MBTA Retirement Fund

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

2019 Comprehensive Annual Financial Report

For the fiscal years ended December 31, 2019 & 2018
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

COMPREHENSIVE ANNUAL FINANCIAL REPORT

For the Years Ended December 31, 2019 and 2018

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 22, 2020

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 present the Comprehensive Annual Financial Report (CAFR) for the Massachusetts Bay Transportation Authority Retirement Fund for the fiscal year ended December 31, 2019. 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 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 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.

(Continued)

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 utilizing 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 104.

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 and 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, 2019, the Fund had approximately $1,614.1 million in net position restricted for pension benefits compared to $1,449.7 million for the prior calendar year, representing an increase of $164.4 million in net assets. 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

What a difference a year can make. At the end of 2018, markets were selling off due to political uncertainty, and the year finished on a sour note. However, in 2019, the stock market rallied. Markets experienced solid gains consistently throughout the year. The Federal Reserve lowered interest rates three times sending investors on a search for yield, forcing more money into stocks. Furthermore, strong consumer spending helped power some of the market gains. This resulted in a positive gross return of 18.36% on a time-weighted performance basis and the Fund outperformed its benchmark by 207 basis points. The Board continues to monitor the investment environment and makes prudent decisions on behalf of the Members. The Fund's well-diversified portfolio is positioned to overcome volatility, challenges and risks.

Objectives and Goals

In an effort to focus on our sustainability for the future and protecting our member's assets, the Fund maintains a Strategic Plan that outlines many goals and objectives. The Retirement Board is always looking to continually improve financial reporting, accountability and transparency. In addition, the Fund works to cultivate a high-performing, professional and innovative organization, which encourages professional and continuing education for all Board, committee and staff members.

The Fund seeks to develop a technologically sophisticated infrastructure in order to better serve members and retirees. The first initiative is through the continual development and maintenance of the Fund's website which can be found at www.mbtarf.com. In addition to our website the Fund has contracted the firm, Pension Technology Group, to develop and update our pension benefit software program. The rollout was completed in the spring of 2019. The upgraded software offers enhanced capabilities and security permitting the Fund's data providers to interface with the system allowing data to load into the system via an automated process.

(Continued)

An employee self-service website was launched on April 1, 2020. This site offers active members the ability to create their own retirement benefit estimates using the most recent service and earnings history. Furthermore, Members have the capacity to print forms to notify the Fund of certain changes to their personal information. Retired members will be able to review their payment history for the preceding three months and print forms to setup direct deposit. This new online platform can be found at www.pensiontechnologygroup.com/mbta.

Investment Policy Overview

The Fund's portfolio is broadly diversified, holding investments ranging from publicly traded stocks and bonds to privately held partnerships. 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 2018, the Fund convened its Investment Compliance Working Group to review the IPS, Investment Selection Process, Investment Management Compliance Policies and Financial Reporting. The current Investment Policy Statement has been in effect since April 2019. 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

While, the Board continues to focus on long-term performance we are particularly proud of the strong returns posted for 2019. As of December 31, 2019, the total Fund returns gross of fees with the exception of hedge funds which are net of fees was 18.36 % and the annualized three and five-year returns were 9.93% and 7.45% 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 65.

Year Ended December 31, 2019

- The Fund gained 18.36% outperforming the total policy benchmark of 16.29% by 207 basis points.
- The Fund's inception to date gross return is 9.32%.
- The return equates to an investment gain of $253.6 million.
- Net total outflows to pay benefits for the calendar year were approximately $220.6 million.
- The return outperformed the actuarial rate of return of 7.25%.

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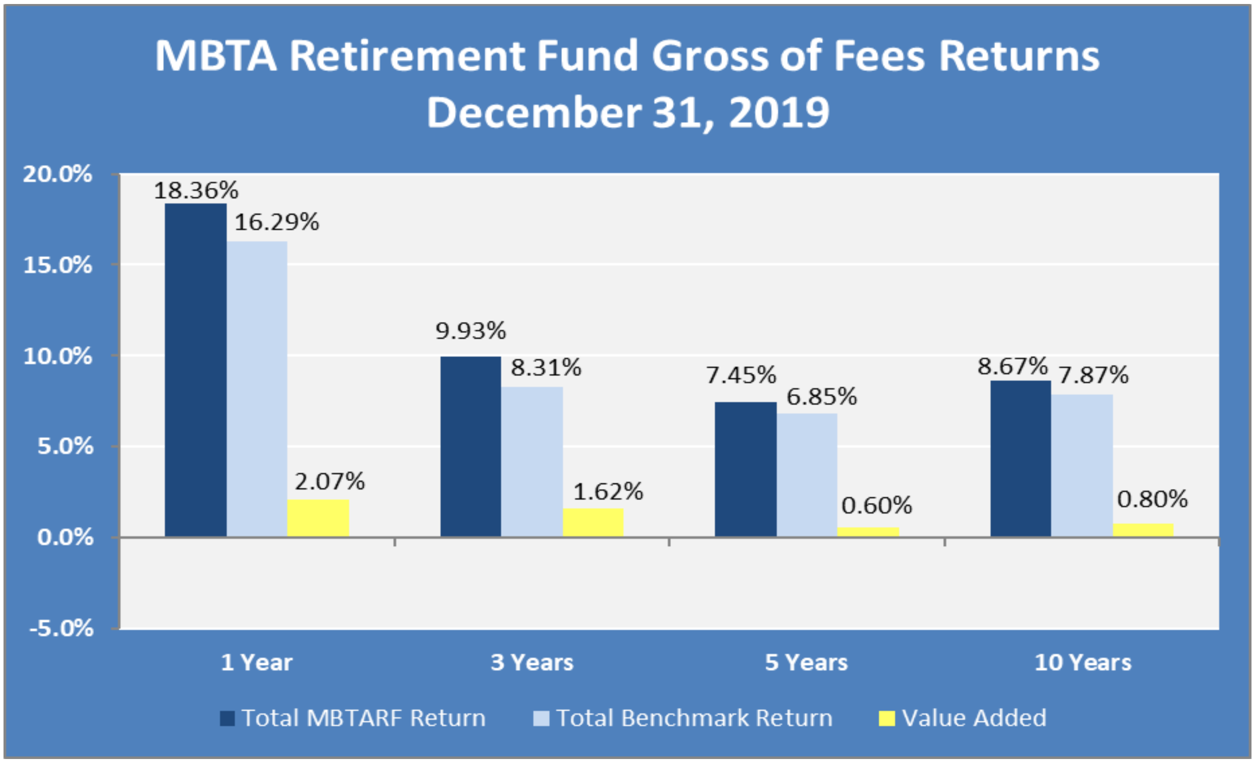
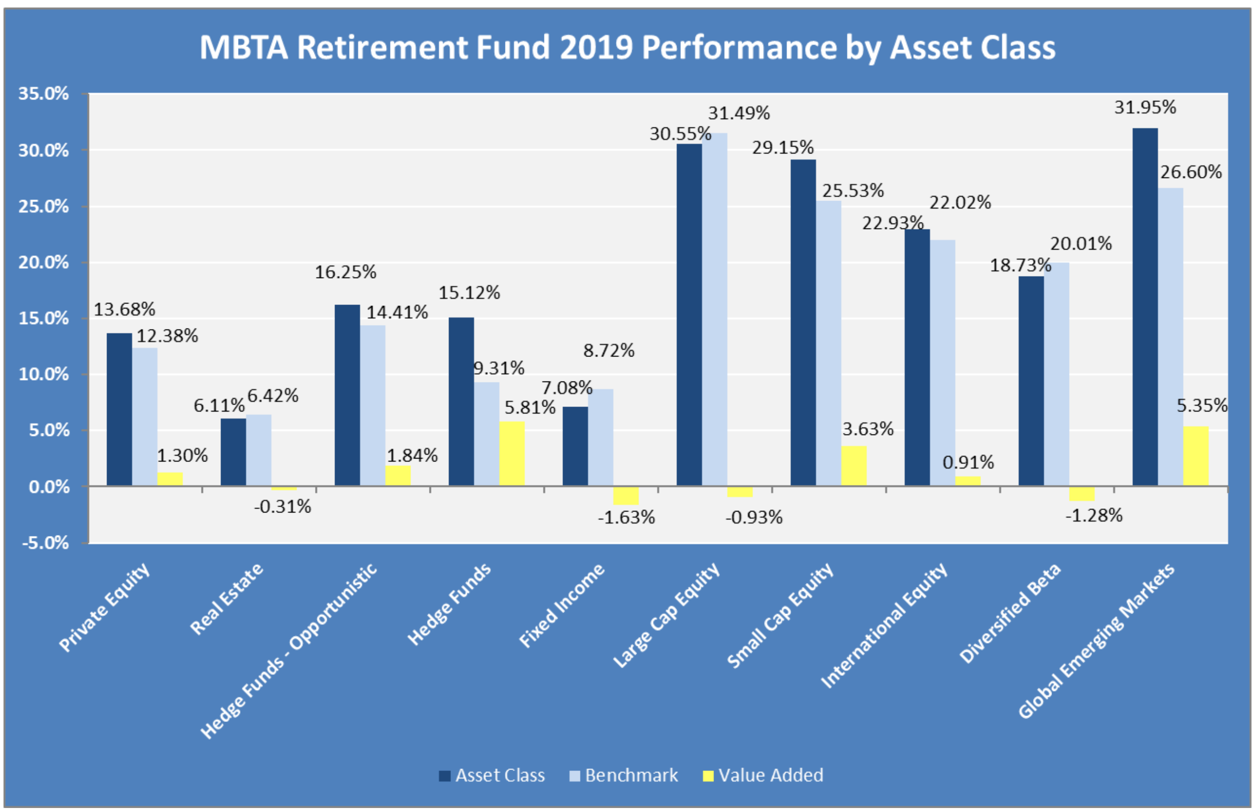
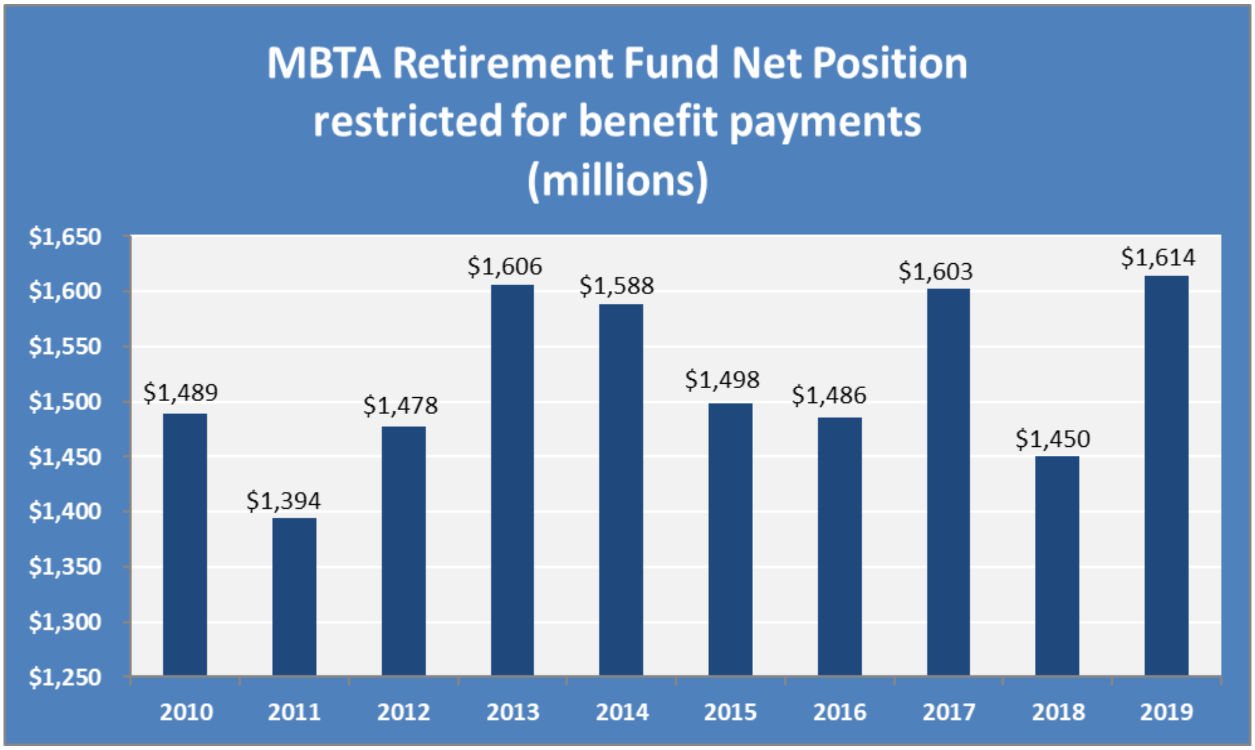

MBTA Retirement Fund Gross of Fees Returns
December 31, 2019
20.0%
15.0%
10.0%
5.0%
0.0%
-5.0%
18.36%
16.29%
2.07%
9.93%
8.31%
1.62%
7.45%
6.85%
0.60%
8.67%
7.87%
0.80%
1 Year
3 Years
5 Years
10 Years
Total MBTARF Return
Total Benchmark Return
Value Added


MBTA Retirement Fund 2019 Performance by Asset Class
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
-5.0%
13.68%
12.38%
1.30%
6.11%
6.42%
-0.31%
16.25%
14.41%
1.84%
15.12%
9.31%
5.81%
7.08%
8.72%
-1.63%
30.55%
31.49%
-0.93%
29.15%
25.53%
3.63%
22.93%
22.02%
0.91%
18.73%
20.01%
-1.28%
31.95%
26.60%
5.35%
Private Equity
Real Estate
Hedge Funds - Opportunistic
Hedge Funds
Fixed Income
Large Cap Equity
Small Cap Equity
International Equity
Diversified Beta
Global Emerging Markets
Asset Class
Benchmark
Value Added

(Continued)


MBTA Retirement Fund Net Position
restricted for benefit payments
(millions)
$1,650
$1,600
$1,550
$1,500
$1,450
$1,400
$1,350
$1,300
$1,250
$1,489
$1,394
$1,478
$1,606
$1,588
$1,498
$1,486
$1,603
$1,450
$1,614
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

(Continued)

Management's Discussion and Analysis

The MD&A beginning on page 26 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 this letter.

Markets and Outlook

The current coronavirus (COVID-19) outbreak has the potential to significantly impact the economy. Classified by the World Health Organization as a pandemic, the current spread of COVID-19 has created significant declines in the global financial markets. The market value of investments of pension funds have incurred a considerable decline in the value due to these unfavorable market conditions. Volatile market performance is expected to continue through the remainder of 2020 and may extend into future years. As of the date of this Comprehensive Annual Financial Report, it is too early to quantify the impact of the COVID-19 outbreak on the Fund.

While the Fund has never been through this kind of crisis before, it has been through other market downturns. Each time, although at different paces, the markets have recovered and reached new highs in the months or years to follow. Despite this current negative news, it is important that our Members know that the Fund's investment portfolio is broadly diversified and we expect to perform strong 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. 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 current allocation has been in effect since January 2017 and there were no significant changes during the reporting period. However, the Board voted in February 2020 to adopt a new asset allocation policy which took effect in 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 2019 (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	18	13	23
Domestic Small Cap	7	4	10
International Equity (unhedged)	9	5	13
International Small Cap	2	0	4
Global / Emerging Markets	7	4	10
Fixed Income	25	22	32
Core Fixed Income	8	4	12
TIPS	3	0	5
Mortgages	3	0	5
Global & Multi Sector	8	4	12
Bank Loans	2	0	4
Real Estate Debt	1	0	2
Cash	2	0	3
Alternative Investments	30	18	37
Private Equity	10	6	14
Real Estate	9	5	12
Fund of Hedge Funds	4	1	7
Fund of Hedge Funds - Opportunistic	2	0	4
Risk Parity	5	2	8

The Board of Trustees and Management are responsible for continually reviewing investment manager performance in order to ensure the Fund is utilizing the best investment managers possible. In April of 2019, the Board voted to terminate the small cap value equity manager, Boston Partners - Robeco Investment Management due to underperformance. The redeemed assets were transferred to the SSgA Russell 2000 Index Fund. In September 2019, the Board of Trustees voted to invest $20 million in Pension Reserve Investment Management's (PRIM) Hedge Fund Segmentation of the Portfolio Completion Asset Class. The Hedge Fund Segmentation investment was funded on October 1, 2019. At the November 2019, Board Meeting, an additional $25 million was allocated to PRIM's Private Equity Vintage Year 2020 Segmentation Program (PEVY 2020). In addition to allocating to PEVY 2020, in November 2019, the Board also committed to a new private equity fund with a long-standing investment manager, Lexington Partners Fund IX.

Administration

The Board of Trustees of the Retirement Fund is the highest authority within the organizational structure. As of December 31, 2019, the date of the Fund's most recent actuarial valuation, the Fund's membership included 5,507 members in active status, 6,813, retirees and beneficiaries receiving benefits and 3 terminated vested members who are not yet receiving benefits. The new pension management software that was implemented in Spring 2019 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 launched 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

(Continued)

Membership

Membership in the Fund is available to most MBTA employees although MBTA Police Officers are excluded. 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. Members 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, a completion of at least twenty-three (23) years of creditable service is required to receive compensation under an early normal allowance.

Benefits

The collectively bargained active wage agreement went into effect July 1, 2014. The current Pension Agreement expired on June 30, 2018; updates will be provided on our website when available. However, all terms remain in effect until a new agreement is negotiated.

Contributions

Benefits paid to Members are financed by employer contributions, employee contributions, and earnings on investments made by the Fund. Effective July 1, 2019, Members are required to contribute at a rate of 8.8239% of their pensionable salary while the Authority contribution rate is 25.1261%. Effective July 1, 2020, member contribution and Authority contribution rates will be 9.3339% and 26.6561% respectively.

Awards

The Government Finance Officers Association (GFOA) awarded a Certificate of Achievement for Excellence in Financial Reporting to the Fund for its comprehensive annual financial report for the fiscal year that ended December 31, 2018. This was the third year the Fund has achieved this prestigious award. In order to be awarded a Certificate of Achievement, the Fund must publish a comprehendible and efficiently organized CAFR. This report must satisfy both generally accepted accounting principles and applicable legal requirements.

A Certificate of Achievement is valid for a period of one year only. We believe our current CAFR 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.

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.

(Continued)

Funding

In setting contribution rates, the Board's principal objectives are to set rates so the unfunded actuarial accrued liability (UAAL) will be amortized over a reasonable period of time from the most recent valuation date and the set rates so they remain relatively level over time. An actuarial valuation is performed annually. The most recent actuarial valuation report, dated December 31, 2019, calculated the Fund's unfunded actuarial pension liability at $1,459,917,828. As of December 31, 2019, the funded ratio is 51.68%. As a result of an experience study performed in 2019, the proposed assumptions were adopted by the Board in April 2019, assumptions for salary increases, mortality tables, termination rates, and retirement rates were revised. The adoption of the most recent asset allocation supports a 7.25% discount rate. However, the Board of Trustees are mindful of monitoring this rate to help facilitate financial solvency. In addition, investment managers' performances are 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, 2019 valuation, please see the Summary of Actuarial Assumptions and Methods found in the Actuarial Section of the CAFR, starting on page 108.

Acknowledgements

The compilation of the CAFR 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.

