, the fiduciary net position as a percentage of the total pension liability was 51.23% and 62.54%, respectively.

Investment Performance 2022

The Fund began the calendar year 2022 with a net position of $1,939.9 million and ended the calendar year with a net position of $1,622.6 million, representing a 16.4% decrease. The Fund invests strategically to achieve the actuarial rate of return, while controlling risk through diversification of asset class exposure. The primary determinant of long-term investment performance is the strategic asset allocation policy.

Domestic equity 24.6%, international equity 16.7%, fixed income investments 22.3%, and cash equivalents 3.5% comprise approximately 67.1% of invested assets as of December 31, 2022. The remaining 32.9% of assets are invested in real estate 10.7%, and alternative investments 22.2%, which include private equity, absolute return, and diversified beta. These assets are expected to earn enhanced returns and manage risk through further diversification.

Investment performance results are measured by the relationship of the Fund's portfolio returns for equity and fixed income investment against widely accepted market indices. For the calendar year ended December 31, 2022, the MBTA Retirement Fund's total fund return was (13.0%) compared to 13.9% for the calendar year ended December 31, 2021. The 2022 decrease in return is attributed to the decline in markets and reductions previous gains experienced in several core asset classes. Investment classes that drove the negative return were in the small cap growth equity, large cap growth equity, global equity and emerging markets and domestic fixed income.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Required Supplementary Information

Management's Discussion and Analysis

December 31, 2022 and 2021

(Unaudited)

The domestic large cap equity returned (15.8%) compared to the S&P 500 Index of (18.1%). The domestic small cap equity returned (22.3%) compared to the Russell 2000 Growth Index of (26.3%) and the Russell 2000 Value Index of (14.5%). The global equity and emerging markets returned (37.0%) compared to MSCI All Country World Index of (18.4%). The international equity returned (16.9%) compared to the MSCI EAFE Index of (14.5%). Fixed Income returned (10.3%) compared to the Bloomberg US Aggregate of (13.0%).

The total fund performance of (13.0%) for calendar year 2022 trailed by 465 basis points, the total fund custom index (a blended composition of major market indices in proportion to the Fund's asset allocation), which returned (8.3%).

Additionally, for the year ended December 31, 2022, the real estate portfolio returned 3.9% compared to the NCREIF Property Index of 5.5%. The hedge fund portfolio returned (2.5%) compared to the CSFB/Tremont Hedge Fund Index of 1.1%. The opportunistic portfolio returned (0.7%) compared to Bank of America/Merrill Lynch High Yield Benchmark return of (11.2%). The private equity portfolio returned (0.5%) compared to State Street's Private Equity benchmark return of (5.47%). The private credit portfolio returned 7.9% compared to State Street's Private Credit benchmark return of 3.0%. Diversified Beta returned (19.6%) compared to the 60% MSCI World Eq / 40% Barclays Aggregate Bond return of (15.9%).

Investment Performance 2021

The Fund began the calendar year 2021 with a net position of $1,769.9 million and ended the calendar year with a net position of $1,939.9 million, representing a 9.6% increase. The Fund invests strategically to achieve the actuarial rate of return, while controlling risk through diversification of asset class exposure. The primary determinant of long-term investment performance is the strategic asset allocation policy.

Domestic equity 30.6%, international equity 14.1%, fixed income investments 22.1%, and cash equivalents 3.3% comprise approximately 70.1% of invested assets as of December 31, 2021. The remaining 29.9% of assets are invested in real estate 9.3%, and alternative investments 20.6%, which include private equity, absolute return, and diversified beta. These assets are expected to earn enhanced returns and manage risk through further diversification.

Investment performance results are measured by the relationship of the Fund's portfolio returns for equity and fixed income investment against widely accepted market indices. For the calendar year ended December 31, 2021, the MBTA Retirement Fund's total fund return was 13.9% compared to 15.3% for the calendar year ended December 31, 2020. The 2021 increase in return is attributed to the continued positive gains experienced in all asset classes. Investment classes with significant positive returns were in the small cap growth equity, large cap growth equity, real estate and private equity.

The domestic large cap equity returned 27.2% compared to the S&P 500 Index of 28.7%. The domestic small cap equity returned 22.6% compared to the Russell 2000 Growth Index of 2.8% and the Russell 2000 Value Index of 28.3%. The global equity and emerging markets returned 8.5% compared to MSCI All Country World Index of 18.5%. The international equity returned 8.8% compared to the MSCI EAFE Index of 11.3%. Fixed Income returned 0.9% compared to the Bloomberg Aggregate of -1.5%.

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The total fund performance of 13.9% for calendar year 2021 outperformed by 36 basis points, the total fund custom index (a blended composition of major market indices in proportion to the Fund's asset allocation), which returned 13.5%.

Additionally, for the year ended December 31, 2021, the real estate portfolio returned 18.8% compared to the NCREIF Property Index of 17.7%. The hedge fund portfolio returned 8.1% compared to the CSFB/Tremont Hedge Fund Index of 8.2%. The opportunistic portfolio returned 9.9% compared to Bank of America/Merrill Lynch High Yield Benchmark return of 5.4%. The private equity portfolio returned 31.7% compared to State Street's Private Equity benchmark return of 49.2%. The private credit portfolio returned 56.2% compared to State Street's Private Credit benchmark return of 25.3%. Diversified Beta returned 9.8% compared to the 60% MSCI World Eq / 40% Barclays Aggregate Bond return of 12.1%.

Other Information

As part of a Plan of Reorganization approved on March 27, 2014 in In re: Fletcher Int'l, Ltd., No. 12-12796 (Bankr. S.D.N.Y.) (the Fletcher Bankruptcy), the Fund agreed with the Bankruptcy Trustee, Richard Davis, to pool claims against Alphonse "Buddy" Fletcher, Fletcher related entities, current and former officers, directors and insiders, and various third-party professionals for recovery of the Fund's investment in Fletcher Fixed Income Alpha Fund (Alpha). A Judgement was obtained against Buddy Fletcher personally, which is reported to be of little, if any, value. Confidential settlements were also reached by the Trustee with other Fletcher related defendants. See, e.g., MBTARF, et al. v. Citco Fund Services (Cayman Islands), Ltd., et al., Case No. 651446/2015 (New York Supreme Court).

Following the Trustee's report that the bankruptcy estate had been wound down and distribution of substantially all estate funds and moneys recovered on behalf of the estate had occurred, the Court entered its Final Decree Pursuant to 11 U.S.C. Section 350 and Fed. R. Bankr. P. 2033 Closing the Chapter 11 Case. On March 21, 2019, the Fletcher Bankruptcy was officially closed. In December 2019, the Joint Voluntary Liquidators of Alpha in the Cayman Islands issued their final report and made their final distribution and repayment to the Fund in the sum of $1,958,840.30. The Fund's remaining interest in any Fletcher related, a distributed share from Alpha of the Cayman liquidation of Fletcher Income Arbitrage, Ltd (Arbitrage,) was extinguished. On January 10, 2022, the Joint Official Liquidators of Arbitrage issued their final report to creditors declaring a de minimis final dividend (less than a half cent on the dollar) and reported no further projected recoveries. More complete historical reporting about the Fund's investment in Fletcher is found in prior Fund ACFR's. See, e.g., Fund's 2013 ACFR at p. 19.

The Fund was also party to a Pooling and Cooperation Agreement (PCA) with other investors in Weston Capital Partners Fund II (PII) and investors in Wimbledon Financing Master Fund Ltd (WFF). On or about November 9, 2021, the Fund conveyed its interest in the PCA in exchange for a release from PII Investment Liquidation Company, LLC, the liquidator of PII. Both PII and WFF are funds previously managed by Weston Capital Asset Management LLC (Weston) and reportedly remain in liquidation. Weston and certain of its principals were the subject of an SEC consensual civil judgement in Florida on June 23, 2014 for an investment unrelated to PII. Civil litigation, in which the Fund holds no interest or exposure due to its conveyance of the PCA, involving Weston and various related parties including insiders and investors is ongoing. A turnover proceeding filed by other Weston investors (Class TT) in New York has settled.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

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See, The Wimbledon Fund, SPC (Class TT) v. Weston Capital Partners Master Fund II, Ltd, et al., Supreme Court New York, Index No. 160576/2017. Criminal proceedings involving Weston insiders resulted in guilty pleas and jury verdicts. See, e.g., USA v. Bergstein, et.al, No. 1:16-cr-746 (S.D.N.Y.) and USA v. Galanis, et. al., No. 1:16-cr-371 (S.D.N.Y).

For more detail and historical background on the Fund's investments in PII and White Oak Global Advisors, a PII investment assigned in-kind to the Fund, please see the Fund's 2013 ACFR at p. 19 and the Fund's 2015 ACFR at p. 31.

The Fund's investments in Alpha, Weston and White Oak were all written down in full in prior fiscal years. The Fund no longer holds any interest in the Alpha, Weston or White Oak liquidations in the Cayman Islands.

The Fund does not anticipate any material activity, recoveries or need for future reporting on those cases during this coming fiscal year or beyond.

Contacting the MBTA Retirement Fund

This financial report is designed to provide a general overview of the Fund's investment results and financial condition of the Fund for the years ended December 31, 2022 and 2021. Please contact the MBTA Retirement Fund Office by emailing invest@mbtarf.com or by phone to 617-316-3800 for additional financial information or questions related to this report.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Statements of Fiduciary Net Position

December 31, 2022 and 2021

	2022	2021
Assets:		
Investments, at fair value:		
Domestic:		
Cash and cash equivalents	$ 58,763,129	62,768,979
Fixed income	357,589,712	424,763,531
Common stock and equity funds	444,338,203	592,743,743
Real estate funds	173,477,871	179,905,942
Alternative investments and hedge funds	358,179,394	398,210,575
	1,392,348,310	1,658,392,770
International:		
Cash and cash equivalents	137,798	124,510
Fixed income	149,438	2,181,798
Common stock and equity funds	223,460,403	273,647,873
	223,747,639	275,954,181
Total investments	1,616,095,949	1,934,346,951
Cash and cash equivalents	1,204,250	1,274,199
Contribution receivable from Massachusetts Bay Transportation Authority	6,719,724	6,316,398
Cash collateral on securities lending, invested	10,255,356	17,474,343
Receivable for investments sold	2,902,212	3,063,525
Total assets	1,637,177,491	1,962,475,416
Liabilities:		
Cash collateral on securities lending, due to borrowers	10,255,356	17,474,343
Accounts payable and accrued expenses	2,435,703	2,293,999
Payable for investments purchased	1,937,454	2,764,649
Total liabilities	14,628,513	22,532,991
Net position – restricted for pension benefits	$ 1,622,548,978	1,939,942,425

See accompanying notes to financial statements.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Statements of Changes in Fiduciary Net Position
For the years ended December 31, 2022 and 2021

	2022	2021
Additions:		
Contributions by Massachusetts Bay Transportation Authority	$ 129,973,295	123,493,762
Contributions by members	45,511,253	43,224,002
Total contributions	175,484,548	166,717,764
Investment income:		
Income from investments	27,388,603	24,474,091
Less investment expenses, other than from securities lending	(4,901,736)	(6,537,963)
Net (depreciation) appreciation in fair value of investments	(279,781,753)	214,422,255
Net investment (loss) gain	(257,294,886)	232,358,383
Securities lending activity:		
Securities lending income	365,533	117,465
Less borrower rebates and fees	(325,638)	(58,307)
Net income from securities lending activities	39,896	59,158
Total net investment (loss) income	(257,254,990)	232,417,541
Total additions	(81,770,442)	399,135,305
Deductions:		
Retirement benefits	226,290,777	221,589,832
Refunds of members' contributions	4,847,462	3,177,839
Administrative expenses	4,484,766	4,366,485
Total deductions	235,623,005	229,134,156
Change in fiduciary net position	(317,393,447)	170,001,149
Net position restricted for pension benefits:		
Beginning of year	1,939,942,425	1,769,941,276
End of year	$ 1,622,548,978	1,939,942,425

See accompanying notes to financial statements.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND

Notes to Financial Statements

December 31, 2022 and 2021

(1) Description of the Fund

(a) General

The following description of the Massachusetts Bay Transportation Authority Retirement Fund (the Fund), a single employer defined benefit pension plan, provides only general information. Employees (members) should refer to the Pension Agreement for a more complete description of the Fund's provisions.

The Fund was established on January 1, 1948, under an agreement and declaration of trust (restated in October 28, 1980) by and among the Massachusetts Bay Transportation Authority (the Authority), Local 589, Amalgamated Transit Union, Boston Carmen's Union, and AFL CIO (collectively, the Union). The Fund was established as a contributory defined benefit retirement plan in accordance with the Pension Agreement, effective July 1, 1970, adopted by the Authority and the Union for the purpose of receiving contributions and providing pension benefits for its members and qualified beneficiaries.

The general administration and responsibility for the operation of the Fund are vested in a seven-member Retirement Board. The Board consists of three members appointed by the Authority (at least one of whom must be a member of the Authority's Board of Directors), two members appointed by the Boston Carmen's Union, Local Union 589 of the Amalgamated Transit Union, AFL-CIO, one member elected by vote conducted by the Authority for a term of three years by members of the Fund who are not members of the Boston Carmen's Union, Local Union 589 of the Amalgamated Transit Union, AFL-CIO, and one member, who has no vote and is known as the honorary member, who is elected, for such period as the Retirement Board may determine, by the other six members of the Retirement Board.

(b) Membership

The Fund covers all employees of the Authority except the MBTA Police, who are covered separately, and certain executives who elect coverage under an alternate plan. At December 31, 2022 and 2021, Fund membership consisted of:

		2022	2021
Retired members or beneficiaries currently receiving benefits	$	6,759 (1)	6,713 (2)
Active members		5,555	5,486
Active members not presently earning service credit		307	215
Total membership	$	12,621	12,414

(1) Includes 6,614 retirees and beneficiaries and 145 individuals receiving payments under Qualified Domestic Relation Orders (QDROs)

(2) Includes 6,572 retirees and beneficiaries and 141 individuals receiving payments under Qualified Domestic Relation Orders (QDROs)

(c) Funding Policy

Contributions required to provide benefits and meet administrative expenses are made jointly by the Authority and members. The member contribution rate was increased from 8.8239% to 9.3339% effective July 1, 2020 of pretax compensation.

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MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
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The Authority contribution rate was increased from 25.1261% to 26.6561% effective July 1, 2020. As of July 1, 2022, member contribution and Authority contribution rates remained the same at 9.3339% and 26.6561%, respectively. As of July 1, 2023, member contributions will increase to 10.3489%, which is the negotiated 1.25% over the actuarial annual required contribution rate of 9.0989%. The Authority contribution rate will be 25.9511% as determined by the 2022 Valuation of plan benefits and the Memorandum of Understanding with the Authority. The terms of the Fund's obligations are part of the Pension Agreement contained in the annual report of the Fund. Only parties to the Pension Agreement can amend the terms. The contributions by members and the Authority have been developed to provide normal contributions, interest on the unfunded accrued liability, and administrative expenses.

(d) Benefits

The Fund provides for retirement, disability and death benefits in accordance with the Pension Agreement, as amended.

A summary of benefits is as follows:

(i) Normal Retirement Allowance

Condition for Allowance

Any member may retire at age 65. A member may remain in service after the stated retirement date.

Amount of Allowance

The normal retirement allowance equals 2.46% of 3-year average annual compensation multiplied by the years of service, such allowance not to exceed 75% of such average annual compensation.

(ii) Early Normal Retirement Allowance

Condition for Allowance

Any member hired prior December 6, 2012 and has completed at least 23 years of service may retire on an early normal retirement allowance.

Any member hired on or after December 6, 2012, has attained age 55 and completed at least 25 years of service may retire on an early normal retirement allowance.

Amount of Allowance

The early normal retirement allowance is computed in the same manner as a normal retirement allowance on the basis of the compensation and service to the time of retirement.

(iii) Early Reduced Retirement Allowance

Condition for Allowance

A member who has attained age 55 and has completed at least 20 years of service may be retired on an early reduced retirement allowance.

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MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Notes to Financial Statements
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Amount of Allowance

The early reduced retirement allowance is an immediate allowance, commencing at the date of retirement, and is computed in the same manner as a normal retirement allowance on the basis of compensation and service to the time of early retirement, but reduced by 1/2 of 1% for each month of retirement prior to normal retirement date.

(iv) Disability Retirement Allowance

Condition for Allowance

Any member who has completed 4 years of service in case of disablement due to an occupational accident or sickness, or who has completed 6 years of service in case of disablement due to any other cause, and who has become totally and permanently incapacitated, mentally or physically, for the further performance of duty may be retired.

Amount of Allowance

Upon disability retirement, a member receives an allowance commencing immediately, which is computed as a normal retirement allowance on the basis of the compensation and service to the time of disability retirement and is not less than 15% of the member’s 3-year average annual compensation.

(v) Vested Retirement Allowance

Condition for Allowance

Any member who has completed 10 years of service and who is not eligible for a retirement allowance is eligible for a vested retirement allowance, in lieu of a refund of his/her contributions with interest, in the event his/her employment terminates for reasons other than voluntary quit or discharge for cause.

Amount of Allowance

The vested retirement allowance is a deferred allowance commencing on the member’s normal retirement date and equal to a percentage, not exceeding 100%, of the amount computed as a normal retirement allowance on the basis of the compensation and service to the time of termination; the applicable percentage is 5% multiplied by the number of years of creditable service, not in excess of 20, at the time of termination.

(vi) Survivor Benefit

Condition for Benefit

Upon the death of a member who has completed 10 years of service and who is survived by a spouse and/or dependent children designated to receive the deceased member’s contributions with interest, a benefit may be elected by such survivor in lieu of the payment of the contributions with interest.

Amount of Benefit

If the deceased member had completed at least 10 but fewer than 23 years of service, the survivor’s benefit, payable for life, is equal to the amount which would have become payable if

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MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Notes to Financial Statements
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the member had retired as of the date of his/her death and elected a 50% joint and survivor option in effect as of the date of death with the survivor as the designated person under the option. There is no reduction for early commencement.

If the deceased member had completed at least 23 years of service, the survivor's benefit, payable for life, is equal to the amount which would have become payable if the member had retired as of the date of his/her death and elected a 100% joint and survivor option in effect as of the date of death with the survivor as the designated person under the option. There is no reduction for early commencement.

(vii) Accidental Death Benefit

Condition for Benefit

Upon the death of a member in service whose death results solely from an injury or injuries sustained in the performance of duty, and who is survived by a spouse designated to receive the deceased member's contribution with interest, an allowance shall be payable to said spouse.

Amount of Benefit

The accidental death benefit, payable for life, is equal to the amount which would have become payable to the member if the member had retired as of the date of his/her death on a disability retirement allowance. If there should be insufficient creditable service, the surviving spouse receives the minimum allowance available under the disability retirement provision.

(e) Fund Termination

In the event of termination of the Fund, all of the assets of the Fund shall be used for the benefit of members and retired members or their beneficiaries, and for no other purpose. Each member, and each retired member or their designated beneficiary in receipt of a retirement allowance, shall be entitled to such proportionate part of the assets of the Fund as the reserve, required for their benefits, bears to the total reserves required under the Fund as determined by the Massachusetts Bay Transportation Authority Retirement Board (the Retirement Board) on the basis of actuarial valuation. The Retirement Board may require all such members, and retired members or designated beneficiaries, to withdraw such amounts in cash or in the form of immediate or deferred annuities as it may determine.

(2) Significant Accounting Policies

(a) Basis of Accounting

The financial statements have been prepared on the accrual basis of accounting in conformity with U.S. generally accepted accounting principles (GAAP), as promulgated by the Governmental Accounting Standards Board (GASB).

(b) Use of Estimates

The preparation of financial statements in conformity with U.S. generally accepted accounting

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**MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
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principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the dates of the financial statements and the reported amounts of additions and deductions during the reporting periods. Actual results could differ from estimates.

(c) Cash and Cash Equivalents

Cash and cash equivalents generally consist of cash on deposit with banks and financial institutions and highly liquid short-term investments, which have original maturities of three months or less. The Fund maintains its cash deposits with financial institutions, which management considers being of high credit quality and, by policy, limits the allocation of funds to any single major financial institution to minimize the Fund's amount of credit exposure.

(d) Revenue Recognition

Contributions are recognized pursuant to the contractual requirements of the Pension Agreement. Investment income is recognized as it is earned. Net appreciation (depreciation) in the fair value of investments is recorded as an increase (decrease) to investment income based on the valuation of investments as of the date of the financial statements.

(e) Retirement Benefits and Refunds

Retirement benefits and refunds are recognized when they become due and payable.

(f) Investments

Investments are stated at fair value. Securities traded on national security exchanges are valued on the basis of the closing price as of the last business day of the reporting period. Securities traded in the over-the-counter market are normally valued at the mean of the closing bid and ask prices. Securities listed or traded on certain foreign exchanges whose operations are similar to the U.S. over-the-counter market are valued at the price within the limits of the latest available current bid and ask prices deemed best to reflect current value. Gains and losses on sales of investments are determined on the basis of average cost.

Investments in real estate represent the Fund's percent ownership in private real estate funds. The Fund's investments are valued based on estimates by the Fund's management as a result of their review of financial information of the underlying real estate investment assets and standards established by the real estate industry, generally using the net asset value of the underlying investment as a practical expedient.

Investments in alternative investments and hedge funds include the Fund's percent ownership in venture capital, leveraged buyouts, private placements, hedge fund-of-funds, and other investments where the structure, risk profile, and return potential differ from traditional equity and fixed income investments. These investments are included in the statement of fiduciary net position at estimated values determined in good faith by the Fund's management, generally using the net asset value of the underlying investment as a practical expedient.

Purchase and sales of investments are selected on a trade-date basis.

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**MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
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(g) Derivatives

A derivative is an investment agreement or security with a value that depends on, or is derived from, the value of an underlying asset, reference rate, or financial index. The Fund has classified its investment in forward exchange contracts as investment in derivative instruments. A forward exchange contract is a commitment to purchase or sell a foreign currency at a future date at a negotiated forward rate. The Fund utilizes forward foreign exchange contracts to minimize the effect of fluctuating foreign currencies. Risk associated with such contracts includes movement in the value of a foreign currency relative to the U.S. dollar. Realized gain or loss on forward exchange contracts is the difference between the original contract and the closing value of such contract and is included in the statement of changes in fiduciary net position. At December 31, 2022 and 2021, the Fund held open forward exchange contracts of varying amounts and currencies. Unrealized gains and losses are not significant to the financial statements.

(h) Currency Translation

As a result of having assets and liabilities denominated in foreign currencies, the Fund is exposed to the effect of foreign exchange rate fluctuations. Assets and liabilities denominated in foreign currencies and commitments under forward foreign exchange contracts and currency options are translated into U.S. dollars at the mean of the quoted bid and ask prices of such currencies against the U.S. dollar. Changes in foreign exchanges are reflected directly in income. Purchases and sales of portfolio securities are translated at the rates of exchange prevailing when such securities were acquired or sold. Income and expenses are translated at rates of exchange prevailing when accrued. It is not practical to isolate that portion of the results of operations arising as a result of changes in the foreign exchange rates from the fluctuations arising from changes in the market price of securities during the period. Net realized gains on foreign currency transactions represent net foreign exchange gains from holding foreign currencies, currency gains or losses realized between the trade and settlement dates on security transactions, and the difference between the amounts of dividends, interest, and foreign taxes recorded on the Fund's books and the U.S. dollar equivalent amounts actually received or paid.

(i) Income Taxes

The Fund is considered a qualified governmental plan under Internal Revenue Code Section 414(d) and, is generally exempt from federal and state income tax under the Internal Revenue Code Section 115.

(j) Adoption of New Accounting Pronouncement

In 2022, the Fund implemented GASB Statement No. 87, *Leases*. This statement requires the recognition of certain lease assets and liabilities for leases that previously were classified as operating leases and recognized as inflows of resources or outflows of resources based on the payment provisions of the contract. It establishes a single model for lease accounting based on the foundational principle that leases are financings of the right to use an underlying asset. Under this Statement, a lessee is required to recognize a lease liability and an intangible right-to-use lease asset.

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MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Notes to Financial Statements
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GASB Statement No. 87 did not have a material impact on the financial statements.

(3) Cash Deposits, Investments, and Securities Lending

The Fund, in accordance with the declaration of trust agreement, is authorized to make deposits into checking and savings accounts and to invest in any form or type of investment, financial instrument, or financial transaction deemed prudent in the informed opinion of the Retirement Board. State Street Bank & Trust Company serves as the master custodian for the Fund's assets.

For the years ended December 31, 2022 and 2021, the Fund's essential risk information about deposits and investments is presented on the following tables.

(a) Custodial Credit Risk

Custodial credit risk is the risk that, in the event of failure of a depository financial institution, the Fund's deposits may not be returned. The Fund maintains its cash and cash equivalent deposits with various financial institutions, which management considers being of high quality. The Fund limits the allocation of its cash and cash equivalent deposits to any single financial institution to minimize the Fund's exposure. The Fund's Board has not adopted a formal custodial credit risk policy.

The Fund's cash and cash equivalent deposits that are not collateralized are subject to the Federal Deposit Insurance Corporation (FDIC) insurance limits. At December 31, 2022 and 2021, $804,225 and $844,214 of the Fund's cash and cash equivalents deposits were in excess of the FDIC insurance limit.

Investment securities are exposed to custodial credit risk if the securities are uninsured, are not registered in the name of the Fund and are held by either the depository financial institution or the depository financial institution's trust department or agent but not in the Fund's name.

All of the Fund's investments are held by the Fund's custodian in the Fund's name, except for investments in hedge funds, real estate and alternative investments, which by their nature are not required to be categorized.

(b) Investment Policy

The Fund's investment objective is to achieve consistent positive real returns and to maximize long-term total return within prudent levels of risk through a combination of income and capital appreciation. The Fund's goal is to meet or exceed the Fund's actuarial target rate of return in order to maintain and improve upon its funded status.

The Fund is currently invested in stocks (domestic and foreign), fixed income securities (domestic), real estate, private equity, and hedge funds.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Notes to Financial Statements
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The following was the Board's adopted target asset allocation policy as of December 31, 2022 and 2021:

Asset class	2022	2021
Domestic equity	24 %	24 %
International large cap equity	9	9
International small cap equity	2	2
Global/emerging markets	8	8
Fixed income	23	23
Real estate	9	9
Private equity	8	8
Private credit	2	2
Hedge funds	5	5
Hedge funds – opportunistic	2	2
Risk parity/diversified beta	6	6
Cash	2	2
Total	100 %	100 %

(c) Interest Rate Risk

Interest rate risk is the risk that changes in interest rates will adversely affect the fair value of an investment. The following is a listing of the Fund's fixed income investments and related maturity schedule (in years) as of December 31, 2022 and 2021:

	2022				
Investment type	Fair value	Less than 1	1-5	6-10	More than 10
Agency debt	$ 2,536,775	368,340	586,350	586,718	995,367
U.S. Treasury notes & bonds	83,746,982	9,942,351	36,262,963	21,959,405	15,582,263
Domestic corporate	203,331,868	1,624,489	105,276,205	33,442,625	62,988,549
International corporate	149,438	-	149,438	-	-
Asset Backed:					
CMOs	10,407,771	-	194,230	273,082	9,940,459
Mortgage backed	32,383,692	-	-	648,757	31,734,935
Other	25,182,624	-	4,445,322	2,048,918	18,688,384
	$ 357,739,150	11,935,180	146,914,508	58,959,505	139,929,957

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
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Notes to Financial Statements
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	2021				
Investment type	**Fair value**	**Less than 1**	**1-5**	**6-10**	**More than 10**
Agency debt	$ 3,531,828	-	1,467,090	673,979	1,390,759
U.S. Treasury notes & bonds	113,235,825	7,875,402	61,536,718	28,745,383	15,078,322
Domestic corporate	231,643,225	1,538,703	104,755,312	44,432,047	80,917,164
International corporate	2,181,798	265,402	1,595,586	-	320,810
Asset Backed:					
CMOs	15,480,527	-	168,115	-	15,312,412
Mortgage backed	36,528,750	-	-	752,973	35,775,777
Other	24,343,376	-	6,211,036	2,470,846	15,661,493
	$ 426,945,329	9,679,507	175,733,857	77,075,228	164,456,737

The Fund's guidelines limit its effective exposure to interest rate risk by benchmarking the separately managed fixed income investment accounts to an intermediate duration benchmark with a weighted average duration of four to five years. The Fund further constrains its actively managed fixed income portfolios to maintain a duration that shall not exceed 1.5 times the benchmark duration.

Fixed income managers are also expected to report risk statistics and give a description of portfolio characteristics, including quality, duration, allocation by security type, and yield to maturity.

The collateralized mortgage obligations (CMOs) held by the Fund at December 31, 2022 and 2021 are highly sensitive to changes in interest rates.

