

City of Boston

Actuarial Valuation and Review of Other Postemployment Benefits (OPEB)

Measured at June 30, 2021



This report has been prepared at the request of the City of Boston to assist in administering the Plan. This valuation report may not otherwise be copied or reproduced in any form without the consent of the City of Boston and may only be provided to other parties in its entirety. The measurements shown in this actuarial valuation may not be applicable for other purposes.

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August 19, 2022

Ms. Maureen Joyce
City Auditor
City of Boston
City Hall, Room M-4
Boston, MA 02201

Dear Ms. Joyce:

We are pleased to submit this report on our actuarial valuation of postemployment welfare benefits as of June 30, 2021. The purpose of this report is to calculate an Actuarially Determined Contribution for the City of Boston Other Postemployment Benefit (OPEB) Plan for the fiscal years ending June 30, 2022 and June 30, 2023. It summarizes the actuarial data used in the valuation and analyzes the experience and changes in assumptions since the prior valuation. The GASB Statements No. 74 and 75 disclosure information for the fiscal year ending June 30, 2022 will be provided in a separate report when the June 30, 2022 financial information is available.

This report is based on information received from the City of Boston and vendors employed by the City of Boston. Segal does not audit the data provided. The accuracy and comprehensiveness of the data is the responsibility of those supplying the data. Segal, however, does review the data for reasonableness and consistency.

The measurements shown in this actuarial valuation may not be applicable for other purposes. Accordingly, additional determinations may be needed for other purposes, such as judging benefit security at termination of the plan, or determining short-term cash flow requirements.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: retiree group benefits program experience or rates of return on assets differing from that anticipated by the assumptions; changes in assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period); and changes in retiree group benefits program provisions or applicable law. Retiree group benefits models necessarily rely on the use of approximations and estimates, and are sensitive to changes in these approximations and estimates. Small variations in these approximations and estimates may lead to significant changes in actuarial measurements.

The actuarial valuation has been completed in accordance with generally accepted actuarial principles and practices. The actuarial calculations were directed under our supervision. We are members of the American Academy of Actuaries and collectively meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the best of our knowledge, the information supplied in the actuarial valuation is complete and accurate. The assumptions used in this actuarial valuation were selected by the City of Boston based upon our analysis and recommendations. In our opinion, the assumptions are reasonable and take into account the experience of the Plan and reasonable expectations.

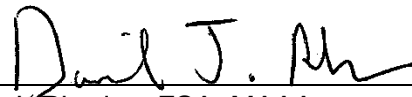
We look forward to reviewing this report with you and to answering any questions.

Sincerely,

Segal



Kathleen A. Riley, FSA, MAAA, EA
Senior Vice President and Actuary



Daniel J. Rhodes, FSA, MAAA
Senior Vice President and Consulting Actuary

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Section 1: Actuarial Valuation Summary

Purpose and basis

This report presents the results of our actuarial valuation of the City of Boston other postemployment welfare benefit plan as of June 30, 2021. The purpose of this report is to calculate a recommended Actuarially Determined Contribution for the OPEB plan for the fiscal years ending June 30, 2022 and June 30, 2023. Determinations for purposes other than meeting funding requirements may be significantly different from the results reported here. This valuation is based on:

- The benefit provisions of the OPEB plan, as administered by the City;
- The characteristics of covered active members, retired members and beneficiaries as of June 30, 2021, provided by the City;
- The assets of the Plan as of June 30, 2021, provided by the City;
- Economic assumptions regarding future salary increases and investment earnings;
- Health care assumptions regarding per capita costs, trend rates and participation; and
- Other actuarial assumptions, regarding employee terminations, retirement, death, etc.

