



**MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND**

Financial Statements and Required Supplementary Information
December 31, 2019 and 2018
(With Independent Auditors' Report Thereon)

**MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND**

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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.



Other Matter

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.

KPMG LLP

Boston, Massachusetts

June 22, 2020

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Required Supplementary Information
Management's Discussion and Analysis

December 31, 2019 and 2018
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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.

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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.

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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.

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.

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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. 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.

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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.

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

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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)%. 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%.

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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.).

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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.

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Statement of Fiduciary Net Position

Fiscal years ended 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	<u>294,002,864</u>	<u>259,214,511</u>
	<u>1,393,735,093</u>	<u>1,280,801,926</u>
International:		
Cash and cash equivalents	1,032,360	132,231
Fixed income	2,050,088	1,555,488
Common stock and equity funds	<u>212,124,717</u>	<u>163,274,105</u>
	<u>215,207,165</u>	<u>164,961,824</u>
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	<u>3,405,040</u>	<u>2,427,658</u>
Total assets	<u>1,643,365,637</u>	<u>1,506,144,714</u>
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	<u>1,640,387</u>	<u>1,281,833</u>
Total liabilities	<u>29,221,424</u>	<u>56,449,614</u>
Net position – restricted for pension benefits	<u>\$ 1,614,144,213</u>	<u>1,449,695,100</u>

See accompanying notes to financial statements.

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Statement 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	<u>36,366,108</u>	<u>32,606,337</u>
Total contributions	<u>139,629,871</u>	<u>124,619,461</u>
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	<u>221,079,004</u>	<u>(91,225,005)</u>
Net investment (loss) / gain	<u>253,578,961</u>	<u>(52,216,325)</u>
Securities lending activity:		
Securities lending income	1,054,040	1,075,337
Less borrower rebates and fees	<u>902,011</u>	<u>931,891</u>
Net income from securities lending activities	<u>152,029</u>	<u>143,446</u>
Total net investment (loss) / income	<u>253,730,990</u>	<u>(52,072,879)</u>
Total additions	<u>393,360,861</u>	<u>72,546,582</u>
Deductions:		
Retirement benefits	220,553,916	218,385,648
Refunds of members' contributions	3,311,057	3,324,406
Administrative expenses	<u>5,046,775</u>	<u>4,317,624</u>
Total deductions	<u>228,911,748</u>	<u>226,027,678</u>
Change in fiduciary net position	<u>164,449,113</u>	<u>(153,481,096)</u>
Net position restricted for pension benefits:		
Beginning of year	<u>1,449,695,100</u>	<u>1,603,176,196</u>
End of year	<u>\$ 1,614,144,213</u>	<u>1,449,695,100</u>

See accompanying notes to financial statements.

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Notes to Financial Statements
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(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)

(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

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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.

(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

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compensation and service to the time of early retirement, but reduced by 1/2 of 1% for each month of retirement prior to normal retirement date.

(iv) *Disability Retirement Allowance*

Condition for Allowance

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

Amount of Allowance

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

(v) *Vested Retirement Allowance*

Condition for Allowance

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

Amount of Allowance

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

(vi) *Survivor Benefit*

Condition for Benefit

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

Amount of Benefit

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

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

(vii) Accidental Death Benefit

Condition for Benefit

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

Amount of Benefit

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

(e) Fund Termination

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

(2) Significant Accounting Policies

(a) Basis of Accounting

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

(b) Use of Estimates

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

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maintains its cash deposits with financial institutions, which management considers being of high credit quality and, by policy, limits the allocation of funds to any single major financial institution to minimize the Fund's amount of credit exposure.

(d) Revenue Recognition

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

(e) Retirement Benefits and Refunds

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

(f) Investments

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

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

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

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

(g) Derivatives

A derivative is an investment agreement or security with a value that depends on, or is derived from, the value of an underlying asset, reference rate, or financial index. The Fund has classified its investment in forward exchange contracts as investment in derivative instruments. A forward exchange contract is a commitment to purchase or sell a foreign currency at a future date at a negotiated forward rate. The Fund utilizes forward foreign exchange contracts to minimize the effect of fluctuating foreign currencies. Risk associated with such contracts includes movement in the value of a foreign currency relative to the U.S. dollar. Realized gain or loss on forward exchange contracts is the difference between the original contract and the closing value of such contract and is included in the statement of changes in fiduciary

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net position. At December 31, 2019 and 2018, the Fund held open forward exchange contracts of varying amounts and currencies. Unrealized gains and losses are not significant to the financial statements.