(d) Credit Risk

Credit risk exists when there is a possibility the issuer or other counterparty to an investment may be unable to fulfill its obligations.

The Fund's Board does not have a formal investment policy governing credit risk; each fixed income securities investment manager is given a specific set of guidelines to invest within based on the mandate for which it was hired. The Fund expects all investment managers to perform their fiduciary duties as prudent people would and conform to all state and federal statutes governing the investment of the funds. Managers are to adhere to the philosophy and style that was articulated to the Retirement Board at the time of hire. The fixed income investment managers have full discretion to invest in fixed income securities in order to exceed their strategy specific benchmarks.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Notes to Financial Statements

December 31, 2022 and 2021

The Fund's fixed income investments as of December 31, 2022 and 2021 were rated by Standard and Poor's and/or an equivalent national rating organization, and the ratings are presented below using the Standard & Poor's rating scale:

	2022								
Investment type	**Fair value**	**AAA**	**AA**	**A**	**BBB**	**BB**	**B**	**CCC****	**Not Rated**
Agency debt	$ 2,536,775	—	2,536,775	-	—	—	—	—	—
Domestic corporate	203,331,868	47,420,833	1,395,366	19,227,985	64,966,295	12,754,464	53,960,675	1,313,337	2,292,913
International	149,438	—	—	—	102,960	—	—	46,478	-
Asset backed:									
CMOs	10,407,771	1,927,758	191,423	285,139	37,385	87,326	—	—	7,878,740
Mortgage backed	32,383,692	—	—	—	—	—	—	—	32,383,692
Other	25,182,624	5,561,507	685,085	3,241,367	3,187,235	—	131,506	—	12,375,924
Total credit securities risk	273,992,168	54,910,098	4,808,649	22,754,491	68,293,875	12,841,790	54,092,181	1,359,815	54,931,269
U.S. government fixed income securities*	83,746,982								
Total fixed income securities	$ 357,739,150								

	2021								
Investment type	**Fair value**	**AAA**	**AA**	**A**	**BBB**	**BB**	**B**	**CCC****	**Not Rated**
Agency debt	$ 3,531,828	—	1,625,640	1,060,086	846,102	—	—	—	—
Domestic corporate	231,643,225	53,571,798	903,022	16,095,452	66,137,936	24,480,916	64,138,600	1,789,110	4,526,392
International	2,181,798	—	553,916	—	320,810	467,361	—	72,812	766,899
Asset backed:									
CMOs	15,480,527	5,185,617	207,758	251,959	146,518	—	—	—	9,688,675
Mortgage backed	36,528,750	—	—	—	—	—	—	—	36,528,750
Other	24,343,376	6,149,758	1,137,505	4,109,375	3,875,807	—	172,905	—	8,898,025
Total credit securities risk	313,709,504	64,907,173	4,427,841	21,516,872	71,327,173	24,948,277	64,311,505	1,861,922	60,408,741
U.S. government fixed income securities*	113,235,825								
Total fixed income securities	$ 426,945,329								

* Obligations of the U.S. government or obligations explicitly guaranteed by the U.S. government are not considered to have credit risk.

** The rating associated with this investment grade can be between C to CCC.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Notes to Financial Statements
December 31, 2022 and 2021

(e) Concentration Risk

Concentration of credit risk is the risk of loss that may be attributed to the magnitude of a government's investment in a single issuer. The Fund places a 5% limit on the individual exposure to any single issuer at the time of purchase. The Fund has no investments with the exception of commingled funds, at fair value, that exceed 5% of the Fund's total investments as of December 31, 2022 and 2021. The Fund does have investments in individual commingled funds and trusts that represent more than 5% of the Fund's assets, but in each case, these investments are in institutional commingled funds that are invested in diversified portfolios.

(f) 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. The Fund's exposure to foreign currency risk is attributable to its investments in separately managed and commingled international equity mutual funds and trusts that are invested in diversified portfolios of international stocks that are denominated in foreign currencies. The Fund's combined policy target allocation to all non-U.S. securities is currently 19.0% of the Fund's total assets. Currency hedging is permitted for defensive purposes. Currency hedging shall be effected through the use of forward currency contracts, which are described more fully in note 2.

Risk of loss arises from changes in currency exchange rates. The Fund's exposure to foreign currency risk as of December 31, 2022 and 2021 are presented on the following tables:

Currency		2022 Short-Term	Fixed Income	Equity	Total
Argentine peso	$	53,521	46,478	—	99,999
Canadian dollar		82,723	—	—	82,723
Euro currency		(105)	102,960	3,993,614	4,096,469
Indian rupee		0	—	6,462,030	6,462,030
Japanese yen		0	—	3,793,044	3,793,044
Norwegian krone		1,666	—	122,152	123,818
Pound sterling		(7)	—	2,486,758	2,486,751
Swiss franc		0	—	2,297,034	2,297,034
Thailand baht		—	—	948,820	948,820
International equity pooled funds (various currencies)		—	—	203,356,951	203,356,951
Total securities subject to foreign currency risk		137,798	149,438	223,460,403	223,747,639
United States dollars (securities held by international investment managers)		—	—	5,930,124	5,930,124
Total International Investment Securities	$	137,798	149,438	229,390,527	229,677,763

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Notes to Financial Statements
December 31, 2022 and 2021

Currency		2021 Short-Term	2021 Fixed Income	2021 Equity	2021 Total
Argentine peso	$	41,347	99,356	—	140,703
Australian dollar		—	—	4,704,003	4,704,003
Brazilian real		—	467,361	—	467,361
Canadian dollar		84,585	—	5,066,734	5,151,319
Danish krone		—	—	732,597	732,597
Euro currency		(1,422)	—	42,728,698	42,727,276
Hong Kong dollar		—	—	7,640,710	7,640,710
Indian rupee		—	792,774	7,227,804	8,020,578
Japanese yen		—	—	31,635,773	31,635,773
Mexican peso		—	822,307	—	822,307
New Israeli sheqel		—	—	284,638	284,638
New Taiwan dollar		—	—	1,327,213	1,327,213
Norwegian krone		—	—	26,962	26,962
Pound sterling		—	—	20,942,924	20,942,924
Singapore dollar		—	—	2,994,924	2,994,924
Swedish krona		—	—	4,370,433	4,370,433
Swiss franc		—	—	2,611,750	2,611,750
Thailand baht		—	—	1,770,442	1,770,442
International equity pooled funds (various currencies)		—	—	139,582,269	139,582,269
Total securities subject to foreign currency risk		124,510	2,181,798	273,647,874	275,954,182
United States dollars (securities held by international investment managers)		—	—	7,416,106	7,416,106
Total International Investment Securities	$	124,510	2,181,798	281,063,980	283,370,288

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND

Notes to Financial Statements
December 31, 2022 and 2021

(g) Securities Lending Transactions

The Fund participates in the State Street Bank and Trust Company securities lending program by lending securities to borrowers (subject to borrower limits and program guidelines) and earning additional income, which is included in net investment income in the statement of changes in fiduciary net position. The lending program loans domestic and international equities, real estate investment trusts and fixed income securities for collateral with a concurrent agreement to return the collateral for the same securities in the future.

The Fund did not incur any losses on loaned securities during the year ended December 31, 2022 and 2021. The securities are monitored and valued on a daily basis by the custodian to ensure that the loans are properly collateralized. The collateral value is required to be at least 102% of the fair value of loaned domestic investments and a collateral value of at least 105% of the fair value on loaned international investments. Collateral can consist of both cash and securities. Should the collateral percentage levels fall below the stated figures, the borrowers are required to provide additional collateral to proper levels. The indemnification that State Street Bank provides the Fund in regard to loan risk is that should a borrower default on returning a security from loan, the collateral held is used to buy the security to be returned to the Fund. Any shortfall of proceeds to purchase the securities is taken on by State Street Bank. Since loans are terminable at will, loan durations do not generally match the duration of the investments made with the cash collateral.

Loaned securities are included in the statement of fiduciary net position since the Fund maintains ownership. For loans collateralized by cash, the value of the collateral is recorded as a liability offsetting the cash collateral recorded as an asset. The cash collateral as of December 31, 2022 and 2021 was $10,255,356 and $17,474,343 respectively. For loans having collateral other than cash, the related collateral securities are not recorded as assets in the statement of fiduciary net position, and a corresponding liability is not recorded, since the Fund cannot pledge or sell the collateral securities, except in the event of a borrower's default.

At December 31, 2022 and 2021, the fair value of loaned securities outstanding, included in investments, was approximately $10,008,621 and $17,085,222 respectively.

(h) Commitments

At December 31, 2022 and 2021, the Fund had contractual commitments to provide approximately $109.2 million and $118.4 million, respectively, of additional funding for alternative investments and real estate.

(i) Money-Weighted Rate of Return

The annual money-weighted rate of return on the Fund's investments calculated as the internal rate of return on the pension fund net of investment expenses for the years ended December 31, 2022 and 2021 is (9.26%) and 13.23%, respectively. A money weighted return expresses investment performance net of pension plan investment expense, adjusted for the changing amounts actually invested.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Notes to Financial Statements
December 31, 2022 and 2021

(4) Fair Value Measurements

The Fund measures and records its investments using fair value measurement guidelines established by generally accepted accounting principles. The fair value 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). These levels of the fair value hierarchy are described below:

- Level 1 – Unadjusted quoted prices for identical assets or liabilities in active markets
- Level 2 – Observable inputs other than quoted prices in active markets for identical assets and liabilities. 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
  - Inputs other than quoted prices that are observable for the asset or liability, such as:
    1. Interest rates and yield curves observable at commonly quoted intervals
    2. Implied volatilities
    3. Credit spreads
- Level 3 – Unobservable inputs for the asset or liability (i.e., supported by little or no market activity). Level 3 inputs include management's assumptions.

The following tables' set forth by fair value hierarchy level, the Fund's assets carried at fair value December 31, 2022 and 2021:

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Notes to Financial Statements
December 31, 2022 and 2021

	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)
Cash equivalents:				
Active cash	9,165,056	9,165,056	-	-
International cash and equivalents	137,798	137,798	-	-
STIF-type instrument	40,022,933	40,022,933	-	-
Treasury bill	9,575,140	9,575,140	-	-
Total cash equivalents	58,900,927	58,900,927	-	-
U.S. equities:				
Common stock	202,033,228	202,033,228	-	-
Depository receipts	10,686,069	10,686,069	-	-
Mutual funds	228,438,926	228,438,926	-	-
Preferred stock	805,793	805,793	-	-
Real estate investment trust	2,374,187	2,374,187	-	-
Total U.S. equities	444,338,203	444,338,203	-	-
International equities - common stock	223,460,403	223,460,403	-	-
Fixed income:				
Agency debt	2,536,775	-	2,536,775	-
U.S. treasury notes and bonds	83,746,982	-	83,746,982	-
Domestic corporate	203,331,868	-	203,331,868	-
Asset backed:				
CMO	10,407,771	-	10,407,771	-
Mortgage-backed	32,383,692	-	32,383,692	-
Other asset backed	25,182,624	-	25,182,624	-
Total U.S. fixed income	357,589,712	-	357,589,712	-
International fixed income - bonds	149,438	-	149,438	-
Total investments by fair value level	1,084,438,683	726,699,533	357,739,150	-
Total investments measured at net asset value (NAV):				
Hedge fund of funds	178,789,685			
Private equity funds	179,389,710			
Private real estate funds	173,477,871			
Total investments measured at NAV	531,657,266			
Total investments	1,616,095,949			

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Notes to Financial Statements
December 31, 2022 and 2021

		Fair value measurements using:		
	Total at December 31, 2021	Quoted prices in active markets for identical assets (Level 1)	Significant other observable inputs (Level 2)	Significant unobservable inputs (Level 3)
Cash equivalents:				
Active cash	9,013,990	9,013,990	-	-
International cash and equivalents	124,510	124,510	-	-
STIF-type instrument	53,754,989	53,754,989	-	-
Total cash equivalents	62,893,489	62,893,489	-	-
U.S. equities:				
Common stock	270,780,183	270,780,183	-	-
Depository receipts	20,097,162	20,097,162	-	-
Mutual funds	296,563,106	296,563,106	-	-
Preferred stock	1,104,336	1,104,336	-	-
Real estate investment trust	4,198,956	4,198,956	-	-
Total U.S. equities	592,743,743	592,743,743	-	-
International equities - common stock	273,647,873	273,647,873	-	-
Fixed income:				
Agency debt	3,531,828	-	3,531,828	-
U.S. treasury notes and bonds	113,235,825	-	113,235,825	-
Domestic corporate	231,643,225	-	230,745,705	897,520
Asset backed:				
CMO	15,480,527	-	15,480,527	-
Mortgage-backed	36,528,750	-	36,528,750	-
Other asset backed	24,343,376	-	24,343,376	-
Total U.S. fixed income	424,763,531	-	423,866,011	897,520
International fixed income - bonds	2,181,798	-	2,181,798	-
Total investments by fair value level	1,356,230,434	929,285,105	426,047,809	897,520
Total investments measured at net asset value (NAV):				
Hedge fund of funds	218,588,765			
Private equity funds	179,621,810			
Private real estate funds	179,905,942			
Total investments measured at NAV	578,116,517			
Total investments	1,934,346,951			

Commingled funds are typically structured as an investment vehicle created by the Investment Manager to execute a specific investment strategy. Some investment strategies are only pursued by commingled accounts. Mutual funds and/or other types of commingled investment vehicles, including, but not limited to,

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**MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND**

Notes to Financial Statements
December 31, 2022 and 2021

Alternative Investments, may provide lower costs and better diversification than can be obtained with a separate account that pursues the same investment objectives. The fair value of the hedge fund of funds, private equity funds and real estate funds are not rated funds. The fair values of these funds are based on net asset value calculated in accordance with the general partner's fair valuation policy as of the measurement date and are annually audited separately.

The following represents the significant investment strategies and terms on which the Fund may redeem investments for those investments measured at the NAV (or its equivalent) as a practical expedient:

	Fair Value December 31, 2022	Fair Value December 31, 2021	Total Unfunded Commitments as of December 31, 2022	Redemption Frequency if Currently Eligible	Redemption Notice Period
Hedge fund of funds					
Diversified beta[1]	$ 90,623,911	$ 123,788,181	$ -	monthly	15-30 days
Fund of hedge fund[2]	66,252,755	81,398,857	-	quarterly	30-90 days
Opportunistic hedge fund[3]	21,913,019	13,401,727	31,126,932	N/A	N/A
Private equity funds[4]	179,389,710	179,621,810	78,042,553	N/A	N/A
Private real estate funds					
Open-ended real estate funds[5]	155,439,203	160,291,065	-	quarterly	30 days - 1 year
Closed-end real esate funds[6]	18,038,668	19,614,877	-	N/A	N/A
Total Investments Measured at NAV	**$ 531,657,266**	**$ 578,116,517**	**$ 109,169,485**		

1 This category includes two diversified beta investment managers who utilize a risk premium capture strategy that seeks to generate returns by investing in equity, bond and commodity markets using a risk-balanced investment process. The managers provide monthly liquidity with either 15 or 30-day notification.

2 This category includes one fund of hedge fund managers; the manager provides quarterly liquidity with 30 - 90-day notice.

3 This category includes one opportunistic hedge fund manager who is not subject to redemption and is normally returned through distributions as a result of the liquidation of the underlying assets over a period of approximately three to seven years.

4 This type includes private equity funds that invest in nonmarketable securities of private companies, which ultimately may become public in the future and whose strategies include buyout, growth equity, venture, mezzanine debt, distressed debt, secondary fund of funds or special situations. Generally, each fund in this category may not be subject to redemption and is normally returned through distributions as a result of liquidation of the underlying assets over a weighted average period of approximately nine years.

5 This category includes six open-ended real estate funds that invest directly in real estate and real estate related assets, including retail, industrial, office, residential and hotels. Investments in this category can be redeemed quarterly upon 30 days to one-year notice.

6 This category includes funds that invest directly in real estate and real estate related assets, including retail, industrial, office, residential and hotels. Generally, investment in each fund in this category may not be subject to redemption and is normally returned through distributions as a result of the liquidation of the underlying assets over a weighted average period of approximately seven or more years.

(Continued)

**MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND**

Notes to Financial Statements
December 31, 2022 and 2021

(5) Related-Party Transactions

The Fund invests certain cash in a money market fund, the State Street Bank and Trust Company Short Term Investment Fund, which is sponsored by the Fund's custodial bank. The total value of the funds held at December 31, 2022 and 2021 was $40,022,933 and $53,754,989 respectively.

The Fund invests in the AFL-CIO Housing Investment Trust and the AFL-CIO Building Investment Trust, two for-profit investment programs of the AFL-CIO. The total value of AFL-CIO Housing Investment Trust at December 31, 2022 and 2021 was $46,312,964 and $53,571,798 respectively. The total value of AFL-CIO Building Investment Trust at December 31, 2022 and 2021 was $14,988,018 and $18,782,796, respectively.

(6) Net Pension Liability

The components of the net pension liabilities of the Fund as of December 31, 2022 and 2021 are shown as follows (amounts in thousands):

		2022	2021
Total pension liability	$	3,167,471	3,101,704
Plan fiduciary net position		(1,622,549)	(1,939,942)
Fund's net pension liability	$	1,544,922	1,161,762
Plan fiduciary net position as a percentage of total pension liability		51.23 %	62.54 %

Actuarial Assumptions

The total pension liability was determined by an actuarial valuation as of December 31, 2022 and 2021, using the following actuarial assumptions:

- As of December 31, 2022, a table of increases based on years of service, with rates of increase declining from 14% per year for the newly hired to 2.75% per year with 15 or more years of service
- Investment rate of return compounded annually in 2022 and 2021 of 7.25% per annum
- Inflation rate of 2.75%

For the actuarial valuation as of December 31, 2022 and 2021, the PRI-2012 Amount Weighted Blue Collar Mortality Tables with fully generational projection using Scale MP-2021 are used for all active participants. 101.1 % of the PRI-2012 Amount Weighted Blue Collar Post Commencement Tables with fully generational projection using Scale MP-2021 are used for all retirees and beneficiaries preceding their related member's death. 98.3% of the PRI-2012 Amount Weighted Blue Collar Contingent Survivor Tables with fully generational projection using Scale MP-2021 are used for all beneficiaries following the death of their related member. The PRI-2012 Amount Weighted Total Dataset Disability Tables with fully generational projection using Scale MP-2021 are used for the period after disability retirement. Among pre-retirement deaths, 7.50% are assumed to qualify for accidental death benefits.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND

Notes to Financial Statements
December 31, 2022 and 2021

The actuarial assumptions used in the December 31, 2022 valuation were based on the results of an actuarial experience study for the period from January 1, 2018, through December 31, 2022. Actuarial valuations attempt to estimate costs associated with the pension fund based on a number of demographic, economic and retirement experience assumptions. Experience studies are required by statute to be conducted every five years to review experience in comparison to these assumptions and to provide recommended changes to assumptions.

The long-term expected rate of return on Fund 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 Fund 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 long-term arithmetic rates of return for each major asset class included in the Fund's target asset allocation as of December 31, 2022, are summarized in the following table:

	Target asset allocation		Long-term expected real rate of return	
Asset class	2022	2021	2022	2021
Equity				
US Large Cap	17 %	17 %	7.33 %	6.62 %
US Small Cap	7 %	7 %	7.91 %	0.07 %
Non-US Equity				
Global Equity	4 %	4 %	7.47 %	6.96 %
Emerging Markets Equity	4 %	4 %	9.54 %	7.16 %
Developed International Equity	11 %	11 %	7.19 %	5.85 %
Total Equity	43 %	43 %		
Fixed income				
Global Aggregate	8 %	8 %	1.74 %	0.57 %
Mortgage-Backed Securities	3 %	3 %	1.48 %	(0.02) %
Global Multi Sector	6 %	6 %	1.08 %	0.80 %
US TIPS	3 %	3 %	1.98 %	0.86 %
Bank Loans	3 %	3 %	5.99 %	1.07 %
Total Fixed Income	23 %	23 %		
Alternatives				
Private Equity	8 %	8 %	12.92 %	9.41 %
Private Credit	2 %	2 %	5.91 %	9.41 %
Real Estate	9 %	9 %	5.17 %	5.86 %
Multi Asset Class	6 %	6 %	5.18 %	6.52 %
Hedge Funds FOF & Hedged Equity	7 %	7 %	4.12 %	4.28 %
Total Alternatives	32 %	32 %		
Cash	2	2	0.51 %	(0.12) %

Nominal long-term expected rates of return for these asset classes are equal to the sum of the above expected long-term real rates and the expected long-term inflation rate of 2.72%.

(Continued)

**MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND**

Notes to Financial Statements
December 31, 2022 and 2021

(a) Discount Rate

The discount rate used to measure the total pension liability at December 31, 2022 and 2021 was 7.25%. The projections of cash flows used to determine the discount rate assumed that contributions will continue to be made in accordance with the current funding policy. Based on those assumptions, the Fund's fiduciary net position was projected to be available to make all projected future benefit payments to current Fund members. Therefore, the long-term expected rate of return on the plan investments was applied to all periods of projected benefit payments to determine the total pension liability.

(b) Sensitivity of the Net Pension Liability to Changes in the Discount Rate

The following presents the net pension liability as of December 31, 2022 and 2021, calculated using the discount rate of 7.25%, respectively, as well as what the Fund's net pension liability would be if it were calculated using a discount rate that is one percentage point lower 6.25% or one percentage point higher 8.25% than the current rate (amounts in thousands):

		1% Decrease (6.25%)	Current discount rate (7.25%)	1% Increase (8.25%)
2022 Net pension liability	$	1,862,112	1,544,922	1,274,657
2021 Net pension liability	$	1,476,768	1,161,762	894,212

(7) Subsequent Events

On March 31, 2023, the parties to the Pension Agreement, Local 589, Amalgamated Transit Union, AFL-CIO (Union) and the Massachusetts Bay Transportation Authority (MBTA) reached agreement on a new Pension Agreement, which will run through June 30, 2028. The new Pension Agreement creates a two-tier benefit structure for new employees who become Members of the Fund after June 30, 2023 or existing employees who are otherwise eligible to switch into the new system. All other Members and retirees will remain subject to the preexisting benefit structure. Other changes to the Pension Agreement, which will be published to the Fund's website, include a COLA increase for eligible retired Members, contribution increases for active Members and the MBTA, changes in disability retirement calculations and the return of Member contributions, and Fund investments in the Pension Reserves Investment Trust (PRIT).

There have been no other subsequent events through June 19, 2023 the date that the Fund's financial statements were available to be issued, that require recognition or disclosure.

REQUIRED SUPPLEMENTARY INFORMATION

(Unaudited)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Required Supplementary Information
Schedule of Changes in Net Pension Liability and Related Ratios
(Unaudited)

	2022	2021	2020	2019	2018	2017	2016	2015	2014
Total Pension Liability									
Service cost	55,162,629	55,417,684	52,008,968	47,942,711	46,101,006	31,850,127	31,896,560	37,305,333	34,500,540
Interest	220,640,668	217,508,956	214,772,564	214,112,586	207,497,686	204,779,603	195,768,057	191,392,028	184,667,178
Differences between expected and actual experience	66,601,348	1,811,509	(7,346,171)	(3,179,975)	11,599,381	44,627,096	90,067,566	31,325,149	48,560,391
Changes of assumptions	(45,499,300)	(3,389,843)	-	69,299,287	43,926,927	128,688,470	-	(6,762,751)	-
Benefit Payments	(231,138,239)	(224,767,671)	(225,422,340)	(223,864,973)	(221,710,054)	(212,814,757)	(197,561,539)	(188,906,232)	(184,130,187)
Net change in total pension liability	65,767,106	46,580,635	34,013,021	104,309,636	87,414,946	197,130,539	120,170,644	64,353,527	83,597,922
Total pension liability-beginning of year	3,101,704,015	3,055,123,380	3,021,110,359	2,916,800,723	2,829,385,777	2,632,255,238	2,512,084,594	2,447,731,057	2,364,133,135
Total pension liability-ending (a)	3,167,471,121	3,101,704,015	3,055,123,380	3,021,110,359	2,916,800,723	2,829,385,777	2,632,255,238	2,512,084,594	2,447,731,057
Change in fiduciary net position:									
Contributions - employer	129,973,295	123,493,762	116,285,928	103,263,763	92,013,124	83,382,882	77,239,279	73,373,672	70,603,285
Contributions - employee	45,511,253	43,224,002	40,774,027	36,366,108	32,606,337	29,775,344	27,791,543	26,510,946	25,318,224
Net investment (loss) income	(257,254,990)	232,417,541	228,670,823	253,730,990	(52,072,879)	221,690,618	86,782,343	4,711,246	73,543,477
Benefit payments	(231,138,239)	(224,767,671)	(225,422,340)	(223,864,973)	(221,710,054)	(212,814,757)	(197,561,539)	(188,906,232)	(184,130,187)
Administrative expenses	(4,484,766)	(4,366,485)	(4,511,375)	(5,046,775)	(4,317,624)	(4,463,775)	(6,493,777)	(5,808,086)	(4,052,664)
Net change in fiduciary net position	(317,393,447)	170,001,149	155,797,063	164,449,113	(153,481,096)	117,570,312	(12,242,151)	(90,118,454)	(18,717,865)
Fund fiduciary net position-beginning of year	1,939,942,425	1,769,941,276	1,614,144,213	1,449,695,100	1,603,176,196	1,485,605,884	1,497,848,035	1,587,966,489	1,606,684,354
Fund fiduciary net position - end of year (b)	1,622,548,978	1,939,942,425	1,769,941,276	1,614,144,213	1,449,695,100	1,603,176,196	1,485,605,884	1,497,848,035	1,587,966,489
Fund's net pension liability-ending (a)-(b)	1,544,922,143	1,161,761,590	1,285,182,104	1,406,966,146	1,467,105,623	1,226,209,581	1,146,649,354	1,014,236,559	859,764,568
Fund fiduciary net position as a percentage of the total pension liability	51.23%	62.54%	57.93%	53.43%	49.70%	56.66%	56.44%	59.63%	64.88%
Covered payroll	496,467,531	458,857,189	460,921,559	436,828,077	425,862,201	428,830,122	446,740,427	443,237,899	417,957,007
Net pension liability as a percentage of covered payroll	311.18%	253.19%	278.83%	322.09%	344.50%	285.94%	256.67%	228.82%	205.71%

This schedule is intended to present 10 years of data. Additional years will be presented when available.

See accompanying independent auditors' report.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND

Required Supplementary Information
Schedule of Changes in Net Pension Liability and Related Ratios
(Unaudited)

Change of Assumptions:

2022: Assumption changes to the salary scale, mortality rates, termination rates, and retirement rates were made according to the experience study completed in 2023. This decreased the total pension liability by $45.5 million.

2021: Participants who have been receiving Workers' Compensation benefits for five or more years are assumed to never receive a Massachusetts Bay Transportation Authority Retirement Fund pension benefit. This decreased the actuarial accrued liability by $2.76 million.

Participants who are active, but did not contribute to the plan in 2021, are assumed to remain non-contributing to the remainder of their employment and to receive only a refund of their contributions to the Fund with interest. This decreased the actuarial accrued liability by $0.63 million.

2020: No change of assumptions.

2019: Discount rate decreased from 7.50% to 7.25% resulting in an increased net pension liability totaling $69.3 million.

2018: Salary scale decreased the net pension liability by $(59.6) million, mortality rates increased the net pension liability by $6.0 million, termination rates increased the net pension liability by $9.4 million, and retirement rates increased the net pension liability by $88.1 million, resulting in increased net pension liability totaling $43.9 million.

2017: Discount rate decreased from 7.75% to 7.50% resulting in an increased net pension liability totaling $128.7 million.

See accompanying independent auditor's report.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Required Supplementary Information
Schedule of Investment Returns
(Unaudited)

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

2022	2021	2020	2019	2018	2017	2016	2015	2014
(9.26%)	13.23%	14.22%	17.67%	(3.37%)	17.79%	5.88%	0.65%	4.80%

This schedule is intended to present 10 years of data. Additional years will be presented when available.
See accompanying independent auditors' report.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Required Supplementary Information
Schedule of Contributions
(Unaudited)

Year	Actuarially determined contribution	Actual contribution in relation to actuarially determined contribution	Percentage of actuarially required contributions	Covered-payroll	Contribution as a percentage of covered-payroll
2022	$126,389,486	$129,973,295	102.84 %	$496,467,531	26.18 %
2021	122,034,414	123,493,762	101.20	458,857,189	26.91
2020	116,285,928	116,285,928	100.00	460,921,559	25.23
2019	103,264,000	103,263,763	100.00	436,828,000	23.64
2018	92,013,000	92,013,124	100.00	425,862,000	21.61
2017	83,383,000	83,382,882	100.00	428,830,000	19.44
2016	77,239,000	77,239,279	100.00	446,740,000	17.29
2015	73,359,000	73,373,372	100.02	443,238,000	16.55
2014	77,594,000	70,603,285	90.99	417,957,000	16.89
2013	67,602,000	58,039,160	85.85	379,071,000	15.31

See accompanying independent auditors' report.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Notes to Required Supplementary Information

(Unaudited)

Actuarial Assumption and Methods Used to Determine Contribution Rates

Actuarially determined contributions are calculated as of the December 31 preceding by six months of the start of the fiscal year in which contributions are made. For example, the contribution calculated in the December 31, 2022 actuarial valuation was to be made during the period from July 1, 2023 through June 30, 2024.