Highlights of the valuation

- The discount rate used to determine the liabilities that are the basis of the Actuarially Determined Contribution is the expected return on assets. Based on the investment allocation of the OPEB Trust, we recommend lowering the expected return on assets from 6.75% to 6.25%.
- The unfunded actuarial accrued liability (UAAL) as of June 30, 2021 is \$2,194 million based on an actuarial accrued liability (AAL) of \$3,093 million and an actuarial value of assets of \$898 million. Going forward, net unfunded plan obligations will be expected to change due to normal plan operations, which consist of continuing accruals for active members, plus interest on the unfunded actuarial accrued liability, less employer contributions. Future valuations will analyze the difference between actual and expected unfunded actuarial accrued liabilities.
- As of June 30, 2021 the ratio of assets to the AAL (the funded ratio) is 29.05%, compared to 22.52% in the prior valuation. This funded percentage is not necessarily appropriate for assessing the sufficiency of OPEB assets to cover the estimated cost of settling the benefit obligations or the need for or the amount of future contributions.

Section 1: Actuarial Valuation Summary

- In addition to lowering the discount rate from 6.75% to 6.25%, the following assumptions were revised with this valuation:
 - The per capita costs, retiree contributions, and trends were updated to reflect current experience; and
 - The mortality projection scale was updated.
- The UAAL was expected to increase by \$67 million from \$2,128 million as of June 30, 2019 to \$2,195 million as of June 30, 2021. The actual unfunded liability of \$2,194 million is \$1 million less than expected. The difference between the actual and expected increase was the net effect of the following:

	(In Millions)
June 30, 2019 unfunded actuarial liability	\$2,128
June 30, 2021 expected unfunded actuarial liability	2,195
Change due to:	
• Experience loss (reflects correction to generational mortality projection ¹)	\$107
• Investment gain	-100
• Updating future trends	82
• Updating per capita costs and contributions	-262
• Updating the mortality projection scale	-15
• Revising the discount rate	187
Net decrease	-\$1
June 30, 2021 unfunded actuarial accrued liability	\$2,194

- The participant data received for the June 30, 2021 actuarial valuation included 16,405 active employees with health coverage and 15,387 retirees and beneficiaries receiving retiree health benefits compared to 15,427 active employees and 15,575 retirees and beneficiaries in the prior valuation.
- The Actuarially Determined Contribution (ADC) for fiscal year 2022 is \$204 million for the City and \$8 million for the Public Health Commission (PHC). The ADC is calculated using a 24-year amortization of the UAAL for the City and a 30-year open amortization of the UAAL for PHC, with payments increasing at 3.25% per year.

¹ Generational mortality projection described in prior valuation report was inadvertently not applied.

Section 1: Actuarial Valuation Summary

- A projection of the ADC for the City appears on page 13. The projection for the City reflects the City's policy to contribute \$40 million per year to the OPEB Trust until the Boston Retirement System is fully funded and \$100 million per year thereafter. Accordingly, the \$100 million contribution to the OPEB Trust will begin in fiscal 2028. The liabilities are projected to be fully funded in 2044, if all assumptions are met and there are no future changes in assumptions or the plan of benefits. This is three years later than in the prior valuation report.

The City will pay projected benefit payments in addition to the contribution to the OPEB Trust through fiscal 2043. In fiscal 2044, a larger payment to the OPEB Trust will be made and benefit payments will be made from the Trust. The contribution to the Trust in fiscal 2045 will be the normal cost payment. The OPEB liabilities are projected to be fully funded when the fiscal 2044 payment is made, assuming that there are no assumption or plan changes and that experience develops as assumed.

- We have provided two additional schedules for the City that show the impact of a higher contribution to the OPEB Trust beginning in 2028 when the Boston Retirement System is projected to be fully funded. As shown on pages 14 and 15, increasing the funding contribution to \$125 million accelerates the projected full funding of the OPEB obligations by two years to fiscal 2042 and increasing the funding contribution to \$150 million accelerates the projected full funding an additional two years to fiscal 2040.
- A projection of the ADC for the PHC appears on page 16. The projection for the PHC reflects the PHC's policy to contribute \$2.25 million per year to the OPEB Trust. Although the obligations are not projected to be fully funded at the end of the 30-year projection period, the projected unfunded liability is lower than in the prior valuation report.
- The long-term impact of the Coronavirus (COVID-19) pandemic is still unknown. Our results do not include the impact of the following:
 - The short-term impact on health plan costs; or
 - Short-term or long-term impacts on mortality of the covered population.