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 Comprehensive Annual Financial Report for the Fiscal Year Ended

December 31, 2018

Christopher P. Morrill

Executive Director/CEO

MBTA Retirement Fund Board Trustees

Effective January 1, 2020

Advisory Committees to the MBTA Retirement Fund Board

Audit and Actuary Committee

James Evers
Board Member

Michael Abramo
Board Member

James Bradley
Board Member

Betsy Taylor
Board Member

Organizational Chart

Effective January 1, 2020

MBTA Retirement Fund Board

Elected

James Evers, Interim-Chair
James Bradley
Craig Hughes

Appointed

Michael Abramo
Betsy Taylor

Pamela Holloman, Board Secretary

Interim-Executive Director

John P. Barry

Fund Staff/Counsel

Administrative
Maura Corso

Sagine Gay

- Executive Support
- Maintain Documentation
- Correspondence
- Customer Service

Finance
Catherine McGahan

Jacquelyn Carey
Michael Baryski

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

Benefits
Dominique Sye

Siobhan Keeney
John Fitzgerald

- 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 102 for the Summary Schedule of Broker Commission and Fees and page 103 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

	Period of Service From	To
(E) James T. Norton	07/80	10/90
(E) Paul M. Connolly	01/83	12/86
(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	Present
(A) Michael J. Heffernan	06/15	09/17
(E) Craig S. Hughes	07/15	Present
(A) Steven Kadish	10/17	09/18
(A) Michael Abramo	03/19	Present
(E) James Bradley	01/20	Present

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

Historical Executive Directors of the MBTA Retirement Fund

	Period of Service From	To		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

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

(Continued)

(E) James Crowley	01/02	03/03	(E) Walter J. Novicki	02/08	01/10
(E) Roy L. Chance	02/02	12/02	(E) Lawrence C. Kelly	02/10	04/11
(A) Wesley G. Wallace, Jr.	05/02	10/06	(E) Walter J. Novicki	01/11	12/11
(E) Robert L. Callahan	03/03	02/06	(E) James M. O'Brien	05/11	12/13
(E) M. John Burr	03/03	12/03	(E) John A. Clancy	01/12	12/13
(E) John S. Murray	01/04	02/05	(A) Gerald K. Kelley	06/12	Present
(A) Brian J. Donohue	10/04	05/09	(E) Margaret C. LaPaglia	01/14	02/18
(E) James M. O'Brien	03/05	12/10	(E) Lawrence C. Kelly	01/14	12/16
(E) Michael F. Mastrocola	02/06	06/06	(E) Timothy P. Long	07/15	Present
(E) Daniel K. Burton	07/06	09/07	(E) John D. Hunt	01/17	12/19
(A) Jeanne M. Morrison	10/06	03/15	(E) Patrick Hogan	04/18	Present
(E) John M. Burr	09/07	02/08	(A) Paul Brandley	03/18	05/19
(A) William A. Mitchell, Jr.	03/07	01/12	(A) Mary Ann O'Hara	12/19	Present
(E) Brian P. Cummins	08/07	06/15			

(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:

We have audited the accompanying financial statements of the Massachusetts Bay Transportation Authority Retirement Fund (the Fund), as of and for the years ended December 31, 2019 and 2018 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.

Management's Responsibility for the Financial Statements

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

Auditors' Responsibility

Our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

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

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

Opinion

In our opinion, the financial statements referred to above present fairly, in all material respects, the fiduciary net position of the Massachusetts Bay Transportation Authority Retirement Fund as of December 31, 2019 and 2018 and the changes in fiduciary net position for the years then ended in accordance with U.S. generally accepted accounting principles.

KPMG

Other Matters

Required Supplementary Information

U.S. generally accepted accounting principles require that the Management's Discussion and Analysis and the required supplementary information as listed in the accompanying table of contents (collectively referred to as RSI) be presented to supplement the basic financial statements. Such information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board 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 RSI in accordance with auditing standards generally accepted in the United States of America, 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 and Other 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 Introductory, Other Supplementary Information, Investment, Actuarial, Statistical and the Frequently Asked Questions sections identified in the accompanying table of contents are presented for purposes of additional analysis and are not a required part of the basic financial statements.

The Other Supplementary Information section 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. Such information has been subjected to the 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 auditing standards generally accepted in the United States of America. In our opinion, the Other Supplementary Information section is fairly stated in all material respects in relation to the basic financial statements as a whole.

The Introductory, Investment, Actuarial, Statistical and the Frequently Asked Questions sections have not been subjected to the auditing procedures applied in the audit of the basic financial statements, and accordingly, we do not express an opinion or provide any assurance on them.

KPMG LLP

Boston, Massachusetts
June 22, 2020

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Required Supplementary Information

Management's Discussion and Analysis

December 31, 2019 and 2018

(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, 2019 and 2018. 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, 2019 and 2018 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, 2019

The net position of the Fund increased $164.4 million, or 11.34%, from $1,449.7 million as of December 31, 2018 to $1,614.1 million as of December 31, 2019.

Net investment income increased $305.8 million, or 587%, from ($52.1) million for the year ended December 31, 2018 to $253.7 million for the year ended December 31, 2019. The Fund had a 18.4% rate of return for the year ended December 2019 compared to a (3.08)% rate of return for the year ended December 31, 2018. 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, 2019 were $139.6 million compared to total contributions received during the year ended December 31, 2018 of $124.6 million.

Employer contributions during the year ended December 31, 2019 increased $11.3 million or 12.3% to $103.3 million from $92 million during the year ended December 31, 2018.

Member contributions were $36.4 million during the year ended December 2019, an increase of $3.8 million or 11.7% over year ended December 31, 2018 member contributions of $32.6 million.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND

Required Supplementary Information

Management's Discussion and Analysis

December 31, 2019 and 2018

(Unaudited)

Benefits paid during the year ended December 31, 2019 were $220.6 million an increase of $2.2 million, or 1%, over the benefits paid during the year ended December 31, 2018 of $218.4 million. This increase is primarily due to the rise in number of retirees and lengthening life span.

Year ended December 31, 2018

The net position of the Fund decreased $153.5 million, or (9.57)%, from $1,603.2 million as of December 31, 2017 to $1,449.7 million as of December 31, 2018.

Net investment income decreased $273.8 million, or (123.5)%, from $221.7 million for the year ended December 31, 2017 to ($52.1) million for the year ended December 31, 2018. The Fund had a (3.08)% rate of return for the year ended December 2018 compared to a 15.80% rate of return for the year ended December 31, 2017. 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, 2018 were $124.6 million compared to total contributions received during the year ended December 31, 2017 of $113.2 million.

Employer contributions during the year ended December 31, 2018 increased $8.6 million or 10.3% to $92 million from $83.4 million during the year ended December 31, 2017.

Member contributions were $32.6 million during the year ended December 2018, an increase of $2.8 million or 9.4% over year ended December 31, 2017 member contributions of $29.8 million.

Benefits paid during the year ended December 31, 2018 were $218.4 million an increase of $9.4 million, or 4.5%, over the benefits paid during the year ended December 31, 2017 of $209.0 million. This increase is primarily due to the increased number of retirees and lengthening life span.

Year ended December 31, 2017

The net position of the Fund increased $117.6 million, or 7.92%, from $1,485.6 million as of December 31, 2016 to $1,603.2 million as of December 31, 2017.

Net investment income increased $134.9 million, or 155%, from $86.8 million for the year ended December 31, 2016 to $221.7 million for the year ended December 31, 2017. The Fund had a 15.80% rate of return for the year ended December 2017 compared to a 6.88% rate of return for the year ended December 31, 2016. 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, 2017 were $113.2 million compared to total contributions received during the year ended December 31, 2016 of $105.0 million.

Employer contributions during the year ended December 31, 2017 increased $6.2 million or 8.0% to $83.4 million from $77.2 million during the year ended December 31, 2016.

Member contributions were $29.8 million during the year ended December 2017, an increase of $2.0 million or 7.2% over year ended December 31, 2016 member contributions of $27.8 million.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND

Required Supplementary Information

Management's Discussion and Analysis

December 31, 2019 and 2018

(Unaudited)

Benefits paid during the year ended December 31, 2017 were $209.0 million an increase of $13.3 million, or 6.8%, over the benefits paid during the year ended December 31, 2016 of $195.7 million. This increase is primarily due to the increased number of retirees and lengthening life span as well as the voluntary separation incentive program offered by the MBTA.

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.

Condensed Comparative Fiduciary Net Position

(Dollar values expressed in millions)

		December 31		
		2019	2018	2017
Cash	$	4.2	4.2	4.2
Receivables		7.7	6.2	5.8
Investments		1,608.9	1,445.8	1,616.9
Cash collateral on securities lending		22.5	49.9	38.8
Total assets		1,643.3	1,506.1	1,665.7
Cash collateral on securities lending		22.5	49.9	38.8
Accounts payable and accrued expenses		5.1	5.2	5.2
Payable for investments purchased		1.6	1.3	18.5
Total liabilities		29.2	56.4	62.5
Net position – restricted for pension benefits	$	1,614.1	1,449.7	1,603.2

Total assets at fair value were $1,643.3 million as of December 31, 2019, an increase of $137.2 million, or 9.1%, over the year ended December 31, 2018 and were $1,506.1 million as of December 31, 2018, a decrease of $159.6 million, or (9.6) %, over the year ended December 31, 2017. At year-end 2019, investments at fair value were $1,608.9 million, an increase of $163.1 million, or 11.3%, over the year ended December 31, 2018, which were valued at $1,445.8 million, a decrease of $171.1 million, or (10.6) %, over the year ended December 31, 2017. This investment increase in 2019 is due to solid market returns in all asset classes. The Federal Reserve lowered the Federal Funds interest rate three times boosting domestic equity markets. In addition, fixed income and international equities contributed healthy returns.

(Continued)

**MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND**

Required Supplementary Information

Management's Discussion and Analysis

December 31, 2019 and 2018

(Unaudited)

As of December 31, 2019, cash collateral on securities lending decreased by $27.4 million or (54.9)%, over the year ended December 31, 2018. The cash collateral on securities lending increased by $11.1 million or 28.6% between December 31, 2017 and December 31, 2018. Receivables increased by $1.5 million, or 24.2%, over the prior calendar year. Between December 31, 2017 and December 31, 2018 receivables increased by $0.4 million, or 6.9%.

Total liabilities as of December 31, 2019 decreased by $27.2 million, or 48.2% over the prior year, and decreased by $6.1 million, or (9.8%) during calendar year 2018. The cash collateral on securities lending decreased by $27.4 million, or (54.9%), in calendar year 2019 and increased by $11.1 million, or 28.6%, in calendar year 2018. Payable for investment purchased increased by $0.3 million, or 23.1% over the year ended December 31, 2019. Payable for investment purchased decreased by $17.2 million or (93.0%) during calendar year 2018.

Condensed Comparative Statement of Changes in Fiduciary Net Position

(Dollar values expressed in millions)

		December 31		
		2019	2018	2017
Additions:				
Employer contributions	$	103.2	92.0	83.4
Member contributions		36.4	32.6	29.8
Income from investments		253.7	(52.1)	221.7
Total additions		393.3	72.5	334.9
Deductions:				
Retirement benefits		220.6	218.4	209.0
Refunds of contributions		3.3	3.3	3.8
Administrative expense		5.0	4.3	4.5
Total deductions		228.9	226.0	217.3
Total changes in fiduciary net position	$	164.4	(153.5)	117.6

Additions to Plan Fiduciary Position

For the calendar year ended December 31, 2019, employer contributions increased by $11.2 million and member contributions increased by $3.8 million. For the calendar year ended December 31, 2018, employer contributions increased by $8.6 million and member contributions increased by $2.8 million. Effective July 1, 2019, the employer's contribution rate changed from 22.6811% to 25.1261% and the member contribution rate changed from 8.0089% to 8.8239%, resulting in a 10.8% and 10.2% increase, respectively.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Required Supplementary Information

Management's Discussion and Analysis

December 31, 2019 and 2018

(Unaudited)

Effective July 1, 2018, the employer's contribution rate changed from 20.0111% to 22.6811% and the member contribution rate changed from 7.1189% to 8.0089%, resulting in a 13.3% and 12.5% increase, respectively.

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 gain in 2019 of $253.7 million compared to a $52.1 million net investment loss in 2018 and $221.7 million net investment gain in 2017. This is a result of a change in the fair value of the investment portfolio due to the markets experiencing solid gains.

Deductions from Fiduciary Net Position

Benefits paid increased by $2.2 million and $9.4 million, or 1% and 4.5%, over the years ended 2019 and 2018, respectively. These increases continue to be primarily due to the rise in number of retirees and lengthening life span. Administrative expenses increased from $4.3 million to $5.0 million, an increase of $0.7 million or 16.3% over year 2018 and decreased $0.2 million, or (4.4) % over year 2017.

Net Pension Liability (NPL)

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

As of December 31, 2019, and 2018, the fiduciary net position as a percentage of the total pension liability was 53.43% and 49.70%, respectively.

Investment Performance 2019

The Fund began the calendar year 2019 with a net position of $1,449.7 million and ended the calendar year with a net position of $1,614.1 million, representing a 11.3% 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 (31.5%), international equity (13.2%), fixed income investments (24.2%), and cash equivalents (4.0%) comprise approximately (72.9%) of invested assets as of December 31, 2019. The remaining (27.1%) of assets are invested in real estate (8.8%), and alternative investments (18.3%), 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, 2019, the MBTA Retirement Fund's total fund return was 18.4% compared to (3.08) % for the calendar year ended December 31, 2018. The 2019 increase in return is attributed to the positive gains experienced in all asset classes. The S&P 500, Dow Jones Industrial Average and the NASDAQ all had impressive annual returns.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Required Supplementary Information

Management's Discussion and Analysis

December 31, 2019 and 2018

(Unaudited)

The domestic large cap equity returned 30.6% compared to the S&P 500 Index of 31.5%. The domestic small cap equity returned 29.2% compared to the Russell 2000 Growth Index of 28.5% and the Russell 2000 Value Index of 22.4%. The global equity and emerging markets returned 32.0% compared to MSCI All Country World Index of 26.6%. The international equity returned 23.0% compared to the MSCI EAFE Index of 22.0%. Fixed Income returned 7.1% compared to the BC Aggregate of 8.7%.

The total fund performance of 18.4% for calendar year 2019 outperformed by 210 basis points, the total fund custom index (a blended composition of major market indices in proportion to the Fund's asset allocation), which returned 16.3%.

Additionally, for the year ended December 31, 2019, the real estate portfolio returned 6.1% compared to the NCREIF Property Index of 6.4%. The hedge fund portfolio returned 15.1% compared to the CSFB/Tremont Hedge Fund Index of 9.3%. The opportunistic portfolio returned 16.3% compared to Bank of America/Merrill Lynch High Yield Benchmark return of 14.4%. The private equity active portfolio returned 13.7% and the legacy private equity portfolio returned 16.3% compared to State Street's Customized Benchmark return of 12.4%. State Street Customized Benchmark consists of 36% buyout, 9% venture, 37% debt and 18% fund of funds. Diversified Beta returned 18.7% compared to the 60% MSCI World Eq / 40% Barclays Aggregate Bond return of 20.0%. The 91 Treasury Bill Plus 300 Basis Points returned 5.3% for the year ended December 31, 2019.

Investment Performance 2018

The Fund began the calendar year 2018 with a net position of $1,603.2 million and ended the calendar year with a net position of $1,449.7 million, representing a (9.6)% 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 (31.6%), international equity (11.3%), fixed income investments (27.0%), and cash equivalents (2.8%) comprise approximately (72.7%) of invested assets as of December 31, 2018. The remaining (27.3%) of assets are invested in real estate (9.4%), and alternative investments (17.9%), 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, 2018, the MBTA Retirement Fund's total fund return was (3.08)% compared to 15.80% for the calendar year ended December 31, 2017. The 2018 decrease in return is attributed to poor performance in the fourth quarter amid concerns of slowing economic growth and trade tension.

The domestic large cap equity returned (6.19)% compared to the S&P 500 Index of (4.38)%. The domestic small cap equity returned (7.34)% compared to the Russell 2000 Growth Index of (9.31)% and the Russell 2000 Value Index of (12.86)%.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Required Supplementary Information

Management's Discussion and Analysis

December 31, 2019 and 2018

(Unaudited)

The global equity and emerging markets returned (1.88)% compared to MSCI All Country World Index of (9.41)%. The international equity returned (16.14)% compared to the MSCI EAFE Index of (13.79)%. Fixed Income returned (0.20)% compared to the BC Aggregate of 0.01%.

The total fund performance of (3.08)% for calendar year 2018 underperformed by 51 basis points, the total fund custom index (a blended composition of major market indices in proportion to the Fund's asset allocation), which returned (2.57)%.

Additionally, for the year ended December 31, 2018, the real estate portfolio returned 9.93% compared to the NCREIF Property Index of 6.72%. The hedge fund portfolio returned (12.60)% compared to the CSFB/Tremont Hedge Fund Index of (3.19)%. The opportunistic portfolio returned 7.87% compared to Bank of America/Merrill Lynch High Yield Benchmark return of (2.26)%. The private equity active portfolio returned 4.82% and the legacy private equity portfolio returned 3.21% compared to State Street's Customized Benchmark return of 8.70%. State Street Customized Benchmark consists of 36% buyout, 9% venture, 37% debt and 18% fund of funds. Diversified Beta returned (6.29)% compared to the 60% MSCI World Eq / 40% Barclays Aggregate Bond return of (5.07)%. The 91 Treasury Bill Plus 300 Basis Points returned 4.93% for the year ended December 31, 2018.

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 appears to be uncollectible. 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*, and 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. More complete reporting about the Fund's investment in Fletcher is found in prior Fund CAFR's. *See, e.g.,* Fund's 2013 CAFR at p. 19.

The Fund is also party to a Pooling and Cooperation Agreement with other investors in Weston Capital Partners Fund II (PII) and investors in Wimbledon Financing Master Fund Ltd (WFF). Both PII and WFF are funds previously managed by and Weston Capital Asset Management LLC (Weston). 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 involving Weston and various related parties including insiders and investors is ongoing but winding down. A turnover proceeding filed by other Weston investors (Class TT) is also pending in New York. *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 have 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).

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Required Supplementary Information

Management's Discussion and Analysis

December 31, 2019 and 2018

(Unaudited)

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

The Fund's investments in Alpha, Weston (White Oak) were all written down in full in prior fiscal years. The Weston (White Oak) funds remain in liquidation in the Cayman Islands.

The Fund is reporting on the pending litigation, liquidations and recovery efforts because of limited activity anticipated in those cases this coming fiscal year. Prospects for future recoveries are uncertain.