Methods and assumptions used to determine the contributions for calendar 2022 and 2021 (based on 2021 and 2022 actuarial valuations).

- Salary – As of December 31, 2022, a table of increases based on years of service, with rates of increase declining from 14% per year for the newly hired to 2.75% per year with 15 or more years of service. As of December 31, 2021, a table of increases based on years of service, with rates of increase declining from 8% per year for the newly hired to 2.75% per year with 15 or more years of service.
- Actuarial cost method – Entry Age Normal
- Amortization method – Closed period (specified below); installments increase at the rate of 4% per year
- Remaining amortization period – 17 years (2022 valuation), 18 years (2021 valuation)
- Asset Valuation method – Five-year phase-in smoothing method
- Investment rate of return – 7.25% net of pension plan investment expense.
- Retirement Age – Probabilities of retirement are based on table that reflects both age and service
- Mortality
  - Current Year: The PRI-2012 Amount Weighted Blue Collar Mortality Tables with fully generational projection using Scale MP-2021 are used for all active participants. 101.1 % of the PRI-2012 Amount Weighted Blue Collar Post Commencement Tables with fully generational projection using Scale MP-2021 are used for all retirees and beneficiaries preceding their related member's death. 98.3% of the PRI-2012 Amount Weighted Blue Collar Contingent Survivor Tables with fully generational projection using Scale MP-2021 are used for all beneficiaries following the death of their related member. The PRI-2012 Amount Weighted Total Dataset Disability Tables with fully generational projection using Scale MP-2021 are used for the period after disability retirement. Among pre-retirement deaths, 7.50% are assumed to qualify for accidental death benefits.
  - Prior Year: The RP-2014 Blue Collar Mortality Tables with fully generational projection using Scale MP-2018 are used for all active participants and deferred vested participants. 94.5% of the RP-2014 Blue Collar Mortality Tables with fully generational projection using Scale MP-2018 are used for all beneficiary participants. The RP-2014 Disabled Mortality Table with fully generational projection using Scale MP-2018 are used for the period after disability retirement. Among pre-retirement deaths, 7.50% are assumed to qualify for accidental death benefits.

Schedule of Administrative Expenses

As of December 31,		2022	2021
Wages and Benefits			
Staff Salaries *	$	1,182,038	1,093,517
Retiree Payroll		328,326	243,915
Benefits		364,362	364,342
Total Personnel Services	**$**	**1,874,726**	**1,701,775**

*Interim Executive Director Salary = $196,000

Professional Services			
Actuarial	$	231,499	143,150
Audit		136,450	134,085
Legal Counsel		1,040,948	1,294,778
Disability Medical Exams		78,275	71,950
Total Professional Services	**$**	**1,487,172**	**1,643,963**
Communication			
Newsletter / Annual Report	$	12,030	19,592
Postage		2,980	3,615
Telephone		12,636	31,588
Education and Training		46,806	45,005
Manager Meetings		4,990	1,465
Member Services		7,048	6,262
Total Communication	**$**	**86,490**	**107,527**
Miscellaneous			
General and Administrative	$	27,553	26,364
Business Insurance		234,745	122,522
Rent		459,524	428,040
Technological Support		314,556	336,293
Total Miscellaneous	**$**	**1,036,378**	**913,220**
Total Administrative Expenses	**$**	**4,484,766**	**4,366,485**

See accompanying Independent Auditors' Report

Schedule of Investment Expenses and Payments to Consultants

As of December 31,		2022	2021
Schedule of Investment Expenses			
Investment Management Fees	$	3,736,480	5,294,960
Investment Consultant Fees		344,000	344,000
Communications / Governmental Services		148,225	120,400
Custodial Fees		673,031	778,602
Total Investment Expenses	**$**	**4,901,736**	**6,537,963**
Schedule of Payments to Consultants*			
Independent Auditors	$	136,450	134,085
Actuary		231,499	143,150
Legal		1,040,948	1,294,778
Total Payments to Consultants	**$**	**1,408,897**	**1,572,013**

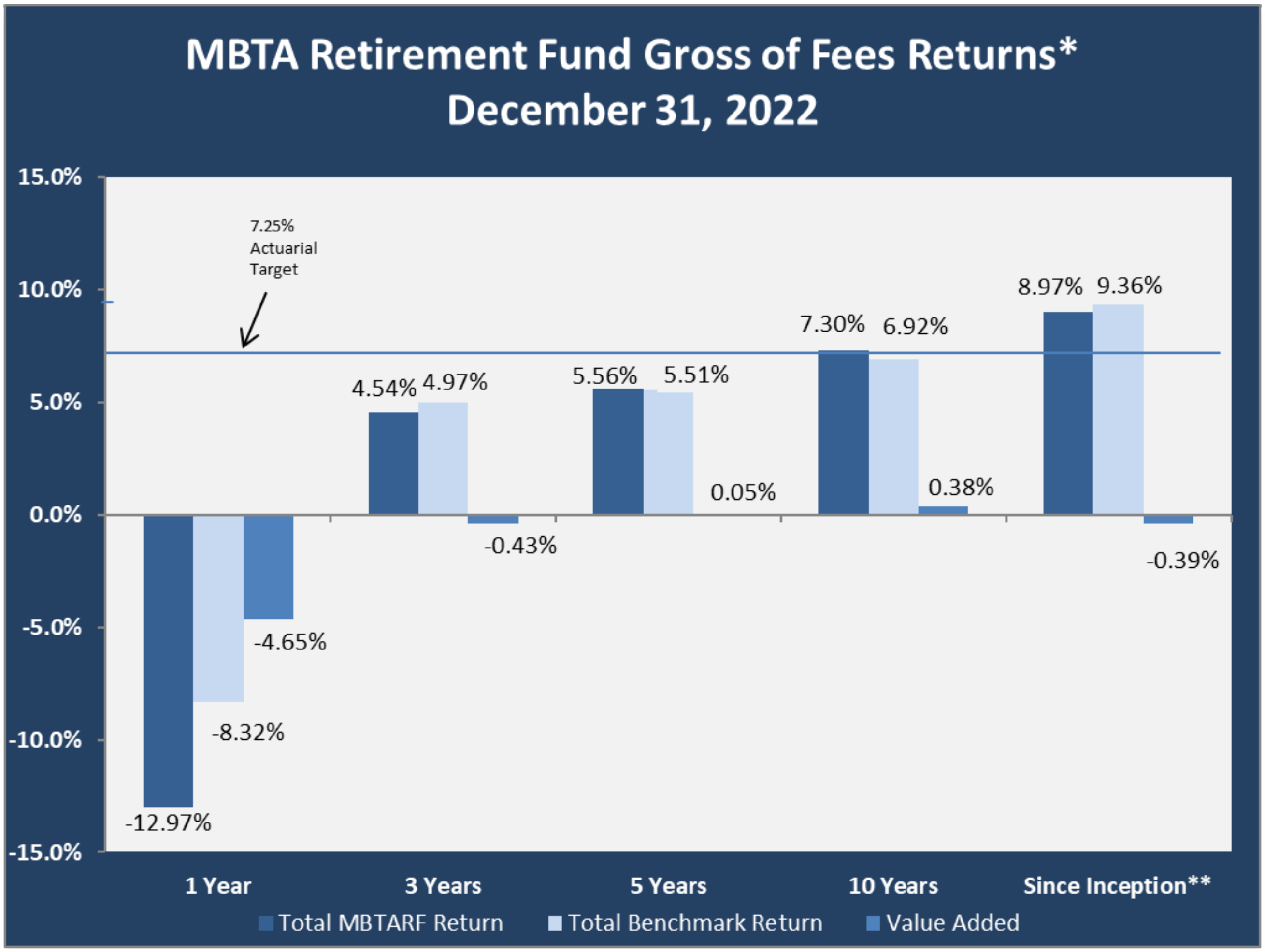
*These payments are presented for analytical purposes; each amount is already included in schedules of administrative or investment expenses

See accompanying Independent Auditors' Report

INVESTMENT SECTION

(Unaudited)

2022 Investment Results



* Gross of Fees with the exception of hedge funds which are net of fees

** Performance inception date of January 1, 1982

Report on Investment Activity

The Massachusetts Bay Transportation Authority Retirement Fund (the "Fund" or "MBTARF") was created to provide retirement benefits for certain employees of the Massachusetts Bay Transportation Authority (the "Authority"). The Fund was established in 1948 pursuant to a Trust Agreement between local 589 ATU AFL-CIO (the "Union") and the Authority, that is governed by the terms of a separately negotiated Pension Agreement between the Authority and the Union. The MBTA Retirement Board is responsible for the general oversight of the MBTA Retirement Fund. The primary goal of the Fund's investment program is to meet or exceed the Fund's actuarial target rate of return in order to maintain and improve upon its funded status. The Board of the Fund seeks to maximize return on investments through a diverse group of investment managers with an acceptable level of risk.

The Investment Section was prepared by the MBTA Retirement Fund Finance Staff with assistance of the consultant, Segal Marco Advisors. The Fund's investment portfolios are presented at fair value, which is appropriate industry standard. The accompanying financial statements were prepared in accordance with U.S. generally accepted accounting principles (GAAP). The Fund adheres to the reporting requirements established by the Governmental Accounting Standards Board (GASB).

The investment performance information provided in this section of the Annual Comprehensive Financial Report was calculated by the Fund's custodian, State Street Bank & Trust Company, using a time-weighted rate of return based on the fair value of assets.

As of December 31, 2022, the Board employed 14 public markets investment managers, 17 private equity market managers, 4 private credit managers, 9 real estate managers, 1 hedge fund-of-funds manager, 1 opportunistic hedge fund manager and 2 risk parity/diversified beta managers. The Fund had approximately $1,622.5 million in assets under management as of December 31, 2022. Each investment manager operates within guidelines that are established by the Board and consultant and are outlined in a detailed investment management or partnership agreement.

The Investment Policy statement adopted by the Fund Board requires that the Board and the Executive Director review the asset allocation at least quarterly to determine if the asset allocation is consistent with the exposure ranges described. A change in the Fund's liability structure, funded status or long-term investment prospects may also trigger a revision of the asset allocation. The Interim-Executive Director will direct investment managers to transfer funds to rebalance the asset allocation as necessary and shall use appropriate judgment and care when rebalancing portfolios.

Current Allocation as of 12/31/2022

Asset Class	12/31/2022 Allocation (%)	Target (%)
Equities	**41.3**	**43**
US Large Cap	17.4	17
US Small Cap	7.2	7
International Equity (unhedged)	8.8	9
International Small Cap	1.9	2
Global / Emerging Markets	6.0	8
Fixed Income	**22.3**	**23**
Core Fixed Income	7.9	8
TIPS	3.1	3
Mortgages	2.9	3
Global & Multi Sector	5.4	6
Bank Loans	3.0	3
Cash*	3.5	2
Alternative Investments	**32.9**	**32**
Private Equity & Private Credit	11.1	10
Real Estate	10.7	9
Fund of Hedge Funds	4.1	5
Fund of Hedge Funds - Opportunistic	1.4	2
Risk Parity / Diversified Beta	5.6	6

*Investment manager's cash holdings are reported in cash and cash equivalents

The Year in Review – The World Markets

Fiscal Year 2022 Global Markets Overview

First Quarter 2022:

U.S. markets, developed international markets, and emerging markets all fell during the quarter at rates of (4.6%), (5.9%) and (7.0%), respectively, as heightened inflation, tightening monetary policy and Russia's invasion of Ukraine weighed on global equity markets. Continued heightened inflation weighed on consumer purchasing power, hurting consumer discretionary stocks in all markets; tightening monetary policy globally increased the cost of borrowing, which was a headwind for more rate-sensitive sectors such as information technology. The conflict in Ukraine created concerns over supply, driving prices up and resulting in commodity-driven markets to outperform during the quarter. U.S. equities were down (4.6%) during the quarter and inflation hit 8.5% in March. Due to the significant uptick in inflation, the Federal Reserve approved a 0.25% interest rate hike in March; in addition, growth underperformed value across the market cap spectrum as the Federal Reserve began tightening monetary policy, raising the Federal Funds Rate to 0.25-0.50%. With the increase of the Federal Funds Rate, both the front and tail ends of the yield curve rose significantly. Domestic fixed income spreads increased across all sectors, with High Yield showing the largest increase at 42 basis points. Despite the widening, fixed income spreads remain below the median. Private equity, real estate, and infrastructure all had positive returns, while the HFRI Fund Weighted Composite Index dropped (0.78%) during the quarter.

The U.S. growth domestic product (GDP) fell (1.4%), the weakest quarter since spring 2020 at the onset of the COVID-19 pandemic. A wider trade deficit, as well as a slowdown in inventory investment by businesses, contributed to this decline. Consumer spending accelerated in the first quarter and business investment was up 9.2%. The economy faced growing challenges, including rising interest rates, persistent inflation, and supply disruptions stemming from both the pandemic and the Russia/Ukraine conflict. The unemployment rate was 3.6% in March, the lowest level since February 2020. The leisure and hospitality sector gained the most in March, as bars and restaurants continued to reopen. Professional and business services and retail were other sectors that posted significant growth. Retail sales rose 0.5% in March 2022 and 6.9% year over year. An 8.9% jump in gasoline spending and a 19% increase in food services and drink boosted retail sales.

Second Quarter 2022:

Fear of recession added to the weights on global equity markets, causing another decline in U.S. (16.1%), developed international (14.5%) and emerging markets (11.5%). U.S. dollar strength hurt international market returns, (Continued)

while Europe's reliance on Russian oil and gas continued to put pressure on the continent's economies. With the exception of China, all major markets were negative. Emerging markets outperformed both developed international and U.S. markets, largely due to China's positive performance from relaxed COVID-19 lockdown measures and reopening the economy. The European Central Bank announcing it would end its asset purchases and raise the deposit rate, in addition to the bank of England's further interest rate hikes, caused a (10.0%) drop in Europe. The Bank of Japan maintained its loose monetary stance despite inflation beginning to hit the Japanese economy, as the yen weakened relative to the U.S. dollar and the USD-yen exchange rate crossed 130 for the first time in 20 years.

CPI reached 9.1% year over year in June (the largest one-year increase since 1981), prompting the Federal Reserve to hike rates by 0.75% which was the biggest increase since 1994 and indicated future rate increases in 2022. The yield curve rose significantly in face of these hiked rates. The U.S. Aggregate Index was negative, with Stable Value having the strongest sector performance and U.S. Corporate High Yield experiencing the weakest performance. Once again, growth underperformed value across the market cap spectrum, as the cost of capital increased and discounted rates weighed in on earnings expectations. Small cap stocks slightly underperformed large cap as economic growth slowed, with the purchasing managers' index falling (5.6%) and reaching a five-month low. All sectors were negative this quarter, with consumer staples the relative strongest at (4.6%) and Consumer Discretionary down the most at (26.2%). The HFRI Fund Weighted Composite Index dropped (4.85%), and macro funds continued to outperform the rest of the hedge fund landscape. Real estate saw an increase this quarter, while the Bloomberg Commodity Index declined.

The U.S. GDP fell (0.9%), for a second quarter in a row of negative growth. Two quarters of negative growth typically means the economy is in a recession, however the Federal Reserve asserted that the ongoing strength of the labor market signified it was too soon to label as such. As higher inflation persisted, consumer spending declined and business investment fell slightly, despite both being positive last quarter. The unemployment rate for June held steady at 3.6%, the fourth month in a row at this rate. Inflation, the Russia/Ukraine conflict and negative stock and bond markets weighed on consumer sentiment. Americans were increasingly pessimistic over the state of the economy creating a decline in the consumer confidence index.

Third Quarter 2022:

The global equity markets continued their downward trend, with U.S. markets falling (4.9%), developed international falling (9.4%) and emerging markets (11.6%). There was potential for interest rate cuts among markets early in the quarter, however central banks continued to raise rates in order to aggressively combat inflation.

(Continued)

The energy crisis in Europe held back Eurozone market returns during the quarter and political concerns weighed on market sentiment. Central bank deposit rates in Europe turned positive for the first time since 2013 as the UK sterling fell to an all-time low against the US dollar in September, following the proposed tax cuts and stimulative programs announced by the new Prime Minister. The yen weakened relative to the US dollar again, causing the bank of Japan to intervene and support the yen for the first time since 1998. All international equities sectors, as well as all emerging market sectors, declined this quarter. Small cap growth beat small cap value despite continued concerns regarding slowing economic growth; the same is true for large cap stocks. Yield once again rose across the curve with the hiked rates from the Federal Reserve, and the U.S. Aggregate Index and the Bloomberg Commodity Index were once again both negative.

Despite the continued fears of recession, U.S. GDP saw a rise in growth for the first time this year, at 2.6%, recovering from a two-quarter slump. The rise comes amid a narrowing trade deficit, as well as spending on healthcare and government spending. The unemployment rate was 3.5% in September, matching July’s 29-month low. A still-strong labor market means the Federal Reserve continued to hike interest rates, and is likely to continue to do so. The consumer confidence index also saw an increase, due to job growth, higher wages and less concern over inflation caused by lower gas prices. Consumer sentiment remained below its 2021 level from the weights of inflation, the Russia/Ukraine conflict and negative stock and bond markets.

Fourth Quarter 2022:

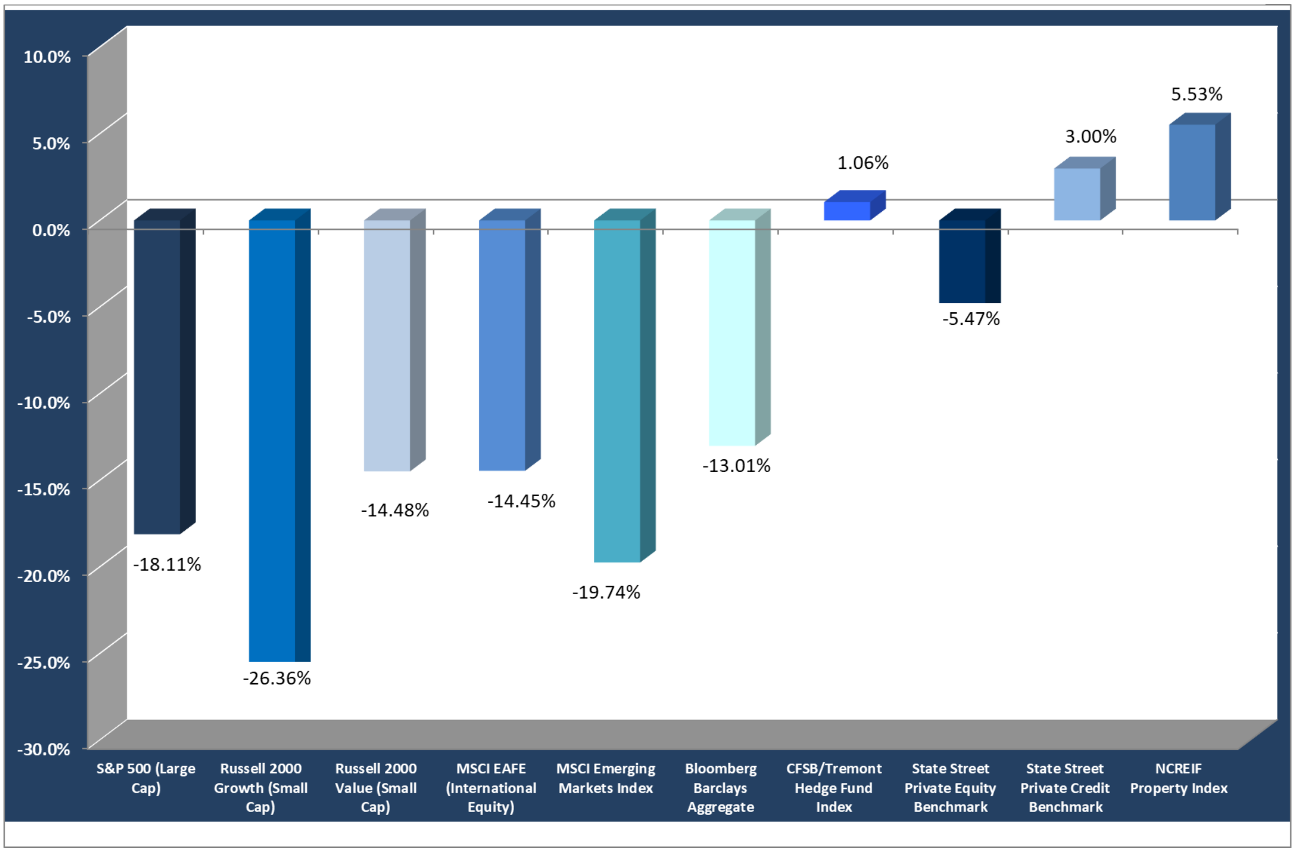
The global equity markets showed a turn and U.S., developed international and emerging markets all posted positive returns this quarter at 7.6%, 17.3%, 9.7%, respectively. Global market sentiment was boosted by the prospect of cooling inflation. The U.S. dollar experienced depreciation, causing a boost in the developed international and emerging market stocks: the UK sterling appreciated against the U.S. dollar following the resignation of Prime Minister Truss, and the yen appreciated approximately 9% against the dollar. European markets stabilized following the UK’s bond price crash in September and a slowdown in European Central Bank rate increases. Emerging markets benefitted greatly from relaxing China pandemic restrictions. In opposition to last quarter, all international market sectors, as well as emerging market sectors, were positive this quarter. The U.S. Aggregate Index and the Bloomberg Commodity Index were positive, and the HFRI Fund Weighted Composite Index returned 2.32%.

Despite persistent fears of a recession, the U.S. GDP rose again this quarter at 2.9% growth. A solid labor market and relatively strong consumer spending both exhibit economic resilience to challenges such as rate hikes, fallout from Russia/Ukraine conflict and still-high inflation. The unemployment rate beat market expectation with a value of 3.5%, and the nonfarm payrolls are still increasing.

(Continued)

With moderated inflation and slowing interest rate hikes, the consumer confidence index rose this quarter, however consumer sentiment remained below its 2021 value. Retail sales experienced their biggest decline in the year, but overall increased 6.6% year over year.

Fiscal Year 2022 Market Indices Returns



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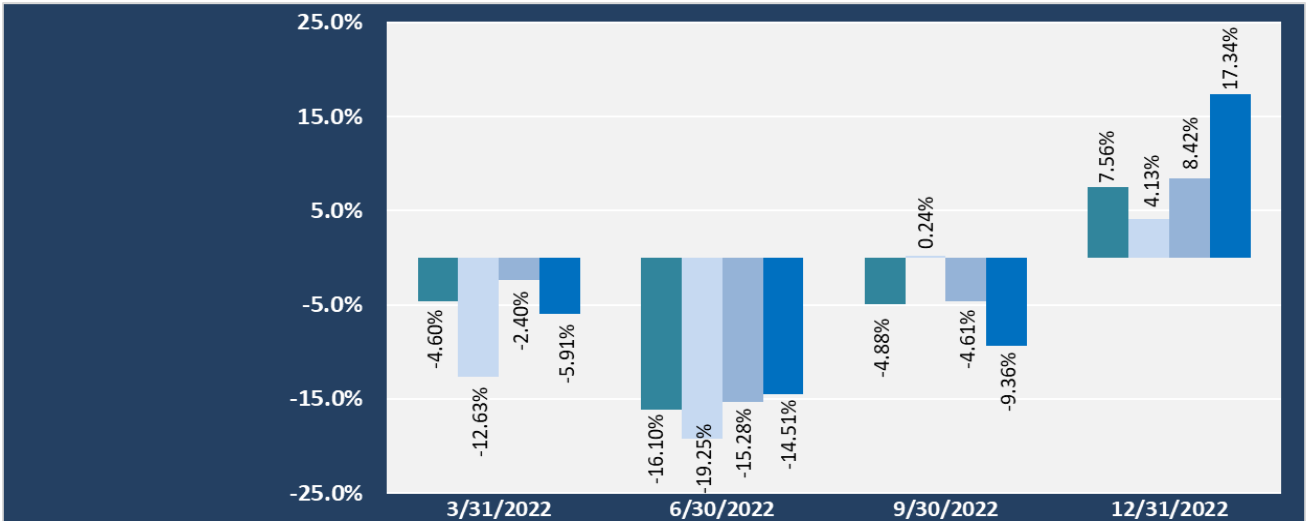
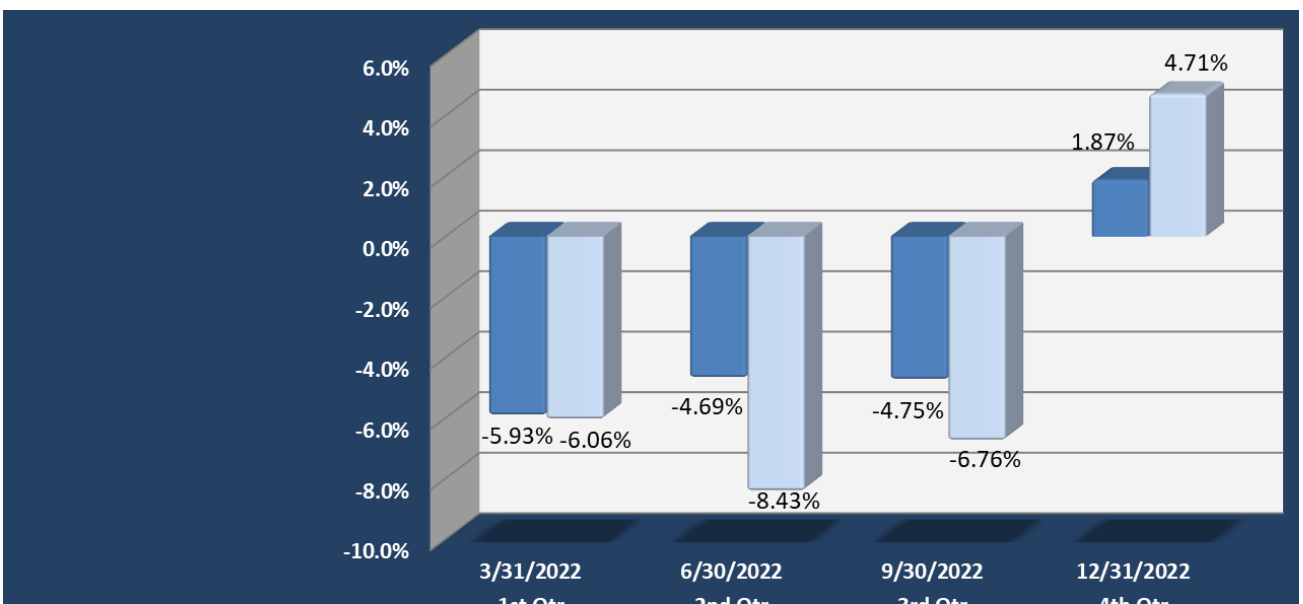
Fiscal Year 2022 Equity Indices by Quarter



	3/31/2022 1st Qtr	6/30/2022 2nd Qtr	9/30/2022 3rd Qtr	12/31/2022 4th Qtr
S&P 500 (Large Cap)	-4.60%	-16.10%	-4.88%	7.56%
Russell 2000 Growth (Small Cap)	-12.63%	-19.25%	0.24%	4.13%
Russell 2000 Value (Small Cap)	-2.40%	-15.28%	-4.61%	8.42%
MSCI EAFE (International Equity)	-5.91%	-14.51%	-9.36%	17.34%

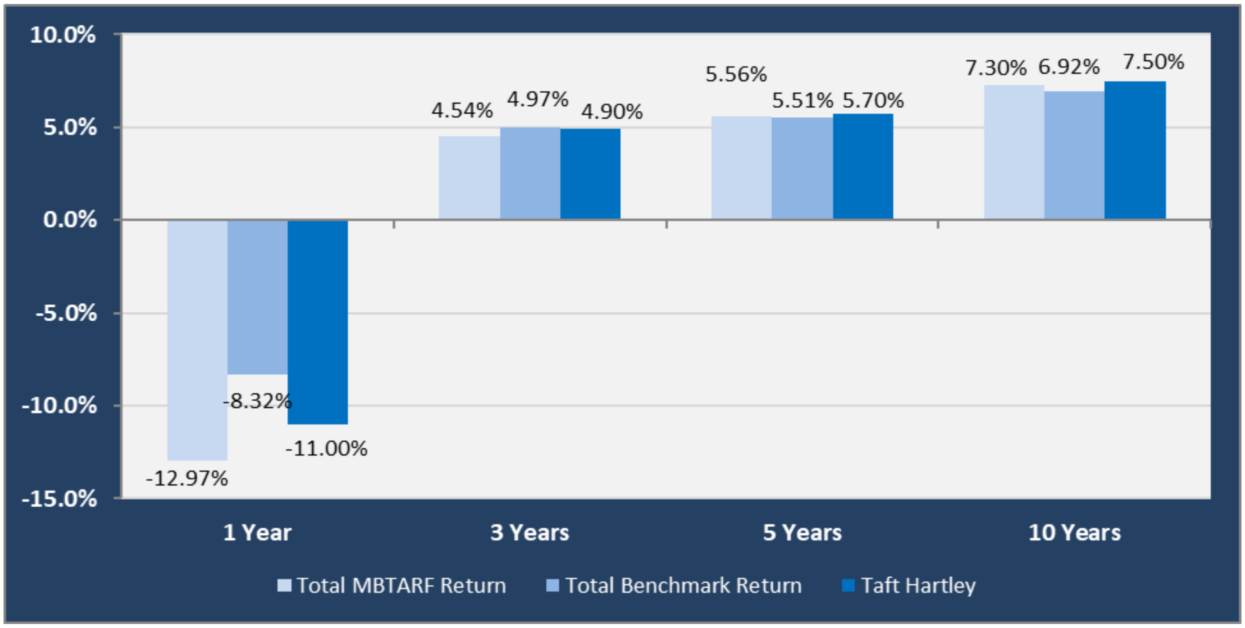
Fiscal Year 2022 Fixed Income Indices by Quarter



	3/31/2022 1st Qtr	6/30/2022 2nd Qtr	9/30/2022 3rd Qtr	12/31/2022 4th Qtr
Bloomberg Barclays Aggregate	-5.93%	-4.69%	-4.75%	1.87%
Bloomberg Multiverse Index (Global)	-6.06%	-8.43%	-6.76%	4.71%

MBTARF Core Performance: Fiscal Year 2022

Returns are calculated based on a time-weighted rate of return methodology. The chart below depicts the Fund's returns (gross of fees) and benchmarks for the periods ended December 31, 2022:



During fiscal year 2022, the Fund returned (12.97%), underperforming the Policy Benchmark of (8.32%) by 465 basis points. The MBTARF began fiscal year 2022 with a net position of $1,939.9 million and ended with a net position of $1,622.5 million. On a gross basis, the Fund decreased by $317.4 million. Additionally, $226.3 million in net retirement benefits were dispersed to members of the Fund.