Section 1: Actuarial Valuation Summary

OPEB Trust information

As of June 30, 2021, OPEB Trust as \$862 million allocated to the City of Boston and \$37 million allocated to the PHC. The table below shows the increase in assets from June 30, 2019 to June 30, 2021.

Reconciliation of OPEB Balance from June 30, 2019 through June 30, 2021	City	PHC	Total
Balance as of June 30, 2019	\$594,248,953	\$24,215,502	\$618,464,455
• Contributions	40,000,000	2,250,000	42,250,000
• Net investment income	<u>21,030,397</u>	<u>877,756</u>	<u>21,908,153</u>
Balance as of June 30, 2020	\$655,279,350	\$27,343,258	\$682,622,608
• Contributions	40,000,000	2,250,000	42,250,000
• Net investment income	<u>166,535,192</u>	<u>7,061,358</u>	<u>173,596,550</u>
Balance as of June 30, 2021	\$861,814,542	\$36,654,616	\$898,469,158

Section 1: Actuarial Valuation Summary

Other considerations

Employer decisions regarding plan design, cost sharing between the Employer and its retirees, actuarial cost method, amortization techniques, and integration with Medicare are just some of the decisions that affect the magnitude of OPEB obligations. We are available to assist you with any investigation of such options you may wish to undertake.

Calculations are based on the benefits provided under the terms of the substantive plan in effect at the time of the valuation and on the pattern of sharing costs between the employer and plan members. The projection of benefits does not incorporate the potential effect of legal or contractual funding limitations on the pattern of cost sharing between the employer and plan members in the future.

Actuarial calculations reflect a long-term perspective, and the methods and assumptions use techniques designed to reduce short-term volatility in accrued liabilities and the actuarial value of assets, if any.

The calculation of an accounting obligation does not, in and of itself, imply that there is any legal liability to provide the benefits valued, nor is there any implication that the Employer is required to implement a funding policy to satisfy the projected expense.

Actuarial valuations involve estimates of the value of reported amounts and assumptions about the probability of events far into the future, and the actuarially determined amounts are subject to continual revision as actual results are compared to past expectations and new estimates are made about the future.

Section 1: Actuarial Valuation Summary

Important information about actuarial valuations

An actuarial valuation is a budgeting tool with respect to defining future uncertain obligations of a postretirement health plan. As such, it will never forecast the precise future stream of benefit payments. It is an estimated forecast – the actual cost of the plan will be determined by the benefits and expenses paid, not by the actuarial valuation.

In order to prepare a valuation, Segal relies on a number of input items. These include:

Plan of benefits	Plan provisions define the rules that will be used to determine benefit payments, and those rules, or the interpretation of them, may change over time. Even where they appear precise, outside factors may change how they operate. For example, a plan may provide health benefits to post-65 retirees that coordinates with Medicare. If so, changes in the Medicare law or administration may change the plan's costs without any change in the terms of the plan itself. It is important for the City of Boston to keep Segal informed with respect to plan provisions and administrative procedures, and to review the plan summary included in our report to confirm that Segal has correctly interpreted the plan of benefits.
Participant data	An actuarial valuation for a plan is based on data provided to the actuary by the plan. Segal does not audit such data for completeness or accuracy, other than reviewing it for obvious inconsistencies compared to prior data and other information that appears unreasonable. It is not necessary to have perfect data for an actuarial valuation: the valuation is an estimated forecast, not a prediction. The uncertainties in other factors are such that even perfect data does not produce a "perfect" result. Notwithstanding the above, it is important for Segal to receive the best possible data and to be informed about any known incomplete or inaccurate data.
Assets	The valuation is based on the market value of assets as of the valuation date, as provided by the City of Boston.
Actuarial assumptions	In preparing an actuarial valuation, Segal starts by developing a forecast of the benefits to be paid to existing plan participants for the rest of their lives and the lives of their beneficiaries. To determine the future costs of benefits, Segal collects claims, premiums, and enrollment data in order to establish a baseline cost for the valuation measurement, and then develops short- and long-term health care cost trend rates to project increases in costs in future years. This forecast also requires actuarial assumptions as to the probability of death, disability, withdrawal, and retirement of each participant for each year, as well as forecasts of the plan's benefits for each of those events. The forecasted benefits are then discounted to a present value, typically based on an estimate of the rate of return that will be achieved on the plan's assets or, if there are no assets, a rate of return based on a yield or index rate for 20-year, tax-exempt general obligation municipal bonds with an average rating of AA/Aa or higher (or equivalent quality on another rating scale). All of these factors are uncertain and unknowable. Thus, there will be a range of reasonable assumptions, and the results may vary materially based on which assumptions the actuary selects within that range. That is, there is no right answer (except with hindsight). It is important for any user of an actuarial valuation to understand and accept this constraint. The actuarial model necessarily uses approximations and estimates that may lead to significant changes in our results but will have no impact on the actual cost of the plan. In addition, the actuarial assumptions may change over time, and while this can have a significant impact on the reported results, it does not mean that the previous assumptions or results were unreasonable or wrong.