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, 2019 and 2018. 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, 2019 and 2018

		2019	2018
Assets:			
Investments, at fair value:			
Domestic:			
Cash and cash equivalents	$	62,733,184	39,654,078
Fixed income		387,336,073	388,707,273
Common stock and equity funds		507,511,655	457,339,468
Real estate funds		142,151,317	135,886,596
Alternative investments and hedge funds		294,002,864	259,214,511
		1,393,735,093	1,280,801,926
International:			
Cash and cash equivalents		1,032,360	132,231
Fixed income		2,050,088	1,555,488
Common stock and equity funds		212,124,717	163,274,105
		215,207,165	164,961,824
Total investments		1,608,942,258	1,445,763,750
Cash and cash equivalents		4,249,801	4,229,397
Contribution receivable from Massachusetts Bay Transportation Authority		4,310,996	3,789,915
Cash collateral on securities lending, invested		22,457,542	49,933,994
Receivable for investments sold		3,405,040	2,427,658
Total assets		1,643,365,637	1,506,144,714
Liabilities:			
Cash collateral on securities lending, due to borrowers		22,457,542	49,933,994
Accounts payable and accrued expenses		5,123,495	5,233,787
Payable for investments purchased		1,640,387	1,281,833
Total liabilities		29,221,424	56,449,614
Net position – restricted for pension benefits	$	1,614,144,213	1,449,695,100

See accompanying notes to financial statements.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Statements of Changes in Fiduciary Net Position
Fiscal years ended December 31, 2019 and 2018

	2019	2018
Additions:		
Contributions by Massachusetts Bay Transportation Authority	$ 103,263,763	92,013,124
Contributions by members	36,366,108	32,606,337
Total contributions	139,629,871	124,619,461
Investment income:		
Income from investments	38,510,760	45,240,909
Less investment expenses, other than from securities lending	(6,010,803)	(6,232,229)
Net (depreciation) / appreciation in fair value of investments	221,079,004	(91,225,005)
Net investment (loss) / gain	253,578,961	(52,216,325)
Securities lending activity:		
Securities lending income	1,054,040	1,075,337
Less borrower rebates and fees	902,011	931,891
Net income from securities lending activities	152,029	143,446
Total net investment (loss) / income	253,730,990	(52,072,879)
Total additions	393,360,861	72,546,582
Deductions:		
Retirement benefits	220,553,916	218,385,648
Refunds of members' contributions	3,311,057	3,324,406
Administrative expenses	5,046,775	4,317,624
Total deductions	228,911,748	226,027,678
Change in fiduciary net position	164,449,113	(153,481,096)
Net position restricted for pension benefits:		
Beginning of year	1,449,695,100	1,603,176,196
End of year	$ 1,614,144,213	1,449,695,100

See accompanying notes to financial statements.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND

Notes to Financial Statements
December 31, 2019 and 2018

(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, 2019 and 2018, Fund membership consisted of:

	2019		2018	
Retired members or beneficiaries currently receiving benefits	6,813	(1)	6,841	(2)
Active members	5,507		5,392	
Active members not presently earning service credit	390		355	
Total membership	12,710		12,588	

(1) Year 2019 includes 6,678 retirees and beneficiaries and 135 individuals receiving payments under Qualified Domestic Relation Orders (QDROs)

(2) Year 2018 includes 6,714 retirees and beneficiaries and 127 individuals receiving payments under Qualified Domestic Relation Orders (QDROs)

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND

Notes to Financial Statements
December 31, 2019 and 2018

(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 8.0089% to 8.8239% effective July 1, 2019 of pretax compensation. The Authority contribution rate was increased from 22.6811% to 25.1261% effective July 1, 2019. As of July 1, 2020, member contribution and Authority contribution rates will be 9.3339% and 26.6561%, respectively. These contribution rates were calculated based on the most recent actuarial 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.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Notes to Financial Statements
December 31, 2019 and 2018

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.

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.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Notes to Financial Statements
December 31, 2019 and 2018

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 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.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND

Notes to Financial Statements
December 31, 2019 and 2018

(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 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.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND

Notes to Financial Statements
December 31, 2019 and 2018

(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.

(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 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, 2018 and 2017, the Fund held open forward exchange contracts of varying amounts and currencies. Unrealized gains and losses are not significant to the financial statements.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Notes to Financial Statements

December 31, 2019 and 2018

(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.

(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, 2019 and 2018, 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, 2019 and 2018, $3,841,810 and $3,821,407 of the Fund's cash and cash equivalents deposits were in excess of the FDIC insurance limit.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Notes to Financial Statements

December 31, 2019 and 2018

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.

The following was the Board's adopted asset allocation policy as of December 31, 2019 and 2018:

Asset class	2019 Target	2018 Target
Domestic equity	25 %	25 %
International large cap equity	9	9
International small cap equity	2	2
Global/emerging markets	7	7
Fixed income	25	25
Real estate	9	9
Private equity	10	10
Hedge funds	4	4
Hedge funds – opportunistic	2	2
Risk parity/diversified beta	5	5
Cash	2	2
Total	100 %	100 %

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Notes to Financial Statements
December 31, 2019 and 2018

(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, 2019 and 2018.

	2019				
Investment type	Fair value	Less than 1	1–5	6–10	More than 10
Agency debt	$ 55,531,102	1,078,827	53,317,674	769,422	365,179
U.S. Treasury notes & bonds	75,590,389	387,147	34,495,547	20,164,571	20,543,124
Domestic corporate	185,592,597	2,377,222	44,470,007	63,249,243	75,496,124
International corporate	2,050,088	503,679	1,368,222	—	178,188
Asset backed:					
CMOs	13,200,181	—	—	88,153	13,112,028
Mortgage backed	32,003,237	—	—	—	32,003,237
Other	25,418,567	—	11,616,248	2,705,450	11,096,869
	$ 389,386,161	4,346,875	145,267,698	86,976,839	152,794,749

	2018				
Investment type	Fair value	Less than 1	1–5	6–10	More than 10
Agency debt	$ 54,654,433	—	53,848,707	144,002	661,724
U.S. Treasury notes & bonds	70,519,064	571,327	36,276,482	17,944,553	15,726,702
Domestic corporate	194,678,219	2,285,167	45,953,916	118,131,250	28,307,886
International corporate	1,555,488	—	492,140	203,104	860,244
Asset backed:					
CMOs	12,189,919	—	—	88,096	12,101,823
Mortgage backed	29,473,017	—	—	—	29,473,017
Other	27,192,621	—	12,817,560	3,466,781	10,908,280
	$ 390,262,761	2,856,494	149,388,805	139,977,786	98,039,676

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. The manager of each fixed income portfolio is responsible for determining the maturity and commensurate returns of his/her portfolio. 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, 2019 and 2018 are highly sensitive to changes in interest rates.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Notes to Financial Statements

December 31, 2019 and 2018

(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.

The Fund's fixed income investments as of December 31, 2019 and 2018 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:

	2019								
Investment type	Fair value	AAA	AA	A	BBB	BB	B	CCC	Not Rated
Agency debt	$ 55,531,102	–	2,401,684	52,979,789	–	–	–	149,629	–
Domestic corporate	185,592,597	50,977,072	1,345,987	14,895,708	59,660,239	13,612,023	36,983,753	660,688	7,457,127
International	2,050,088	642,826	–	–	–	397,810	5,664	68,603	935,185
Asset backed:									
CMOs	13,200,181	4,145,665	–	103,145	72,842	–	–	–	8,878,529
Mortgage backed	32,003,237	–	–	–	–	–	–	–	32,003,237
Other	25,418,567	8,685,739	266,863	3,569,206	3,761,341	–	–	–	9,135,418
Total credit securities risk	313,795,772	64,451,302	4,014,534	71,547,848	63,494,422	14,009,833	36,989,417	878,920	58,409,496
U.S. government fixed income securities*	75,590,389								
Total fixed income securities	$ 389,386,161								

	2018								
Investment type	Fair value	AAA	AA	A	BBB	BB	B	CCC	Not Rated
Agency debt	$ 54,654,433	–	1,968,383	–	52,415,702	–	270,348	–	–
Domestic corporate	194,678,219	53,438,986	2,994,800	18,229,790	51,298,593	17,425,072	36,941,097	530,904	13,818,977
International	1,555,488	–	–	67,141	0	860,244	287,098	–	341,005
Asset backed:									
CMOs	12,189,919	3,887,927	–	125,170	111,658	–	–	–	8,065,164
Mortgage backed	29,473,017	–	–	–	0	–	–	–	29,473,017
Other	27,192,621	10,461,721	306,768	4,042,918	4,047,316	–	–	–	8,333,898
Total credit securities risk	319,743,697	67,788,634	5,269,951	22,465,019	107,873,269	18,285,316	37,498,543	530,904	60,032,061
U.S. government fixed income securities*	70,519,064								
Total fixed income securities	$ 390,262,761								

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

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND

Notes to Financial Statements
December 31, 2019 and 2018

(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, 2019 and 2018. 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 18.0% 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, 2019 and 2018 are presented on the following tables:

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Notes to Financial Statements
December 31, 2019 and 2018

Currency		2019 Short-Term	Fixed Income	Equity	Total
Argentine peso	$	71,026	211,556	—	282,582
Australian dollar		—	—	2,547,570	2,547,570
Brazilian real		—	397,810	—	397,810
Canadian dollar		203,284	178,188	3,798,784	4,180,256
Danish krone		—	—	276,090	276,090
Euro currency		(1,116)	—	39,254,874	39,253,758
Hong Kong dollar		—	—	9,786,832	9,786,832
Indian rupee		528,740		12,036,344	12,565,084
Japanese yen		—	—	29,516,569	29,516,569
Malaysian ringgit		4,181	619,708	—	623,889
New Israeli sheqel		—	—	611,072	611,072
New Zealand dollar		—	—	178,321	178,321
Norwegian krone		—	642,826	138,048	780,874
Pound sterling		196,580	—	12,208,278	12,404,858
Singapore dollar		(9)	—	2,997,908	2,997,899
Swedish krona		—	—	4,026,016	4,026,016
Swiss franc		29,674	—	2,660,409	2,690,083
Thailand baht		—	—	4,814,374	4,814,374
International equity pooled funds (various currencies)		—	—	87,273,228	87,273,228
Total securities subject to foreign currency risk		1,032,360	2,050,088	212,124,717	215,207,165
United States dollars (securities held by international investment managers)		—	—	14,909,099	14,909,099
Total International Investment Securities	$	1,032,360	2,050,088	227,033,816	230,116,264

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND

Notes to Financial Statements
December 31, 2019 and 2018

Currency		2018 Short-Term	2018 Fixed Income	2018 Equity	2018 Total
Argentine peso	$	34,257	628,103	—	662,360
Australian dollar		—	—	2,213,012	2,213,012
Canadian dollar		50,320	—	3,146,938	3,197,258
Danish krone		—	—	1,302,702	1,302,702
Euro currency		443	—	30,229,484	30,229,927
Hong Kong dollar		—	—	6,782,835	6,782,835
Japanese yen		17,547	—	25,362,996	25,380,543
Mexican peso		—	67,141	—	67,141
New Israeli sheqel		—	—	491,589	491,589
New Zealand dollar		—	—	225,472	225,472
Norwegian krone		—	—	81,087	81,087
Pound sterling		2	—	7,153,897	7,153,899
Singapore dollar		(9)	—	2,671,809	2,671,800
South African rand		—	860,244	1,789,448	2,649,692
Swedish krona		—	—	2,665,679	2,665,679
Swiss franc		29,671	—	2,009,072	2,038,743
Thailand baht		—	—	4,908,725	4,908,725
International equity pooled funds (various currencies)		—	—	72,239,360	72,239,360
Total securities subject to foreign currency risk		132,231	1,555,488	163,274,105	164,961,824
United States dollars (securities held by international investment managers)		—	—	17,227,910	17,227,910
Total International Investment Securities	$	132,231	1,555,488	180,502,015	182,189,734

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND

Notes to Financial Statements
December 31, 2019 and 2018

(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, 2019 and 2018. 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, 2019 and 2018 was $22,457,542 and $49,933,994, 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, 2019 and 2018, the fair value of loaned securities outstanding, included in investments, was approximately $21,965,011 and $49,125,668, respectively.

(h) Commitments

At December 31, 2019 and 2018, the Fund had contractual commitments to provide approximately $82.6 million and $60.1 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, 2019 and 2018 is 17.67% and (3.37)%, 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, 2019 and 2018

(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 at December 31, 2019 and 2018. Certain reclassifications have been made to the 2018 schedule in order to conform with the current year presentation.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Notes to Financial Statements
December 31, 2019 and 2018

		Fair value measurements using:		
	Total at December 31, 2019	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	11,248,850	11,248,850	-	-
International cash and equivalents	1,032,360	1,032,360	-	-
STIF-type instrument	51,484,334	51,484,334	-	-
Total cash equivalents	63,765,544	63,765,544	-	-
U.S. equities:				
Common stock	215,562,486	215,562,486	-	-
Depository receipts	25,145,079	25,145,079	-	-
Mutual funds	263,619,013	263,619,013	-	-
Preferred stock	525,575	525,575	-	-
Real estate investment trust	2,659,502	2,659,502	-	-
Total U.S. equities	507,511,655	507,511,655	-	-
International equities - common stock	212,124,717	212,124,717	-	-
Fixed income:				
Agency debt	55,531,102	-	55,531,102	-
U.S. treasury notes and bonds	75,590,389	-	75,590,389	-
Domestic corporate	185,592,597	-	179,453,278	6,139,319
Asset backed:				
CMO	13,200,181	-	13,200,181	-
Mortgage-backed	32,003,237	-	32,003,237	-
Other asset backed	25,418,567	-	25,418,567	-
Total U.S. fixed income	387,336,073	-	381,196,754	6,139,319
International fixed income - bonds	2,050,088	-	2,050,088	-
Total investments by fair value level	1,172,788,077	783,401,916	383,246,842	6,139,319
Total investments measured at net asset value (NAV):				
Hedge fund of funds	163,861,840			
Private equity funds	130,141,024			
Private real estate funds	142,151,317			
Total investments measured at NAV	436,154,181			
Total investments	1,608,942,258			

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Notes to Financial Statements
December 31, 2019 and 2018

		Fair value measurements using:		
		Quoted prices in active markets for identical assets	Significant other observable inputs	Significant unobservable inputs
	Total at December 31, 2018	(Level 1)	(Level 2)	(Level 3)
Cash equivalents:				
Active cash	1,776,988	1,776,988	-	-
Swap Bank of America COC	60,000	60,000	-	-
International cash and equivalents	132,231	132,231	-	-
STIF-type instrument	37,155,764	37,155,764	-	-
Treasury bill	661,326	-	661,326	-
Total cash equivalents	39,786,309	39,124,983	661,326	-
U.S. equities:				
Common stock	224,340,138	211,528,345	12,811,793	-
Depository receipts	17,424,992	17,424,992	-	-
Mutual funds	210,103,708	210,103,708	-	-
Preferred stock	638,190	638,190	-	-
Real estate investment trust	4,832,440	4,832,440	-	-
Total U.S. equities	457,339,468	444,527,675	12,811,793	-
International equities - common stock	163,274,105	163,274,105	-	-
Fixed income:				
Agency debt	54,654,433	-	54,654,433	-
U.S. treasury notes and bonds	70,519,064	-	70,519,064	-
Domestic corporate	194,678,219	-	182,437,175	12,241,044
Asset backed:				
CMO	12,189,919	-	12,189,919	-
Mortgage-backed	29,473,017	-	29,473,017	-
Other asset backed	27,192,621	-	27,192,621	-
Total U.S. fixed income	388,707,273	-	376,466,229	12,241,044
International fixed income - bonds	1,555,488	-	1,555,488	-
Total investments by fair value level	1,050,662,643	646,926,763	391,494,836	12,241,044
Total investments measured at net asset value (NAV):				
Hedge fund of funds	132,296,715			
Private equity funds	126,917,796			
Private real estate funds	135,886,596			
Total investments measured at NAV	395,101,107			
Total investments	1,445,763,750			

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND

Notes to Financial Statements
December 31, 2019 and 2018

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, 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:

Investments Measured at NAV

	Fair Value December 31, 2019	Fair Value December 31, 2018	Total Unfunded Commitments as of December 31, 2019	Redemption Frequency if Currently Eligible	Redemption Notice Period
Hedge fund of funds					
Diversified beta[1]	$ 100,773,343	$ 89,280,782	$ -	monthly	15-30 days
Fund of hedge fund[2]	54,024,745	30,533,980	-	quarterly	30-90 days
Opportunistic hedge fund[3]	9,063,752	12,481,953	3,110,401	N/A	N/A
Private equity funds[4]	130,141,024	126,917,796	75,762,364	N/A	N/A
Private real estate funds					
Open-ended real estate funds[5]	122,039,587	118,009,713	-	quarterly	30 days - 1 year
Closed-end real esate funds[6]	20,111,730	17,876,883	3,741,160	N/A	N/A
Total Investments Measured at NAV	**$ 436,154,181**	**$ 395,101,107**	**$ 82,613,925**		

[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 two fund of hedge fund managers; the managers provide 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.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Notes to Financial Statements

December 31, 2019 and 2018

[5] This category includes four 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.

(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, 2019 and 2018 was $51,484,334 and $37,155,764, 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, 2019 and 2018 was $50,977,072 and $51,913,451, respectively. The total value of AFL CIO Building Investment Trust at December 31, 2019 and 2018 was $16,796,387 and $16,290,413, respectively.

(6) Net Pension Liability

The components of the net pension liabilities of the MBTA Retirement Fund as of December 31, 2019 and 2018 are shown as follows (amounts in thousands):

		2019	2018
Total pension liability	$	3,021,110	2,916,801
Plan fiduciary net position		(1,614,144)	(1,449,695)
Fund's net pension liability	$	1,406,966	1,467,106
Plan fiduciary net position as a percentage of total pension liability		53.43 %	49.70 %

Actuarial Assumptions

The total pension liability was determined by an actuarial valuation as of December 31, 2019 and 2018, using the following actuarial assumptions:

- As of 12/31/19, 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
- Investment rate of return compounded annually in 2019 and 2018 of 7.25% and 7.50% per annum respectively
- Inflation rate of 2.75%

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND

Notes to Financial Statements
December 31, 2019 and 2018

For the actuarial valuation as of December 31, 2019 and 2018, 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.

The actuarial assumptions used in the December 31, 2019 valuation were based on the results of an actuarial experience study for the period from January 1, 2013, through December 31, 2017. 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, 2019, are summarized in the following table:

	Target asset allocation		Long-term expected real rate of return	
Asset class	2019	2018	2019	2018
Equity	43 %	43 %	8.39 %	7.91 %
Fixed income	25	25	1.99	2.36
Alternatives	30	30	7.16	6.67
Cash	2	2	0.53	1.06

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 2.75%.

(a) Discount Rate

The discount rate used to measure the total pension liability at December 31, 2019 and 2018, was 7.25% and 7.50%, respectively. 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.

(Continued)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND

Notes to Financial Statements
December 31, 2019 and 2018

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

The following presents the net pension liability as of December 31, 2019 and 2018, calculated using the discount rate of 7.25% and 7.50%, 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% and 6.50% or one percentage point higher 8.25% and 8.50% than the current rate (amounts in thousands):

		2019		
		1% Decrease (6.25%)	Current discount rate (7.25%)	1% Increase (8.25%)
Net pension liability	$	1,714,806	1,406,966	1,145,684

		2018		
		1% Decrease (6.50%)	Current discount rate (7.50%)	1% Increase (8.50%)
Net pension liability	$	1,760,361	1,467,106	1,217,856

(7) Subsequent Events

On March 11, 2020, an outbreak of the novel strain of coronavirus known as COVID-19 was declared a pandemic by the World Health Organization. Due to this, the financial markets have experienced and may continue to experience significant volatility. While much is still being learned, this outbreak is expected to affect the global economy as financial markets have declined. Management and the Fund's investment advisor will continue to monitor market conditions as information is available to evaluate the potential impacts, if any, on the value of its various investments and operations. Management is not yet able to quantify the impact but is continuing to monitor returns and investments.

As of the date of issuance, the MBTA Retirement Fund does not note any indication of an inability for the Fund to continue as a concern. Management will continue to monitor the situation and address any matters that may arise. However, there is no contingency, liability, or other accounting adjustments to be made as of the subsequent event date.