The quarterly returns of the Fund in fiscal year 2022 were as follows:

	MBTARF Return	Policy Benchmark Return
1st Quarter	-5.56%	-2.36%
2nd Quarter	-8.07%	-7.51%
3rd Quarter	-3.77%	-3.63%
4th Quarter	4.17%	5.34%

(Continued)

Although the 4th quarter of 2022 ended strong, 2022 was overall a difficult year for investors. Both global and domestic equities and bonds were negative for the year, providing very little downside protection. The U.S. Federal Reserve raised rates seven times in 2022, in an effort to tame inflation without sparking a recession. Although investor sentiment appeared depressed in metrics, it luckily did not impact the consumer's willingness to spend.

For the full-year period, equities generated returns ranging from (16.00%) for the EAFE index of non-U.S. developed markets stocks to (18.11%) and (20.44%) for the S&P 500 Index of Large Cap U.S. stocks and Russell 2000 Index of Small Cap U.S. stocks, respectively. Core bond index returns ranged from (11.19%) for the Bloomberg U.S. Corporate High Yield index to (13.01%) for the Bloomberg Barclays Aggregate Index. Among alternatives, real estate as measured by the NECREIF Property Index gained 5.53%. Diversified hedge funds gained 1.06% for the year based on the CFSB/Tremont Hedge Fund Index.

The MBTA Retirement Fund generated a gross return of (12.97%) in 2022, which ranked in the 50th percentile of the InvMetrics Public DB Gross Return Universe. The Fund's long-term investment objective is 7.25%. and annualized return since inception is 8.97%. The Fund's gross annualized return over the ten-year period ended December 2022 was 7.30% and ranked in the top 46% of the InvMetrics Public DB Gross Return Universe. The gross returns for the three and five-year periods ended December 2022 were 4.54% and 5.56% and ranked in the 35th and 34th percentiles, respectively.

The MBTA Retirement Board authorized the following actions, among others, to position the Fund for long-term risk-adjusted returns, while addressing the Fund's policy framework and cost effectiveness:

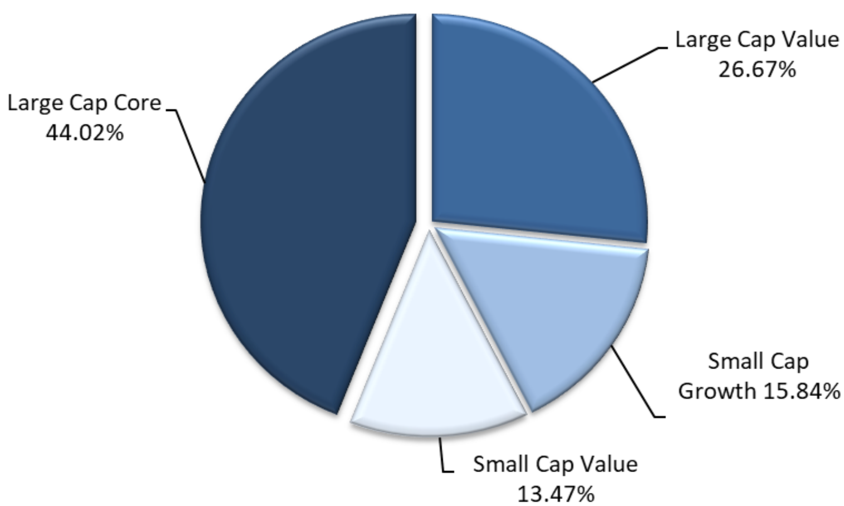
- Enhanced and documented the Standard Operating Procedures for the Benefits Department to assure prompt, consistent and accurate administration of benefits for the membership.
- Committed $20 million in the opportunistic asset class to Hamilton Lane Strategic Opportunities Fund VII.
- Allocated $7.5 million to private credit manager, Neuberger Berman Private Debt Fund IV.
- Terminated relationship with international small cap manager, Principal Global Investors, and hired Eaton Vance International Small Cap.
- Redeemed fully from international equity manager Gryphon International and transferred assets to SSGA MSCI EAFE Index Fund.
- Committed $10 million to Venture Lending and Leasing Fund X, managed by a long-standing investment manager, Western Technology.
- Committed $15 million to PRIM's Private Equity Vintage Year 2023 Segmentation and $10 million to Lexington Capital Partners Fund X.

Investment Summary by Type

Domestic Equity Portfolio

As of December 31, 2022, the domestic equity portfolio had approximately $397.4 million in net positions, which represented 24.59% of the Fund portfolio. Approximately 70.7% of the domestic equity portfolio is invested in a large capitalization equity strategy (large cap) with the remaining 29.3% in a small capitalization equity strategy (small cap). The Fund's domestic equity portfolio is actively managed in an attempt to outperform a diverse set of indices. Each investment manager's performance is measured against an assigned index based on the stated investment strategy.

Domestic Equity Portfolio
As of December 31, 2022



On a three, five and ten-year basis through December 31, 2022, the domestic equity portfolio has returned 7.16%, 8.48% and 11.58% compared to the S&P 500 benchmark, which returned 7.66%, 9.43% and 12.56% respectively.

Style - The Board intends to manage risk and diversify the Fund's portfolio through the selection of money managers with different investment styles and complementary characteristics within each asset class.

Portfolio Risks – Although the performance of equity securities has historically exceeded that of other market assets over an extended period of time, these assets, as all investments, carry the risk of loss of principal and are subject to changing market conditions. The value of equities is not only determined by external market factors, but by the performance of the firms for which these assets legally represent. (Continued)

Portfolio Returns - During the fiscal year, the domestic equity portfolio produced a return of (17.82%) compared to the S&P 500 benchmark (18.11%). Large cap equity managers returned (15.80%), outperforming the benchmark by 2.31%; and small cap equity returned (22.31%), underperforming the Russell 2000 Index by 1.87%. The Fund had one large cap core indexed manager and one small cap value indexed manager. The two active large cap value managers outperformed their benchmark in 2022. One of the two small cap growth managers, RBC Global Asset Management, beat their benchmark in 2022. The two growth managers are paired together in order to complement one another.

The top ten holdings in the domestic equity portfolio on December 31, 2022, are illustrated below. A complete listing of holdings is available upon request.

Shares	Stock	Fair Value ($000's)	% of fair value
18,688	VISA INC CLASS A SHARES	$ 3,883	0.98 %
7,004	ASML HOLDING NV NY REG SHS	3,827	0.96
32,156	DEXCOM INC	3,641	0.92
23,826	NIKE INC CL B	2,788	0.70
31,840	AMAZON.COM INC	2,675	0.67
2,754	MERCADOLIBRE INC	2,331	0.59
12,387	JOHNSON + JOHNSON	2,188	0.55
7,293	NETFLIX INC	2,151	0.54
5,088	LAM RESEARCH CORP	2,138	0.54
15,661	JPMORGAN CHASE + CO	2,100	0.53
	Total Top Ten	**$ 27,722**	**6.98%**

(Continued)

The MBTA Retirement Fund's domestic equity managers on December 31, 2022 are presented in the following table:

	Manager	Investment Mandate	Portfolio Fair Value @ 12-31-2022
	Alliance Bernstein	Small Cap Growth	$ 24,588,877
	Aristotle Capital Management	Large Cap Value	50,573,096
	Boston Partners	Large Cap Value	55,400,190
	RBC Global Asset Management	Small Cap Growth	38,369,963
	State Street Global Advisors	Small Cap Value	53,530,721
	State Street Global Advisors	Large Cap Core	174,908,206
	Total Portfolio Fair Value:		**$ 397,371,053**

International Equity Portfolio

As of December 31, 2022, the international equity portfolio had approximately $173.2 million in net positions, representing 10.72% of the Fund portfolio. Two of the three international equity managers are benchmarked against the MSCI EAFE index, which includes the developed markets of Europe, Australia and the Far East. The third international equity manager is benchmarked against the MSCI World Ex US Small Cap index.

The primary strategy is to invest in international equity funds to achieve consistent, positive real returns and to maximize long-term total return within prudent levels of risk through a combination of income and capital appreciation.

Style – The Board intends for a group of managers employing various strategies to invest assets in a well-diversified portfolio of Non-U.S. developed market equity securities. This group consists of a broad range of styles and approaches including: core international products, top-down country selectors, bottom-up security selectors, capitalization ranges, growth and value-oriented products and products using various mixtures of these strategies. Certain investment managers may have a guideline limiting exposure to emerging markets.

Portfolio Risks – International assets are subject to additional risks such as changes in foreign currency exchange markets and the environment in which the trading of these securities and associated financial reporting are governed. Differences between reporting standards across jurisdictions also adds to the complexity of these markets.

Portfolio Returns - During the fiscal year, international equity returned (16.90%), underperforming the MSCI EAFE by 245 basis points. All managers outperformed their individual benchmarks in 2022.

(Continued)

On a three, five and ten-year basis through December 31, 2022, the international equity portfolio has returned 0.21%, 0.73% and 4.77% compared to the MSCI EAFE benchmark, which returned 0.87%, 1.54% and 4.67% respectively.

The top ten holdings in the international equity portfolio on December 31, 2022 are illustrated below. A complete listing of holdings is available upon request.

Shares	Stock	Fair Value ($000's)	% of fair value
7,300	KEYENCE CORP	$ 2,845	1.64 %
89,471	TITAN CO LTD	2,809	1.62
1,853	ADYEN NV	2,548	1.47
156,436	ENTAIN PLC	2,487	1.44
9,586	SIKA AG REG	2,297	1.33
64,242	HOUSING DEVELOPMENT FINANCE	2,048	1.18
42,993	ASIAN PAINTS LTD	1,605	0.93
40,911	ZALANDO SE	1,446	0.83
481,500	CP ALL PCL FOREIGN	949	0.55
76,800	NIHON M+A CENTER HOLDINGS IN	948	0.55
	Total Top Ten	**$ 19,982**	**11.54%**

The MBTA Retirement Fund's international equity managers on December 31, 2022 are presented in the following table:

	Manager	Investment Mandate	Portfolio Fair Value @ 12-31-2022
Eaton Vance Investment Managers	Eaton Vance International Small Cap	Small Cap	$ 30,781,324
Morgan Stanley	Morgan Stanley Investment Management	Large Value	88,138,423
Principal℠	Principal Global Investors	Small Cap	122,152
SSgA State Street Global Advisors	SSGA - MSCI EAFE Index	Large Value	54,166,904
	Total Portfolio Fair Value:		**$ 173,208,803**

Global Equity and Emerging Market Portfolio

As of December 31, 2022, the global equity and emerging markets portfolio had approximately $96.4 million, or 5.96%, of the MBTA Retirement Fund's assets. There are two portfolios in this asset class- Sands Capital Management and PRIM Emerging Market. The MBTA Retirement Fund measures Sands Global Growth performance against the MSCI ALL Country World Index, a benchmark comprised of stocks from 47 different countries, including 23 countries classified as developed markets (including the United States), and 24 countries that are considered emerging markets. The Fund measures the PRIM Emerging Market portfolio against the MSCI Emerging Markets Index which captures large and mid-cap representation across 24 emerging markets countries.

Portfolio Composition - The portfolio invests a significant percentage of its assets in foreign securities traded on foreign exchanges, including the use of derivatives (e.g., LEPOS and p-notes), to gain access to certain foreign markets. The global growth manager is granted full discretion to buy, sell, invest and reinvest its portion of the Fund's assets in stocks contained within the MSCI ALL Country World Index. The maximum allocation to emerging markets is three times the benchmark sector weighting or approximately 30% of the portfolio. The investment objective of the global equity and emerging markets portfolio is to achieve consistent, positive real returns and to maximize long term total return within prudent levels of risk through a combination of income and capital appreciation.

As of December 31, 2022, the Sands Capital, a global and emerging markets portfolio, had country and regional exposures which included an 83.6% allocation to developed market stocks, which included a 55.3% allocation to U.S. stocks. Approximately 11.0% was allocated to emerging, markets stocks, which included an 14.8% allocation to holdings in Asia Ex-Japan.

Portfolio Risks – In addition to providing the potential for higher expected returns, emerging markets generally expose investors to higher expected risks, due to their susceptibility to more volatile economic conditions, potential political instability and, in some cases, an absence of a mature system of corporate governance. These investments also carry all the risks associated with domestic and developed market investments. (Continued)

Portfolio Returns - During the fiscal year, the Global Equity and Emerging Markets portfolio returned (36.96%). Sands Global Growth returned (43.03%), underperforming the benchmark by 2,467 basis points, which was the largest driver of negative performance in 2022. On a three, five and ten-year basis through December 31, 2022, the global equity and emerging market portfolio has returned 0.97%, 5.91% and 10.19% compared to the MSCI All Country World Index, which returned 4.00%, 5.23% and 7.98% respectively.

The top ten holdings in the global equity and emerging market portfolio on December 31, 2022 are illustrated below. A complete listing of holdings is available upon request.

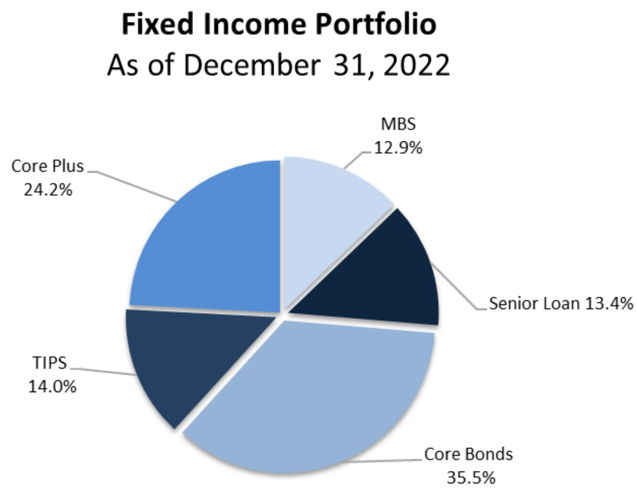
Shares	Stock	Fair Value ($000's)	% of fair value
18,688	VISA INC CLASS A SHARES COMMON STOCK USD.0001	$ 3,883	4.03 %
7,004	ASML HOLDING NV NY REG SHS NY REG SHRS EUR.09	3,827	3.97
32,156	DEXCOM INC COMMON STOCK USD.001	3,641	3.78
7,300	KEYENCE CORP COMMON STOCK	3,845	2.95
89,471	TITAN CO LTD COMMON STOCK INR1.0	2,809	2.91
23,826	NIKE INC CL B COMMON STOCK	2,788	2.89
31,840	AMAZON.COM INC COMMON STOCK USD.01	2,675	2.77
1,853	ADYEN NV COMMON STOCK EUR.01	2,548	2.64
156,436	ENTAIN PLC COMMON STOCK EUR.01	2,487	2.58
2,754	MERCADOLIBRE INC COMMON STOCK USD.001	2,331	2.42
	Total Top Ten	**$ 30,834**	**30.94%**

The MBTA Retirement Fund's global equity and emerging market manager on December 31, 2022 is presented in the following table:

	Manager	Investment Mandate	Portfolio Fair Value @ 12-31-2022
PENSION RESERVES INVESTMENT MANAGEMENT BOARD	Pension Reserves Investment Management	Emerging	$ 30,270,300
SANDS CAPITAL	Sands Capital Management	Growth	66,142,657
	Total Portfolio Fair Value:		**$ 96,412,957**

Fixed Income Portfolio

As of December 31, 2022, the fixed income portfolio had approximately $358.5 million in net positions, which represented 22.18% of the MBTARF portfolio. The Fund's fixed income portfolio is benchmarked against the Barclays Aggregate Bond Index, BC GOV/Credit, BC MBS, S&P/LSTA Leveraged Loan and BC U.S. TIPS.



Styles - Fixed income managers serve in a specialist role managing debt securities. Domestic core fixed income managers' investments may include (i) U.S. dollar denominated obligations of the United States Government and its Agencies and instrumentalities, as well as U.S. corporations, (ii) mortgage-backed securities including CMOs and commercial mortgage backed securities ("CMBS"), (iii) Asset Backed Securities("ABSs"), (iv) registered 144A securities if applicable, (v) municipal bonds, (vi) short term securities, (vii) securities of foreign companies or foreign countries (sovereigns or supranational) denominated in U.S. dollars, trading in the U.S. markets and capable of settlement in U.S. markets (Yankee bonds) and (viii) dollar denominated obligations of U.S. companies trading outside the U.S. ("Eurobonds").

Portfolio Risk - Risk in bond investments is primarily driven by changing interest rates which cause the value of these investments to fluctuate. The action of the Federal Reserve Bank of the United States through its monetary policy and through the monetary policy of other such institutions significantly affects interest rates. The risk of default is also associated with these investments and is measured by established credit rating firms. Default risks are subject to change.

Portfolio Returns - During the fiscal year, fixed income portfolio returned (10.26%) outperforming the Bloomberg Aggregate Bond Index benchmark by 2.75%.

(Continued)

On a three, five and ten-year basis through December 31, 2022, the fixed income portfolio has returned (0.86%), 0.81% and 1.91% compared to the Bloomberg Aggregate Bond Index, which returned (2.71%), 0.02% and 1.06% respectively.

The top ten holdings in the fixed income portfolio on December 31, 2022 are illustrated below. A complete listing of holdings is available upon request.

Shares	Stock		Fair Value ($000's)	% of fair value
6,009,000	US TREASURY N/B Due 08/15/2040	Rating NR	$ 3,732	1.04 %
3,330,000	US TREASURY N/B Due 09/30/2023	Rating NR	3,219	0.90
3,140,000	US TREASURY N/B Due 01/31/2023	Rating NR	3,131	0.87
3,181,107	TSY INFL IX N/B Due 01/15/2024	Rating NR	3,114	0.87
3,156,419	TSY INFL IX N/B Due 01/15/2026	Rating NR	3,030	0.85
3,155,534	TSY INFL IX N/B Due 01/15/2029	Rating NR	3,006	0.84
3,155,395	TSY INFL IX N/B Due 01/15/2027	Rating NR	2,975	0.83
3,231,000	US TREASURY N/B Due 08/15/2032	Rating NR	2,942	0.82
2,995,520	TSY INFL IX N/B Due 07/15/2025	Rating NR	2,877	0.80
2,826,414	TSY INFL IX N/B Due 07/15/2028	Rating NR	2,692	0.75
	Total Top Ten		**$ 30,718**	**8.57 %**

(Continued)

The MBTA Retirement Fund's fixed income managers on December 31, 2022 are presented in the following table:

Manager	Investment Mandate	Portfolio Fair Value @ 12-31-2022
AFL-CIO Housing	MBS	$ 46,312,964
Eaton Vance	Senior Loan	47,909,109
Income Research & Management	Core Bonds	127,643,249
IRM TIPS	TIPS	50,048,890
Loomis, Sayles & Company	Core Plus	86,630,731
Total Portfolio Fair Value:		**$ 358,544,943**

Real Estate Portfolio

As of December 31, 2022, the MBTA Retirement Fund had $173.5 million invested in real estate. The equity real estate program is comprised primarily of two separate but complementary investment strategies – core and specialty. Core investments include property types in multi-family housing, retail, industrial and office buildings. These assets are characterized by stable and increasing income levels and are located in major metropolitan areas which exhibit reasonable economic diversification. Specialty investments include property types in hotels, assisted-living and congregate care facilities. Specialty strategies enhance returns of assets capable of, but not currently, exhibiting core type characteristics.

Objective - The MBTA Retirement Fund's allocation to real estate equity is intended to enhance the return, risk and portfolio diversification characteristics of the Fund's total portfolio. It is anticipated that investments in equity real estate will, over a full market cycle, produce an income return that is in excess of the yield of an investment grade, core fixed income investment combined with some level of equity appreciation. In addition, it is expected that equity real estate will exhibit a lower correlation with traditional equity and fixed income securities.

Portfolio Risk - Real estate investments expose investors to risks. which include:

- Market risks that may be exacerbated by real estate's sensitivity to economic conditions and/or by the investment manager's utilization of leverage.
- Lower liquidity, especially for closed end, limited partnership and direct investments.
- Operational and credit risks that are higher than those of traditional investments.
- Valuation and appraisal lag which can be exacerbated in times of rapid price changes in the commercial real estate market.

Leverage – Leverage may be utilized at the discretion of the underlying real estate managers in a constrained manner, consistent with the commingled fund documents, in order to enhance

(Continued)

yields of the various investments and/or facilitate the diversification of the portfolio. The total level of debt for any single commingled fund investment is not expected to exceed 70% of the value of that fund. However, as a general guideline, the Fund's composite real estate portfolio shall never be more than 50% levered on an aggregate basis at any time.

Real Estate Investment Strategies - Private real estate equity strategies include core, core plus, value-added and opportunistic approaches. Core diversified funds have lower risk due to their limited use of leverage and broad diversification across multiple property types, geographic regions and income generating assets (most properties in core portfolios are fully leased and generating income). Further out on the risk and return continuum, core plus, value-added and opportunistic funds have lower occupancy rates, utilize more leverage and include properties in the development and/or pre-development stage. Due to their higher risk, these strategies are expected to generate returns that exceed that of core real estate.

Open-ended and closed-end real estate investments are diversified by vintage year, investment manager, geographic region, property type and investment strategy. With respect to vintage year diversification, closed end funds are diversified due to the fact that they are designed to invest over specific, finite time periods, while open-end funds are diversified by definition (i.e. by virtue of always being open and investing in all time periods).

Investment Strategy Allocations - Of the MBTA Retirement Fund's four active closed-end real estate funds, there are no funds are in the investing stage of their lifecycle; two funds accounting for $16.8 million in fair value is in the harvesting stage, while two funds accounting for less than $1.5 million in fair value is liquidating its underlying investments.

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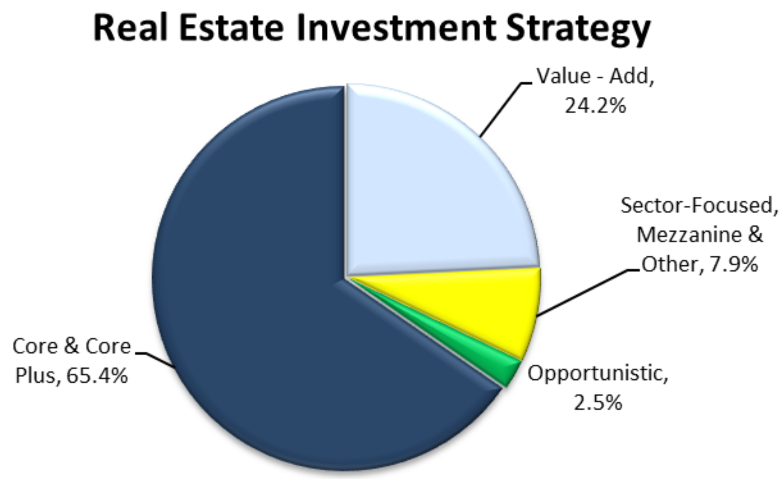
The MBTA Retirement Fund's investment strategy is diversified across closed and open-end funds as follows:



Portfolio Returns – The MBTARF real estate portfolio returned 3.85% during the year. The 3, 5 and 10-year returns for the real estate portfolio are 7.69%, 7.81% and 10.44%, respectively. The NCREIF Benchmark returned 5.53% during the fiscal year. The benchmark's 3, 5, and 10-year returns are 8.06%, 7.46% and 8.82%, respectively.

The MBTARF real estate portfolio received $14.2 million in distributions during the year-ending December 31, 2022, compared to the $18.6 million in distributions received during 2021. Partial redemptions were received from Intercontinental, MEPT and AFL-CIO Building Investment Trust in 2022. The MBTARF's real estate managers called $0.7 million of capital during 2022, compared to $31.2 million of capital called during 2021. The decrease was a result of two real estate commitments, for $15 million dollars each, to PRIT Real Estate Segmentation in July 2021 and TA Core Property Fund in October 2021. The net cash flow from the MBTARF's real estate portfolio for the year ended December 31, 2022 was an inflow of $13.5 million, compared to a net outflow of $12.6 million for 2021.

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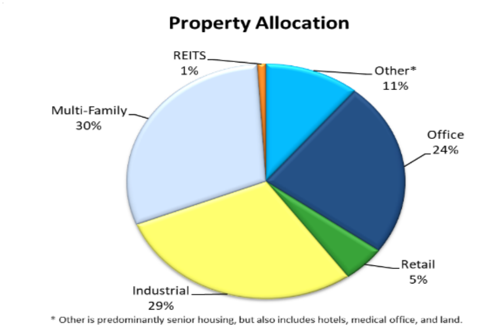
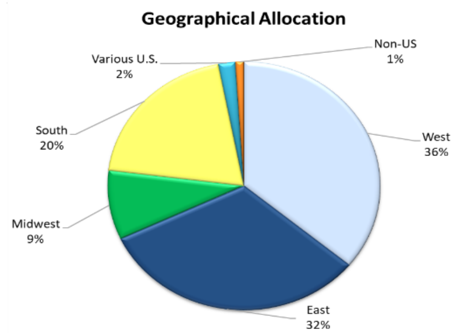
Geographic Diversification

The following charts illustrate the property type and geographic diversification of the closed end real estate portfolio:





The MBTA Retirement Fund Real Estate managers on December 31, 2022 are presented in the following table:

	Manager	Investment Mandate	Portfolio Fair Value @ 12-31-2022
AFL-CIO BUILDING INVESTMENT TRUST	AFL CIO BLDG INVST TR	Open Ended	$ 14,988,018
ColonyCapital	COLONY INVESTORS VII LP	Opportunistic	190,200
INTERCONTINENTAL REAL ESTATE CORPORATION	INTERCONTINENAL REAL ESTATE CORP	Open Ended	14,695,383
J.P.Morgan Asset Management	JP MORGAN ASSET MANAGEMENT	Open Ended	42,034,072
BentallGreenOak Residential Services	BENTALL GREEN OAK	Open Ended	48,446,194
PENSION RESERVES INVESTMENT MANAGEMENT BOARD	PRIM REAL ESTATE SEGMENTATION	Open Ended	18,451,165
Prudential Real Estate Investors	PRUDENTIAL REAL ESTATE INVESTORS	Sector Focused	13,623,203
SIGULER GUFF	SIGULER GUFF & COMPANY	Opportunistic	4,225,265
TA REALTY	TA REALTY CORE PROPERTY FUND	Open Ended	16,824,371
	Total Portfolio Fair Value:		**$ 173,477,871**

Risk Parity / Diversified Beta Portfolio:

As of December 31, 2022, the MBTA Retirement Fund had $90.6 million invested in the risk parity portfolio, representing 5.61% of the total Fund. The Risk Parity managers utilize a risk premium capture strategy that seeks to generate returns by investing in equity, bond and commodity markets using a risk-balanced investment process. Specifically, the managers select the appropriate assets for the strategy, allocates them based on their proprietary risk management and portfolio construction techniques, and then applies an active position process to improve expected returns.