(h) *Currency Translation*

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

(i) *Income Taxes*

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

(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.

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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	<u>100 %</u>	<u>100 %</u>

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(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.

Investment type	2019				
	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
	<hr/> <u>\$ 389,386,161</u>	<hr/> <u>4,346,875</u>	<hr/> <u>145,267,698</u>	<hr/> <u>86,976,839</u>	<hr/> <u>152,794,749</u>

Investment type	2018				
	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
	<hr/> <u>\$ 390,262,761</u>	<hr/> <u>2,856,494</u>	<hr/> <u>149,388,805</u>	<hr/> <u>139,977,786</u>	<hr/> <u>98,039,676</u>

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.

(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.

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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:

Investment type	2019								
	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*	<u>75,590,389</u>								
Total fixed income securities	<u>\$ 389,386,161</u>								

Investment type	2018								
	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*	<u>70,519,064</u>								
Total fixed income securities	<u>\$ 390,262,761</u>								

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

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(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:

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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

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Currency	2018			
	Short-Term	Fixed Income	Equity	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

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(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.

(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

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prices in active markets for identical assets and liabilities (Level 1) and the lowest priority to unobservable inputs (Level 3). These levels of the fair value hierarchy are described below:

- Level 1 – Unadjusted quoted prices for identical assets or liabilities in active markets
- Level 2 – Observable inputs other than quoted prices in active markets for identical assets and liabilities. Level 2 inputs include the following:
 - Quoted prices for similar assets and liabilities in active markets
 - Quoted prices for identical or similar assets or liabilities in markets that are not active
 - Inputs other than quoted prices that are observable for the asset or liability, such as:
 1. Interest rates and yield curves observable at commonly quoted intervals
 2. Implied volatilities
 3. Credit spreads
- Level 3 – Unobservable inputs for the asset or liability (i.e., supported by little or no market activity). Level 3 inputs include management's assumptions.

The following tables' set forth by fair value hierarchy level, the Fund's assets carried at fair value December 31, 2019 and 2018. Certain reclassifications have been made to the 2018 schedule in order to conform with the current year presentation.

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	Fair value measurements using:		
	Quoted prices in active markets for identical assets	Significant other observable inputs	Significant unobservable inputs
	Total at December 31, 2019	(Level 1)	(Level 2)
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	<u>63,765,544</u>	<u>63,765,544</u>	-
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	<u>507,511,655</u>	<u>507,511,655</u>	-
International equities - common stock	<u>212,124,717</u>	<u>212,124,717</u>	-
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
Asset backed:			6,139,319
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	<u>387,336,073</u>	<u>-</u>	<u>381,196,754</u>
International fixed income - bonds	<u>2,050,088</u>	<u>-</u>	<u>2,050,088</u>
Total investments by fair value level	<u>1,172,788,077</u>	<u>783,401,916</u>	<u>383,246,842</u>
Total investments measured at net asset value (NAV):			6,139,319
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	<u>436,154,181</u>		
Total investments	<u>1,608,942,258</u>		

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	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		

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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 funds⁴	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 estate 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.

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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	<u>\$ 1,406,966</u>	<u>1,467,106</u>
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%

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

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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:

Asset class	Target asset allocation		Long-term expected real rate of return	
	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.

(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

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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%)			
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.

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)

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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 - employee	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
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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 the 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 auditor's report

**MASSACHUSETTS BAY TRANSPORTATION AUTHORITY
RETIREMENT FUND**

Required Supplementary Information

Schedule of Investment Returns

(Unaudited)

	<u>2019</u>	<u>2018</u>	<u>2017</u>	<u>2016</u>	<u>2015</u>	<u>2014</u>
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
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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), 7.50% (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.