There have been no other subsequent events though June 22, 2020, 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)

		2019	2018	2017	2016	2015	2014
Total Pension Liability							
Service cost		47,942,711	46,101,006	31,850,127	31,896,560	37,305,333	34,500,540
Interest		214,112,586	207,497,686	204,779,603	195,768,057	191,392,028	184,667,178
Differences between expected and actual experience		(3,179,975)	11,599,381	44,627,096	90,067,566	31,325,149	48,560,391
Changes of assumptions		69,299,287	43,926,927	128,688,470	-	(6,762,751)	-
Benefit Payments		(223,864,973)	(221,710,054)	(212,814,757)	(197,561,539)	(188,906,232)	(184,130,187)
Net change in total pension liability		104,309,636	87,414,946	197,130,539	120,170,644	64,353,527	83,597,922
Total pension liability-beginning of year		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)		3,021,110,359	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		103,263,763	92,013,124	83,382,882	77,239,279	73,373,672	70,603,285
Contributions - emplopyee		36,366,108	32,606,337	29,775,344	27,791,543	26,510,946	25,318,224
Net investment income		253,730,990	(52,072,879)	221,690,618	86,782,343	4,711,246	73,543,477
Benefit payments		(223,864,973)	(221,710,054)	(212,814,757)	(197,561,539)	(188,906,232)	(184,130,187)
Administrative expenses		(5,046,775)	(4,317,624)	(4,463,775)	(6,493,777)	(5,808,086)	(4,052,664)
Net change in fiduciary net position		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		1,449,695,100	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)		1,614,144,213	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)	$	1,406,966,146	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		53.43%	49.70%	56.66%	56.44%	59.63%	64.88%
Covered payroll	$	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		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:

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 an increased net pension liability totaling $43.9 million.

2017: Discount rate decreased from 7.75% to 7.5% resulting in an increased net pension liability totaling $128.7 million.

2015: Retirement rates decreased the net pension liability by $(41.9) million, mortality rates increased the net pension liability by $25.4 million, termination rates increased the net pension liability by $8.9 million, and disability rates increased the net pension liability by $0.9 million, resulting in a decreased net pension liability totaling $(6.7) million.

See accompanying independent auditors' report.

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY RETIREMENT FUND

Required Supplementary Information
Schedule of Investment Returns
(Unaudited)

	2019	2018	2017	2016	2015	2014
Annual money-weighted rate of return, net of investment expense	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
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
2012	66,035,000	54,968,325	83.24	370,873,000	14.82
2011	60,691,000	52,278,311	86.14	366,535,000	14.26
2010	60,252,000	49,006,722	81.34	356,608,000	13.74

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, 2018 actuarial valuation was to be made during the period from July 1, 2019 through June 30, 2020.

Methods and assumptions used to determine the contributions for calendar 2019 and 2018 (based on 2018 and 2019 actuarial valuations).

- Salary – As of 12/31/19, 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 – 20 years (2019 valuation), 21 years (2018 valuation)
- Asset Valuation method – Five-year phase in smoothing method
- Investment rate of return – 7.25% (2019 valuation), 7.5% (2018 valuation) net of pension plan investment expense.
- Retirement Age – Probabilities of retirement are based on table that reflects both age and service
- Mortality
    - For the actuarial valuation as of December 31, 2019 & 2018, 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.

Schedule of Administrative Expenses

As of December 31,		2019	2018
Wages and Benefits			
Staff Salaries *	$	1,091,504	1,019,668
Retiree Payroll		292,752	310,598
Benefits		333,291	333,425
Total Personnel Services	**$**	**1,717,547**	**1,663,691**

*Interim Executive Director Salary = $196,000

Professional Services			
Actuarial	$	213,823	233,120
Audit		123,135	115,500
Extraordinary Consultant fees*		4,726	18,302
Legal Counsel		1,619,637	825,721
Disability Medical Exams		65,215	57,222
Total Professional Services	**$**	**2,026,536**	**1,249,865**
Communication			
Newsletter / Annual Report	$	17,445	20,617
Postage		9,165	10,629
Telephone		31,041	30,387
Education and Training		90,364	82,275
Manager Meetings		25,254	33,604
Member Services		5,901	5,667
Total Communication	**$**	**179,170**	**183,179**
Miscellaneous			
General and Administrative	$	42,866	38,270
Business Insurance		205,078	178,057
Rent		410,495	258,025
Technological Support**		465,083	746,537
Total Miscellaneous	**$**	**1,123,522**	**1,220,889**
Total Administrative Expenses	**$**	**5,046,775**	**4,317,624**

*Fees incurred in response to Markopolous allegations and in support of FTI Consulting investigation, and related matters.

**Implementation of Pension Technology Software

See accompanying Independent Auditors' Report

Schedule of Investment Expenses and Payments to Consultants

As of December 31,		**2019**	**2018**
Schedule of Investment Expenses			
Investment Management Fees	$	4,682,788	4,999,426
Investment Consultant Fees		344,000	344,000
Communications / Governmental Services		150,400	171,505
Custodial Fees		833,615	717,299
Total Investment Expenses	**$**	**6,010,803**	**6,232,229**
Schedule of Payments to Consultants*			
Independent Auditors	$	123,135	115,500
Extraordinary Consultant fees**		4,726	18,302
Actuary		213,823	233,120
Legal		1,619,637	825,721
Total Payments to Consultants	**$**	**1,961,321**	**1,192,643**

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

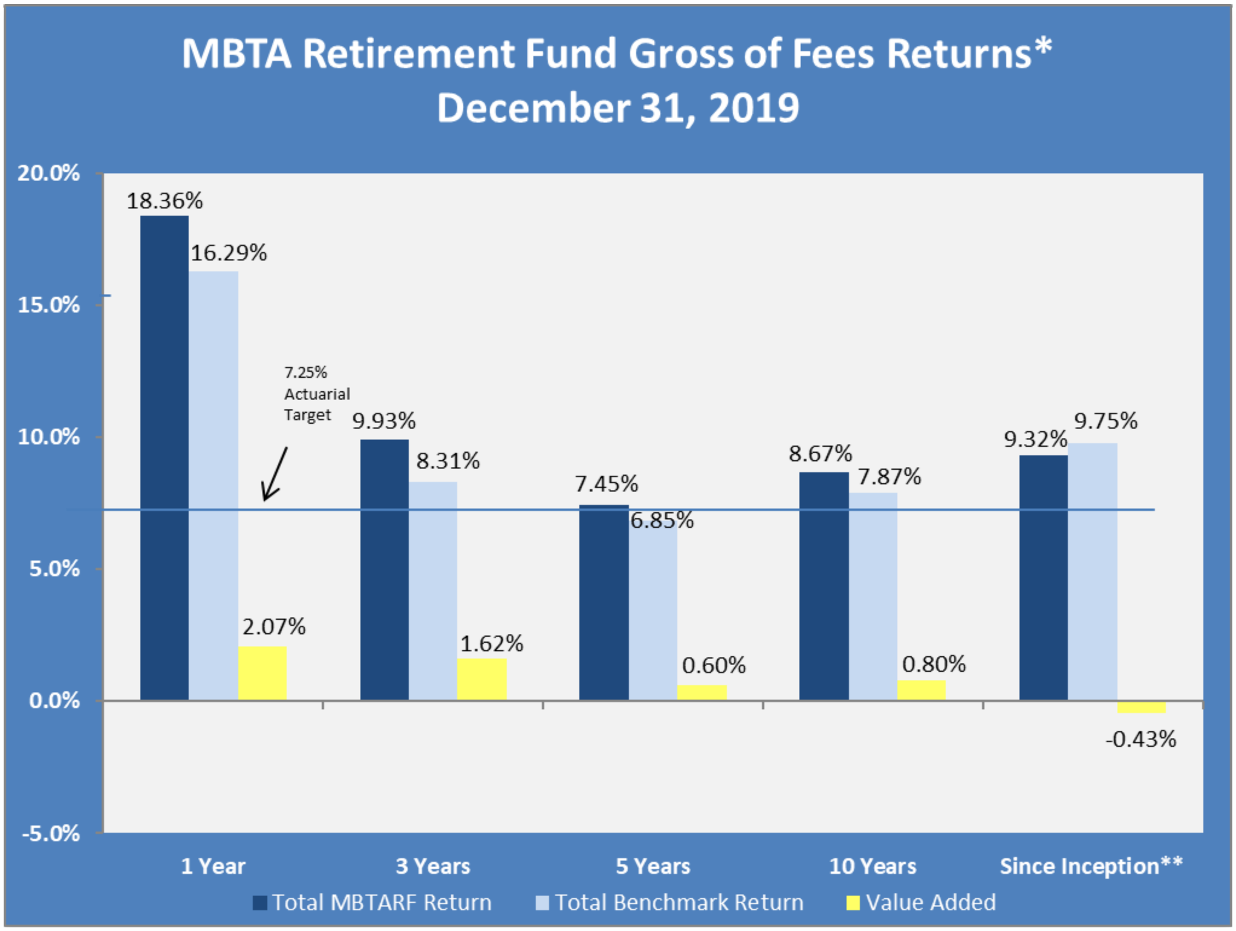
**Fees incurred in response to Markopolous allegations and in support of FTI Consulting investigation, and related matters.

See accompanying Independent Auditors' Report

INVESTMENT SECTION

(Unaudited)

2019 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”) 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 Comprehensive Annual Financial Report was calculated by the Fund’s custodian, State Street Bank & Trust Company, using a time-weighted rate of return based on the market value of assets.

As of December 31, 2019, the Board employed 15 public markets investment managers, 25 private equity market managers, 7 real estate managers, 2 hedge fund-of-funds managers, 1 opportunistic hedge fund manager and 2 risk parity/diversified beta managers. The Fund had approximately $1,614.1 million in assets under management at December 31, 2019. 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 Executive Director will direct investment managers to transfer funds to rebalance the asset allocation as necessary. The Executive Director shall use appropriate judgment and care when rebalancing portfolios.

Current Allocation as of 12/31/2019

Asset Class	12/31/2019 Allocation %	Target (%)
Equities	**44.8**	**43**
US Large Cap	18.7	18
US Small Cap	7.6	7
International Equity (unhedged)	9.0	9
International Small Cap	2.2	2
Global / Emerging Markets	7.3	7
Fixed Income	**24.4**	**25**
Core Fixed Income	7.7	8
TIPS	2.4	3
Real Estate Debt/Mortgages	3.6	4
Global & Multi Sector	8.4	8
Bank Loans	2.3	2
Cash*	3.6	2
Alternative Investments	**27.2**	**30**
Private Equity	8.1	10
Real Estate	8.8	9
Fund of Hedge Funds	3.4	4
Fund of Hedge Funds - Opportunistic	0.6	2
Risk Parity / Diversified Beta	6.3	5

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

The Year in Review – The World Markets

Fiscal Year 2019 Global Markets Overview

First Quarter 2019:

After a weak fourth quarter in 2018, markets were positive across the board. World equity markets surged during the first quarter of 2019. Fears over US/China trade relations lessened and the central banks became more accommodative.

U.S stocks were strong in the first quarter, gaining back much of what was lost in the previous quarter. Global stocks rallied on signs of progress in U.S. and China trade negotiations and clear indications that the Federal Reserve placed a hold on interest rate hikes. The financial markets responded favorably to the U.S. Federal Reserve's shift away from its monetary tightening bias. After a difficult end to 2018, developed markets outside of the U.S. rebounded to positive returns. European markets were resilient despite the overhang of Brexit, slowing economic data, and other political and monetary uncertainty. Emerging market equity also rose during the first quarter with more optimism surrounding trade talks between U.S. and China. The standout performer in emerging markets was China, which climbed nearly 18%.

U.S. Fixed income had positive performance in the quarter as investors favored riskier assets like corporate and high-yield bonds over Treasuries. Interest rates on hold and growth concerns in Europe led investors to safer assets which resulted in Non-U.S. fixed income gains.

Hedge funds ended the quarter in positive territory, with equity hedge strategies coming in as top performers.

Second Quarter 2019:

Markets continued to rise during the second quarter of 2019. As the Federal reserve suggested it may cut rates, economic data was broadly positive. U.S. GDP growth rose by 2.1%, consumer spending jumped and the unemployment rate fell. However, consumer confidence did fall as global trade tensions persisted and worries grew about the state of the global economy. Global GDP in countries such as the Eurozone, China and Japan modestly grew this quarter and unemployment in the Eurozone was the lowest-recorded rate since July 2008.

U.S. equity was positive for the quarter, as the S&P hit a new all-time record high towards the end of the quarter. The top performing sectors were financials, materials and technology, all of which were positive contributors. International equities were higher with the optimism over global trade and with the European Central Bank (ECB) not raising rates.

(Continued)

Emerging markets fell sharply in May after trade talks between the U.S. and China broke down. Stocks then recovered in June after the G20 meeting, when hopes for new trade talks emerged. Emerging markets ended the quarter slightly positive.

The prospect of an interest rate cut boosted investment grade credit and treasuries which resulted in U.S. fixed income to rise during the quarter. In addition, the Fed did not increase rates as its plans for future rate increases have been dashed due to uncertainty surrounding economic growth and the effect of trade tensions. International fixed income also performed well during the quarter, with investor expectations that central banks would keep monetary policy loose.

Hedge funds rose during the second quarter, global macro strategies were the top performers as they were able to take advantage of market inefficiencies in select pockets of the capital markets as headline risk increased.

Third Quarter 2019:

The Federal Reserve implemented two rate reductions this quarter, which led to positive economic data and global equity markets. Trade tensions cooled toward the end of the quarter encouraging increased consumer confidence. The trade issues were not limited to China and the U.S. – questions surrounded trade relations between the U.S. and Europe; and between Japan and South Korea. This trade risk led to underperformance in international stocks relative to domestic markets. Global trade uncertainty particularly hit countries that are tightly integrated with Chinese supply chains.

U.S. Equity markets were higher during the third quarter, while developed international and emerging markets were lower. After climbing through July, global equity markets dipped sharply in August, but then recovered into mid-September as new U.S. – China talks were announced and odds of a no-deal Brexit declined. International equities weakened with lackluster economic data. The ECB said it would restart quantitative easing to jumpstart growth. Emerging market equity also fell due to a stronger U.S. dollar and weakening global growth. All Emerging market sectors posted negative absolute returns, with the exception of tech.

Domestic Fixed Income markets rose for the third consecutive quarter and non-U.S. fixed income fell slightly with corporate bonds outperforming government bonds. Concern for economic growth increased due to the inverted yield curve, which is considered to be a leading indicator of recession.

Hedge funds declined as global macro strategies continued to be the top performer in the quarter. Emerging market strategies suffered the greatest losses, fueled by surprise primary election results in Argentina and growing tensions between the US and China that drove fears of an economic slowdown.

(Continued)

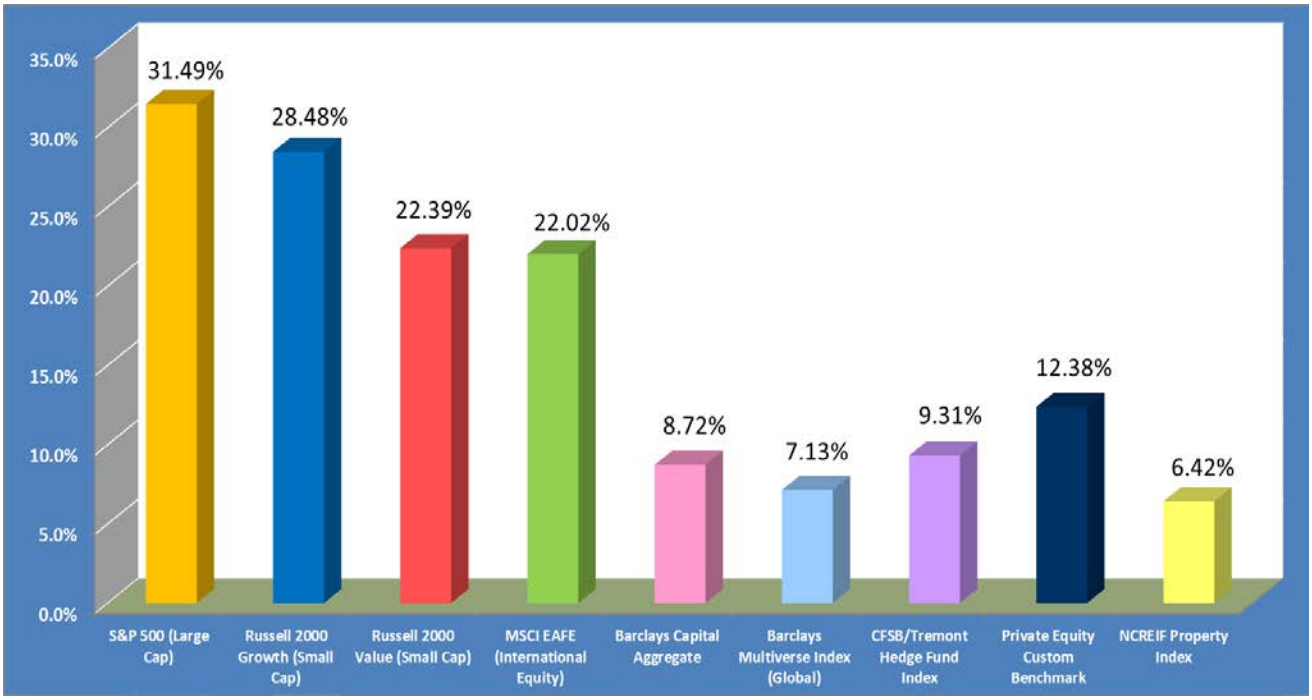
Fourth Quarter 2019:

Global trade tensions seemed to moderate early in the quarter which led the Fed to cut rates. In the U.S. growth in the fourth quarter resulted from trade, with exports increasing and imports falling. Consumer spending increased but business investment fell for the third quarter in a row. The progression of the U.S. Presidential impeachment proceedings provided no significant impact on the equity markets.

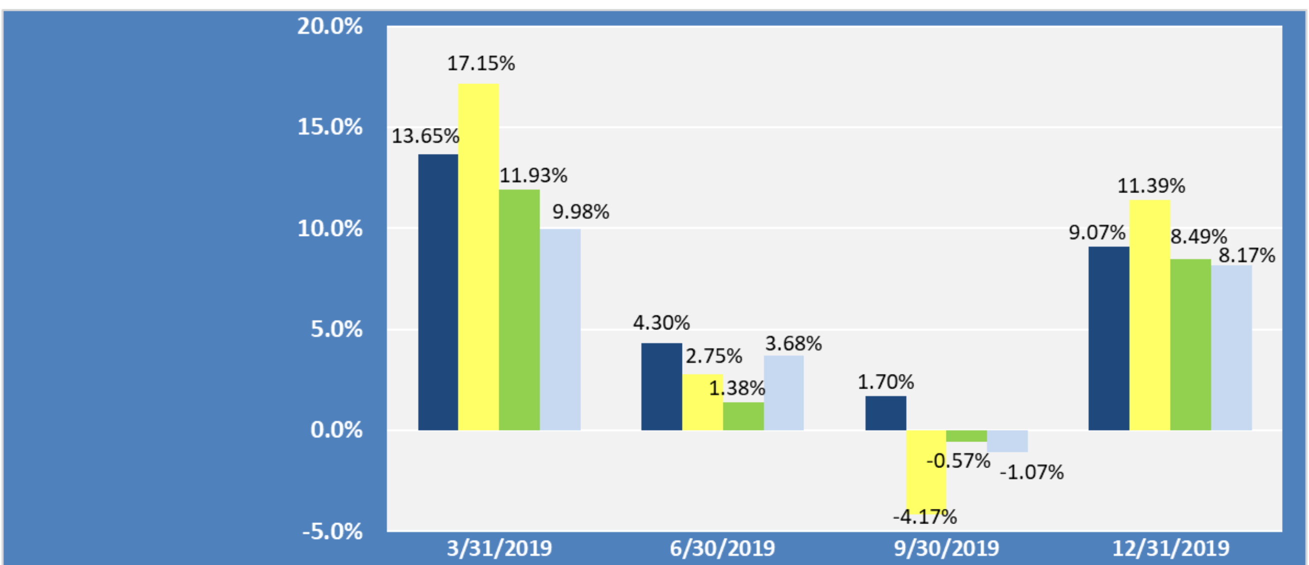
U.S. stocks were strongly positive due to a more optimistic trade outlook and stable economic data. Small cap and growth stocks outperformed large cap and value stocks. Technology was the largest gainer in 2019, up 50.3%. International equities also gained due to the brighter trade picture and strong economic data from Germany. Uncertainty around Brexit diminished during the fourth quarter, as conservative party leader, Boris Johnson's reelection seemed to increase the likelihood of an exit from the European Union. Emerging markets surged due to the weaker USD, monetary easing by major emerging markets central banks and the US and China agreeing to terms for 'phase one' trade deal.