The MBTA Retirement Fund invests in Risk Parity / Diversified Beta products because it provides the Fund with diversification and attractive returns. Additionally, the strategy provides daily liquidity, no lock-up, high capacity and high transparency, all of which are attractive qualities for the Fund.

Portfolio Risks - Investments in Risk Parity / Diversified Beta are subject to various risks, including derivatives and leverage risk. Risk Parity managers may invest a substantial portion of their assets in "derivatives" because their value "derives" from the value of an underlying asset, reference rate or index, the value of which may rise or fall more rapidly than other investments. The strategy invests principally in exchange-traded futures across a diverse mix of assets including equities, bonds and commodities. For some derivatives, it is possible to lose more than the amount invested in the derivative. If the portfolio uses derivatives to "hedge" a portfolio risk, it is possible that the hedge may not succeed and may result in unexpected changes in the value of the rest of the portfolio. Over the counter derivatives are also subject to counterparty risk, which is the risk that the other party to the contract will not fulfill its contractual obligation to complete the transaction with the Fund. The implementation of a risk parity strategy requires the use of leverage in order to increase the risk of the government bond allocation in the strategy so that it can be balanced against the portfolio's exposure to stocks and commodities.

(Continued)

The use of derivatives facilitates the ability to create the desired exposure of leverage in the portfolio. Leverage may cause the portfolio to be more volatile than if the portfolio had not been leveraged because it can exaggerate the effect of any increase or decrease in the value of securities held by the portfolio.

Portfolio Returns - For the calendar year 2022, the Risk Parity / Diversified Beta portfolio returned (19.55%) underperforming the asset class benchmark (60% MSCI World Equity / 40% Barclays Aggregate Bond Index) by 3.70%.

On a three, five and ten-year basis through December 31, 2022, the Risk Parity / Diversified Beta portfolio has returned (0.26%), 2.00% and 3.99% compared to its benchmark, which returned 2.23%, 4.01% and 5.92% respectively.

The MBTA Retirement Fund's Risk Parity / Diversified Beta managers on December 31, 2022 are presented in the following table:

	Manager	Investment Mandate	Portfolio Fair Value @ 12-31-2022
	Invesco	Diversified Beta	$ 48,557,654
	PanAgora Asset Management	Risk Parity	42,066,257
	Total Portfolio Fair Value:		**$ 90,623,911**

Fund of Hedge Fund Portfolio

As of December 31, 2022, the MBTARF's fund of hedge fund portfolio held $66.3 million in net positions, which represented 4.10% of the total MBTARF portfolio. The objective of the MBTARF's hedge fund program is to reduce the volatility of the total fund while attempting to maximize returns in a variety of market conditions. As a group of strategies, hedge funds represent a broad set of investment styles, mandates and products that focus primarily on the liquid equity, fixed income and derivatives markets. This may also include allocations to non-traditional investments, including illiquid securities and investments. There are two primary methods for investing in hedge funds, funds of hedge funds and single manager funds. The MBTARF primarily utilizes funds of hedge funds in an effort to significantly reduce risk through diversification.

Portfolio Risks - Hedge Funds are subject to various risks inherent in this strategy. Fluctuations in the markets can create market risk and credit risk is due to the fixed income nature of hedge fund strategies. As the MBTARF is invested in fund of fund strategies, liquidity risk is present as managers unwind from underlying positions. Investing in hedge fund exposes operational risks in executing strategies and valuations of positions. The Fund monitors risk by enforcing the investment managers to provide exceptional levels of transparency.

Portfolio Returns - The MBTARF's fund of hedge fund portfolio returned (2.51%) for the fiscal year. The MBTARF uses the CSFB/Tremont Hedge Fund Index as a benchmark for hedge fund performance. The benchmark returned 1.06% in the 2022 fiscal year. On a 3, 5 and 10-year basis, the MBTARF hedge fund portfolio returned 3.35%, 2.12% and 2.85%, respectively. The benchmark returned 5.17%, 4.25% and 4.24%, respectively, over the same 3, 5 and 10-year periods.

(Continued)

The MBTARF hedge fund portfolio has one active fund of hedge fund investment managers as of December 31, 2022.

	Manager	Investment Mandate	Portfolio Fair Value @ 12-31-2022
	Pension Reserves Investment Management	Fund of Funds	$ 66,252,755
	Total Portfolio Fair Value:		**$ 66,252,755**

Fund of Hedge Fund - Opportunistic Portfolio

As of December 31, 2022, the MBTARF's fund of hedge fund - opportunistic portfolio held $21.9 million in net positions, which represented 1.36% of the total MBTARF portfolio. While descriptions vary across investors, opportunistic investments generally encompass non-traditional investment strategies that seek to generate risk-adjusted returns by taking advantage of temporary market inefficiencies or dislocations arising from evolving market conditions, regulatory changes and other factors. Opportunistic investments generally do not fit into other asset class or strategy descriptions and may be viewed as tactical and time constrained. As compared to multi-strategy hedge funds, opportunistic investments generally exhibit higher expected returns, greater market risk, less liquidity and a higher level of concentration. Opportunistic managers may invest across asset classes (e.g. equity, debt, alternatives) and offer funds in different vehicles. Opportunistic investments may also come in the form of hedge funds or long-only investment strategies.

Portfolio Risks – Opportunistic Hedge Funds are subject to various risks inherent in this strategy. Depending on what form they take, opportunistic investments may expose an investor to a range of risks. These include:

- Market risks that impact the underlying value of investments held in underlying equity, fixed income and alternative investments.
- Market risks may include equity, interest rate or currency exchange rate risk and may be impacted by macroeconomic factors such as inflation expectation.
- Credit risk attributable to fixed income securities or private debt investments.
- Liquidity risks, especially for closed-end, limited partnership and direct investments.
- Operational risks related to valuation processes, transaction processing, compliance, financial reporting and service providers.

(Continued)

Portfolio Returns - The MBTARF's opportunistic fund of hedge fund portfolio returned (0.68%) for fiscal year 2022. The 3 and 5-year returns for the opportunistic fund of hedge fund portfolio is 6.74% and 8.42% respectively. The MBTARF uses the Bank of America/Merrill Lynch High Yield Index as a benchmark for performance, which returned (11.22%) in 2022, and returned (0.23%) and 2.12% for the 3 and 5-year periods. The first full year the MBTA Retirement Fund began investing in this asset class was 2018, due to this, the 10-year returns are not yet available.

The MBTARF opportunistic hedge fund of fund portfolio held three active investments with one manager as of December 31, 2022. The manager is presented in the following table:

	Manager	Investment Mandate	Portfolio Fair Value @ 12-31-2022
Hamilton Lane	Hamilton Lane	Fund of Funds - Opportunistic	$ 21,913,019
	Total Portfolio Fair Value:		**$ 21,913,019**

Private Equity Portfolio

As of December 31, 2022, the private equity portfolio had approximately $150.4 million in net positions, which represented 9.31% of the MBTARF portfolio. The private equity portfolio is used to increase the expected long-term return of the MBTARF portfolio, while generating cash flow and providing diversification. The private equity portfolio is diversified among sub-classes, which include venture capital, growth equity, buyouts, secondary strategies, distressed, energy and special situations. The MBTARF private equity portfolio is benchmarked to a State Street Customized Benchmark, which takes into account the portfolio's allocations to the various private equity sub-classes.

Portfolio Risks - Private equity does not lend itself to traditional quantitative measures of risk. Rather, risk is measured through a combination of quantitative and qualitative constraints. These risks include, but are not limited to, the following:

- ***Liquidity risk***: Private equity investments are illiquid and typically have expected holding periods of 10-12 years. Investments are typically held until maturity and selling prior to maturity results in a discount to fair value. Liquidity risk is managed by minimizing the possibility of forced sales that may arise from exceeding maximum exposure limits or lowering asset allocation exposure limits.
- ***Vintage risk***: Vintage reflects the year of the first capital draw from a fund. Vintage risk refers to the variability of private equity commitments over time and is minimized by pacing investments to provide vintage year diversification.
- ***Manager risk***: Manager risk consists of two elements - the exposure within an investment vehicle, and the number of managers in the private equity program. The exposure to a specific manager within an investment vehicle is controlled by limiting the commitment size to a specific investment vehicle. The optimum number of managers in the portfolio varies with time.
- ***Firm risk***: Firm risk is the exposure to a private equity firm and is controlled by limiting the maximum commitment to funds actively managed by a firm and its affiliates.

(Continued)

- ***Currency risk***: Currency risk is the risk that investments held in a foreign currency will change in value as a result of changes in the currency exchange rates. The private equity program accepts the currency risks consistent with the geographic constraints of the investment opportunity. Private equity investments generally do not hedge currency risk and the private equity program does not implement currency hedges.
- ***Industry risk***: Typically, private equity funds are permitted to invest in a wide variety of industries with limited controls. Industry risk is controlled primarily through appropriate diversification across strategies and sub-strategies.
- ***Geographic risk***: Geographic risk is controlled through a long-term, international target exposure. Global opportunities generally indicate geographic limits and exposure will be attributed and monitored accordingly.
- ***Leverage risk***: Private equity managers invest capital throughout the capital structure of portfolio companies. The capital markets control the maximum leverage available to the private equity managers. Investors control leverage exposure through portfolio construction and private equity fund selection.

Portfolio Returns - The MBTARF's private equity portfolio returned (0.53%) during the fiscal year. The 3, 5 and 10-year returns for the private equity portfolio are 18.59%, 14.72% and 10.34%, respectively. The MBTARF's State Street Private Equity Benchmark returned (5.46%) during the fiscal year. The benchmark's 3, 5 and 10-year returns are 17.59%, 15.01% and 13.57%, respectively. In April 2020, per the asset allocation, private credit was separated from the private equity portfolio. Due to this, the 3, 5 and 10-year returns include both private equity and private credit funds while the 1-year return reflects only private equity.

The MBTARF private equity portfolio received $16.4 million in distributions during the fiscal year 2022, compared to $37.5 million in the 2021 fiscal year. The private equity portfolio managers called $17.8 million of capital during the fiscal year 2022, compared to $23.3 million called in the 2021 fiscal year. The net cash flow from the private equity portfolio was an outflow of $1.4 million in fiscal year 2022, compared to an inflow of $14.2 million in fiscal year 2021.

(Continued)

The MBTA Retirement Fund's active private equity investment managers are reported in the summary below:

Manager	Investment Mandate	Portfolio Fair Value 12-31-2022	Manager	Investment Mandate	Portfolio Fair Value 12-31-2022
EUROPEAN STRATEGIC PARTNERS II	Buyout	38,589	PRIT PEVY 2020 VINTAGE	Secondary Fund of Funds	17,732,499
EUROPEAN STRATEGIC PARTNERS 2006B	Buyout	974,371	PRIT PEVY 2021 VINTAGE	Secondary Fund of Funds	9,574,314
EUROPEAN STRATEGIC PARTNERS 2008A	Buyout	755,277	PRIT PEVY 2022 VINTAGE	Secondary Fund of Funds	1,289,852
GROSVENOR OPPOR CREDIT III	Special Situations	211,820	LAVIEN (fka Quadrangle Capital Partners II)	Buyout	474,030
LAZARD TECHNOLOGY II	Venture	539,861	SCP PARTNERS II	Venture	602,945
LEXINGTON CAPITAL PARTNERS VIB	Secondary Fund of Funds	90,961	SIGULER GUFF BRIC OPPN FDII	Buyout	640,303
LEXINGTON CAPITAL PARTNERS VII	Secondary Fund of Funds	1,340,853	SL CAPITAL ESF I	Buyout	3,259,858
LEXINGTON CAPITAL PARTNERS VIII	Secondary Fund of Funds	6,267,668	SL CAPITAL SOF II	Secondary Fund of Funds	28,760
LEXINGTON CAPITAL PARTNERS IX	Secondary Fund of Funds	9,971,992	STERLING CAPITAL PARTNERS	Growth Equity	137,067
LEXINGTON MIDDLE MARKET II	Secondary Fund of Funds	1,618,757	STERLING CAPITAL PARTNERS II	Growth Equity	184,881
LEXINGTON MIDDLE MARKET III	Secondary Fund of Funds	5,183,231	STERLING CAPITAL PARTNERS III	Growth Equity	32,482
LEXINGTON MIDDLE MARKET	Secondary Fund of Funds	72,258	STERLING CAPITAL PARTNERS IV	Growth Equity	1,379,787
LEXINGTON MIDDLE MARKET IV	Secondary Fund of Funds	9,777,545	SVB STRATEGIC INVESTORS VIII	Venture	11,578,568
NEW MOUNTAIN PARTNERS III	Buyout	211,615	SVB CAPITAL PARTNERS II	Venture	201,862
NEW MOUNTAIN PARTNERS IV	Buyout	1,695,519	SVB CAPITAL PARTNERS III	Venture	9,682,444
NEW MOUNTAIN PARTNERS V	Buyout	17,129,388	SVB STRATEGIC INVESTORS III	Venture	2,500,352
NEW MOUNTAIN PARTNERS VI	Buyout	4,090,029	TOP TIER VENTURE VELOCITY FUND	Secondary Fund of Funds	808,292
OPUS CAPITAL VENTURE PARTNERS V	Venture	3,601,768	TOP TIER VENTURE VELOCITY FUND IV	Secondary Fund of Funds	5,144,426
PHAROS CAPITAL PARTNERS	Growth Equity	1,055,764	WELLINGTON PARTNERS II	Venture	873,269
PHAROS CAPITAL PARTNERS II	Growth Equity	5,918,134	WLR RECOVERY FUND V	Special Situations	1,973,266
PHAROS CAPITAL PARTNERS III	Growth Equity	5,181,876	Z CAPITAL SPECIAL SIT. FD II	Special Situations	6,594,929
			Total Portfolio Fair Value		$ 150,421,462

Private Credit Portfolio

As of December 31, 2022, the private credit portfolio had approximately $29.0 million in net positions, which represented 1.79% of the MBTARF portfolio. The private credit portfolio is used to increase the expected long-term return of the MBTARF portfolio, while generating cash flow and providing diversification. Private credit is a way for businesses to raise capital, where an investor lends money in exchange for interest payments. The investor can impose covenants, warrants and/or collateralization to secure the loan. As a comparison, private equity is when the investor owns all or part of the company.

In April 2020, per the asset allocation, the Fund separated performance and reporting for the private credit strategy from the private equity portfolio. As of December 31, 2022, the MBTA Retirement Fund's private credit strategy has 11 limited partnerships. The MBTARF private credit portfolio is benchmarked to a State Street Private Credit Benchmark.

Portfolio Risks - Private credit does not lend itself to traditional quantitative measures of risk. Rather, risk is measured through a combination of quantitative and qualitative constraints. These risks include, but are not limited to, the nonpayment of scheduled interest and principal payments on a debt investment. If a borrower fails to make a payment, or default, this may affect the overall return to the lender. Private credit investments are generally illiquid and require longer investment horizons. The typical lifespan of an MBTARF investment in private credit can range between 8-12 years.

Portfolio Returns - The MBTARF's active private credit portfolio returned 7.86% during the fiscal year. The MBTARF's State Street PEI Mezzanine - Special Situations Benchmark returned 3.00% during the fiscal year. 2021 was the first full year the MBTA Retirement Fund began reporting in this asset class separate from private equity. Due to this, the 3, 5 and 10-year returns are not yet available.

(Continued)

The MBTARF private credit portfolio received $3.1 million in distributions during the fiscal year 2022, compared to $8.6 million received in 2021. The private credit portfolio managers called $8.4 million of capital during the fiscal year 2022, compared to $4.0 million called in 2021. The net cash flow from the private credit portfolio was an outflow of $5.3 million in fiscal year 2022, compared to an inflow of $4.6 million in 2021. The main driver of the 2022 cash flow was the funding of the new investment in Neuberger Berman.

The MBTA Retirement Fund's active private credit investment managers are reported in the summary below:

Manager	Investment Mandate	Portfolio Fair Value 12-31-2022
CRESCENT MEZZ PARTNERS VIIB	Mezzanine	$ 3,094,214
OAKTREE MEZZANINE FUND - CLASS A	Mezzanine	3,335
OAKTREE MEZZANINE FUND - CLASS B	Mezzanine	56,306
VENTURE LENDING + LEASING IV	Mezzanine	69,100
VENTURE LENDING + LEASING V	Mezzanine	335,288
VENTURE LENDING + LEASING VI	Mezzanine	1,612,388
VENTURE LENDING + LEASING VII	Mezzanine	3,416,625
VENTURE LENDING + LEASING VIII	Mezzanine	5,068,781
VENTURE LENDING + LEASING IX	Mezzanine	8,287,725
WTI FUND X	Mezzanine	3,122,272
NEUBERGER BERMAN FUND IV	Mezzanine	3,902,215
Total Portfolio Fair Value		**$ 28,968,249**

SCHEDULE OF TIME-WEIGHTED RETURNS BY ASSET CLASS*

For the Period Ended December 31, 2022

	Annualized Returns		Annual Returns				
Portfolio	3 - Year	5 - Year	2022	2021	2020	2019	2018
Total Fund	4.54	5.56	(12.97)	13.88	15.26	18.36	(3.08)
Policy Benchmark	4.97	5.51	(8.32)	13.52	10.64	16.29	(2.57)
Taft Hartley - Median	4.90	5.70	(11.00)	14.60	11.50	18.10	(3.20)
Domestic Equity Large Cap Composite	7.88	9.07	(15.80)	27.17	17.27	30.55	(5.85)
S&P 500 Index	7.66	9.43	(18.11)	28.71	18.40	31.49	(4.38)
Domestic Equity Small Cap Composite	5.48	7.03	(22.31)	22.63	23.15	29.15	(7.34)
Russell 2000 Growth Index	0.65	3.51	(26.36)	2.84	34.63	28.48	(9.31)
Russell 2000 Value Index	4.70	4.13	(14.48)	28.27	4.63	22.39	(12.86)
Global Emerging Markets Composite	0.97	5.91	(36.96)	8.47	49.72	31.95	(1.88)
MSCI ALL Country World	4.00	5.23	(18.36)	18.54	16.26	26.60	(9.41)
International Equity Composite	0.21	0.73	(16.90)	8.77	11.32	22.93	(16.14)
MSCI EAFE	0.87	1.54	(14.45)	11.26	7.82	22.02	(13.79)
Fixed Income Composite	(0.86)	0.81	(10.26)	0.86	7.66	7.08	(0.20)
Bloomberg Aggregate	(2.71)	0.02	(13.01)	(1.54)	7.51	8.72	0.01
Diversified Beta	(0.26)	2.00	(19.55)	9.82	12.30	18.73	(6.29)
60% MSCI World Eq / 40% BC Agg Bond	2.23	4.01	(15.85)	12.05	13.31	20.01	(5.07)
Hedge Funds	3.35	2.12	(2.51)	8.06	4.76	15.12	(12.60)
CSFB/Tremont Hedge Fund Index	5.17	4.25	1.06	8.23	6.36	9.31	(3.19)
Hedge Funds - Opportunistic	6.74	8.42	(0.68)	9.85	11.47	16.25	7.87
Bank of America/Merrill Lynch HY Index	(0.23)	2.12	(11.22)	5.36	6.17	14.41	(2.26)
Private Equity Composite	18.59	14.72	(0.53)	31.74	31.10	13.68	4.82
State Street Private Equity Benchmark	17.59	15.01	(5.47)	49.22	9.27	12.38	8.70
Private Credit Composite	-	-	7.86	56.20	-	-	-
State Street Private Credit Benchmark	-	-	3.00	25.30	-	-	-
Real Estate Composite	7.69	7.81	3.85	18.83	1.19	6.11	9.93
NCREIF Property Index	8.06	7.46	5.53	17.70	1.60	6.42	6.72

Policy Benchmark:

17% S&P 500	6% BBG Barclays Multiuniverse
7% Russell 2000	3% BBG Barclays MBS
9% MSCI EAFE	8% State Street PE Index
2% MSCI World EX US Small Cap	2% State Street Private Credit
4% MSCI AC World Index Net	7% 91 T-Bill One Month Lag Plus 300BP
4% MSCI Emerging Markets Index	9% NCREIF Property Index quarter lag
3% BBG Barclays US TIPS 1-10 year	6% 91 T-Bill Pluss 300BP
8% BBG Barclays Aggregate	2% ICE BoFA US 3-Month T-Bill
3% S&P/LSTA	

* All return information is gross of fees, except hedge funds, which are net of fees. Returns are calculated on a time-weighted rate of return methodology.

Investment Summary at Fair Value

As of December 31, 2022

	Fair Value	% of Fair Value
Short-Term:		
Cash and cash equivalents*	$ 58,900,927	3.64 %
Fixed Income:		
U.S. Agencies	2,536,775	0.16
US Treasury	83,746,982	5.18
Domestic fixed income	203,331,868	12.58
International fixed income	149,438	0.01
Asset Backed	67,974,087	4.21
Equity:		
Domestic equity securities	444,338,203	27.49
International equity securities	223,460,403	13.83
Real Estate	173,477,871	10.73
Private Equity & Private Credit	179,389,710	11.10
Risk Parity	90,623,911	5.61
Hedge Funds	66,252,755	4.10
Hedge Funds - Opportunistic	21,913,019	1.36
Total Investments	$ 1,616,095,949	100.00 %

*Investment manager's cash holdings are reported in cash and cash equivalents

SUMMARY SCHEDULE OF BROKER COMMISSION

(Top 25 Brokers and Cumulative Fees Paid to Others)

Year Ended December 31, 2022

Brokerage Firm	Shares/Par Value		Fees Paid	% Total	Average $ per share
CITIBANK N.A.	2,713,869,018		$22,211	17.06%	0.0000
MORGAN STANLEY CO INCORPORATED	47,528,579		14,525	11.16%	0.0003
CITIBANK INTERNATIONAL PLC	12,951,965		7,301	5.61%	0.0006
GOLDMAN SACHS + CO LLC	16,191,517		6,257	4.81%	0.0004
BOFA SECURITIES, INC.	42,403,892		6,230	4.79%	0.0001
CREDIT SUISSE SECURITIES (USA) LLC	74,316,451		3,925	3.02%	0.0001
JOH. BERENBERG, GOSSLER & CO. KG	1,046,081		3,347	2.57%	0.0032
BARCLAYS CAPITAL	3,769,249		3,262	2.51%	0.0009
J P MORGAN SECURITIES INC	61,661		2,908	2.23%	0.0472
BARCLAYS CAPITAL LE	164,451		2,867	2.20%	0.0174
WILLIAM BLAIR & COMPANY L.L.C	128,216		2,805	2.15%	0.0219
JEFFERIESLLC	10,768,585		2,659	2.04%	0.0002
UBS AG	15,610,271		2,535	1.95%	0.0002
CITIBANK AG	5,294,444		2,390	1.84%	0.0005
STOCK DISTRIBUTION	234,107		2,349	1.80%	0.0100
NATIONAL FINANCIAL SERVICES LLC	6,555,295		2,128	1.63%	0.0003
STATE STREET BANK AND TRUST CO	5,477,585		2,099	1.61%	0.0004
MIRABAUD SECURITIES LLP	1,568,574		2,067	1.59%	0.0013
EXANE S.A.	1,408,818		1,813	1.39%	0.0013
UBS SECURITIES LLC	327,848		1,327	1.02%	0.0040
WELLS FARGO SECURITIES, LLC	1,965,923		1,314	1.01%	0.0007
UBS SECURITIES ASIA LTD	40,273,483		1,302	1.00%	0.0000
JEFFERIESINTERNATIONAL LTD	1,223,699		1,288	0.99%	0.0011
J.P. MORGAN SECURITIES LLC	20,414,714		1,232	0.95%	0.0001
WEDBUSH SECURITIES INC	46,134		1,190	0.91%	0.0258
OTHER	324,902,470		28,847	22.16%	0.0001
TOTAL	**3,348,503,031**	**$**	**130,179**	**100%**	**0.0000**

The Fund Board has a commission recapture agreement with Capital Institutional Services, Inc. For the year ended December 31, 2022, the Fund earned approximately $3,400 from the commission recapture program.

SCHEDULE OF DIRECT MANAGEMENT FEES
Year Ended December 31, 2022

Investment Management Fees by Asset Class:	**AUM ($000s)**	**Fees ($000s)**
Domestic Equity	$ 397,371	$ 1,077
International Equity	173,209	923
Global Equity	96,413	558
Fixed Income	358,545	676
Risk Parity / Diversified Beta	90,624	210
Alternative Asset Classes	614,511	292
Total Investment Management Fees		**$ 3,736**
Investment Advisory (Consulting) Fees		$ 344
Communications and Governmental Services		148
Custodian Fees		673
Total Other Fees		**$ 1,165**
Total Direct Management Fees charged to MBTARF		**$ 4,901**

INVESTMENT POLICY STATEMENT

The following are significant fundamentals of the Fund's Investment Policy Statement. The policy delineates the objectives and policies that have been established by the Board to provide a framework for the on-going management of the Fund. It is designed to clearly communicate the directives of the Board to all interested parties. The Policy shall be revised from time to time, as deemed necessary, and will be reviewed annually to ensure its relevance to the Fund's current needs. Any resulting material changes will be communicated to all affected parties. The Policy will apply to the Fund on an aggregate basis.

The purpose of this Investment Policy Statement ("IPS") is to enumerate for stakeholders clear and concise guidelines by which the Retirement Board administers the Fund. This IPS is designed to allow sufficient flexibility to capture investment opportunities while providing guidance to facilitate compliance with the governing documents of the Fund and Massachusetts law. The Retirement Board periodically reviews this IPS to ensure that it conforms with the best practices applicable to the Fund.

In fulfilling the mission of the Trust, the objective of the Retirement Board is to ensure the availability of sufficient assets to pay benefits by achieving the highest level of investment performance compatible with acceptable levels of risk in a cost-effective manner and prudent investment practices. Specifically, in order to maintain if not improve upon its funded status, the Retirement Board seeks to meet or exceed the actuarial target rate of return. Maintaining, if not exceeding, the Assumed Rate of Return should have the benefit of stabilizing employer and employee contributions to the Fund. The Fund shall have a risk tolerance consistent with that of other funds created for similar purposes, and the assets of the Fund shall be invested accordingly. The Fund has adopted a Risk Management Framework. As a mature defined benefit plan, the Fund will have a negative cash flow as more participants retire, which, in turn, impacts the Fund's tolerance for market volatility.

The Fund's investment program is based on the precepts of the generally accepted capital markets theory followed by institutional investors who, by definition, are long-term-oriented investors with goals and objectives that are similar to the Fund. This philosophy holds that:

- Increasing risk is rewarded with compensating returns over time and therefore, prudent risk-taking is justifiable for long-term investors.
- Risk can be mitigated through diversification of asset class exposure, implementation strategies and individual security holdings.

(Continued)

- Diversification benefits shall be measured by examining the correlation between asset classes, implementation strategies and manager styles, with a goal of maximizing diversification and limiting concentration and overlap in asset classes and strategies that are more highly correlated.
- The primary determinant of long-term investment performance is the strategic or long-term asset allocation strategy.

Rate of Return Assumption

The Retirement Board will, with the assistance of the Actuary and Investment Advisor, establish and annually review the Assumed Rate of Return and may adopt changes over a market cycle, or more frequently if warranted. The current Assumed Rate of Return is 7.25% annually, net of all fees and operating expenses.

Relative Return Objectives

The Fund shall seek to achieve a rate of return that ranks in the top half of the appropriate peer fund universes given a comparable level of risk and to achieve a long-term rate of return on investments that is equal to or exceeds both the Asset Allocation Index Return and the Policy Index Return. Given its investment philosophy, the Retirement Board recognizes that the return targets may not be achieved in any single year; the Retirement Board will measure the performance of the Fund over an appropriate longer-term horizon.

Current Asset Allocation Targets & Ranges

Asset allocation herein refers to the establishment of relative percentage allocation guidelines for the investment of assets in equities, fixed income, alternative investments, cash equivalents and other general forms of investment, but not to individual security selection. This single decision is the most important consideration for the Board. In terms of direct impact on the Fund’s performance, the Fund’s policy asset mix choice outweighs all other decisions. As a practical matter, the Board understands that while important, portfolio structure decisions and active management strategies involving stock and bond selection, sector weighting or market timing have been shown to contribute less than long-term asset allocation decisions.