Section 1: Actuarial Valuation Summary

The user of Segal's actuarial valuation (or other actuarial calculations) should keep the following in mind:

The actuarial valuation is prepared for use by the City of Boston's Finance Department. It includes information for compliance with accounting standards and for the plan's auditor. Segal is not responsible for the use or misuse of its report, particularly by any other party.

If the City of Boston is aware of any event or trend that was not considered in this valuation that may materially change the results of the valuation, Segal should be advised, so that we can evaluate it.

An actuarial valuation is a measurement at a specific date – it is not a prediction of a plan's future financial condition. Accordingly, Segal did not perform an analysis of the potential range of financial measurements, except where otherwise noted. The actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.

Sections of this report include actuarial results that are not rounded, but that does not imply precision.

Critical events for a plan include, but are not limited to, decisions about changes in benefits and contributions. The basis for such decisions needs to consider many factors such as the risk of changes in plan enrollment, emerging claims experience, health care trend, and investment losses, not just the current valuation results.

Segal does not provide investment, legal, accounting, or tax advice. Segal's valuation is based on our understanding of applicable guidance in these areas and of the plan's provisions, but they may be subject to alternative interpretations. The City of Boston should look to their other advisors for expertise in these areas.

While Segal maintains extensive quality assurance procedures, an actuarial valuation involves complex computer models and numerous inputs. In the event that an inaccuracy is discovered after presentation of Segal's valuation, Segal may revise that valuation or make an appropriate adjustment in the next valuation.

Segal's report shall be deemed to be final and accepted by the City of Boston upon delivery and review. The City of Boston should notify Segal immediately of any questions or concerns about the final content.

As Segal has no discretionary authority with respect to the management or assets of the Plan, it is not a fiduciary in its capacity as actuaries and consultants with respect to the Plan.