U.S. fixed income continued to benefit from another drop in interest rates. The Fed cut rates again in the fourth quarter in an attempt to stimulate economic growth. The Treasury yield curve steepened as investors took a more optimistic view of the economy. International fixed income fell slightly as European yields rose with increasing political risk.

Fiscal Year 2019 Market Indices Returns

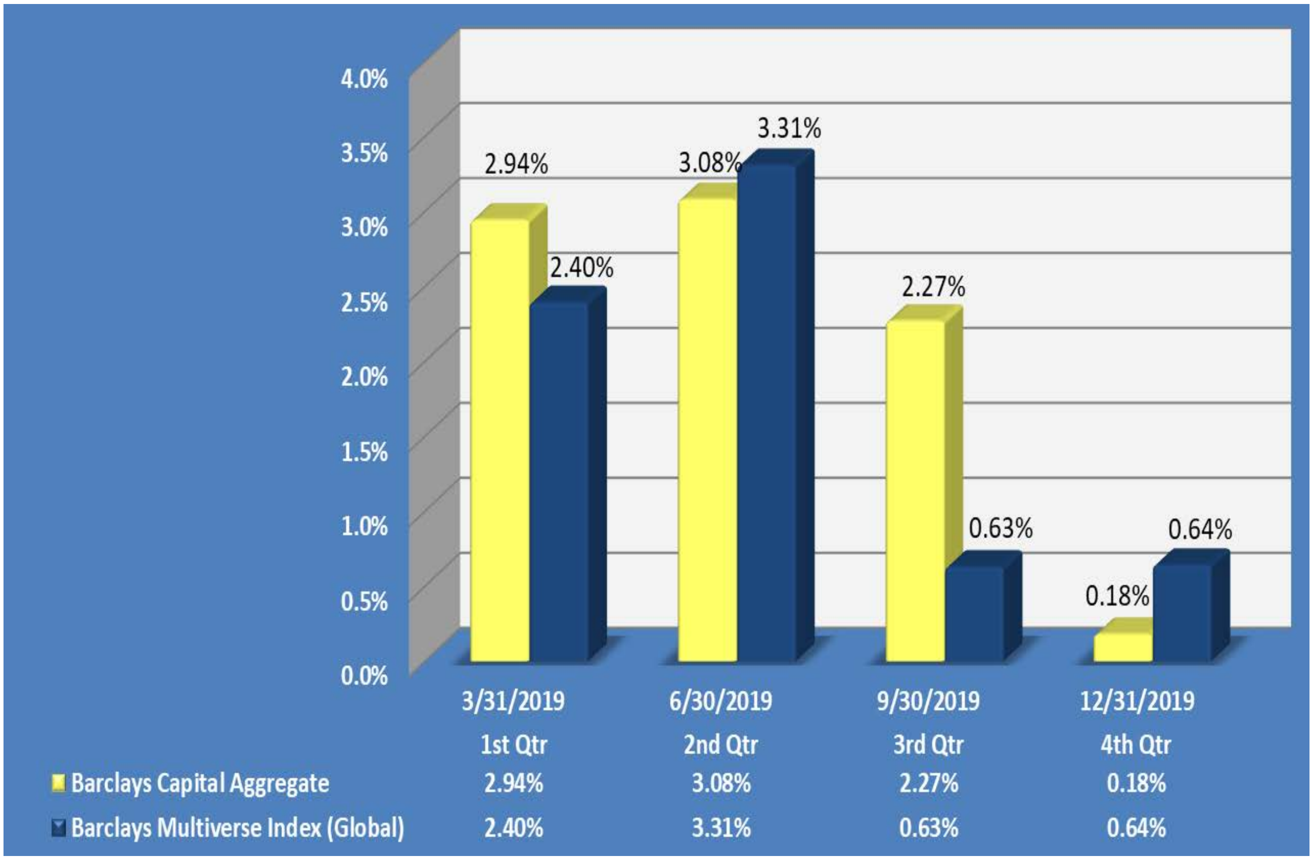


Fiscal Year 2019 Equity Indices by Quarter



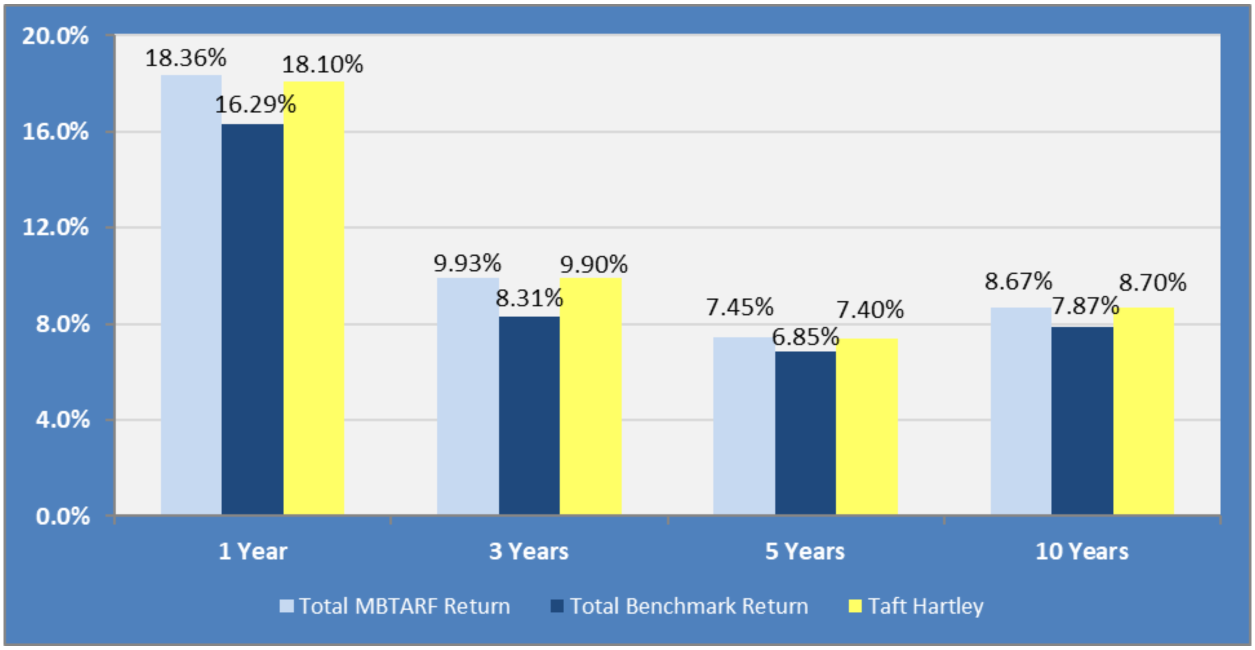
	3/31/2019 1st Qtr	6/30/2019 2nd Qtr	9/30/2019 3rd Qtr	12/31/2019 4th Qtr
S&P 500 (Large Cap)	13.65%	4.30%	1.70%	9.07%
Russell 2000 Growth (Small Cap)	17.15%	2.75%	-4.17%	11.39%
Russell 2000 Value (Small Cap)	11.93%	1.38%	-0.57%	8.49%
MSCI EAFE (International Equity)	9.98%	3.68%	-1.07%	8.17%

Fiscal Year 2019 Fixed Income Indices by Quarter



MBTARF Core Performance: Fiscal Year 2019

Returns are calculated based on a time-weighted rate of return methodology. The Fund's returns (gross of fees) and benchmarks for the periods ended December 31, 2019:



During fiscal year 2019, the Fund returned 18.36%, outperforming the Policy Benchmark of 16.29% by 207 basis points. The MBTARF began fiscal year 2019 with a net position of $1,450 million and ended with a $1,614 million net position. On a gross basis the Fund increased $164 million. $221 million in net retirement benefits were dispersed to members of the Fund.

The quarterly returns of the Fund in fiscal year 2019 were as follows:

	MBTARF Return	Policy Benchmark Return
1st Quarter	7.73%	6.91%
2nd Quarter	3.40%	3.07%
3rd Quarter	0.20%	0.76%
4th Quarter	6.04%	4.74%

2019 was a great year for investors with positive performance for every major asset class. The Federal Reserve turned its course of direction and lowered the interest rates three times to help U.S. economic growth. Furthermore, strong consumer spending powered some of the market gains.

(Continued)

For the full-year period, equities generated returns ranging from 22.02% for the EAFE index of non-U.S. developed markets stocks to 31.49% and 25.53% 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 7.13% for the Bloomberg Barclays Multiverse index to 8.72% for the Bloomberg Barclays U.S. Aggregate Index.

Among alternatives, real estate as measured by the NECREIF Property Index gained 6.42%. Diversified hedge funds gained 9.31% for the year based on the CFSB/Tremont Hedge Fund Index.

The MBTA Retirement Fund (the "Fund") generated a gross return of 18.36% in 2019, which ranked in the 22nd percentile of the InvMetrics Public Fund Gross Return universe for funds with market values of greater than $1 billion. The Fund's long-term investment objective is 7.25%. The Fund's annualized return since inception is 9.32%. The Fund's annualized return over the ten-year period ended December 2019 was 8.67% and ranked in the top 32% of the InvMetrics greater than $1 billion Public Pension Fund Universe. The Fund's returns for the three and five-year periods ended December 2019 were 9.93% and 7.45% and ranked in the 26th and 29th percentiles, respectively.

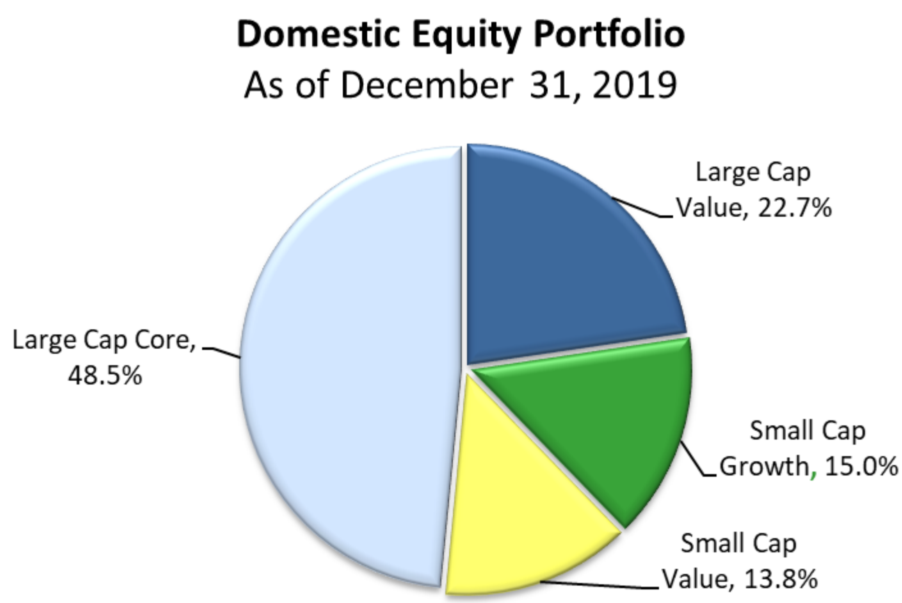
The MBTA Retirement Board authorized the following actions, among others, to position the Fund for long-term risk-adjusted returns, while addressing the Fund's policy framework and cost effectiveness:

- Underwent an IPS revision in order to update for current best practices. This re-write was completed in the spring of 2019.
- Terminated small cap value equity manager, Robeco Investment Management in April 2019. Transitioned assets and cash to SSGA Russell 2000 Index Fund.
- Completed and funded $20 million to PRIM's Hedge Fund Segmentation Program of the Portfolio Completion Asset Class in September 2019.
- Committed $25 million to PRIM's Private Equity Vintage Year 2020 Segmentation and $10M to Lexington Partners Secondary Fund IX in November 2020.
- The MBTARF Board of Directors approved an updated asset allocation effective April 1, 2020.

Investment Summary by Type

Domestic Equity Portfolio

As of December 31, 2019, the domestic equity portfolio had approximately $423.3 million in net assets, which represented 26.3% of the Fund portfolio. Approximately 71.2% of the domestic equity portfolio is invested in a large capitalization equity strategy (large cap) with the remaining 28.8% 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.



On a three, five and ten-year basis through December 31, 2019, the domestic equity portfolio has returned 13.76%, 10.56% and 13.65% compared to the S&P 500 benchmark, which returned 15.27%, 11.70% and 13.56% 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 30.16% compared to the S&P 500 benchmark, 31.49%. Large cap equity managers returned 30.55% underperforming the benchmark by (0.94) % and small cap equity returned 29.15% outperforming the Russell 2000 Index by 3.62%. The Fund had one large cap core indexed manager and one small cap value indexed manager. Of the two active large cap value managers, Aristotle exceeded their respective benchmark in 2019. Both of the two active small cap managers outperformed their respective benchmark in 2019.

The top ten holdings in the domestic equity portfolio at December 31, 2019 are illustrated below. A complete listing of holdings is available upon request.

Shares	Stock	Market Value ($000's)		% of fair value
34,776	ALIBABA GROUP HOLDING SP ADR	$	7,376	1.74%
35,971	VISA INC CLASS A SHARES		6,759	1.60
19,197	ASML HOLDING NV NY REG SHS		5,681	1.34
2,695	AMAZON.COM INC		4,980	1.18
20,984	EDWARDS LIFESCIENCES CORP		4,895	1.16
47,598	NIKE INC CL B		4,822	1.14
10,551	SHOPIFY INC CLASS A		4,195	0.99
25,246	WORKDAY INC CLASS A		4,152	0.98
110,321	BANK OF AMERICA CORP		3,886	0.92
18,394	GALAPAGOS NV SPON ADR		3,804	0.90
	Total Top Ten	**$**	**50,550**	**11.94%**

(Continued)

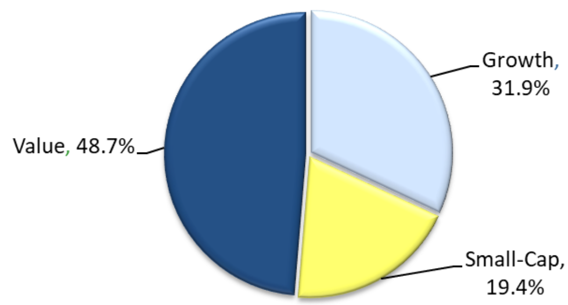
The MBTA Retirement Fund's domestic equity managers at December 31, 2019 are presented in the following table:

Manager	Investment Mandate	Portfolio Fair Value @ 12-31-2019
Alliance Bernstein	Small Cap Growth	$ 29,741,471
Aristotle Capital Management	Large Cap Value	48,761,667
Boston Partners	Large Cap Value	47,193,724
RBC Global Asset Management	Small Cap Growth	33,936,501
State Street Global Advisors	Small Cap Value	58,448,523
State Street Global Advisors	Large Cap Core	205,170,491
Private Equity Stock Distribution	Small Cap Value	24,553
Total Portfolio Fair Value:		**$ 423,276,930**

International Equity Portfolio

As of December 31, 2019, the international equity portfolio had approximately $179.2 million in net assets, representing 11.14% of the Fund portfolio. Two of the three actively managed 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.

International Equity Portfolio
As of December 31, 2019



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 up to 20% exposure in 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 22.93% outperforming the benchmark by 91 basis points. Principal Global Investors was the only international equity asset manager to outperform their respective benchmark in 2019.

(Continued)

On a three, five and ten-year basis through December 31, 2019, the international equity portfolio has returned 10.50%, 6.40% and 6.60% compared to the MSCI EAFE benchmark, which returned 9.56%, 5.67% and 5.50% respectively.

The top ten holdings in the international equity portfolio at December 31, 2019 are illustrated below. A complete listing of holdings is available upon request.

Shares	Stock	Market Value ($000's)	% of fair value
111,499	HOUSING DEVELOPMENT FINANCE	$ 3,769	2.10%
75,900	TENCENT HOLDINGS LTD	3,659	2.04
71,006	ZALANDO SE	3,601	2.01
10,100	KEYENCE CORP	3,577	2.00
1,187,900	CP ALL PCL FOREIGN	2,865	1.60
239,563	GVC HOLDINGS PLC	2,806	1.57
25,901	MARUTI SUZUKI INDIA LTD	2,674	1.49
155,286	TITAN CO LTD	2,584	1.44
3,115	ADYEN NV	2,556	1.43
498,591	DS SMITH PLC	2,538	1.42
	Total Top Ten	**$ 30,629**	**17.09%**

The MBTA Retirement Fund's international equity managers at December 31, 2019 are presented in the following table:

Manager	Investment Mandate	Portfolio Fair Value @ 12-31-2019
Gryphon International Investment Corp.	Growth	$ 57,266,977
Morgan Stanley Investment Management	Large Value	87,273,228
Principal Global Investors	Small Cap	34,701,539
Total Portfolio Fair Value:		**$ 179,241,744**

Global Equity and Emerging Market Portfolio

As of December 31, 2019, the global equity and emerging markets portfolio had approximately $116.6 million or 7.25% of MBTA Retirement Fund's assets. The MBTA Retirement Fund measures the investment manager's performance against the MSCI ALL Country World Index a benchmark comprised of stocks from 49 different countries including 23 countries classified as developed markets (including the United States) and 26 countries that are considered emerging markets.

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 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, 2019, the global and emerging markets portfolio's country and regional exposures included a 74% allocation to developed market stocks, which included a 47% allocation to U.S. stocks, and an approximately 22% allocation to emerging, markets stocks, which included a 10% allocation to holdings in India.

Portfolio Risks – In addition to providing the potential for higher expected returns, emerging markets generally expose investors to higher expected risks due 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, global equity and emerging market portfolio returned 31.95%, outperforming the benchmark by 5.35%. On a three and five-year basis through December 31, 2019, the global equity and emerging market portfolio has returned 21.89% and 13.29% compared to the MSCI All Country World Index, which returned 12.44% and 8.41% respectively. Due to the fact the MBTA Retirement Fund began investing in this asset class in October 2012, the investment manager's results do not yet include the ten-year period.

The top ten holdings in the global equity and emerging market portfolio at December 31, 2019 are illustrated below. A complete listing of holdings is available upon request.