It is generally recognized that asset allocation decisions may account for up to 90% of the investment return for a large pool of assets; in terms of direct impact on the Fund’s performance, the Fund’s policy asset mix choice outweighs all other decisions. The Retirement Board shall manage the Fund to achieve the Assumed Rate of Return while adhering to fiduciary obligations and ensuring liquidity sufficient to pay benefits.

(Continued)

Factors to be considered include:
(1) the Fund's assumed rate of return,
(2) the risk tolerance of the Board,
(3) the Fund's liquidity requirements,
(4) Funded status,
(5) the Fund's liability structure and other characteristics unique to the fund. Following an asset allocation review which considered the impact of a range of asset allocation policies on the Fund.

The Board will review the asset allocation targets at least annually and may adopt changes over a three to five-year time horizon or, more frequently, if significant changes occur within the economic or capital market environments. A change in the Fund's liability structure, funded status or long-term investment prospects may also trigger a revision of the asset allocation.

The Fund may have the opportunity to invest in PRIT. If the Fund invests with a PRIT Segmentation Program, the Investment Advisor will, at the time of the investment is being considered by the Retirement Board, suggest to the Retirement Board allocations to the Fund's asset (sub)classes (if necessary), recognizing that a PRIT Segmentation Account may not fit uniformly into the Fund's asset allocation rubric; this assignment will impact the IM Benchmark(s) applicable to the PRIT Segmentation Account.

Performance Benchmarks

Total Fund Return: The Total Fund Return shall be compared against other corporate, jointly trusteed and public pension plans of similar size and circumstances, as identified by the Investment Advisor. The Total Fund Return objective is to meet or exceed the Allocation Index Return and the Policy Index Return, which are each described below.

Allocation Index: The Allocation Index Return shall measure the success of the Fund's current allocation. It shall be calculated by using index rates of return for each asset class invested in by the Fund multiplied by the actual percent allocated to each asset class. The difference between the Allocation Index Return and the Total Fund Return measures the effect of active management. If the Total Fund Return is greater than the Allocation Index Return, then active management has in aggregate added value.

Policy Index: The Policy Index Return shall measure the success of the Fund's target asset allocation. It shall be calculated by using index rates of return for each asset class invested in by the Fund multiplied by the percent targeted to each asset class. The difference between the Allocation Index Return and the Policy Index Return measures the effects of deviating from the target allocation.

(Continued)

If the Allocation Index Return is greater than the Policy Index Return, then deviating from the target allocation has added value. If the Allocation Index Return is less than the Policy Index Return, then deviating from the target allocation has not added value.

Manager Benchmarks: The Investment Managers shall be compared to a combination of passively managed index returns matching the managers' specific investment styles, as well as the median manager in their appropriate peer group universe.

Rebalancing

The actual asset allocation mix will deviate from the targets due to market movements, cash flows, and manager performance. The Retirement Board and Executive Director with the assistance of the Investment Advisor will review asset allocation at least quarterly to determine compliance with the targets and rebalance as warranted. The Executive Director shall report material rebalancing activity to the Retirement Board.

ACTUARIAL SECTION

(Unaudited)

Buck Global, LLC has performed a December 31, 2022 actuarial valuation of the MBTA Retirement Fund. This valuation and report was prepared using Generally Accepted Actuarial Principles and practices and meets the parameters set by the Governmental Accounting Standards Board (GASB). To the best of our knowledge, this report is complete and accurate, and the assumptions used represent our best estimate of anticipated experience of the Fund.

Buck Global, LLC has prepared and included, as part of this report, all of the supporting schedules in the Actuarial Section of the Annual Comprehensive Financial Report (ACFR).

BUCK

500 Plaza Drive
Secaucus, NJ 07096

May 22, 2023

Retirement Board
Massachusetts Bay Transportation Authority Retirement Fund
One Washington Mall, Fourth Floor
Boston, MA 02108

Dear Board Members:

The Pension Agreement covering the Massachusetts Bay Transportation Authority Retirement Fund provides that the actuary make annual actuarial valuations of the Fund and certify rates of contribution to the Retirement Board. The most recent actuarial valuation of the Fund was prepared as of December 31, 2022.

This valuation reflects the funding policy adopted by the Board effective December 31, 2009. The actuarial cost method used is the entry age normal cost method. The amortization of the unfunded liability is made in installments increasing at the rate of four percent per year over a closed 30-year period beginning December 31, 2009.

This valuation is based on assumptions adopted by the Retirement Board, in April 2023 and effective with the actuarial valuation of December 31, 2012, on the basis of an experience study covering the period January 1, 2018, through December 31, 2022. Significant assumptions revised on the basis of the experience study include mortality, salary increase rates, termination rates, and retirement rates. We believe that these assumptions are reasonable. The assumptions and methods used for funding purposes satisfy the requirements of all applicable Actuarial Standards of Practice. The same actuarial assumptions are used for financial reporting by and for the Fund under GASB Statements 67 and 68.

We performed the valuation using participant data and plan asset data supplied by the Authority and Retirement Fund. Although we did not audit the data, we reviewed the data for reasonableness and consistency with the prior year's information. The accuracy of the results of the valuation is dependent on the accuracy of the data.

The following exhibits from the valuation report were incorporated in the Actuarial Section of the Annual Comprehensive Financial Report (ACFR):

1. Summary of Principal Results
2. Number and annual retirement allowances of retired members, disabled members and beneficiaries as of December 31, 2021
3. Schedule of Funding Progress
4. Outline of Actuarial Assumptions and Methods
5. Summary of Main Provisions of the Fund as Interpreted for Valuation Purposes

(Continued)

6. Number and Annual Compensation of Active Members Distributed by Fifth Age and Service as of December 31, 2021
7. Number and Annual Retirement Allowances Distributed by Age as of December 31, 2021

The following exhibits were separately prepared by Buck for use in the ACFR:

1. Schedule of Retired Members and Beneficiaries Added To and Removed From Rolls
2. Solvency Test

Actuarial Standard of Practice No. 56 ("ASOP 56") provides guidance to actuaries when performing actuarial services that involve designing, developing, selecting, modifying, using, reviewing, or evaluating models. Buck uses third-party software in the performance of annual actuarial valuations and projections. The model is intended to calculate the liabilities associated with the provisions of the Fund using data and assumptions as of the measurement date under the funding methods specified in this report. The output from the third-party vendor software is used as input to an internally developed model that applies applicable funding methods and policies to the derived liabilities and other inputs, such as plan assets and contributions, to generate many of the exhibits in the valuation report. Buck has an extensive review process in which the results of the liability calculations are checked using detailed sample output, changes from year to year are summarized by source, and significant deviations from expectations are investigated. Other funding outputs and the internal model are similarly reviewed in detail and at a high level for accuracy, reasonability, and consistency with prior results. Buck also reviews the third-party model when significant changes are made to the software. The review is performed by experts within the company who are familiar with applicable funding methods as well as the manner in which the model generates its output. Extra checking and review are completed if significant changes are made to the internal model. Significant modifications to the internal model that apply to multiple clients are generally developed, checked, and reviewed by various experts within the company who are familiar with the details of the required changes.

Future actuarial measurements may differ significantly from current measurements due to plan experience differing from that anticipated by the economic and demographic assumptions, increases or decreases expected as part of the natural operation of the methodology used for these measurements, and changes in plan provisions or applicable law. An analysis of the potential range of such future differences is beyond the scope of the valuation. However, in accordance with the requirements of Actuarial Standard of Practice No. 51 ("ASOP 51"), a risk assessment is provided in Section X of the valuation report.

Where presented, the "funded ratio" and "unfunded accrued liability" are generally measured using the actuarial value of assets basis. It should be noted that recomputation of these measurements using the market value of assets would result in different funded ratios and unfunded accrued liabilities. Moreover, the funded ratio presented is appropriate for evaluating the need and level of future contributions but does not provide a basis for the assessment of the funded status of the plan if the plan were to settle (i.e., purchase annuities to cover) a portion or all of its liabilities.

(Continued)

I am a Fellow of the Society of Actuaries and a Member of the American Academy of Actuaries. I meet the Qualification Standards of the Academy to render the actuarial opinions contained in this report. This report has been prepared in accordance with all applicable Actuarial Standards of Practice, and I am available to answer questions about it.

Buck Global, LLC (Buck)

David L. Driscoll

David L. Driscoll, FSA, EA, MAAA, FCA
Principal, Consulting Actuary

Section II - Summary of Principal Results

1. The principal results of the current and preceding years' valuations are summarized below:

Valuation Date	December 31, 2021	December 31, 2022
Number of active members	5,486	5,555
Annual compensation of all members	$ 458,857,189	$ 496,467,531
Annual compensation of active members below normal retirement age	$ 454,984,547	$ 492,169,885
Average age (years)	48.46	48.42
Average service (years)	11.12	10.86
Average compensation	$ 83,641	$ 89,373
Number of active members not accumulating creditable service	215	307
Number of retired members, beneficiaries and disabled members	6,738[1]	6,783[2]
Annual retirement allowances	$ 225,623,892[3]	$ 232,067,261[4]
Assets for funding purposes	$ 1,760,643,571	$ 1,799,924,778
Unfunded accrued liability	$ 1,341,060,444	$ 1,367,546,343
Contribution rates required:		
Normal	12.1200%	12.6400%
Accrued liability	21.7500%	21.4100%
Expenses	1.0000%	1.0000%
Total required rate	34.8700%	35.0500%
Member excess rate	0.0000%	0.0000%
Actual contribution rate during following fiscal year	34.8700%	35.0500%

2. Valuation results as of December 31, 2022, are given in Section VI, and contribution levels are set forth in Section VII.
3. Schedule B of this report outlines the actuarial assumptions and methods used in the valuation. The actuarial assumptions were selected on the basis of an experience study covering the five-year period ending December 31, 2022. The Retirement Board voted to adopt these assumptions in April 2023.
4. Schedule C of this report presents a summary of the main provisions of the Fund, as interpreted in preparing the actuarial valuation.

[1] Includes 6,572 retirees and beneficiaries, 25 individuals receiving worker's compensation for over 5 years, and 141 individuals receiving payments under QDROs.

[2] Includes 6,614 retirees and beneficiaries, 24 individuals receiving worker's compensation for over 5 years, and 145 individuals receiving payments under QDROs.

[3] Excludes 25 individuals receiving worker's compensation for over 5 years.

[4] Excludes 24 individuals receiving worker's compensation for over 5 years.

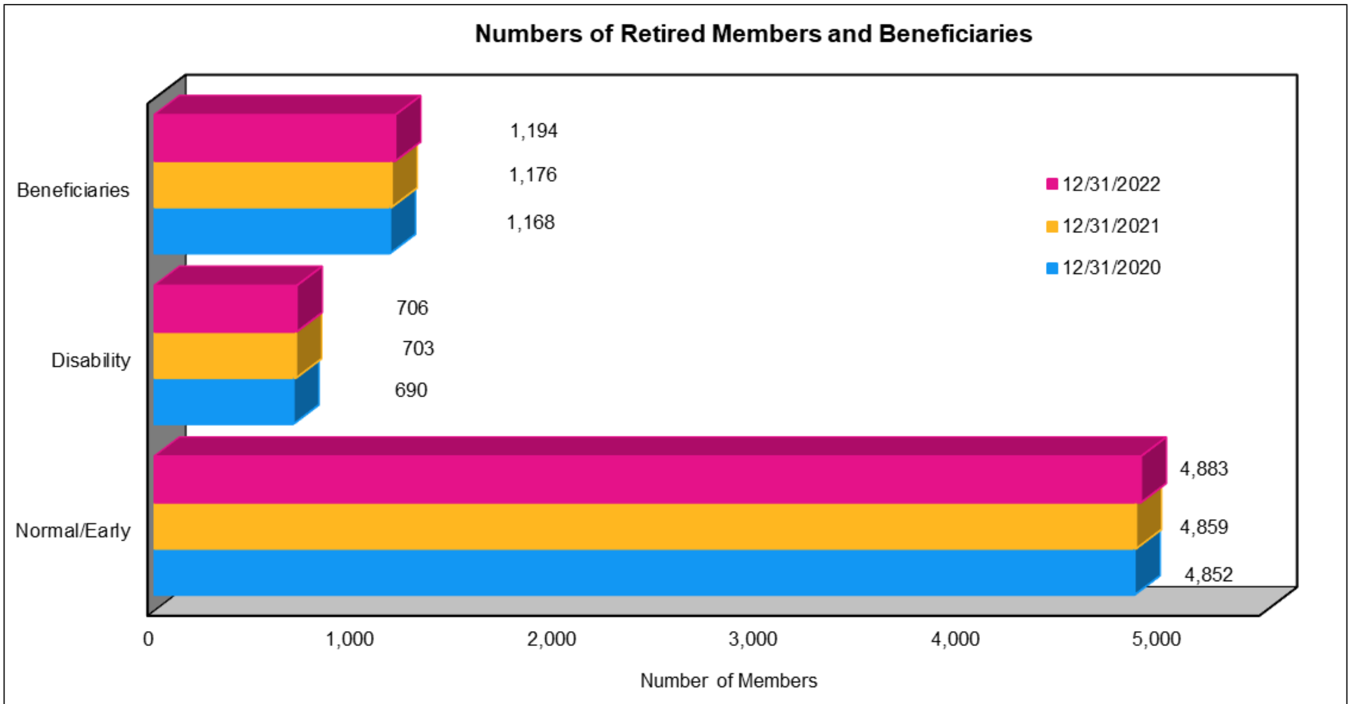
Section III - Membership Data

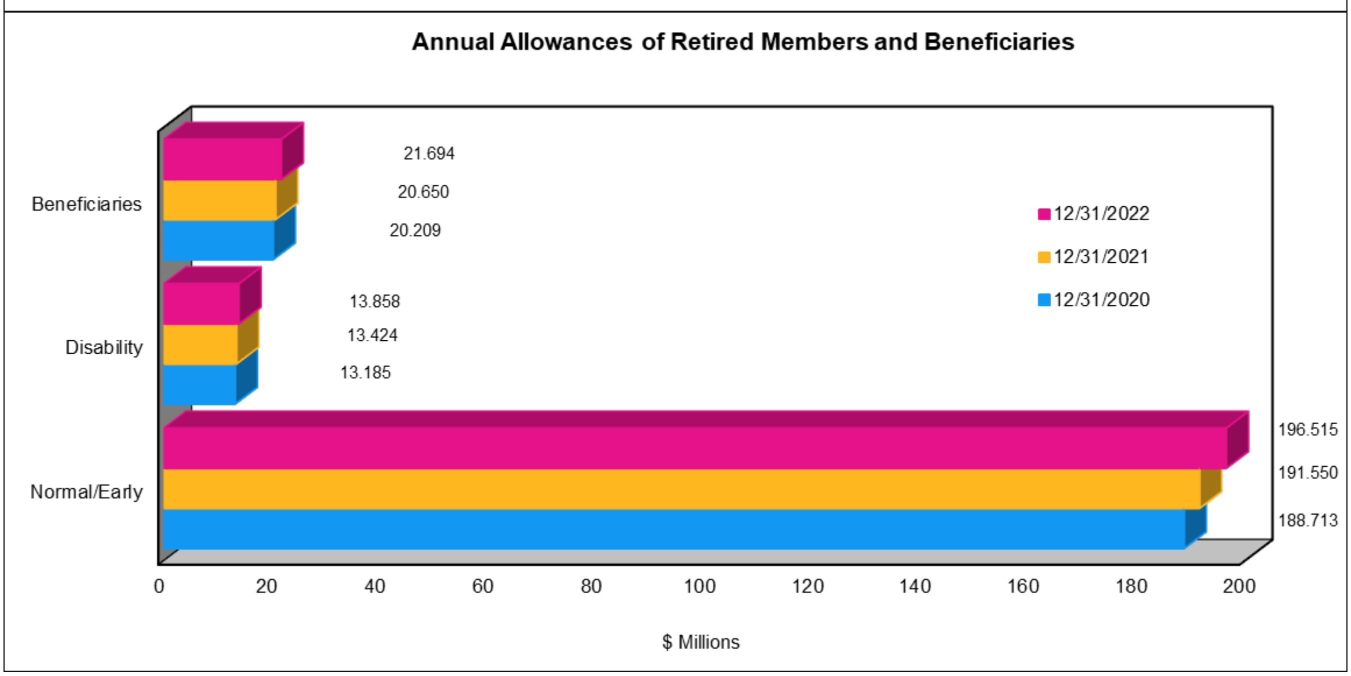
1. Employee data were furnished by the Authority and Retirement Fund.
2. Table 1 of Schedule D shows the number and annual compensation of active members, while Table 2 of Schedule D shows the number and annual retirement allowances of retired members, disabled members and beneficiaries.
3. The following table summarizes the number and annual retirement allowances of retired members, disabled members and beneficiaries as of December 31, 2022:

Category	Number	Annual Retirement Allowances
Benefits to Members Retired on Normal, Early Normal and Reduced Early Retirement Allowances	4,883	$ 196,514,835
Benefits to Members Retired on Disability Retirement Allowances	706[1]	13,857,982[2]
Benefits to Beneficiaries of Deceased Members[3]	1,194	21,694,444
Total	6,783	$ 232,067,261

[1] Includes 24 individuals receiving worker's compensation for over 5 years.
[2] Excludes 24 individuals receiving worker's compensation for over 5 years.
[3] Includes 145 individuals receiving payments under QDROs.

Section III - Membership Data (continued)[1]





[1] Disability counts include individuals receiving worker's compensation for over 5 years, and disability allowances exclude individuals receiving worker's compensation for over 5 years.

Section IV - Assets

1. Asset information was obtained from the Retirement Fund office.
2. The fair value of the Fund's net assets available for benefits as of December 31, 2022, amounted to $1,622,548,978.
3. The asset valuation method is a five-year phase-in smoothing method under which the value of assets for actuarial purposes equals fair value adjusted for a five-year phase-in of the differences between actual and assumed investment return. The value of assets for actuarial purposes may not differ from the fair value of assets by more than 20%. The smoothing method used to calculate the value of assets for actuarial purposes was restarted as of December 31, 2013, coincident with the change to the present method.
4. The calculation of the actuarial value of assets as of December 31, 2022, is presented below:

Fair value as of December 31, 2022					1,622,548,978	(A)
Adjustment to recognize asset gains (losses) over 5 years:						
Year Ending	Asset gain (loss)	X	Adjustment factor	=	Adjustment	
12/31/2022	(395,720,797)		0.80		(316,576,637)	
12/31/2021	106,359,393		0.60		63,815,636	
12/31/2020	114,287,041		0.40		45,714,817	
12/31/2019	148,351,928		0.20		29,670,386	
Total					(177,375,800)	(B)
Actuarial value of assets, as of December 31, 2022					1,799,924,778	
Asset gain during fiscal year ending December 31, 2022						
Actual return on fair value and cash flow						
Income from investments and securities lending					27,428,499	
Net appreciation					(279,781,753)	
Total					(252,353,254)	(C)
Expected 7.25% return on fair value and cash flow					143,367,543	(D)
Asset gain (loss) (C) – (D)					(395,720,797)	

The assets for valuation purposes are 110.90% of fair value.

5. As of December 31, 2007, members' excess contributions (as discussed in Section V) had been fully depleted to cover the cost of the one-time cost-of-living increases negotiated in collective bargaining related to the benefits provided under the Fund. The actuarial asset value derived above thus requires no additional adjustment for members' excess contributions.

Section V – Member Excess Contributions

1. Effective July 1, 1998, in lieu of a reduction in the 4% contribution rate, members continued to make contributions equal to 4% of covered payroll.
2. To the extent that 4.00% exceeds the actuarially determined member required contribution rate, the excess is characterized as member excess contributions. These amounts are to be accumulated within the Retirement Fund and used to provide additional benefits.
3. The member excess rates developed in prior years are as follows:

Period	Excess Rate	Period	Excess Rate
July 1, 2008 – June 30, 2009	0.00000%	July 1, 2015 – June 30, 2016	0.00000%
July 1, 2009 – June 30, 2010	0.00000%	July 1, 2016 – June 30, 2017	0.00000%
July 1, 2010 – June 30, 2011	0.00000%	July 1, 2017 – June 30, 2018	0.00000%
July 1, 2011 – June 30, 2012	0.00000%	July 1, 2018 – June 30, 2019	0.00000%
July 1, 2012 – June 30, 2013	0.00000%	July 1, 2019 – June 30, 2020	0.00000%
July 1, 2013 – June 30, 2014	0.00000%	July 1, 2020 – June 30, 2021	0.00000%
July 1, 2014 – June 30, 2015	0.00000%	July 1, 2021 – June 30, 2022	0.00000%

4. As of December 31, 2007, members' excess contributions accumulated in prior years had been fully depleted.
5. The member excess rate for the period July 1, 2022 - June 30, 2023 is derived as follows:

a.	Effective prior member excess rate (December 31, 2021)	-4.7089%
b.	Decrease in total required contribution rate from prior valuation (see Section VII)	-0.18%
c.	Current member excess rate (July 1, 2022) ((a.) + 25% of (b.))	-4.7539%

6. The accumulated value of the excess contributions as of December 31, 2022 is $0.

Section VI – Comments on Valuation

1. Schedule A of this report presents the results of the valuation as of December 31, 2022.

2. The total entry age normal accrued liability on account of benefits expected to be paid to present retired members, former members, beneficiaries, active and inactive members is $3,167,471,121. Of this amount, $2,143,395,353 is on account of retired members and beneficiaries, $1,014,935,574 is on account of present active members and $9,140,194 is on account of active members not accumulating creditable service.

3. The value of Fund assets to be used in developing required contributions to the Fund is $1,799,924,778, including required contributions made by active members. When $1,799,924,778 is subtracted from $3,167,471,121, there remains $1,367,546,343, which represents the unfunded actuarial accrued liability of the Fund.

4. Amortization of the unfunded liability over the remaining 17 years in the amortization period as of December 31, 2022, in annual installments rising at the rate of 4% per year produces an amortization installment of $105,361,014 as of December 31, 2022. This amounts to 21.41% of the value of annual compensation of active members below normal retirement age on that date.

5. The total entry age normal cost at December 31, 2022, is $62,188,799, or 12.64% of the annual compensation of active members below normal retirement age on that date.

6. In addition to the amounts needed to cover amortization of the unfunded liability and normal cost, an allowance of 1.00% of annual compensation of active members below normal retirement age is included in the total required contribution to cover expected administrative expenses. Under the current funding policy of fully covering the actuarially determined contribution, and assuming there are no future experience gains or losses, future expected Fund contributions are expected to remain relatively level as a percent of payroll for 17 years and remain relatively level as a percent of payroll thereafter at the normal cost rate, and the funded status is expected to increase to 100% after 17 years.

7. During 2022, the unfunded actuarial accrued liability increased $26.4 million, from $1,341.1 million to $1,367.5 million. The expected unfunded actuarial accrued liability at December 31, 2022, was $1,315.6 million. The $51.9 million difference consists of a $30.7 million loss in 2022 of returns on the actuarial value of assets and $21.2 million in increased accrued liability due to unfavorable demographic experience, assumption changes due to the experience study, and contribution rate changes. Additional detail is provided in Section IX.

Section VII – Contributions to the Fund

1. Effective December 31, 2009, the contributions by members and the Authority are to provide normal contributions, amortization of the unfunded accrued liability and administrative expenses. It is assumed that investment earnings will be sufficient to cover fiduciary and investment expenses and, in addition, provide the yield assumed for actuarial purposes.
2. The valuation indicates that 12.64% of compensation is required to cover normal cost and 21.41% of compensation is required to cover amortization of the unfunded accrued liability. Adding 1.00% of compensation for anticipated administrative expenses, excluding fiduciary and other investment expenses, results in a total contribution rate of 35.05% of compensation to be paid by the Authority and the members of the Retirement Fund from July 1, 2023, through June 30, 2024.
3. This rate is 0.18% more than the 34.87% rate developed in the December 31, 2021, valuation. Under the adjustment formula contained in the July 1, 2002, Pension Agreement, 75% of the change will be allocated to the Authority as a change in the contribution rate and 25% will be allocated to the member's required contribution rate. This results in the following rates payable during the year beginning July 1, 2023:

Authority	25.9511%
Members' required	9.0989%[1]
Subtotal (Section II)	35.0500%
Members' excess (Section V)	0.0000%
Total	35.0500%

[1] The actual rate in effect as of July 1, 2023, will be 125 basis points higher, as specified in the new pension agreement.

Section VIII – Statement No. 25 of the Governmental Accounting Standards Board

1. Statement No. 25 of the Governmental Accounting Standards Board has been superseded by Statement No. 67. Required reporting for the Retirement Fund under Statement No. 67 will be covered in a separate report. The information below is shown nonetheless for informational purposes.
2. The following schedule shows funding progress information that would have been required by Statement No. 25 as of December 31, 2022:

Schedule of Funding Progress (,000's)[1]

Year Ending December 31	Actuarial Value of Assets (a)	Actuarial Accrued Liability (AAL) (b)	Unfunded AAL (UAAL) (b-a)	Funded Ratio (a/b)	Covered Payroll (c)	UAAL as a Percentage Covered Payroll ((b-a)/c)
2022	1,799,925	3,167,471	1,367,546	56.83%	492,170	277.86%
2021	1,760,644	3,101,704	1,341,060	56.76%	454,985	294.75%
2020	1,636,054	3,055,123	1,419,069	53.55%	456,930	310.57%
2019	1,561,193	3,021,110	1,459,918	51.68%	433,577	336.72%
2018	1,559,453	2,916,800	1,357,348	53.46%	423,075	320.83%
2017	1,599,505	2,829,386	1,229,881	56.53%	425,658	288.94%
2016	1,607,560	2,694,556	1,086,996	59.66%	444,455	244.57%

[1] Some numbers in the table do not add up due to rounding.

Section IX – Experience

Records are maintained in which the actual experience of active and retired members is compared to that expected on the basis of the tables adopted by the Retirement Board. In this way, deviations in the experience from that anticipated will be noted and any adjustments believed necessary will be brought to the attention of the Retirement Board in future experience studies.

During the last year, the total unfunded actuarial accrued liability (UAL) was expected to decrease from $1,341,060,444 to $1,315,603,383. The actual UAL at the end of the year was $1,367,546,343. The chart below reconciles the expected to actual UAL. The primary sources of changes were a $66,725,664 increase in the accrued liability resulting from unfavorable demographic experience in 2022 and returns on assets measured at actuarial value that were $30,694,315 below expected levels in 2022.

The sources of the (Gains)/Losses are shown below:

Actual UAL as of December 31, 2021		$ 1,341,060,444
Expected UAL (Prior to Changes) as of December 31, 2022		$ 1,315,603,383
Salary Increases	$ 43,739,664	
New Participants	1,276,703	
Active – Retirements	16,995,018	
Active – Terminations	2,241,210	
Active – Mortality	726,625	
Active – Disabilities	(1,211,122)	
Retiree Mortality	(6,065,341)	
Other (Data Corrections, etc.)	9,022,907	
Liability (Gain)/Loss – Demographic Experience		$ 66,725,664
Change in Accrued Liability Due to Contribution Rate Changes		$ 22,281
Change in Accrued Liability Due to Assumption Changes		$ (45,499,300)
Total of Liability (Gain)/Loss and effects of changes in assumptions and Contribution rates		$ 21,248,645
Investment (Gain)/Loss		$ 30,694,315
Total Change in UAL		$ 51,942,960
Actual UAL as of December 31, 2022		$ 1,367,546,343

Section X – ASOP 51

Actuarial Standard of Practice No. 51 (“ASOP 51”) Disclosures

Funding future retirement benefits before they become due requires assumptions regarding future economic and demographic experience. These assumptions are applied to calculate actuarial liabilities and the corresponding funded status of the Fund. However, to the extent future experience deviates from the assumptions used, variations will occur in these calculated values. These variations create risk to the Fund. Understanding the risks to the funding of the Fund is important.

Actuarial Standard of Practice No. 51 (“ASOP 51”) requires certain disclosures of potential risks to the Fund and the provision of useful information for intended users of actuarial reports who determine Fund contributions or evaluate the adequacy of specified contribution levels to support benefit provisions. While its status as a governmental pension plan (as defined in the Internal Revenue Code) exempts it from the funding provisions of ERISA, the Massachusetts Bay Transportation Authority Retirement Fund uses the information presented to assist in making decisions regarding contribution levels.

Under ASOP 51, risk is defined as the potential of actual future measurements deviating from expected future measurements resulting from actual future experience deviating from actuarially assumed experience.

It is important to note that not all risk is negative, but all risk should be understood and accepted based on knowledge, judgment and educated decisions. Future measurements may deviate in ways that produce positive or negative financial effects on the Fund.

In the actuary’s professional judgment, the following risks may reasonably be anticipated to significantly affect the Fund’s future financial condition.