Section 2: Valuation Results

Summary of valuation results

	(A) Boston Public Schools	(B) All Other Departments (City)	(C) Total City: (A) + (B)	(D) Public Health Commission	All Departments Total (C) + (D)
Actuarial Accrued Liability by Participant Category					
1. Current retirees, beneficiaries and dependents	\$642,356,601	\$970,611,033	\$1,612,967,634	\$48,869,000	\$1,661,836,634
2. Current active employees	<u>718,356,082</u>	<u>655,411,312</u>	<u>1,373,767,394</u>	<u>57,115,520</u>	<u>1,430,882,914</u>
3. Total as of June 30, 2021: (1) + (2)	\$1,360,712,683	\$1,626,022,345	\$2,986,735,028	\$105,984,520	\$3,092,719,548
4. Actuarial value of assets as of June 30, 2021	<u>392,642,705</u>	<u>469,171,837</u>	<u>861,814,542</u>	<u>36,654,616</u>	<u>898,469,158</u>
5. Unfunded actuarial accrued liability (UAAL) as of June 30, 2021: (3) - (4)	\$968,069,978	\$1,156,850,508	\$2,124,920,486	\$69,329,904	\$2,194,250,390
6. Funded ratio: (4) / (3)	28.86%	28.85%	28.85%	34.58%	29.05%
Actuarially Determined Contribution for Fiscal Year Ending June 30, 2022					
7. Normal Cost as of June 30, 2021	\$40,695,673	\$42,469,507	\$83,165,180	\$4,493,033	\$87,658,213
8. Amortization payment	<u>54,984,517</u>	<u>65,706,889</u>	<u>120,691,406</u>	<u>3,395,464</u>	<u>124,086,870</u>
9. Total Actuarially Determined Contribution (ADC): (7) + (8)	\$95,680,190	\$108,176,396	\$203,856,586	\$7,888,497	\$211,745,083
10. Projected benefit payments	48,661,939	74,939,170	123,601,109	3,362,950	126,964,059
Actuarially Determined Contribution for Fiscal Year Ending June 30, 2023					
11. Normal cost as of June 30, 2022	\$42,081,310	\$43,915,541	\$85,996,850	\$4,646,015	\$90,642,866
12. Amortization payment	<u>58,016,319</u>	<u>69,329,915</u>	<u>127,346,234</u>	<u>3,554,629</u>	<u>130,900,863</u>
13. Total Actuarially Determined Contribution (ADC): (11) + (12)	\$100,097,629	\$113,245,455	\$213,343,084	\$8,200,644	\$221,543,729
14. Projected benefit payments	53,455,907	80,225,326	133,681,233	3,823,946	137,505,179

Notes:

Assumes payment at beginning of fiscal year.

Assets are allocated to the Boston Public Schools and All Other Departments in proportion to the Actuarial Accrued Liability.

24-year amortization of the UAAL for the City and 30-year open amortization of the UAAL for PHC increasing 3.25% per year as of June 30, 2021.

Section 2: Valuation Results

Projection of the Actuarially Determined Contribution

Total City (Boston Public Schools and All Other City Departments)