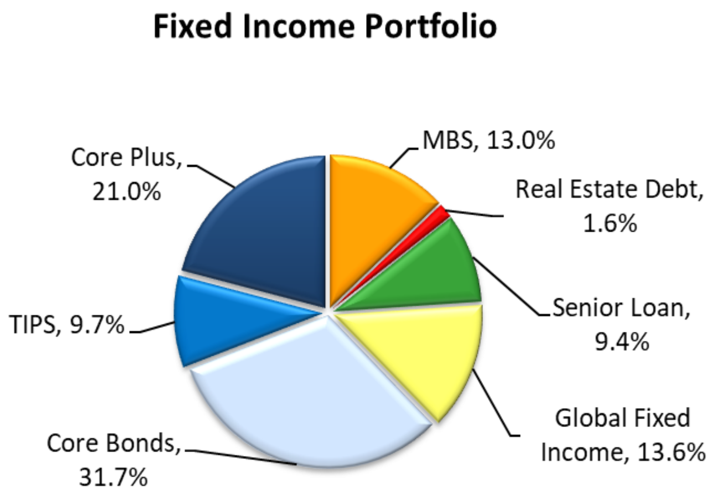
Shares	Stock	Market Value ($000's)	% of fair value
35,971	VISA INC CLASS A SHARES	$ 6,759	5.80%
28,786	ALIBABA GROUP HOLDING SP ADR	6,106	5.24
19,197	ASML HOLDING	5,681	4.87
2,695	AMAZON.COM INC	4,980	4.27
20,984	EDWARDS LIFESCIENCES CORP	4,895	4.20
47,598	NIKE INC CL B	4,822	4.14
10,551	SHOPIFY INC	4,195	3.60
25,246	WORKDAY INC CLASS A	4,152	3.56
18,394	GALAPAGOS NV SPON ADR	3,804	3.26
111,499	HOUSING DEVELOPMENT FINANCE	3,769	3.23
	Total Top Ten	**$ 49,163**	**42.17%**

The MBTA Retirement Fund's global equity and emerging market manager at December 31, 2019 is presented in the following table:

	Manager	Investment Mandate	Portfolio Fair Value @ 12-31-2019
SANDS CAPITAL	Sands Capital Management	Growth	$ 116,592,124

Fixed Income Portfolio

As of December 31, 2019, the fixed income portfolio had approximately $389.9 million in net assets, which represented 24.23% 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, BC U.S. TIPS and Barclays Multiverse.



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, and 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 7.08% underperforming the Barclays Aggregate Bond Index benchmark by 1.64%.

(Continued)

On a three, five and ten-year basis through December 31, 2019, the fixed income portfolio has returned 3.76%, 3.22% and 4.29% compared to the Barclays Aggregate Bond Index, which returned 4.03%, 3.05% and 3.75% respectively.

The top ten holdings in the fixed income portfolio at December 31, 2019 are illustrated below. A complete listing of holdings is available upon request.

Shares	Stock		Market Value ($000's)	% of fair value
7,014,000	US TREASURY N/B Due 06/30/2024	Rating NR	$ 7,036	1.80%
5,115,000	US TREASURY N/B Due 08/15/2048	Rating NR	5,775	1.48
3,357,000	US TREASURY N/B Due 05/15/2038	Rating NR	4,543	1.17
2,463,000	US TREASURY N/B Due 02/15/2036	Rating NR	3,270	0.84
2,565,000	US TREASURY N/B Due 05/15/2049	Rating NR	2,835	0.73
2,720,000	US TREASURY N/B Due 01/15/2025	Rating NR	2,829	0.73
2,307,599	TSY INFL IX N/B Due 01/15/2026	Rating NR	2,328	0.60
2,137,783	TSY INFL IX N/B Due 01/15/2026	Rating NR	2,203	0.56
2,197,686	TSY INFL IX N/B Due 01/15/2022	Rating NR	2,197	0.56
2,245,000	TSY INFL IX N/B Due 08/15/2029	Rating NR	2,189	0.56
	Total Top Ten		**$ 35,205**	**9.03%**

(Continued)

The MBTA Retirement Fund's fixed income managers at December 31, 2019 are presented in the following table:

Manager	Investment Mandate	Portfolio Fair Value @ 12-31-2019
AFL-CIO Housing	MBS	$ 50,977,072
Amalgamated Bank of New York	Real Estate Debt	6,139,319
Eaton Vance	Senior Loan	36,631,703
Franklin Templeton	Global FI	52,979,789
Income Research & Management	Core Bonds	123,490,104
IRM TIPS	TIPS	37,833,094
Loomis, Sayles & Company	Core Plus	81,860,654
Total Portfolio Fair Value:		**$ 389,911,735**

Real Estate Portfolio

As of December 31, 2019, the MBTA Retirement Fund had $142.2 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. These 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 seventy percent of the value of that fund. However, as a general guideline, the Fund's composite real estate portfolio shall never be more than fifty percent levered on an aggregate basis at any time.

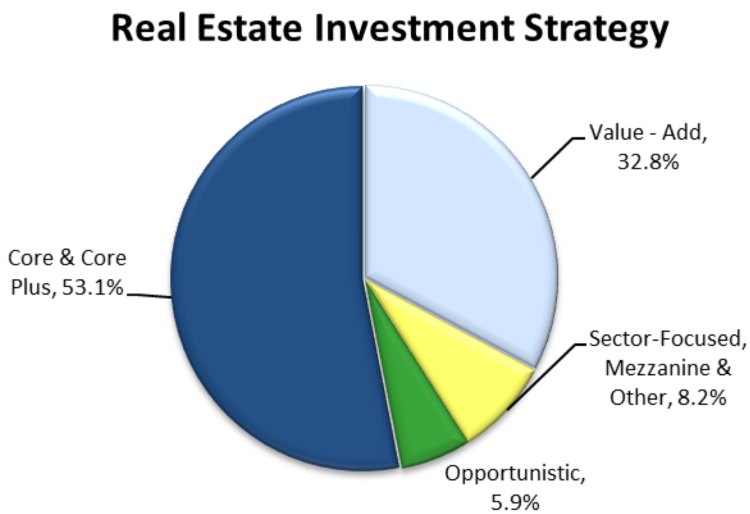
Real Estate Investment Strategies - Private real estate equity strategies include core, core plus, value-added and opportunistic approaches. Core diversified funds have lower risk due to their limited use of leverage and broad diversification across multiple property types, geographic regions, and income 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 4 active closed end real estate funds, 2 funds with a total market value of $17.0 million are in the investing stage of their lifecycle; 1 fund accounting for $2.3 million in market value is in the harvesting stage, while 1 fund accounting for less than one million in market value is liquidating its underlying investments.

(Continued)

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



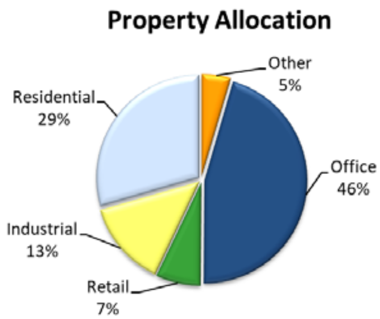
Portfolio Returns – The MBTARF real estate portfolio returned 6.11% during the fiscal year. The 3, 5 and 10 year returns for the real estate portfolio are 8.04%, 9.42%, and 11.48%, respectively. The NCREIF Benchmark returned 6.42% during the fiscal year. The benchmark's 3, 5, and 10-year returns are 6.70%, 8.25%, and 10.18%, respectively.

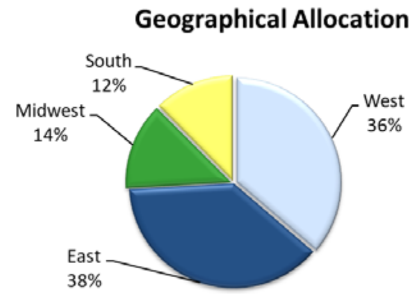
The MBTARF real estate portfolio received $2.9 million in distributions during the fiscal year ended December 31, 2019, compared to the $14.7 million in distributions received during the 2018 fiscal year. The MBTARF's real estate managers called $1.8 million of capital during the 2019 fiscal year, compared to $3.0 million of capital called during the 2018 fiscal year. The net cash flow from the MBTARF's real estate portfolio for the year ended December 31, 2019 was a net cash inflow of $1.1 million, compared to a net inflow of $11.7million for the fiscal year ended December 31, 2018.

(Continued)

Geographic Diversification

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





The MBTA Retirement Real Estate managers at December 31, 2019 are presented in the following table:

	Manager	Investment Mandate	Portfolio Fair Value @ 12-31-2019
	AFL CIO BLDG INVST TR	Open Ended	$ 16,796,387
	COLONY INVESTORS VII LP	Opportunistic	878,700
	INTERCONTINENAL REAL ESTATE CORP	Open Ended	20,613,312
	JP MORGAN ASSET MANAGEMENT	Open Ended	46,688,203
	BENTALL GREEN OAK	Open Ended	37,941,685
	PRUDENTIAL REAL ESTATE INVESTORS	Sector Focused	11,709,784
	SIGULER GUFF & COMPANY	Opportunistic	7,523,246
	Total Portfolio Fair Value:		**$ 142,151,317**

Risk Parity / Diversified Beta Portfolio:

As of December 31, 2019, the MBTA Retirement Fund had $100.8 million invested in the risk parity portfolio, representing 6.27% of the total Fund. The Risk Parity managers utilizes 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. The Risk Parity managers may invest a substantial portion of its assets in “derivatives” –so-called 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. This may happen for various reasons, including 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. The use of derivatives facilitates the ability to create the desired level of leverage in the portfolio. Leverage may cause the portfolio to be more volatile than if the portfolio had not been leveraged because leverage can exaggerate the effect of any increase or decrease in the value of securities held by the portfolio.

(Continued)

Portfolio Returns - For the calendar year 2019, the Risk Parity / Diversified Beta portfolio returned 18.73% underperforming the asset class benchmark, (60% MSCI World Equity / 40% Barclays Aggregate Bond Index) by 1.28%.

On a three and five-year basis through December 31, 2019, the Risk Parity / Diversified Beta portfolio has returned 7.50% and 6.33% compared to its benchmark, which returned 9.27% and 6.63% respectively. The MBTA Retirement Fund began investing in this asset class in 2012. Due to this 10-year returns are not yet available.

The MBTA Retirement Fund's Risk Parity / Diversified Beta managers at December 31, 2019 are presented in the following table:

	Manager	Investment Mandate	Portfolio Fair Value @ 12-31-2019
Invesco	Invesco	Diversified Beta	$ 54,356,292
PanAgora	PanAgora Asset Management	Risk Parity	46,417,051
	Total Portfolio Fair Value:		**$ 100,773,343**

Fund of Hedge Fund Portfolio

As of December 31, 2019, the MBTARF's fund of hedge fund portfolio held $54.0 million in net assets, which represented 3.36% 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, but that 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. Credit risk 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 15.12% for the fiscal year. The MBTARF uses the CSFB/Tremont Hedge Fund Index as a benchmark for hedge fund performance. The benchmark returned 9.31% in the 2019 fiscal year. On a 3, 5, and 10-year basis, the MBTARF hedge fund portfolio returned 2.37%, 0.60%, and 3.35%, respectively. The benchmark returned 4.27%, 2.65%, and 4.25%, respectively, over the same 3, 5, and 10-year periods.

In September 2019, the Board of Trustees authorized an investment of $20 million to the Hedge Fund Segmentation of the Portfolio Completion Asset Class managed by Pension Reserves Investment Management (PRIM). This investment was the first allocation by the MBTARF to a PRIM managed product.

(Continued)

The MBTARF hedge fund portfolio has two active fund of hedge fund investment managers as of December 31, 2019.

	Manager	Investment Mandate	Portfolio Fair Value @ 12-31-2019
	Pension Reserves Investment Management	Fund of Funds	$ 20,343,348
	The Rock Creek Group	Fund of Funds	33,681,397
	Total Portfolio Fair Value:		**$ 54,024,745**

Fund of Hedge Fund - Opportunistic Portfolio

As of December 31, 2019, the MBTARF's fund of hedge fund - opportunistic portfolio held $9.1 million in net assets, which represented 0.57% 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 16.25% for fiscal year 2019. The MBTARF uses the Bank of America/Merrill Lynch High Yield Index as a benchmark for performance, which returned 14.41% in 2019. The first full year the MBTA Retirement Fund began investing in this asset class was 2018. Due to this, 3, 5 and 10-year returns are not yet available.

The MBTARF opportunistic hedge fund of fund portfolio held one active investment as of December 31, 2019. The manager is presented in the following table:

	Manager	Investment Mandate	Portfolio Fair Value @ 12-31-2019
Hamilton Lane	Hamilton Lane	Fund of Funds - Opportunistic	$ 9,063,752
	Total Portfolio Fair Value:		**$ 9,063,752**

Private Equity Portfolio

As of December 31, 2019, the private equity portfolio had approximately $130.1 million in net assets, which represented 8.09% 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, mezzanine, 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. Vintage risk 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.

(Continued)

- ***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.
- ***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 active private equity portfolio returned 13.68% during the fiscal year. The 3, 5 and 10 year returns for the private equity active portfolio are 10.32%, 6.75%, and 7.57%, respectively. The MBTARF's State Street Customized Benchmark returned 12.38% during the fiscal year. The benchmark's 3, 5, and 10-year returns are 12.54%, 11.15%, and 12.65%, respectively. The legacy portfolio, vintage years prior to 2005, returned 16.31% during the calendar year. The 3, 5 and 10 year returns for the private equity legacy portfolio are 2.92%, (8.53) % and 2.28% respectively.

The MBTARF private equity portfolio received $25.5 million in distributions during the fiscal year 2019, compared to $33.4 million in the 2018 fiscal year. The private equity portfolio

(Continued)

managers called $12.6 million of capital during the fiscal year 2019, compared to $17.2 million called in the 2018 fiscal year. The net cash flow from the private equity portfolio was an inflow of $12.9 million in fiscal year 2019, compared to an inflow of $16.2 million in fiscal year 2018.

(Continued)

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

Manager	Investment Mandate	Portfolio Fair Value 12-31-2019	Manager	Investment Mandate	Portfolio Fair Value 12-31-2019
ADD ONE PARTNERS	Venture	123,916	QUADRANGLE CAPITAL PARTNERS II	Buyout	331,877
ASCENT VENTURES III	Venture	174,337	SCP PARTNERS II	Venture	815,206
BOSTON MILLENNIA II	Venture	528,426	SCULPTOR ENERGY FUND	Energy	366,982
CRESCENDO IV	Venture	443,083	SIGULER GUFF BRIC OPPN FDII	Buyout	2,193,498
CRESCENT MEZZ PARTNERS VIIB	Mezzanine	2,581,593	SIGULER GUFF DISTRESSED OPP III	Distressed	1,652,557
EUROPEAN STRATEGIC II	Buyout	60,057	SL CAPITAL ESF I	Buyout	5,010,473
EUROPEAN STRATEGIC PARTNERS 2006B	Buyout	953,375	SL CAPITAL SOF II	Secondary Fund of Funds	4,571,805
EUROPEAN STRATEGIC PARTNERS 2008A	Buyout	3,499,881	STERLING CAPITAL PARTNERS	Growth Equity	269,580
GROSVENOR OPPOR CREDIT III	Special Situations	843,041	STERLING CAPITAL PARTNERS II	Growth Equity	484,184
LAZARD TECHNOLOGY II	Venture	971,950	STERLING CAPITAL PARTNERS III	Growth Equity	452,531
LEXINGTON CAPITAL PARTNERS VIB	Secondary Fund of Funds	791,334	STERLING CAPITAL PARTNERS IV	Growth Equity	2,198,726
LEXINGTON CAPITAL PTNRS VII	Secondary Fund of Funds	2,315,835	SVB STRATEGIC INVESTORS VIII	Venture	4,793,736
LEXINGTON CAPITAL PTNRS VIII	Secondary Fund of Funds	7,126,850	SVB CAPITAL PARTNERS II	Venture	793,128
LEXINGTON MID MARKET II	Secondary Fund of Funds	2,285,928	SVB CAPITAL PARTNERS III	Venture	12,929,778
LEXINGTON MID MARKET III	Secondary Fund of Funds	5,406,004	SVB STRATEGIC INVESTORS III	Venture	3,436,066
LEXINGTON MIDDLE MARKET	Secondary Fund of Funds	831,716	TCW CRESCENT MEZZANINE V	Mezzanine	228,504
LEXINGTON MIDDLE MARKET IV	Secondary Fund of Funds	1,675,901	THOMAS H LEE EQUITY FUND VI	Buyout	391,781
NEW MOUNTAIN PARTNERS II	Buyout	53,646	TOP TIER VENTURE VELOCITY FUND	Secondary Fund of Funds	5,184,683
NEW MOUNTAIN PARTNERS III	Buyout	3,869,799	VENTURE LENDING + LEASING IV	Mezzanine	95,450
NEW MOUNTAIN PARTNERS IV	Buyout	3,858,692	VENTURE LENDING + LEASING V	Mezzanine	558,375
NEW MOUNTAIN PARTNERS V	Buyout	6,125,575	VENTURE LENDING + LEASING VI	Mezzanine	2,297,456
OAKTREE MEZZANINE FUND - CLASS A	Mezzanine	14,744	VENTURE LENDING + LEASING VII	Mezzanine	4,462,350
OAKTREE MEZZANINE FUND - CLASS B	Mezzanine	287,583	VENTURE LENDING + LEASING VIII	Mezzanine	6,044,214
OPUS CAPITAL VENTURE PARTNERS V	Venture	3,220,198	VENTURE LENDING + LEASING IX	Mezzanine	2,610,686
PHAROS CAPITAL	Growth Equity	579,547	WELLINGTON PARTNERS II	Venture	689,592
PHAROS CAPITAL II	Growth Equity	4,123,046	WLR RECOVERY FUND V	Special Situations	3,849,951
PHAROS CAPITAL PARTNERS III	Growth Equity	6,918,350	Z CAPITAL SPECIAL SIT. FD II	Special Situations	3,763,448
			Total Portfolio Fair Value		**$ 130,141,024**

SCHEDULE OF TIME-WEIGHTED RETURNS BY ASSET CLASS*

For the Period Ended December 31, 2019

	Annualized Returns		Annual Returns				
Portfolio	3 - Year	5 - Year	2019	2018	2017	2016	2015
Total Fund	9.93	7.45	18.36	(3.08)	15.80	6.88	0.90
Policy Benchmark	8.31	6.85	16.29	(2.57)	12.60	7.42	2.01
Taft Hartley - Median	9.90	7.40	18.10	(3.20)	14.30	7.50	1.10
Domestic Equity Large Cap Composite	14.47	10.58	30.55	(5.85)	22.04	10.39	(0.16)
S&P 500 Index	15.27	11.70	31.49	(4.38)	21.83	11.96	1.38
Domestic Equity Small Cap Composite	12.00	10.40	29.15	(7.34)	17.41	18.63	(1.62)
Russell 2000 Growth Index	12.49	9.34	28.48	(9.31)	22.17	11.32	(1.38)
Russell 2000 Value Index	4.77	6.99	22.39	(12.86)	7.84	31.74	(7.47)
Global Emerging Markets Composite	21.89	13.29	31.95	(1.88)	39.87	1.63	1.40
MSCI ALL Country World	12.44	8.41	26.60	(9.41)	23.97	7.86	(2.36)
International Equity Composite	10.50	6.40	22.93	(16.14)	30.91	(0.96)	2.02
MSCI EAFE	9.56	5.67	22.02	(13.79)	25.62	1.00	(0.81)
Fixed Income Composite	3.76	3.22	7.08	(0.20)	4.51	5.55	(0.60)
Barclays Aggregate	4.03	3.05	8.72	0.01	3.54	2.65	0.55
Diversified Beta	7.50	6.33	18.73	(6.29)	11.67	12.90	(3.15)
60% MSCI World Eq / 40% BC Agg Bond	9.27	6.63	20.01	(5.07)	14.52	5.71	(0.07)
Hedge Funds	2.37	0.60	15.12	(12.60)	6.62	0.39	(4.31)
CSFB/Tremont Hedge Fund Index	4.27	2.65	9.31	(3.19)	7.12	1.25	(0.71)
Hedge Funds - Opportunistic	-	-	16.25	7.87	3.46	-	-
Bank of America/Merrill Lynch HY Index	-	-	14.41	(2.26)	1.31	-	-
Private Equity:							
Active Portfolio	10.32	6.75	13.68	4.82	12.66	4.84	6.83
Legacy Portfolio (vintage years prior to 2005)	2.92	(8.53)	16.31	3.21	(3.88)	(4.70)	(6.52)
State Street Customized Benchmark	12.54	11.15	12.38	8.70	17.59	10.61	5.40
Real Estate Composite	8.04	9.42	6.11	9.93	8.11	9.18	13.94
NCREIF Property Index	6.70	8.25	6.42	6.72	6.96	7.97	13.33