- Investment risk – the risk that assets will not earn the expected rate of return
- Interest rate risk – the risk that the general level of interest rates will increase or decrease significantly from current levels
- Asset liability mismatch - Potential that changes in asset values are not matched by changes in the value of liabilities
- Longevity and other demographic risk – the risk that mortality or other demographic experience will be different from expected

The following information is provided to comply with ASOP 51 and furnish beneficial information on potential risks to the Fund. This list is not all-inclusive; it is an attempt to identify the most significant risks and how those risks might affect the results shown in this report.

Note that ASOP 51 does not require the actuary to evaluate the ability or willingness of the sponsor of a pension plan to make contributions to the plan. In addition, this valuation report in not intended to provide investment advice or guidance on managing or reducing risk. Buck welcomes the opportunity to assist with such matters as part of a separate project or projects utilizing the appropriate staff and resources for those objectives.

Section X – ASOP 51 (continued)

Assessment of Risks

- Investment return: Lower assets mean higher unfunded liability and larger contribution amounts. For example, if returns on assets at market value were an additional 1% lower than actual, this would reduce the actuarial value of assets by approximately $3.8 million, which would increase the 2022 Authority contribution rate by 0.045% and the member contribution rate by 0.015%.
- Interest rate risk: Actuarial liabilities contained in this report are based on the assumption that interest rates will remain at current levels throughout the forecast period. These interest rates are used to discount future expected benefit payments to determine the Fund liability. As interest rates increase, the discounted value of future benefit payments will decrease; similarly, as interest rates decrease, the discounted value of future benefit payments will increase. The duration of the Fund's liability is approximately nine years, which means that every 100-basis point change in interest rates will result in roughly a 9% change in Fund liability.
- Asset liability mismatch: Unless assets are explicitly structured to mimic the characteristics of Fund liabilities, there is a risk that economic scenarios that affect interest rates will have a larger impact on liability than on assets. This is because Fund liability is the discounted value of benefit payments that extend way out into future years, i.e., have a long duration. Fund investments, on the other hand, typically have a shorter duration with respect to interest rate changes, often holding fixed income securities with lower durations than Fund liabilities, and typically maintaining some monies in equity investments that are not as directly sensitive to interest rate changes.
- Longevity and other demographic risk: The Fund is subject to longevity risk, the risk that participants will live longer (or shorter) than expected. The most recent experience study showed that actual mortality experience had tracked closely to the current mortality assumption as determined by the experience study completed in 2023.

In addition, the Fund is subject to risks associated with assumptions with respect to active and deferred vested participants (for example, salary increases, termination prior to retirement, retirement, and optional form election). The current assumptions for these decrements are based on the experience study completed in 2023. Changes in future liabilities will result to the extent actual experience differs from these assumptions. In particular, higher than expected salary increases (including base pay plus short-term incentives) would increase actuarial liabilities. Further, due to the subsidized early retirement reductions for certain groups, retirements earlier than expected could increase liabilities.

Section X – ASOP 51 (continued)

Historical Results

The following table shows selected historical values of key valuation measures. These items illustrate how actual volatility has impacted the Fund in recent years and gives additional context to the risks described above. Further information can be found in the actuarial valuation reports for each year.

	12/31/2018	12/31/2019	12/31/2020	12/31/2021	12/31/2022
Actuarial Value of Assets (AVA)	$1.56B	$1.56B	$1.64B	$1.76B	$1.80B
Asset Return on MV in Prior Year	(3.37)%	17.67%	14.22%	13.23%	(9.26)%
Investment gain/(loss) on AVA	$(59M)	$(28M)	$33M	$66M	$(31M)
Actuarial Accrued Liability	$2.91B	$3.02B	$3.06B	$3.10B	$3.17B
The ratio of retired life* actuarial accrued liability to total actuarial accrued liability	72%	71%	69%	69%	68%
The ratio of benefit payments to actuarial value of assets	14%	14%	14%	13%	13%
The ratio of actuarial value of assets to participant payroll	367%	357%	355%	384%	363%
Normal cost	$48M	$52M	$55M	$55M	$62M
Discount rate	7.50%	7.25%	7.25%	7.25%	7.25%
Non-Investment gain/(loss)	$(10M)	$4M	$8M	$1M	$(67M)
Funding Policy contribution	$144M	$156M	$161M	$159M	$172M

* Retired members, former members and beneficiaries

Commentary on Fund Maturity Measures

The ratio of retired life actuarial accrued liability to total actuarial accrued liability

A mature pension plan will often have a ratio above 60 - 65 percent. A higher percentage will generally indicate an increased need for asset / liability matching due to inability to accept volatility in future returns.

The ratio of benefit payments to actuarial value of assets

Higher benefit payments as a percentage of assets means the fund may need to invest in more liquid assets to cover the benefit payments. More liquid assets may not garner the same returns as less liquid assets and therefore increase the investment risk. However, there may already be enough liquid assets to cover the benefit payments, less investment return is needed to cover the shortfall, or only a small portion of assets will need to be converted to cash. Therefore, the investment risk is likely not amplified at this time. This maturity measure should be monitored for continual upward trend with greater magnitude.

The ratio of actuarial value of assets to participant payroll

Plans that have higher asset-to-payroll ratios experience *more* volatile employer contributions (as a percentage of payroll) due to investment return. For example, if lower than expected asset return increases the unfunded liability of two pension plans by the same percentage, the plan with the higher assets-to-payroll ratio may experience higher contribution volatility than a plan with the lower asset-to-payroll ratio.

Section XI – Alternative Scenarios

What if Active Headcount Remained at its 12/31/2016 Level?

		12/31/2022 Valuation (A)	More Active Employees (B)
1.	Normal Cost Rate	12.64%	12.64%
2.	Expenses	1.00%	1.00%
3.	Amortization	$105,361,014	$105,361,014
4.	Active Employees 12/31/2022	NA	5,555
5.	Active Employees 12/31/2016	NA	5,786
6.	New Entrant Salary	NA	$65,000
7.	Payroll (7.A+6.x(5.-4.))	$492,169,885	$507,184,885
8.	Accrued Liability Amortization Rate (3./7.)	21.41%	20.77%
9.	Total Contribution (1.+ 2.+ 8.)	35.05%	34.41%
10.	Member Contribution	9.0989%	8.9387%

- In column B, we have assumed the employees who have terminated from 12/31/2016 to 12/31/2022 were replaced by new hires
- The normal cost rate would change with addition of new employees. For the purpose of this illustration, we have assumed the change in normal cost rate is not significant
- Member contribution is calculated as (34.41%-34.87%)*25%+9.0539%=8.9387%

Section XI – Alternative Scenarios (continued)

Contribution as a % of Pay Under Alternative Funding Policies

The current funding policy contribution rates were determined by amortizing the unfunded liability over an 17-year period ending in 2040 in installments escalating at the rate of 4% per year. The table below presents calculations of what the contribution rates developed in this valuation would be if the Fund were to change its current funding policy with respect to the amortization of the unfunded liability.

Amort.	**Escalator % per year**									
(years)	0%		1%		2%		3%		4%	
	Authority	Member	Authority	Member	Authority	Member	Authority	Member	Authority	Member
10	38.87%	13.41%	37.76%	13.03%	36.67%	12.67%	35.61%	12.32%	34.58%	11.98%
11	37.07%	12.80%	35.91%	12.42%	34.79%	12.05%	33.71%	11.69%	32.67%	11.34%
12	35.57%	12.30%	34.39%	11.91%	33.24%	11.53%	32.14%	11.16%	31.07%	10.81%
13	34.31%	11.89%	33.11%	11.48%	31.94%	11.09%	30.81%	10.72%	29.73%	10.36%
14	33.25%	11.53%	32.01%	11.12%	30.83%	10.72%	29.68%	10.34%	28.58%	9.97%
15	32.34%	11.23%	31.08%	10.81%	29.87%	10.40%	28.70%	10.02%	27.59%	9.64%
16	31.55%	10.96%	30.26%	10.54%	29.03%	10.13%	27.85%	9.73%	26.72%	9.35%
17	30.86%	10.74%	29.56%	10.30%	28.30%	9.88%	27.10%	9.48%	25.95%	9.10%

- The “Years” on the left side denote the years over which the unfunded liability is amortized
- Dollar amounts shown are expressed in $millions
- Percentages of payroll shown represent total contributions developed as a % of pay
- The red circle represents current funding policy

Section XI – Alternative Scenarios (continued)

2022 Amortization under Alternative Funding Policies

The table below presents calculations of what the contribution for amortization of the unfunded liability developed in this valuation would be if the Fund were to change its current funding policy with respect to the amortization of the unfunded liability

Amort. (years)	Escalator % per year				
	0%	1%	2%	3%	4%
10	$190.19	$182.83	$175.68	$168.75	$162.03
11	$178.30	$170.74	$163.41	$156.32	$149.46
12	$168.48	$160.73	$153.23	$145.99	$139.00
13	$160.25	$152.32	$144.66	$137.28	$130.17
14	$153.27	$145.16	$137.35	$129.84	$122.61
15	$147.28	$139.02	$131.06	$123.41	$116.08
16	$142.11	$133.68	$125.58	$117.82	$110.38
17	$137.61	$129.02	$120.79	$112.90	$105.36

- The “Years” on the left side denote the years over which the unfunded liability is amortized
- Dollar amounts shown are expressed in $ millions
- Percentages of payroll shown represent total contributions developed as a % of pay
- The red circle represents current funding policy

Schedule A – Results of the Valuation as of December 31, 2022

1.	Present Value of Future Benefits	
	(a) Present value of prospective benefits to retired members, former members and beneficiaries	$ 2,143,395,353
	(b) Present value of prospective retirement allowances on account of present active members	1,540,158,552
	(c) Present value of prospective retirement allowances or return of members' contributions for members not accumulating creditable service	9,140,194
	(d) Total actuarial liabilities	$ 3,692,694,099
2.	Assets of the Fund for purposes of development of contributions	$ 1,799,924,778
3.	Present value of future contributions to the fund (1(d)-2)	$ 1,892,769,321
4.	Present value of future normal contributions to the Fund[1]	$ 525,222,978
5.	Unfunded accrued liability (3) - (4)	$ 1,367,546,343

[1] Includes future contributions of members at the rate developed in Section VII.

Schedule B – Outline of Actuarial Assumptions and Methods

In 2023, an Experience study was conducted based on the experience from January 1, 2018 to December 31, 2022. Based on the experience study, Buck proposed assumptions for mortality tables, salary increases, termination rates, and retirement rates. All proposed assumptions were approved by the Retirement Board in April 2023.

Data

The rate of pay was used for the 2022 valuation (projected 2023 pensionable earnings). Starting with the 2021 valuation, participants who have been receiving Workers' Compensation benefits for 5 or more years are assumed to never commence their Massachusetts Bay Transportation Authority Retirement Fund pension benefit, but are assumed to receive a refund of their contributions to the Fund with interest. In addition, participants who are active but did not contribute to the plan in 2022, are assumed to remain non-contributing for the remainder of their employment.

Interest rate for funding purposes

7.25% per annum, compounded annually, in addition to fiduciary and investment management expenses.

Separations from active service

Representative values of the assumed rates of withdrawal and reduced early retirement and disability are as follows:

Current Year:

	Withdrawal[1]					
Age/Service	0	1	2	3	4	5+
25	6.59%	6.31%	6.62%	4.62%	4.16%	5.73%
30	6.59%	6.31%	6.62%	4.62%	4.16%	6.25%
35	6.59%	6.31%	6.62%	4.62%	4.16%	3.17%
40	6.59%	6.31%	6.62%	4.62%	4.16%	2.73%
45	6.59%	6.31%	6.62%	4.62%	4.16%	2.19%
50	6.59%	6.31%	6.62%	4.62%	4.16%	1.68%
55	6.59%	6.31%	6.62%	4.62%	4.16%	2.33%
60	6.59%	6.31%	6.62%	4.62%	4.16%	2.72%
>64	6.59%	6.31%	6.62%	4.62%	4.16%	3.65%

Age	Disability Male[2]	Disability – Female[2]
20	0.07%	0.11%
25	0.08%	0.12%
30	0.10%	0.15%
35	0.13%	0.20%
40	0.17%	0.26%
45	0.15%	0.38%
50	0.25%	0.44%
55	0.46%	0.80%
60	0.90%	1.58%
64	1.68%	2.94%

[1] 100% of future terminated members not eligible for a retirement allowance are assumed to receive a refund of their accumulated employee contributions.

[2] 50% of disabled employees are assumed to qualify for occupational disability benefits.

Schedule B – Outline of Actuarial Assumptions and Methods (continued)

Separations from active service (continued)

Prior year:

Age	Withdrawal[1]
20-24	4.78%
25-29	7.12%
30-34	0.40%
35-39	3.48%
40-44	3.13%
45-49	2.87%
50-54	2.51%
55-59	2.82%
60-64	4.24%

Age	Disability Male[2]	Disability – Female[2]
20	0.07%	0.11%
25	0.08%	0.12%
30	0.10%	0.15%
35	0.13%	0.20%
40	0.17%	0.26%
45	0.15%	0.38%
50	0.25%	0.44%
55	0.46%	0.80%
60	0.90%	1.58%
64	1.68%	2.94%

Salary increases

Current year:

Service	Salary Increase %
0	14.00%
1	13.00%
2	12.00%
3	11.00%
4	10.00%
5-9	4.00%
10-14	3.00%
15+	2.75%

Prior year:

Service	Salary Increase %
0-4	8.00%
5-9	4.00%
10-14	3.00%
15-19	2.75%
20-24	2.75%
25-29	2.75%
30-34	2.75%
35-39	2.75%
40+	2.75%

[1] 100% of future terminated members not eligible for a retirement allowance are assumed to receive a refund of their accumulated employee contributions.

[2] 50% of disabled employees are assumed to qualify for occupational disability benefits.

Schedule B – Outline of Actuarial Assumptions and Methods (continued)

Unreduced retirement rates

Representative rates of unreduced early normal retirement allowances are as follows:

Current Year:

	Unreduced Retirement		
Age	In the year attaining eligibility	In years after first eligibility	Reduced Retirement
42	39.0%	5.8%	N/A
43	42.0%	5.8%	N/A
44	27.1%	32.3%	N/A
45	30.0%	24.3%	N/A
46	28.7%	17.3%	N/A
47	36.5%	18.1%	N/A
48	24.9%	14.1%	N/A
49	30.2%	15.9%	N/A
50	33.3%	14.7%	N/A
51	37.0%	21.2%	N/A
52	31.7%	15.6%	N/A
53	35.0%	17.0%	N/A
54	28.3%	15.4%	N/A
55	28.6%	15.3%	3.4%
56	30.5%	14.6%	3.7%
57	33.3%	14.8%	4.6%
58	26.7%	23.2%	4.3%
59	31.2%	23.2%	3.8%
60	25.6%	22.3%	5.3%
61	35.5%	20.6%	5.2%
62	40.0%	26.0%	9.7%
63	59.3%	27.8%	11.7%
64	52.9%	18.8%	15.8%
65	30.9%	30.4%	N/A
66	30.9%	27.8%	N/A
67	30.9%	23.9%	N/A
68	30.9%	20.6%	N/A
69	30.9%	26.6%	N/A
70+	100.0%	100.0%	N/A

Schedule B – Outline of Actuarial Assumptions and Methods (continued)

Unreduced retirement rates (continued)

Prior year:

	Unreduced Retirement		
Age	In the year attaining eligibility	In years after first eligibility	Reduced Retirement
45	30.0%	20.0%	N/A
46	30.0%	15.0%	N/A
47	25.0%	15.0%	N/A
48	25.0%	10.0%	N/A
49	25.0%	10.0%	N/A
50	25.0%	15.0%	N/A
51	25.0%	15.0%	N/A
52	25.0%	15.0%	N/A
53	25.0%	20.0%	N/A
54	25.0%	20.0%	N/A
55	30.0%	15.0%	3.9%
56	30.0%	15.0%	3.7%
57	30.0%	18.0%	4.0%
58	30.0%	18.0%	4.3%
59	20.0%	25.0%	4.7%
60	20.0%	25.0%	5.8%
61	35.0%	25.0%	6.3%
62	45.0%	30.0%	8.3%
63	45.0%	25.0%	9.2%
64	45.0%	25.0%	11.4%
65	30.0%	40.0%	N/A
66	30.0%	25.0%	N/A
67	30.0%	28.0%	N/A
68	30.0%	28.0%	N/A
69	30.0%	28.0%	N/A
70+	100.0%	100.0%	N/A

Schedule B – Outline of Actuarial Assumptions and Methods (continued)

Inflation:

2.75% per year.

Deaths before and after retirement

Current year:

The PRI-2012 Amount Weighted Blue Collar Mortality Tables with fully generational projection using Scale MP-2021 are used for all active participants. 101.1% of the PRI-2012 Amount Weighted Blue Collar Post Commencement Tables with fully generational projection using Scale MP-2021 are used for all retirees and beneficiaries preceding their related member's death. 98.3% of the PRI-2012 Amount Weighted Blue Collar Contingent Survivor Tables with fully generational projection using Scale MP-2021 are used for all beneficiaries following the death of their related member. The PRI-2012 Amount Weighted Total Dataset Disability Tables with fully generational projection using Scale MP-2021 are used for the period after disability retirement. Among pre-retirement deaths, 7.50% are assumed to qualify for accidental death benefits.

Prior year:

The RP-2014 Blue Collar Mortality Tables with fully generational projection using Scale MP-2018 are used for all active participants and deferred vested participants. 94.5% of the RP-2014 Blue Collar Mortality Tables with fully generational projection using Scale MP-2018 are used for all retirees. 107.5% of the RP-2014 Blue Collar Mortality Tables with fully generational projection using Scale MP-2018 are used for all beneficiary participants. The RP-2014 Disabled Mortality Table with fully generational projection using Scale MP-2018 are used for the period after disability retirement. Among pre-retirement deaths, 7.50% are assumed to qualify for accidental death benefits.

Normal retirement

Age 65.

Percent married

90% of male members and 50% of female members under age 55 or who have less than 23 years of service are assumed to be married. 100% of employees age 55 and older or who have 23 or more years of service are assumed to be married. In each case, the female is assumed to be three years younger than the male.

Schedule B – Outline of Actuarial Assumptions and Methods (continued)

Pension options

50% of male members elect a 75% joint and survivor benefit and 10% of female members elect a 50% joint and survivor benefit. All others elect a life annuity.

Fiduciary and investment management expenses

Paid from investment earnings of the Fund.

Loading or contingency reserves

None.

Valuation method

Prior to December 31, 2009, projected benefit method with entry age normal cost and open-end accrued liability. On and after December 31, 2009, individual entry age normal method.

Asset valuation method

A five-year phase-in smoothing method is used, under which the value of assets for actuarial purposes equals market value less a five-year phase-in of the differences between actual and assumed investment return. The value of assets for actuarial purposes may not differ from the market value of assets by more than 20%.

Effective December 31, 2013, the actuarial asset method was changed from a five-year moving average of market values to a five-year phase-in smoothing method, with the smoothing restarted as of December 31, 2013.

Prior to December 31, 2013, a five-year moving average of market values method was used to compute the actuarial value of assets.

Administrative expenses

Administrative expenses are estimated to be 1.0% of covered payroll per year.

Summary of Changes from December 31, 2021 Valuation

- Assumption changes to the salary scale, mortality rates, termination rates, and retirement rates were made according to the experience study completed in 2023. This decreased the actuarial accrued liability by $45.50 million.

Schedule C – Summary of Main Provisions of the Fund as Interpreted for Valuation Purposes

The Massachusetts Bay Transportation Authority Retirement Fund became effective as of January 1, 1948. The following summary describes the current main membership, benefit, and contribution provisions of the Fund as interpreted for the valuation.

1 - Definitions

"Compensation" means the full regular remuneration paid to an employee, excluding any overtime pay. "Service" creditable under the Fund means all service rendered by a member prior to his normal retirement date since he last became a member for which contributions are made by the member and by the Authority. "Union" means Boston Carmen's Union, Local Division 589 of the Amalgamated Transit Union, AFL-CIO.

2 - Membership

Each employee, including employees on a part-time basis, who is or who may become a member of the Union or any union recognized by the Authority for collective bargaining purposes is included in the membership of the Fund. Any employee who is not a member of the Union but who is in a group which was authorized to participate in the Fund is included in the membership.

3 - Benefits

Normal Retirement Allowance

Condition for Allowance

Any member may retire at age 65. A member may remain in service after the stated retirement date.

Amount of Allowance

The normal retirement allowance equals 2.46% of 3-year average annual compensation multiplied by the years of service, such allowance not to exceed 75% of such average annual compensation.

Early Normal Retirement Allowance

Condition for Allowance

Any member hired prior December 6, 2012 and has completed at least 23 years of service may retire on an early normal retirement allowance.

Any member hired on or after December 6, 2012, has attained age 55 and completed at least 25 years of service may retire on an early normal retirement allowance.

Amount of Allowance

The early normal retirement allowance is computed in the same manner as a normal retirement allowance on the basis of the compensation and service to the time of retirement.

Early Reduced Retirement Allowance

Condition for Allowance

A member who has attained age 55 and has completed at least 20 years of service may be retired on an early reduced retirement allowance.

Amount of Allowance

The early reduced retirement allowance is an immediate allowance, commencing at the date of retirement, and is computed in the same manner as a normal retirement allowance on the basis of compensation and service to the time of early retirement, but reduced by ½ of 1% for each month of retirement prior to normal retirement date.

Schedule C – Summary of Main Provisions of the Fund as Interpreted for Valuation Purposes (continued)

Disability Retirement Allowance

Condition for Allowance

Any member who has completed 4 years of service in case of disablement due to an occupational accident or sickness, or who has completed 6 years of service in case of disablement due to any other cause, and who has become totally and permanently incapacitated, mentally or physically, for the further performance of duty may be retired.

Amount of Allowance

Upon disability retirement, a member receives an allowance commencing immediately, which is computed as a normal retirement allowance on the basis of the compensation and service to the time of disability retirement and is not less than 15% of the member's 3-year average annual compensation.

Vested Retirement Allowance

Condition for Allowance

Any member who has completed 10 years of service and who is not eligible for a retirement allowance is eligible for a vested retirement allowance, in lieu of a refund of his contributions with interest, in the event his employment terminates for reasons other than voluntary quit or discharge for cause.

Amount of Allowance

The vested retirement allowance is a deferred allowance commencing on the member's normal retirement date and equal to a percentage, not exceeding 100 percent, of the amount computed as a normal retirement allowance on the basis of the compensation and service to the time of termination; the applicable percentage is 5 percent multiplied by the number of years of creditable service, not in excess of 20, at the time of termination.

Survivor Benefit

Condition for Benefit

Upon the death of a member who has completed 10 years of service and who is survived by a spouse and/or dependent children designated to receive the deceased member's contributions with interest, a benefit may be elected by such survivor in lieu of the payment of the contributions with interest.

Amount of Benefit

If the deceased member had completed at least 10 but fewer than 23 years of service, the survivor's benefit, payable for life, is equal to the amount which would have become payable if the member had retired as of the date of his death and elected a 50% joint and survivor option in effect as of the date of death with the survivor as the designated person under the option. There is no reduction for early commencement.

If the deceased member had completed at least 23 years of service, the survivor's benefit, payable for life, is equal to the amount which would have become payable if the member had retired as of the date of his death and elected a 100% joint and survivor option in effect as of the date of death with the survivor as the designated person under the option. There is no reduction for early commencement.

Accidental Death Benefit

Condition for Benefit

Upon the death of a member in service whose death results solely from an injury or injuries sustained in the performance of duty, and who is survived by a spouse designated to receive the deceased member's contribution with interest, an allowance shall be payable to said spouse.

Schedule C – Summary of Main Provisions of the Fund as Interpreted for Valuation Purposes (continued)

Amount of Benefit

The accidental death benefit, payable for life, is equal to the amount which would have become payable to the member if the member had retired as of the date of his death on a disability retirement allowance. If there should be insufficient creditable service, the surviving spouse receives the minimum allowance available under the disability retirement provision.

Return of Contributions

On Account of Termination of Service

In the event of a member's termination of employment for any reason other than death or retirement, he is paid the amount of his contributions, with interest.

On Account of Death Prior to Retirement

Upon the death of a member or retired member before his retirement allowance has become effective, the amount of his contributions, with interest, is paid to his beneficiary or estate, unless a survivor benefit is payable.

On Account of Death after Retirement

Upon the death of a retired member, or the survivor of a retired member and his designated beneficiary under an optional benefit, any excess of his contributions at retirement, with interest, over the sum of all retirement allowance payments made is paid to the member's beneficiary or to the survivor's estate.

Our valuation does not include return of contributions on account of death after retirement for current retirees due to negligible impact on the Fund's liabilities.

Optional Benefits in Lieu of Regular Benefits

At retirement, or on his normal retirement date if prior thereto, any member may elect to convert his allowance into an optional benefit of equivalent actuarial value permitted by the Rules and Regulations.

Reinstatement of Creditable Service

If a member's service is interrupted by reason of resignation or dismissal, he has the opportunity upon the completion of 3 years of service after he has been rehired to repay to the Fund all amounts he has withdrawn together with an amount equal to their reasonable earnings. Upon such repayment, the member is to be credited with service for the periods before and after the interruption as though they had been a single period of service.

4 - Contributions

Contributions required to provide benefits and meet administrative expenses are made jointly by the Authority and members. The member contribution rate was increased from 5.1489% to 5.4989% effective August 11, 2012, to 5.5589% effective July 1, 2013, to 5.7989% effective July 1, 2014, to 5.7914% effective July 1, 2015, to 6.4614% effective July 1, 2016, to 7.1189% effective July 1, 2017, to 8.0089% effective July 1, 2018, to 8.8239% effective July 1, 2019, to 9.3339% effective July 1, 2020, to 9.1239% effective July 1, 2021, to 9.0539% effective July 1, 2022, and to 9.0989% effective July 1, 2023. Member contributions are "picked up" by the Authority pursuant to Section 414(h)(2) of the Internal Revenue Code.

Summary of Changes from December 31, 2021 Valuation

None.

Schedule D – Tables of Employee Data

Table 1 – The Number and Annual Compensation of Active Members Distributed by Fifth Age and Service as of December 31, 2022[1]

Attained Age	Completed Years of Service: 0 to 4		5 to 9		10 to 14		15 to 19		20 to 24		25 to 29		30 to 34		35 to 39		40 & up		Total	
	No.	Salary	No.	Salary	No.	Salary	No.	Salary	No.	Salary	No.	Salary	No.	Salary	No.	Salary	No.	Salary	No.	Salary
Under 25	39	$ 2,290,696	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0	0	$ 0	39	$ 2,290,696
25 to 29	141	10,228,633	8	762,133	0	0	0	0	0	0	0	0	0	0	0	0	0	0	149	10,990,766
30 to 34	280	21,124,060	120	11,185,279	46	4,239,564	0	0	0	0	0	0	0	0	0	0	0	0	446	36,548,903
35 to 39	285	22,006,516	212	19,399,420	150	14,157,104	72	7,089,044	2	184,018	0	0	0	0	0	0	0	0	721	62,836,101
40 to 44	260	18,727,022	207	19,081,558	133	12,862,720	152	14,923,043	47	4,807,254	1	84,011	0	0	0	0	0	0	800	70,485,609
45 to 49	258	18,653,519	186	16,586,315	140	13,385,915	136	13,019,026	95	9,029,426	16	1,518,982	1	95,139	0	0	0	0	832	72,288,322
50 to 54	180	13,987,775	190	17,808,178	157	15,209,921	164	15,881,902	126	11,838,291	17	1,615,286	10	931,112	0	0	0	0	844	77,272,466
55 to 59	133	10,516,143	155	14,871,563	174	16,990,804	199	19,535,044	153	14,249,718	42	3,972,804	22	1,938,456	11	1,092,520	0	0	889	83,167,052
60 to 64	50	4,354,114	103	9,797,228	141	14,275,810	147	14,348,680	129	12,509,831	18	1,613,186	14	1,315,080	13	1,201,242	0	0	615	59,415,171
65 to 69	12	1,485,182	44	4,396,575	33	3,156,849	44	4,099,447	22	1,921,566	9	864,677	9	880,360	6	584,750	0	0	179	17,389,407
70 & up	4	242,607	8	845,187	9	904,322	5	425,110	9	801,986	4	369,491	0	0	0	0	2	194,334	41	3,783,037
Total	1,642	$123,616,268	1,233	$114,733,436	983	$ 95,183,009	919	$ 89,321,297	583	$ 55,342,090	107	$ 10,038,437	56	$ 5,160,147	30	$ 2,878,512	2	$ 194,334	5,555	$496,467,531

[1] Minor differences between the sums of values shown and the totals shown may arise due to rounding.