Policy Benchmark:

10% State Street PE	7% MSCI All County World Index (net)
11% S&P EPAC Large/Mid Cap	9% Barclays Aggregate Bond
17% S&P 500	3% Barclays U.S. TIPS 1-10 yr
1% Russell 3000	3% Barclays MBS
7% Russell 2000	8% Barclays Multiuniverse
11% 91 T-Bill plus 300 BP	2% S&P LSTA
9% NCREIF Property Index	

* 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, 2019

	Fair Value	% of Fair Value
Short-Term:		
Cash and cash equivalents*	$ 63,765,544	3.96%
Fixed Income:		
U.S. Agencies	55,531,102	3.45
US Treasury	75,590,389	4.70
Domestic fixed income	185,592,597	11.54
International fixed income	2,050,088	0.13
Asset Backed	70,621,985	4.39
Equity:		
Domestic equity securities	507,511,655	31.54
International equity securities	212,124,717	13.18
Real Estate	142,151,317	8.84
Private Equity	130,141,024	8.09
Risk Parity	100,773,343	6.26
Hedge Funds	54,024,745	3.36
Hedge Funds - Opportunistic	9,063,752	0.56
Total Investments	$ 1,608,942,258	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, 2019

Brokerage Firm	Shares/Par Value		Fees Paid	% Total	Average $ per share
RBS SECURITIES INC.	5,037	$	60,583	25.34%	12.0276
J.P. MORGAN SECURITIES PLC	560,963		23,752	9.93%	0.0423
STATE STREET BANK AND TRUST COMPANY	988,676		19,541	8.17%	0.0198
GOLDMAN SACHS + CO LLC	631,505		12,687	5.31%	0.0201
CREDIT SUISSE SECURITIES (USA) LLC	622,856		11,919	4.98%	0.0191
MORGAN STANLEY CO INCORPORATED	445,109		7,305	3.06%	0.0164
J P MORGAN INDIA PRIVATE LTD	801,475		5,983	2.50%	0.0075
J.P. MORGAN SECURITIES LLC	223,296		4,711	1.97%	0.0211
BOFA SECURITIES, INC.	193,317		4,562	1.91%	0.0236
JEFFERIES + COMPANY INC	177,127		4,509	1.89%	0.0255
UBS SECURITIES LLC	176,228		4,336	1.81%	0.0246
FIDELITY CAPITAL MARKETS	190,114		3,526	1.47%	0.0185
MORGAN STANLEY INDIA COMPANY PVT LTD	328,107		3,304	1.38%	0.0101
CITIGROUP GLOBAL MARKETS INC	122,679		3,277	1.37%	0.0267
UBS SECURITIES ASIA LTD	417,700		3,265	1.37%	0.0078
MERRILL LYNCH INTERNATIONAL	370,264		2,898	1.21%	0.0078
HSBC SECURITIES (USA) INC.	153,770		2,562	1.07%	0.0167
EXANE S.A.	612,808		2,522	1.05%	0.0041
BARCLAYS CAPITAL LE	110,182		2,443	1.02%	0.0222
HSBC BROKERAGE (USA) INC.	81,422		2,426	1.01%	0.0298
BARCLAYS CAPITAL	243,141		2,096	0.88%	0.0086
COWEN AND COMPANY, LLC	97,622		2,023	0.85%	0.0207
J P MORGAN SECURITIES INC	84,424		2,011	0.84%	0.0238
WILLIAM BLAIR & COMPANY L.L.C	55,219		1,957	0.82%	0.0354
JOH. BERENBERG, GOSSLER & CO. KG	61,873		1,806	0.76%	0.0292
OTHER	4,822,024		43,124	18.03%	0.0089
TOTAL	**12,576,938**	**$**	**239,125**	**100%**	**0.0190**

The Fund Board has a commission recapture agreement with Capital Institutional Services, Inc. For the year ended December 31, 2019 the Fund earned approximately $1,500 from the commission recapture program.

SCHEDULE OF DIRECT MANAGEMENT FEES
Year Ended December 31, 2019

Investment Management Fees by Asset Class:	**AUM ($000s)**	**Fees ($000s)**
Domestic Equity	$ 507,512	$ 1,010
International Equity	146,829	1,145
Global Equity	116,592	747
Fixed Income	389,912	731
Risk Parity / Diversified Beta	100,773	211
Real Estate	122,040	839
Total Investment Management Fees		4,683
Investment Advisory (Consulting) Fees		$ 344
Communications and Governmental Services		150
Custodian Fees		834
Total Other Fees		1,328
Total Direct Management Fees charged to MBTARF		$ 6,011

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 (this "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 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 in order to lower costs. 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, and 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. 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.

(Continued)

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, 2019 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 Comprehensive Annual Financial Report (CAFR).

BUCK

500 Plaza Drive
Secaucus, NJ 07096

May 18, 2020

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, 2019.

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 2019 and effective with the actuarial valuation of December 31, 2018, on the basis of an experience study covering the period January 1, 2013, through December 31, 2017. In April 2020, the Board voted to change the assumed annual rate of return on assets to 7.25% in connection with a revision of the Fund's investment policy. 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 Comprehensive Annual Financial Report (CAFR):

1. Summary of Principal Results
2. Number and annual retirement allowances of retired members, disabled members and beneficiaries as of December 31, 2019
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, 2019
7. Number and Annual Retirement Allowances Distributed by Age as of December 31, 2019

The following exhibits were separately prepared by Buck Global, LLC for use in the CAFR:

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

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 ASOP 51, a risk assessment is provided in Section X of the valuation report.

Where presented, references to “funded ratio” and “unfunded accrued liability” are typically measured on an 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 makes no assessment regarding 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.

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, 2018	December 31, 2019
Number of active members	5,392	5,507
Annual compensation of all members	$ 425,862,201	$ 436,828,077
Annual compensation of active members below normal retirement age	$ 423,075,288	$ 433,576,596
Average age (years)	47.74	47.86
Average service (years)	10.65	10.65
Average compensation	$ 78,980	$ 79,322
Number of active members not accumulating creditable service	355	390
Number of retired members, beneficiaries and disabled members	6,841[1]	6,813[2]
Annual retirement allowances	$ 221,256,116	$ 222,551,908
Assets for funding purposes	$ 1,559,452,659	$ 1,561,192,531
Unfunded accrued liability	$ 1,357,348,064	$ 1,459,917,828
Contribution rates required:		
Normal	11.3300%	12.0000%
Accrued liability	21.6200%	22.9900%
Expenses	1.0000%	1.0000%
Total required rate	33.9500%	35.9900%
Member excess rate	0.0000%	0.0000%
Actual contribution rate during following fiscal year	33.9500%	35.9900%

2. Valuation results as of December 31, 2019, 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, 2017. The Retirement Board voted to adopt these assumptions in April 2019. In addition, the Retirement Board changed the assumed interest rate used in funding calculations from 7.50% to 7.25%, effective with the December 31, 2019 valuation.

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 6,714 retirees and beneficiaries and 127 individuals receiving payments under QDROs.
[2] Includes 6,678 retirees and beneficiaries and 135 individuals receiving payments under QDROs.

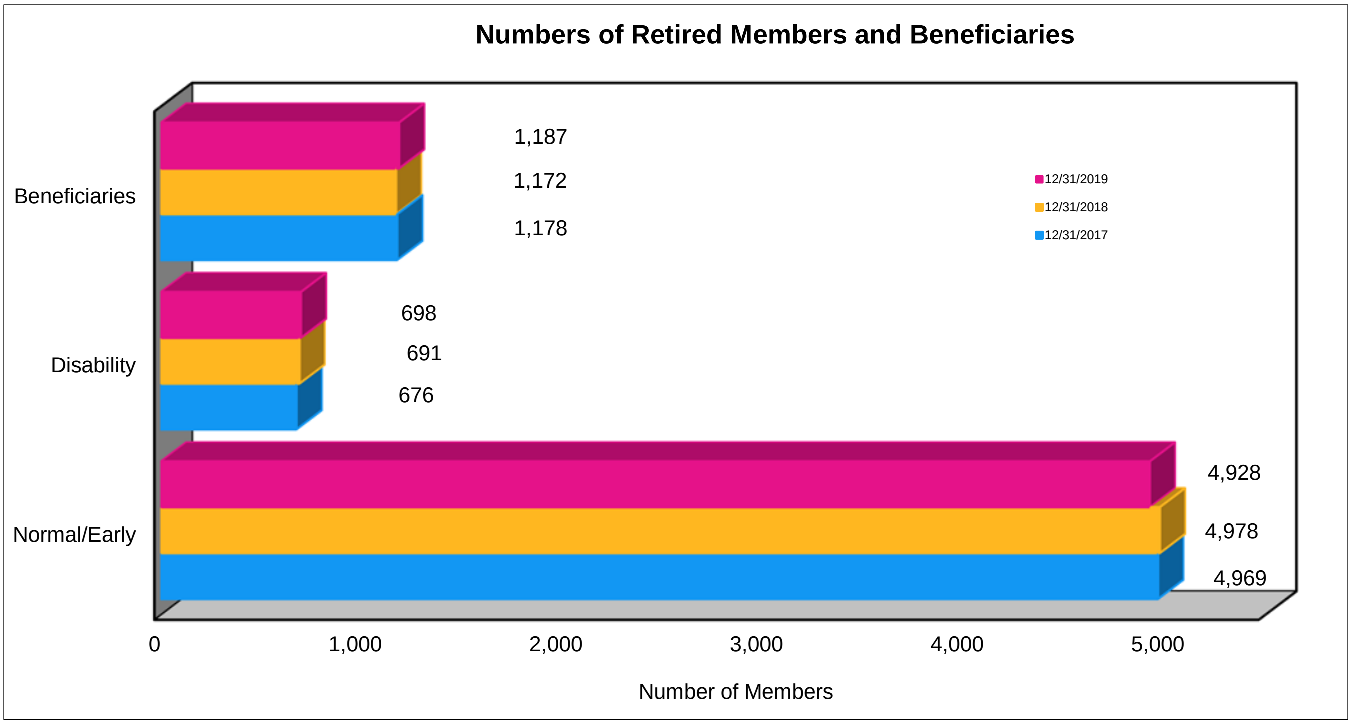
Section III - Membership Data

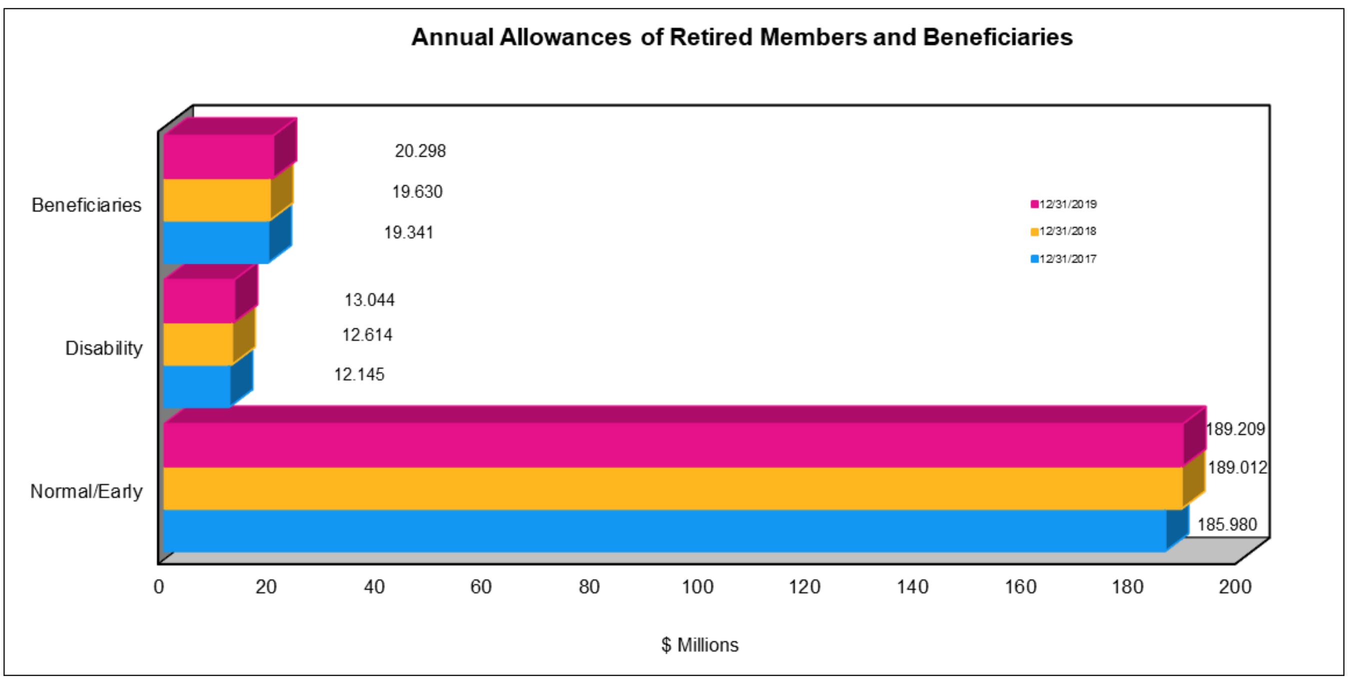
1. Employee data were furnished by the Authority and Retirement Fund.
2. Table 1 of Schedule D shows the number and annual compensation of active members, while Table 2 of Schedule D shows the number and annual retirement allowances of retired members, disabled members and beneficiaries.
3. The following table summarizes the number and annual retirement allowances of retired members, disabled members and beneficiaries as of December 31, 2019:

Category	Number	Annual Retirement Allowances
Benefits to Members Retired on Normal, Early Normal and Reduced Early Retirement Allowances	4,928	$ 189,209,163
Benefits to Members Retired on Disability Retirement Allowances	698	13,044,261
Benefits to Beneficiaries of Deceased Members[1]	1,187	20,298,484
Total	6,813	$ 222,551,908

[1] Includes individuals receiving payments under QDROs.

Section III - Membership Data (continued)





Section IV - Assets

1. Asset information was obtained from the Retirement Fund office.
2. The market value of the Fund's net assets available for benefits as of December 31, 2019, amounted to $1,614,144,213.
3. The asset method is a five-year phase-in smoothing method 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%. 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, 2019 is presented below:

Market value as of December 31, 2019					1,614,144,213	(A)
Adjustment to recognize asset gains (losses) over 5 years:						
Year Ending	Asset gain (loss)	X	Adjustment factor	=	Adjustment	
12/31/2019	148,351,928		0.80		118,681,542	
12/31/2018	(168,508,286)		0.60		(101,104,971)	
12/31/2017	104,247,073		0.40		41,698,829	
12/31/2016	(31,618,592)		0.20		(6,323,718)	
Total					52,951,682	(B)
Actuarial value of assets, as of December 31, 2019					1,561,192,531	
Asset gain during fiscal year ending December 31, 2019						
Actual return on market value and cash flow						
Income from investments and securities lending					38,662,789	
Net appreciation					221,079,004	
Total					259,741,793	(C)
Expected 7.50% return on market value and cash flow					111,389,865	(D)
Asset gain (loss) (C) – (D)					148,351,928	

The assets for valuation purposes are 96.70% of market 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, 2005 – June 30, 2006	0.08610%	July 1, 2012 – June 30, 2013	0.00000%
July 1, 2006 – June 30, 2007	0.39610%	July 1, 2013 – June 30, 2014	0.00000%
July 1, 2007 – June 30, 2008	0.39610%	July 1, 2014 – June 30, 2015	0.00000%
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%

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, 2019 - June 30, 2020 is derived as follows:

a.	Effective prior member excess rate (December 31, 2018)	-4.4789%
b.	Decrease in total required contribution rate from prior valuation (see Section VII)	-2.0400%
c.	Current member excess rate (July 1, 2019) ((a.) + 25% of (b.))	-4.9889%

6. The accumulated value of the excess contributions as of December 31, 2019 is $0.

Section VI – Comments on Valuation

1. Schedule A of this report presents the results of the valuation as of December 31, 2019.

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 $3,021,110,359**.** Of this amount, $2,129,210,443 is on account of retired members and beneficiaries, $884,808,693 is on account of present active members and $7,091,223 is on account of contributions expected to be returned to active members not accumulating creditable service.

3. The value of Fund assets to be used in developing required contributions to the Fund is $1,561,192,531, including required contributions made by active members. When $1,561,192,531 is subtracted from $3,021,110,359, there remains $1,459,917,828, which represents the unfunded actuarial accrued liability of the Fund.

4. Amortization of the unfunded liability over the remaining 20 years in the amortization period as of December 31, 2019, in annual installments rising at the rate of 4% per year produces an amortization installment of $99,687,220 as of December 31, 2019. This amounts to 22.99% 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, 2019, is $52,008,968, or 12.00% 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 20 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 20 years.

7. During 2019, the unfunded actuarial accrued liability increased $102.6 million, from $1,357.3 million to $1,459.9 million. The expected unfunded actuarial accrued liability at December 31, 2019, was $1,365.8 million. The $94.1 million difference consists of a $27.8 million shortfall in 2019 of returns on the actuarial value of assets, $3.0 million in decreased accrued liability due to favorable demographic experience and contribution rate changes, and $69.3 million in increased accrued liability due to changing the assumed rate of return on Fund assets from 7.50% to 7.25%. 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 12.00% of compensation is required to cover normal cost and 22.99% 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 35.99% of compensation to be paid by the Authority and the members of the Retirement Fund from July 1, 2020, through June 30, 2021.
3. This rate is 2.04% more than the 33.95% rate developed in the December 31, 2018, 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, 2020:

Authority	26.6561%
Members' required	9.3339%
Subtotal (Section II)	35.9900%
Members' excess (Section V)	0.0000%
Total	35.9900%

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, 2019:

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)
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%
2015	1,630,411	2,572,084	941,673	63.39%	440,502	213.77%
2014	1,632,175	2,447,731	815,556	66.68%	415,146	196.45%
2013	1,606,684	2,364,133	757,449	67.96%	379,071	199.82%

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

Section IX – Experience

Records are maintained whereby 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 increase from $1,357,348,064 to $1,365,821,592. The actual UAL at the end of the year was $1,459,917,828. The chart below reconciles the expected to actual UAL. The primary sources of changes were a $4,401,296 decrease in the accrued liability resulting from favorable demographic experience in 2019, a $69,299,287 increase in the accrued liability resulting from change in discount rate adopted by the Board in April 2020, effective December 31, 2019, and returns on assets measured at actuarial value that were $27,825,159 below expected levels in 2019.

The sources of the (Gains)/Losses are as follows:

Actual UAL as of December 31, 2018		$ 1,357,348,064
Expected UAL (Prior to Changes) as of December 31, 2019		$ 1,365,821,592
Salary Increases	$ (8,568,684)	
New Participants	11,509	
Active – Retirements	2,364,345	
Active – Terminations	2,997,794	
Active – Mortality	(2,347,157)	
Active – Disabilities	112,186	
Retiree Mortality	(2,172,577)	
Other (Data Corrections, etc.)	3,201,288	
Liability (Gain)/Loss – Demographic Experience		$ (4,401,296)
Change in Accrued Liability Due to Contribution Rate Changes		$ 1,373,086
Change in Accrued Liability Due to Assumption Changes		$ 69,299,287
Total of Liability (Gain)/Loss and effects of changes in assumptions and Contribution rates		$ 66,271,077
Investment (Gain)/Loss		$ 27,825,159
Total Change in UAL		$ 94,096,236
Actual UAL as of December 31, 2019		$ 1,459,917,828

Section X – ASOP 51

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

Funding future retirement benefits prior to when those benefits become due involves 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. Therefore, a new Actuarial Standard of Practice (ASOP) has been adopted. Actuarial Standard of Practice No. 51 (“ASOP 51”) requires certain disclosures of potential risks to the Fund and provides useful information for intended users of actuarial reports that 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 contribution decisions.

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 return as expected
- 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 to provide guidance on the management or reduction of risk. Buck welcomes the opportunity to assist in 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% less than expected, this would reduce the actuarial value of assets by approximately $2.8 million, which would increase the 2020 total contribution rate by 0.05% and the member contribution rate by 0.0125%.

- 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 is approximately 9, 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 moneys 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. Based on the results of the experience study completed earlier this year, actual experience has tracked closely to the current mortality assumption.

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 are based on the experience study completed in 2019. 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.

	12/31/2015	12/31/2016	12/31/2017	12/31/2018	12/31/2019
Actuarial Value of Assets	$1.63B	$1.61B	$1.60B	$1.56B	$1.56B
Asset Return on MV in Prior Year	0.65%	5.88%	17.79%	(3.37)%	17.67%
Investment gain/(loss)	$(40M)	$(53M)	$(29M)	$(59M)	$(28M)
Actuarial Accrued Liability	$2.57B	$2.69B	$2.83B	$2.91B	$3.02B
Liability duration	N/A	N/A	N/A	N/A	N/A
The ratio of retired life* actuarial accrued liability to total actuarial accrued liability	69%	71%	73%	72%	71%
The ratio of benefit payments to actuarial value of assets	12%	12%	13%	14%	14%
The ratio of actuarial value of assets to participant payroll	368%	360%	373%	367%	357%
Normal cost	$44M	$46M	$46M	$48M	$52M
Discount rate	7.75%	7.75%	7.50%	7.50%	7.25%
Non-Investment gain/(loss)	$(21M)	$(80M)	$(31M)	$(10M)	$4M
Funding Policy contribution	$108M	$121M	$131M	$144M	$156M

* Retired members, former members and beneficiaries

Commentary on Plan Maturity Measures

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

A mature 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 absorb 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 plans by the same percent the plan with a higher assets-to-payroll ratio may experience higher contribution volatility than a plan with a lower asset-to-payroll ratio.

Section XI – Alternative Scenarios

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

		12/31/2019 Valuation (A)	More Active Employees (B)
1.	Normal Cost Rate	12.00%	12.00%
2.	Expenses	1.00%	1.00%
3.	Amortization	$ 99,687,220	$ 99,687,220
4.	Active Employees 12/31/2019	NA	5,507
5.	Active Employees 12/31/2016	NA	5,786
6.	New Entrant Salary	NA	$44,000
7.	Payroll (7.A+6.x(5.-4.))	$433,576,596	$445,852,596
8.	Accrued Liability Amortization Rate (3./7.)	22.99%	22.36%
9.	Total Contribution (1.+ 2. + 8.)	35.99%	35.36%
10.	Member Contribution	9.3339%	9.1764%

- In column B, we have assumed the employees who have terminated from 12/31/2016 to 12/31/2019 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 (35.36%-33.95%)*25%+8.8239%=9.1764%

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 a 20-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
13	39.01%	13.45%	37.54%	12.96%	36.13%	12.49%	34.76%	12.04%	33.45%	11.60%
14	37.72%	13.02%	36.22%	12.52%	34.78%	12.04%	33.39%	11.58%	32.06%	11.13%
15	36.61%	12.65%	35.09%	12.14%	33.62%	11.65%	32.21%	11.18%	30.85%	10.73%
16	35.66%	12.33%	34.10%	11.82%	32.60%	11.32%	31.17%	10.84%	29.80%	10.38%
17	34.82%	12.06%	33.24%	11.53%	31.72%	11.02%	30.26%	10.54%	28.87%	10.07%
18	34.10%	11.81%	32.48%	11.28%	30.94%	10.76%	29.46%	10.27%	28.05%	9.80%
19	33.45%	11.60%	31.81%	11.05%	30.24%	10.53%	28.74%	10.03%	27.32%	9.55%
20	32.88%	11.41%	31.22%	10.85%	29.62%	10.32%	28.10%	9.82%	26.66%	9.33%

- 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)

2020 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%
13	$ 171.07	$ 162.61	$ 154.43	$ 146.55	$ 138.96
14	$ 163.62	$ 154.97	$ 146.63	$ 138.61	$ 130.90
15	$ 157.23	$ 148.41	$ 139.91	$ 131.75	$ 123.92
16	$ 151.71	$ 142.71	$ 134.07	$ 125.77	$ 117.84
17	$ 146.90	$ 137.74	$ 128.95	$ 120.52	$ 112.48
18	$ 142.68	$ 133.36	$ 124.42	$ 115.88	$ 107.73
19	$ 138.96	$ 129.49	$ 120.41	$ 111.74	$ 103.49
20	$ 135.66	$ 126.04	$ 116.82	$ 108.04	$ 99.69

- 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, 2019

1.	Present Value of Future Benefits	
	(a) Present value of prospective benefits to retired members, former members and beneficiaries	$ 2,129,210,443
	(b) Present value of prospective retirement allowances on account of present active members	1,314,090,828
	(c) Present value of members' contributions to be returned to the members not accumulating creditable service	7,091,223
	(d) Total actuarial liabilities	$ 3,450,392,494
2.	Assets of the Fund for purposes of development of contributions	$ 1,561,192,531
3.	Present value of future contributions to the fund (1(d)-2)	$ 1,889,199,963
4.	Present value of future normal contributions to the Fund[1]	$ 429,282,135
5.	Unfunded accrued liability (3) - (4)	$ 1,459,917,828

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

Schedule B – Outline of Actuarial Assumptions and Methods

In 2019, an Experience study was conducted based on the experience from January 1, 2013 to December 31, 2017. 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 2019. A subsequent change in the assumed rate of return on assets from 7.50% to 7.25% was adopted by the Board in April 2020.

Data

The rate of pay was used for the 2019 valuation (projected 2020 pensionable earnings).

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:

Age	Withdrawal[1]
20-24	.0478
25-29	.0712
30-34	.0040
35-39	.0348
40-44	.0313
45-49	.0287
50-54	.0251
55-59	.0282
60-64	.0424

Age	Disability Male[2]	Disability – Female[2]
20	.0007	.0011
25	.0008	.0012
30	.0010	.0015
35	.0013	.0020
40	.0017	.0026
45	.0015	.0038
50	.0025	.0044
55	.0046	.0080
60	.0090	.0158
64	.0168	.0294

[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:

Age	Unreduced Retirement In the year attaining eligibility	Unreduced Retirement In years after first eligibility	Reduced Retirement
45	30%	20%	N/A
46	30%	15%	N/A
47	25%	15%	N/A
48	25%	10%	N/A
49	25%	10%	N/A
50	25%	15%	N/A
51	25%	15%	N/A
52	25%	15%	N/A
53	25%	20%	N/A
54	25%	20%	N/A
55	30%	15%	3.90%
56	30%	15%	3.66%
57	30%	18%	4.00%
58	30%	18%	4.27%
59	20%	25%	4.74%
60	20%	25%	5.83%
61	35%	25%	6.33%
62	45%	30%	8.27%
63	45%	25%	9.21%
64	45%	25%	11.42%
65	30%	40%	N/A
66	30%	25%	N/A
67	30%	28%	N/A
68	30%	28%	N/A
69	30%	28%	N/A
70+	30%	100%	N/A

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

Inflation:

2.75% per year

Salary increases

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%

Deaths before and after retirement

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, 2018 Valuation

The assume rate of return was lowered from 7.50% to 7.25%. The change increased the Fund's accrued liability by $69.3 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, and to 9.3339% effective July 1, 2020. 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, 2018 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, 2019[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	21	1,007,743	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	1,007,743
25 to 29	149	8,237,478	30	2,344,439	1	85,072	0	0	0	0	0	0	0	0	0	0	0	0	180	10,666,989
30 to 34	290	18,511,792	167	13,287,552	72	6,161,056	0	0	0	0	0	0	0	0	0	0	0	0	529	37,960,400
35 to 39	292	18,246,322	164	13,592,750	177	15,155,408	55	4,788,888	1	84,677	0	0	0	0	0	0	0	0	689	51,868,045
40 to 44	262	15,995,171	156	12,929,896	183	15,450,153	114	10,124,791	35	3,221,234	0	0	0	0	0	0	0	0	750	57,721,244
45 to 49	252	16,823,622	163	13,505,161	181	15,212,529	131	11,059,859	87	7,607,600	19	1,657,302	0	0	0	0	0	0	833	65,866,075
50 to 54	197	14,014,836	177	15,237,244	220	19,214,399	187	15,848,988	114	9,512,751	46	3,873,151	14	1,153,901	0	0	0	0	955	78,855,271
55 to 59	116	9,106,327	158	13,860,454	225	19,922,232	192	16,891,838	101	8,554,541	49	4,181,590	25	2,185,290	1	78,374	0	0	867	74,780,647
60 to 64	60	4,662,495	98	8,834,671	126	10,893,097	137	11,702,092	67	5,503,759	28	2,440,339	13	1,154,379	7	587,933	0	0	536	45,778,766
65 to 69	12	821,900	23	2,021,082	25	2,094,884	24	2,050,647	14	1,115,683	5	430,082	7	643,115	5	425,651	1	71,989	116	9,675,033
70 & up	2	129,376	7	647,467	4	345,862	9	770,702	4	306,426	3	270,566	0	0	0	0	2	177,466	31	2,647,865
Total	1,653	107,557,062	1,143	96,260,716	1,214	104,534,693	849	73,237,807	423	35,906,670	150	12,853,031	59	5,136,685	13	1,091,958	3	249,454	5,507	436,828,077

[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, 2019[1]

	Service Retirements		Disabled Members		Beneficiaries	
Age	Number	Amount	Number	Amount	Number	Amount
<50	49	2,407,384	35	675,581	37	407,103
50	25	1,207,319	6	76,583	3	77,950
51	35	1,760,892	8	167,621	3	50,946
52	43	2,075,032	16	272,909	8	126,462
53	54	2,640,901	13	242,944	7	80,315
54	80	3,996,951	11	220,166	7	125,133
55	82	4,104,903	16	332,313	10	104,456
56	104	5,272,029	14	269,526	13	186,830
57	91	4,395,438	19	390,566	18	293,047
58	89	4,412,988	15	285,691	14	234,102
59	113	5,393,246	21	434,944	11	227,718
60	119	5,761,522	29	436,001	11	169,567
61	147	6,804,015	32	694,200	19	255,580
62	119	5,632,455	30	663,817	14	351,738
63	153	6,961,080	18	377,300	21	287,314
64	149	6,737,392	37	750,677	30	510,116
65	175	7,577,995	41	808,261	20	398,949
66	186	7,758,975	29	558,265	20	282,610
67	213	8,745,330	26	437,885	23	496,664
68	188	7,177,707	18	361,848	27	432,866
69	194	7,333,623	32	583,368	26	613,885
70	206	7,866,895	30	553,755	27	578,560
71	225	8,300,630	22	419,048	34	678,683
72	224	7,775,768	26	532,450	34	707,076
73	190	6,676,867	16	288,545	41	829,329
74	177	5,986,952	17	365,182	39	776,943
75	192	6,370,224	20	339,021	39	840,040
76	176	5,739,740	24	302,801	48	917,897
77	166	5,419,721	14	258,530	47	805,925
78	136	4,082,336	13	216,132	38	581,949
79	115	3,394,828	13	226,058	45	750,414
80	109	3,399,323	7	83,332	33	603,940
81	89	2,614,893	8	143,616	39	662,095
82	95	2,605,710	5	82,867	35	623,982
83	68	1,985,928	2	23,083	47	824,383
84	66	1,808,356	2	36,828	29	478,014
85	44	1,118,191	2	18,198	25	371,836
>85	242	5,905,621	11	114,347	245	3,554,068
Total	4,928	189,209,163	698	13,044,261	1,187	20,298,484
No Option	3,141	105,076,671	576	11,001,655	1,187	20,298,484
Survivor Option	29	17,624,209	2	44,454	0	0
Pop-Up Option	1,758	66,508,284	120	1,998,153	0	0
Total	4,928	189,209,163	698	13,044,261	1,187	20,298,484

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

Solvency Test

As of December 31, 2019

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:

i. Active member contributions on deposit;
ii. The liabilities for future benefits to present retired lives;
iii. 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.

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)
12/31/2019	$ 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%
12/31/2012	183,328,525	1,627,032,223	501,809,615	1,456,956,884	100%	78%	0%
12/31/2011	170,925,725	1,602,587,528	503,237,245	1,550,446,450	100%	86%	0%
12/31/2010	156,410,547	1,625,488,398	559,445,973	1,649,129,123	100%	92%	0%

Schedule of Retirees and Beneficiaries Added to and Removed from Rolls

As of December 31, 2019

Valuation Date	Added to Rolls No.	Added to Rolls Annual Allowances	Removed from Rolls No.	Removed from Rolls Annual Allowances	Rolls - End of Year No.	Rolls - End of Year Annual Allowances	% Increase in Annual Allowances	Average Annual Allowances
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
12/31/2012	184	6,926,496	154	3,278,250	6,356	177,904,241	1.61%	27,990
12/31/2011	204	7,738,128	176	3,112,020	6,326	174,255,995	2.27%	27,546
12/31/2010	285	11,050,020	137	2,666,364	6,298	169,629,887	2.73%	26,934

Schedule of Active Member Valuation Data

Valuation Date	Number	Annual Payroll	Average Annual Pay	% Increase In Average Pay
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%
2012	5,668	373,000,972	65,808	2.3%
2011	5,726	368,473,591	64,351	1.4%
2010	5,643	358,028,815	63,447	0.9%

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 141 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 141 provides employer and employee contribution rates and investment income historical information. The schedules of deductions and benefits by type on page 142 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 143 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 144 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 145 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 (2010 – 2019 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
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
2012	1,394,395,336	262,766,724	178,813,082	83,953,642	1,478,348,978
2011	1,488,656,182	80,652,299	174,913,145	(94,260,846)	1,394,395,336
2010	1,417,576,340	240,947,436	169,867,594	71,079,842	1,488,656,182

Schedule of Additions by Source

Year Ended Dec 31	Employee Contributions	Employer Contributions	Employer Contributions as % of Covered Payroll	Investment Income (a)	Total
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
2012	20,023,337	54,968,325	14.82	187,775,062	262,766,724
2011	19,089,304	52,278,311	14.26	9,284,684	80,652,299
2010	17,999,009	49,006,722	13.74	173,941,705	240,947,436

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
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
2012	174,627,907	3,384,113	801,062	178,813,082
2011	170,034,251	3,793,418	1,085,476	174,913,145
2010	164,510,892	4,441,078	915,624	169,867,594

Schedule of Benefit Deduction by Type

Year Ended Dec 31	Service	Disability	Beneficiary	Total
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
2012	146,842,625	10,685,263	17,100,019	174,627,907
2011	142,715,543	10,508,424	16,810,284	170,034,251
2010	137,212,102	10,534,419	16,764,370	164,510,892

Demographic and Economic Information (As of 12/31/19)

Distribution of Fund Members as of December 31, 2019 - 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	21	-	-	-	-	-	-	-	-	21	1,007,743	47,988
25-29	149	30	1	-	-	-	-	-	-	180	10,666,989	59,261
30-34	290	167	72	-	-	-	-	-	-	529	37,960,400	71,759
35-39	292	164	177	55	1	-	-	-	-	689	51,868,045	75,280
40-44	262	156	183	114	35	-	-	-	-	750	57,721,244	76,962
45-49	252	163	181	131	87	19	-	-	-	833	65,866,075	79,071
50-54	197	177	220	187	114	46	14	-	-	955	78,855,271	82,571
55-59	116	158	225	192	101	49	25	1	-	867	74,780,647	86,252
60-64	60	98	126	137	67	28	13	7	-	536	45,778,766	85,408
65-69	12	23	25	24	14	5	7	5	1	116	9,675,033	83,405
70+	2	7	4	9	4	3	-	-	2	31	2,647,865	85,415
Total	**1,653**	**1,143**	**1,214**	**849**	**423**	**150**	**59**	**13**	**3**	**5,507**	**436,828,077**	79,322

Operating Information

Schedule of Average Benefit Payments - New Benefit Recipients (2010 – 2019)

Years of Service	0-4	5-9	10-14	15-19	20-24	25-29	30+	Total
2010								
Average Monthly Benefit	$ -	$ 795	$ 1,525	$ 2,035	$ 3,338	$ 3,989	$ 4,169	**$ 3,231**
Average Final Average Salary	-	66,069	68,550	66,235	74,107	76,433	75,093	**73,415**
Number of Retired Members	-	7	11	24	188	41	14	**285**
2011								
Average Monthly Benefit	$ -	$ 876	$ 1,390	$ 2,721	$ 3,266	$ 3,919	$ 4,351	**$ 3,161**
Average Final Average Salary	-	61,939	66,442	75,563	74,337	78,379	80,226	**74,320**
Number of Retired Members	-	7	12	16	133	29	7	**204**
2012								
Average Monthly Benefit	$ 311	$ 840	$ 1,534	$ 2,305	$ 3,165	$ 4,239	$ 4,669	**$ 3,137**
Average Final Average Salary	43,363	59,592	75,925	73,205	74,644	80,771	85,574	**75,643**
Number of Retired Members	1	5	13	22	101	32	10	**184**
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**

Schedule of Benefit Recipients by Type and Option

December 31, 2019

		Type of Retirement*									Option Selected**					
	Total	I	II	III	IV	V	VI	VII	VIII	IX	A	B	C	D	E	Grand Total
$0-$500	214	20	2	0	70	6	1	87	0	28	160	20	7	0	27	214
$500-$1,000	470	61	1	2	128	4	24	212	0	38	370	54	8	1	37	470
$1,000-$1,500	623	96	24	21	164	5	18	259	4	32	480	78	31	2	32	623
$1,500-$2,000	783	137	197	37	159	3	3	194	30	23	524	182	53	1	23	783
$2,000-$2,500	1022	166	575	44	104	2	1	109	13	8	652	289	72	2	7	1022
$2,500-$3,000	1008	121	746	17	49	2	2	66	4	1	580	337	83	7	1	1008
$3,000-$3,500	877	66	743	12	18	0	5	32	0	1	516	297	58	5	1	877
$3,500-$4,000	677	50	601	5	6	0	2	13	0	0	347	246	76	8	0	677
Over $4,000	1139	109	1022	2	0	0	2	4	0	0	656	366	108	9	0	1139
Total	**6813**	**826**	**3911**	**140**	**698**	**22**	**58**	**976**	**51**	**131**	**4285**	**1869**	**496**	**35**	**128**	**6813**

***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