Schedule D – Tables of Employee Data (continued)

Table 2 – The Number and Annual Retirement Allowances Distributed by Age as of December 31, 2022[1]

	Service Retirements		Disabled Members		Beneficiaries	
Age	Number	Amount	Number	Amount	Number	Amount
<50	38	$ 2,137,819	29	$ 569,850	27	$ 379,221
50	18	902,185	5	111,748	5	53,158
51	29	1,533,366	9	222,517	9	196,932
52	31	1,708,917	6	111,570	7	104,162
53	34	1,740,831	6	76,583	5	115,233
54	56	3,001,071	11	265,712	4	63,191
55	61	3,093,684	16	279,967	8	126,462
56	66	3,351,585	13	263,274	12	197,507
57	92	4,774,412	12	249,075	11	187,296
58	102	5,204,544	20	490,311	10	106,150
59	120	6,275,993	17	370,647	16	251,272
60	105	5,224,224	25	626,085	19	303,860
61	100	5,053,125	24	533,157	16	267,199
62	124	6,038,007	32	733,977	13	245,831
63	138	6,832,777	39	759,507	17	250,413
64	167	7,838,977	35	816,720	23	308,692
65	154	7,080,995	27	639,373	19	528,433
66	188	8,148,028	19	414,700	31	543,660
67	193	8,324,132	32	684,391	37	606,756
68	186	7,817,172	39	751,271	24	531,148
69	193	8,030,855	24	452,281	25	409,651
70	212	8,766,482	22	381,896	29	648,352
71	187	7,239,982	12	272,202	31	525,808
72	187	7,000,798	28	510,700	24	602,192
73	195	7,470,738	25	458,685	28	645,623
74	209	7,666,732	18	351,591	42	882,514
75	201	6,972,289	20	456,719	38	869,953
76	178	6,264,967	14	247,083	49	942,508
77	160	5,459,656	14	312,407	44	942,209
78	176	5,971,771	16	273,351	46	1,019,624
79	154	5,029,210	22	288,317	53	1,006,102
80	141	4,655,633	13	248,082	52	899,868
81	113	3,539,254	10	182,670	45	787,222
82	100	2,950,275	8	144,001	44	794,358
83	81	2,608,560	4	53,602	33	622,592
84	74	2,263,062	7	120,222	36	609,092
85	70	1,990,379	3	51,104	33	639,810
>85	250	6,552,346	6	82,633	229	3,480,390
Total	4,883	$196,514,835	682	$ 13,857,982	1,194	$ 21,694,444
No Option	3,074	125,043,921	560	11,679,119	1,194	21,694,444
Survivor Option	34	1,576,576	1	18,676	0	0
Pop-Up Option	1,775	69,894,337	121	2,160,187	0	0
Total	4,883	$196,514,835	682	$ 13,857,982	1,194	$ 21,694,444

[1] Minor differences between the sums of values shown and the totals shown may arise due to rounding. Disabled members' counts and allowances exclude 24 individuals receiving worker's compensation for over 5 years.

Schedule D – Tables of Employee Data (continued)

Table 3 – Reconciliation of Participant Data

	Actives	Retirees	Beneficiaries	Disabled [16]	Actives, not accruing service	Total
Participants as of December 31, 2021	5,486	4,859	1,176	703	215	12,439
Changes due to:						
Termination						
Due Contributions	(101)				101	0
Received Contributions	(64)				(37)	(101)
Retirements	(204)	205			(1)	0
Disability	(26)			27	(1)	0
Deaths						
With Survivor	(1)	(77)		(5)		(83)
Without Survivor	(1)	(105)	(74)	(21)		(201)
New Entrants	457		93		48	598
Rehires	30				(17)	13
Benefits Expired			(1)			(1)
Stopped contributing	(21)				21	0
Escheatment					(21)	(21)
Data Corrections		1		2	(1)	2
Total Changes	69	24	18	3	92	206
Participants as of December 31, 2022	5,555	4,883	1,194	706	307	12,645

[16] Includes 25 individuals on December 31, 2021 and 24 individuals on December 31, 2022 receiving worker's compensation for over 5 years.

Solvency Test

As of December 31, 2022

The MBTA Retirement Fund's funding objective is to meet long-term benefit promises through contributions that remain approximately level from year-to-year as a percent of member payroll. If the contributions to the Fund are level in concept and soundly executed, the Fund will pay all promised benefits when due - - the ultimate test of financial soundness.

A solvency test is one means of checking a fund's progress under its funding program. In a solvency test, the fund's present assets (cash and investments) are compared with:

1. Active member contributions on deposit;
2. The liabilities for future benefits to present retired lives;
3. The liabilities for service already rendered by active and inactive members.

In a Fund that has been following the discipline of level percent-of-payroll financing, the liabilities for active member contributions on deposit (liability 1) and the liabilities for future benefits to present retired lives (liability 2) will be fully covered by present assets (except in rare circumstances). In addition, the liabilities for service already rendered by active members (liability 3) will be partially covered by the remainder of present assets. The larger the funded portion of liability 3, the stronger the condition of the Fund. Buck prepared the following Solvency Schedule:

Valuation Date	(1) Active Member Contributions	(2) Retirees and Beneficiaries	(3) Active/Inactive Members (Employer Financed)	Actuarial Value of Assets	Portion of AAL Covered by Assets (1)	(2)	(3)
12/31/2022	$ 347,358,589	$ 2,143,395,353	$ 610,950,073	$ 1,799,924,778	100%	68%	0%
12/31/2021	325,347,277	2,129,569,570	646,787,168	1,760,643,571	100%	67%	0%
12/31/2020	298,648,242	2,109,955,052	646,520,086	1,636,054,386	100%	63%	0%
12/31/2019	266,634,347	2,129,210,443	625,265,569	1,561,192,531	100%	61%	0%
12/31/2018	240,849,945	2,092,861,364	583,089,414	1,559,452,659	100%	63%	0%
12/31/2017	221,627,390	2,057,542,739	550,215,648	1,599,505,237	100%	67%	0%
12/31/2016	219,497,282	1,918,980,542	556,078,499	1,607,560,108	100%	72%	0%
12/31/2015	219,752,752	1,774,425,407	577,905,849	1,630,411,191	100%	79%	0%
12/31/2014	211,433,306	1,682,557,007	553,740,744	1,632,174,762	100%	84%	0%
12/31/2013	196,543,768	1,644,867,542	522,721,825	1,606,684,354	100%	86%	0%

Schedule of Retirees and Beneficiaries Added to and Removed from Rolls

As of December 31, 2022

Schedule prepared by Buck

Valuation Date	Added to Rolls		Removed from Rolls		Rolls - End of Year		% Increase in Annual Allowances	Average Annual Allowances
	No.	Annual Allowances	No.	Annual Allowances	No.	Annual Allowances		
12/31/2022	233	$ 11,543,586	187	$ 5,100,217	6,759	$ 232,067,261	2.16%	$ 34,335
12/31/2021	205	8,555,618	202	5,039,468	6,713	225,623,892	1.54%	33,610
12/31/2020	144	5,343,426	247	5,787,592	6,710	222,107,742	1.33%	33,101
12/31/2019	148	6,101,838	176	4,806,046	6,813	222,551,908	1.00%	32,666
12/31/2018	209	8,408,514	191	4,618,807	6,841	221,256,116	1.47%	32,343
12/31/2017	310	14,541,060	171	4,108,386	6,823	217,466,409	2.90%	31,873
12/31/2016	370	18,053,040	158	3,735,177	6,684	207,033,735	4.02%	30,975
12/31/2015	270	11,550,600	205	4,661,828	6,472	192,715,872	2.67%	29,777
12/31/2014	123	5,191,092	87	360,332	6,407	185,827,100	2.09%	29,004
12/31/2013	174	6,687,864	159	3,595,765	6,371	180,996,340	1.50%	28,409

Schedule of Active Member Valuation Data

Valuation Date	Number	Annual Payroll	Average Annual Pay	% Increase In Average Pay
2022	5,555	$ 496,467,531	$ 89,373	6.9%
2021	5,486	458,857,189	83,641	3.0%
2020	5,674	460,921,559	81,234	2.4%
2019	5,507	436,828,077	79,322	0.4%
2018	5,392	425,862,201	78,980	-0.8%
2017	5,386	428,830,122	79,619	3.1%
2016	5,786	446,740,427	77,211	2.5%
2015	5,885	443,237,899	75,317	4.5%
2014	5,798	417,957,007	72,086	8.2%
2013	5,726	381,380,271	66,605	1.2%

STATISTICAL SECTION

(Unaudited)

Objectives

The objectives of the Statistical Section are to provide additional historical perspective, context and detail to assist readers in using the information in the Financial Statements, Notes to the Financial Statements and Required Supplementary Information in order to understand and assess the Plan's economic condition.

Financial Trends

The Schedule of Changes in Net Position presented on page 148 contains historical information related to the Fund's revenues, expenses, changes in net position and net position available for benefits. The Schedule of Additions by Source on page 148 provides employer and employee contribution rates and historical investment income information. The schedules of deductions and benefits by type on page 149 provide a history of annual benefit, withdrawal and operating expense trends.

Demographic and Economic Information

The schedule of Distribution of Plan Members shown on page 150 provides relevant details about the composition of the Fund's active membership including concentration of members within various age groups.

Operating Information

The Schedule of Average Benefit Payments on page 151 presents average monthly benefits and average final salary information by years of credited service for new benefit recipients within specified plan years. The Schedule of Benefit Recipients by Type and Option on page 152 illustrates the number of participants and total benefit payments by type and option.

Statistical data is provided from both the Fund's internal resources and from the Fund's Actuary, Buck Global, LLC.

Financial Trends (2013 – 2022 for all reports)

Schedule of Changes in Net Position

Year Ended Dec 31	Net Position Beginning of Year	Additions	Deductions	Increase (Decrease) in net Position	Net Position End of Year
2022	$ 1,939,942,425	$ (81,770,442)	$ 235,623,005	(317,393,447)	1,622,548,978
2021	1,769,941,276	399,135,305	229,134,156	170,001,149	1,939,942,425
2020	1,614,144,213	385,730,778	229,933,715	155,797,063	1,769,941,276
2019	1,449,695,100	393,360,861	228,911,748	164,449,113	1,614,144,213
2018	1,603,176,196	72,546,582	226,027,678	(153,481,096)	1,449,695,100
2017	1,485,605,884	334,848,844	217,278,532	117,570,312	1,603,176,196
2016	1,497,848,035	191,813,165	204,055,316	(12,242,151)	1,485,605,884
2015	1,587,966,489	104,595,864	194,714,318	(90,118,454)	1,497,848,035
2014	1,606,684,354	169,464,986	188,182,851	(18,717,865)	1,587,966,489
2013	1,478,348,978	310,688,826	182,353,450	128,335,376	1,606,684,354

Schedule of Additions by Source

Year Ended Dec 31	Employee Contributions	Employer Contributions	Employer Contributions as % of Covered Payroll	Investment Income (a)	Total
2022	$ 45,511,253	$ 129,973,295	26.18%	$ (257,254,989)	$ (81,770,441)
2021	43,224,002	123,493,762	26.91%	232,417,541	399,135,304
2020	40,774,027	116,285,928	25.45	228,670,823	385,730,778
2019	36,366,108	103,263,763	23.82	253,730,990	393,360,861
2018	32,606,337	92,013,124	21.61	(52,072,879)	72,546,582
2017	29,775,344	83,382,882	19.44	221,690,618	334,848,844
2016	27,791,543	77,239,279	17.38	86,782,343	191,813,165
2015	26,510,946	73,373,672	16.66	4,711,246	104,595,864
2014	25,318,224	70,603,285	17.00	73,543,477	169,464,986
2013	21,027,548	58,039,160	15.31	231,622,118	310,688,826

Contributions were made in accordance with actuarially determined contribution requirements
(a) Net of investment expenses

Schedule of Deductions by Type

Year Ended Dec 31	Benefits	Operating Expenses	Withdrawals	Total
2022	$ 226,290,777	$ 4,484,766	$ 4,847,462	$ 235,623,005
2021	221,589,832	4,366,485	3,177,839	229,134,156
2020	221,447,685	4,511,375	3,974,655	229,933,715
2019	220,553,916	5,046,775	3,311,057	228,911,748
2018	218,385,648	4,317,624	3,324,406	226,027,678
2017	208,999,450	4,463,775	3,815,307	217,278,532
2016	195,707,470	6,493,777	1,854,069	204,055,316
2015	187,148,675	5,808,086	1,757,557	194,714,318
2014	182,499,776	4,052,664	1,630,411	188,182,851
2013	177,311,634	3,948,978	1,092,838	182,353,450

Schedule of Benefit Deduction by Type

Year Ended Dec 31	Service	Disability	Beneficiary	Total
2022	$ 191,860,901	$ 14,600,088	$ 19,829,789	$ 226,290,777
2021	188,377,526	14,081,012	19,131,295	221,589,832
2020	188,613,828	13,697,233	19,136,624	221,447,685
2019	189,884,938	13,715,736	16,953,242	220,553,916
2018	188,529,051	13,331,294	16,525,303	218,385,648
2017	179,572,258	12,873,203	16,553,989	208,999,450
2016	165,645,608	13,811,300	16,250,562	195,707,470
2015	158,790,759	12,294,604	16,063,312	187,148,675
2014	153,390,245	10,892,495	18,217,036	182,499,776
2013	149,450,754	10,689,534	17,171,346	177,311,634

Demographic and Economic Information (As of 12/31/22)

Distribution of Fund Members as of December 31, 2022 - Active Members

	Years of Service										Total	Average
Age	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40+	Total	Compensation	Compensation
under 25	39	-	-	-	-	-	-	-	-	39	2,290,696	58,736
25-29	141	8	-	-	-	-	-	-	-	149	10,990,766	73,764
30-34	280	120	46	-	-	-	-	-	-	446	36,548,903	81,948
35-39	285	212	150	72	2	-	-	-	-	721	62,836,102	87,151
40-44	260	207	133	152	47	1	-	-	-	800	70,485,608	88,107
45-49	258	186	140	136	95	16	1	-	-	832	72,288,321	86,885
50-54	180	190	157	164	126	17	10	-	-	844	77,272,465	91,555
55-59	133	155	174	199	153	42	22	11	-	889	83,167,053	93,551
60-64	50	103	141	147	129	18	14	13	-	615	59,415,171	96,610
65-69	12	44	33	44	22	9	9	6	-	179	17,389,406	97,148
70+	4	8	9	5	9	4	-	-	2	41	3,783,037	92,269
Total	**1,642**	**1,233**	**983**	**919**	**583**	**107**	**56**	**30**	**2**	**5,555**	**496,467,531**	89,373

Operating Information

Schedule of Average Benefit Payments - New Benefit Recipients (2013 – 2022)

Years of Service	0-4	5-9	10-14	15-19	20-24	25-29	30+	Total
2013								
Average Monthly Benefit	$ 844	$ 976	$ 1,460	$ 2,195	$ 3,298	$ 3,969	$ 4,868	**$ 3,203**
Average Final Average Salary	104,387	56,659	69,224	72,730	77,261	77,890	83,824	**76,361**
Number of Retired Members	2	4	19	12	78	52	7	**174**
2014								
Average Monthly Benefit	$ -	$ 944	$ 1,565	$ 2,371	$ 3,455	$ 4,103	$ 4,429	**$ 3,517**
Average Final Average Salary	-	60,088	69,079	71,012	80,485	81,816	80,201	**79,223**
Number of Retired Members	-	1	10	7	55	37	13	**123**
2015								
Average Monthly Benefit	$ 813	$ 951	$ 1,760	$ 2,346	$ 3,720	$ 4,582	$ 4,988	**$ 3,565**
Average Final Average Salary	143,040	77,667	74,294	76,590	86,810	87,865	88,188	**85,090**
Number of Retired Members	2	18	27	24	98	70	31	**270**
2016								
Average Monthly Benefit	$ 2,754	$ 1,294	$ 1,871	$ 2,708	$ 4,012	$ 4,430	$ 5,222	**$ 4,066**
Average Final Average Salary	91,458	82,418	81,622	80,316	85,125	78,969	81,558	**81,761**
Number of Retired Members	2	15	24	19	111	128	71	**370**
2017								
Average Monthly Benefit	$ -	$ 1,145	$ 1,703	$ 2,572	$ 3,805	$ 4,776	$ 5,145	**$ 3,972**
Average Final Average Salary	-	87,848	76,222	78,592	83,192	84,360	83,286	**82,327**
Number of Retired Members	-	7	41	38	52	107	65	**310**
2018								
Average Monthly Benefit	$ 535	$ 1,183	$ 1,718	$ 2,392	$ 3,766	$ 4,767	$ 4,939	**$ 3,445**
Average Final Average Salary	47,133	67,758	67,861	61,879	81,109	87,896	84,979	**77,016**
Number of Retired Members	2	6	37	32	55	48	24	**204**
2019								
Average Monthly Benefit	$ -	$ 1,488	$ 1,821	$ 2,495	$ 3,728	$ 4,904	$ 5,299	**$ 3,345**
Average Final Average Salary	-	68,561	71,079	73,257	80,413	91,264	93,985	**79,622**
Number of Retired Members	-	13	25	25	50	20	17	**150**
2020								
Average Monthly Benefit	$ 655	$ 1,096	$ 1,820	$ 2,832	$ 3,849	$ 4,967	$ 5,073	**$ 3,428**
Average Final Average Salary	74,475	60,381	63,869	72,394	79,997	89,472	77,950	**76,585**
Number of Retired Members	2	9	17	26	53	22	8	**137**
2021								
Average Monthly Benefit	$ 1,027	$ 1,660	$ 1,875	$ 2,872	$ 4,099	$ 4,952	$ 5,654	**$ 3,592**
Average Final Average Salary	98,776	81,957	63,701	75,170	87,159	82,954	99,055	**82,055**
Number of Retired Members	1	15	23	39	82	21	14	**195**
2022								
Average Monthly Benefit	$ 1,189	$ 1,400	$ 2,348	$ 3,108	$ 4,392	$ 5,706	$ 5,561	**$ 4,099**
Average Final Average Salary	101,055	71,338	85,686	84,607	93,017	93,340	93,132	**90,143**
Number of Retired Members	4	10	35	31	92	49	17	**238**

Schedule of Benefit Recipients by Type and Option

December 31, 2022

	Total	Type of Retirement*									Option Selected**					Grand Total
		I	II	III	IV	V	VI	VII	VIII	IX	A	B	C	D	E	
$0-$500	203	24	3	0	65	6	1	77	0	27	147	22	7	0	27	203
$500-$1,000	418	48	1	1	114	4	22	183	0	45	317	49	6	1	45	418
$1,000-$1,500	572	81	16	17	150	4	18	251	3	32	445	68	27	0	32	572
$1,500-$2,000	735	143	142	37	159	3	4	189	28	30	497	167	39	2	30	735
$2,000-$2,500	944	163	464	47	115	2	1	132	11	9	615	257	61	2	9	944
$2,500-$3,000	960	134	666	18	58	2	1	76	4	1	569	303	80	7	1	960
$3,000-$3,500	872	85	700	18	26	0	4	38	0	1	517	290	58	6	1	872
$3,500-$4,000	709	64	601	11	16	0	1	16	0	0	375	246	80	8	0	709
Over $4,000	1372	148	1204	4	1	0	3	12	0	0	798	423	138	13	0	1372
Total	**6785**	**890**	**3797**	**153**	**704**	**21**	**55**	**974**	**46**	**145**	**4280**	**1825**	**496**	**39**	**145**	**6785**

***Type of Retirement**
I Normal
II Early Normal
III Early Reduced
IV Disability
V Special Disability
VI Special Survivor
VII Optionee
VIII Special early Reduced
IX QDRO

**** Option Selected**
A Lifetime Annuity
B Joint Annuinty Pop-up
C Joint Annuity
D Term Certain
E QDRO

FREQUENTLY ASKED QUESTIONS

(Unaudited)

Questions & Answers

Q *Who is eligible to become a member of the Retirement Fund?*

A Any person regularly employed by the MBTA is eligible to become a member of the Retirement Fund.

Q *How does an employee contribute to the Retirement Fund?*

A Retirement contributions are deducted from the regular earnings (excluding overtime).

Q *Are the matching contributions made by the Authority applied to the member's balance in the Fund?*

A NO. The Authority's contributions are not applied to the member's balance in the Fund. These contributions become an irrevocable asset of the Fund used for the benefit of its members.

Q *What is the rate of interest earned by the member on his/her contributions? Does the member continue to earn interest after his/her employment with the Authority is terminated by reason of retirement, resignation or discharge?*

A Interest earned on contributions made on or after July 1, 1967, are compounded annually at a rate of three percent (3%). Note: This rate is set by the Pension Agreement and does not reflect the earnings of the Fund. NO. A member stops earning interest on his/her contributions as of the last day of the month prior to his/her separation from the Authority's service.

Q *How do part-time employees accrue creditable service?*

A For the purpose of determining the amount of retirement benefit, creditable service shall accrue at the rate of one month of creditable service, or fraction thereof, for each 173 pay hours received.

Questions & Answers *(Continued)*

Q *Under what circumstances is the spouse of a member required to sign a spousal consent form?*

A When a member is about to retire, a spousal consent is required when the member elects to receive his/her benefit in the following manner:

- No optional benefit for spouse
- $33^{1/3}$% with no pop-up
- 25% with no pop-up
- 50% with no pop-up
- $33^{1/3}$% with pop-up
- 25% with pop-up
- 5, 10 or 15-year term certain benefits

Q *Are retirement contributions deducted from Workers' Compensation payments? Does the time out on Workers' Compensation count as creditable membership service?*

A No. There are no retirement contributions deducted from Workers' Compensation payments. As a result, it may exclude that year as a high year in calculating the high 3-year average. Yes. When a member is out of work and receiving Workers' Compensation payments, it does count as creditable membership service.

Q *Workers' Compensation Offset: Does my receipt of Workers' Compensation payments affect my disability retirement benefit?*

A Possibly: If the payments that you receive under Workers' Compensation are based on the same injury that qualified you for disability retirement, your pension benefit will be offset against your Workers' Compensation for that same injury.

This means that your pension benefit will be directly reduced by the amount of the Workers' Compensation benefit that you receive.

Workers' Compensation payments that are based on an injury different from the injury that qualified you for a disability pension will not affect your disability retirement benefit.

Q *Is the employment date with the Authority the same as the membership date in the Fund?*

A NO. Membership in the Fund begins when contributions are made to the Fund and is usually a short time after the employment date, typically 90 days after being employed.

Questions & Answers *(Continued)*

Q *When can a member retire?*

A A member can retire at age 65 or older on a Normal Retirement.

For a member hired before December 6th, 2012, an Early Normal Retirement is available with 23 years of creditable service.

A member hired on or after December 6th, 2012, an Early Normal Retirement is available if the member is age 55 or older and has at least 25 years of creditable service.

An Early Reduced Retirement is available if the member is age 55 or older and has at least 20 years of creditable service; however, the retirement allowance will be reduced by 1/2 of 1% for each month between the age at retirement and age 65.

The plan provides for a Disability Retirement after 4 years of creditable service for an occupational dis ability or after 6 years for a non-occupational disability.

Q *How is a member's retirement allowance determined?*

A The maximum retirement allowance is determined by using the following formula: The average of the best 3 years of earnings, multiplied by 2.46%, and multiplied by years and months of creditable membership service.

Q *What is the date shown on the monthly retirement checks and when are they mailed to the retirees?*

A The monthly retirement checks are dated for the last business day of the month. The checks are mailed 4 or 5 days before the end of the month in order for them to arrive at the retiree's home by the last day of the month.

Q *If a member leaves the employ of the MBTA, what happens to the contributions made on the employee's behalf (Authority's Contributions) to the Fund?*

A Those contributions, once made, become an irrevocable asset of the Pension Fund and can only be used for the exclusive benefit of the members of the Fund.

Q *If a retirement benefit is sent direct deposit (ACH – wire transfer) to a bank or credit union, when is the benefit deposited into the retiree's account and when are the funds available?*

A The benefit is wired to the retiree's bank or credit union on the last business day of the month. The availability date of these funds is determined by the members banking institution.

Questions & Answers *(Continued)*

Q *Does a member have a decision to make on how the pension will be paid?*

A YES. A member can take the maximum retirement allowance payable and will get a check every month for life in that amount, subject to adjustments from time to time. If a member takes the maximum retirement allowance payable, the member will recover the money contributed to the Fund in three years or less, and after the member dies, no further payments will be made from this Fund. A member can elect to take retirement payments under an option. Options give the retiree a lesser amount for life with the provision that upon their death the person designated as beneficiary will receive a retirement allowance. An example would be the 100% option. Instead of taking the maximum retirement allowance payable, the member elects to take a reduced amount for life and upon the members death, the designated beneficiary will receive 100% of the allowance the member was receiving for life. The amount of reduction from the maximum is determined by option factors which are based on the member's and designated beneficiary's age and life expectancy. There are several types of options available.

Q *Once a member has retired and elected either the maximum benefit or elected an option, can this election be changed?*

A NO. An option elected by a member can only be changed prior to the effective date of retirement.

Q *How does unused sickleave affect the retirement allowance?*

A At retirement, a member's unused sickleave is converted to creditable membership service, which when multiplied by 2.46% of the average of the three (3) best years, increases the retirement allowance. For example, sickleave of 150 days converts to 7 months of creditable membership service. However, unused sickleave cannot be used to determine service eligibility for retirement.

Q *In the event a retiree is divorced or widowed, can he/she drop the option elected or change it in favor of a new spouse?*

A NO. In the event a retiree is divorced or widowed from his/her spouse, the option elected cannot be dropped or transferred in favor of a new spouse after the effective date of retirement.

Questions & Answers *(Continued)*

Q *Can a member buy any service for which credit is not being received?*

A NO. A member can only get credited for the time in which both the member and the Authority make contributions.

Q *Who can an active or retired member contact with specific questions concerning health and life insurance benefits?*

A Active and retired members of the MBTA may contact the Benefits Department with specific questions about health and life insurance benefits. The telephone number is (617) 222-3244. Written inquires should be sent to the MBTA Benefits Department, 10 Park Plaza, 4th Floor, Boston, MA 02116.

Q *Can a member withdraw any money from the Fund and pay it back at a later date with interest?*

A NO. A member cannot withdraw any contributions from the Fund. The only way a member can obtain money from the Fund is either by resigning or retiring.

Q *Can I receive creditable service in the MBTA Retirement Fund for service with any other Federal, State or local government agency?*

A NO. Since the MBTA Retirement Fund is a private system, no credit can be given for service other than with the MBTA.

Q *If the surviving spouse is eligible to receive a monthly benefit, how soon does he/she begin receiving the benefit? Does he/she have to wait until the member would have reached age 65?*

A The surviving spouse is eligible to receive the benefit the first month following the member's death. He/She does not have to wait until the member would have reached age 65.

Example: Member passes away June 15th. The surviving spouse is eligible for benefit starting July 1st.

Q *How are changes made in the Pension Plan?*

A All changes and improvements to the Pension Plan are negotiated between Local #589 and the Authority.

Questions & Answers *(Continued)*

Q *If I leave the employ of the Authority and return at a later date, am I eligible to "Buy Back" my prior service?*

A YES. A former member of the Fund who is re-employed by the Authority is eligible, after a 3-year waiting period, to request the Retirement Board to restore his/her previous service by the repayment of the withdrawn funds, plus interest. "Bridging the Gap" restores to the member the creditable service he/she built up during the previous period of employment. There is no credit given for the period between the date the member left the employ of the Authority and the date he/she was re-employed. That gap will always remain. Therefore, any member of the Fund who terminated his/her employment with the Authority and was re-employed should contact the Retirement Board to determine the amount necessary to "Buy Back" the previous service.

Q *How does a member qualify for a benefit under the Vesting Provision of the Fund?*

A Under the Vesting Provision of the Fund, a member who has at least 10 years of creditable membership service may qualify for a benefit provided that his/her employment with the MBTA ended through no fault of their own. If a member resigns or is discharged for cause, he/she is not eligible for a retirement benefit under this provision.

Q *When is a member eligible to receive a benefit under the Vesting Provision of the Fund?*

A Under the Vesting Provision of the Fund, a member is eligible to receive a retirement benefit the first of the month following the member's 65th birthday provided that the member has 10 years of creditable membership service in the Fund and his/her employment did not end voluntarily or by termination.

Questions & Answers *(Continued)*

Q *Can taxes be withheld from my pension benefit?*

A Federal tax can be withheld and deducted from your pension check each month. The amount of federal tax withheld from your monthly benefit can be changed at anytime by filing a new W-4P form with the Retirement Fund.

The MBTARF Pension is not taxable in the state of Massachusetts. Retirees residing in Massachusetts should not include their pensionable earnings from the MBTA Retirement Fund as income on their Massachusetts return.

Q *If a member has a question concerning the Fund or would like to obtain an estimate of his/her retirement benefit, whom should he/she contact for the correct answer?*

A All questions should be directed to the MBTA Retirement Fund at One Washington Mall, Boston, MA 02108 617-316-3800 or 800-810-6228.

MBTA Retirement Fund

One Washington Mall - 4th Floor
Boston, MA 02108

617-316-3800
www.mbtarf.com