Fully Funded in 2044, 24-Year Closed Amortization

\$100,000,000 Contribution to OPEB Trust Beginning in 2028

Fiscal Year Ending June 30	(1) Normal Cost	(2) Amortization of UAAL	(3) Actuarially Determined Contribution (1) + (2)	(4) Projected Benefits to be paid by the City	(5) Projected Benefits to be paid by OPEB Trust	(6) Contribution to OPEB Trust	(7) Total City Cost (4) + (6)	(8) Assets at End of Year	(9) AAL at End of Year	(10) UAAL at End of Year (9) - (8)
2022	\$83,165,180	\$120,691,406	\$203,856,586	\$123,601,109	\$0	\$40,000,000	\$163,601,109	\$958,177,951	\$3,134,363,864	\$2,176,185,913
2023	85,996,850	127,346,234	213,343,084	133,681,233	0	40,000,000	173,681,233	1,060,564,073	3,283,837,798	2,223,273,725
2024	88,924,936	134,286,448	223,211,384	144,568,236	0	40,000,000	184,568,236	1,169,349,327	3,434,542,878	2,265,193,551
2025	91,952,719	141,502,082	233,454,801	155,029,439	0	40,000,000	195,029,439	1,284,933,660	3,587,100,883	2,302,167,223
2026	95,083,594	149,062,841	244,146,435	166,222,334	0	40,000,000	206,222,334	1,407,742,014	3,740,982,947	2,333,240,933
2027	98,321,071	156,973,022	255,294,093	176,876,697	0	40,000,000	216,876,697	1,538,225,890	3,896,940,193	2,358,714,303
2028	101,668,781	165,329,032	266,997,813	187,826,210	0	100,000,000	287,826,210	1,740,615,008	4,054,915,208	2,314,300,200
2029	105,130,476	169,517,685	274,648,161	199,048,240	0	100,000,000	299,048,240	1,955,653,446	4,214,874,310	2,259,220,864
2030	108,710,037	173,520,809	282,230,846	209,563,333	0	100,000,000	309,563,333	2,184,131,786	4,377,795,429	2,193,663,642
2031	112,411,478	177,349,869	289,761,347	218,993,683	0	100,000,000	318,993,683	2,426,890,023	4,545,111,316	2,118,221,293
2032	116,238,948	181,052,783	297,291,731	228,848,399	0	100,000,000	328,848,399	2,684,820,650	4,716,793,126	2,031,972,476
2033	120,196,739	184,551,146	304,747,885	239,146,577	0	100,000,000	339,146,577	2,958,871,940	4,892,795,082	1,933,923,142
2034	124,289,288	187,737,541	312,026,829	249,908,173	0	100,000,000	349,908,173	3,250,051,436	5,073,052,694	1,823,001,258
2035	128,521,183	190,462,207	318,983,390	261,154,041	0	100,000,000	361,154,041	3,559,429,651	5,257,480,821	1,698,051,169
2036	132,897,168	192,511,700	325,408,868	272,905,973	0	100,000,000	372,905,973	3,888,144,004	5,445,971,576	1,557,827,571
2037	137,422,151	193,573,317	330,995,468	285,186,741	0	100,000,000	385,186,741	4,237,403,005	5,638,392,070	1,400,989,065
2038	142,101,203	193,172,830	335,274,033	298,020,145	0	100,000,000	398,020,145	4,608,490,692	5,834,581,969	1,226,091,276
2039	146,939,572	190,558,841	337,498,413	311,431,051	0	100,000,000	411,431,051	5,002,771,361	6,034,350,857	1,031,579,496
2040	151,942,680	184,471,475	336,414,155	325,445,449	0	100,000,000	425,445,449	5,421,694,571	6,237,475,393	815,780,822
2041	157,116,139	172,633,485	329,749,624	340,090,494	0	100,000,000	440,090,494	5,866,800,481	6,443,696,245	576,895,764
2042	162,465,747	150,478,008	312,943,755	355,394,566	0	100,000,000	455,394,566	6,339,725,512	6,652,714,783	312,989,272
2043	167,997,502	107,331,779	275,329,281	371,387,321	0	100,000,000	471,387,321	6,842,208,356	6,864,189,515	21,981,159
2044	173,717,607	11,147,962	184,865,569	0	388,099,751	195,698,766	195,698,766	7,077,732,251	7,077,732,251	0
2045	179,632,475	0	179,632,475	0	405,564,240	179,632,475	179,632,475	7,292,903,971	7,292,903,971	0
2046	185,748,736	0	185,748,736	0	423,814,630	185,748,736	185,748,736	7,509,210,379	7,509,210,379	0
2047	192,073,248	0	192,073,248	0	442,886,289	192,073,248	192,073,248	7,726,097,117	7,726,097,117	0
2048	198,613,102	0	198,613,102	0	462,816,172	198,613,102	198,613,102	7,942,944,618	7,942,944,618	0
2049	205,375,630	0	205,375,630	0	483,642,900	205,375,630	205,375,630	8,159,062,573	8,159,062,573	0

Notes:

Assumes payment at the beginning of the fiscal year.

Normal cost is projected to increase 3.25% per year for inflation and 0.15% per year for mortality improvement and does not reflect the future impact of pension reform for new hires.

Section 2: Valuation Results

Total City (Boston Public Schools and All Other City Departments)
Fully Funded in 2042, 24-Year Closed Amortization
\$125,000,000 Contribution to OPEB Trust Beginning in 2028

Fiscal Year Ending June 30	(1) Normal Cost	(2) Amortization of UAAL	(3) Actuarially Determined Contribution (1) + (2)	(4) Projected Benefits to be paid by the City	(5) Projected Benefits to be paid by OPEB Trust	(6) Contribution to OPEB Trust	(7) Total City Cost (4) + (6)	(8) Assets at End of Year	(9) AAL at End of Year	(10) UAAL at End of Year (9) - (8)
2022	\$83,165,180	\$120,691,406	\$203,856,586	\$123,601,109	\$0	\$40,000,000	\$163,601,109	\$958,177,951	\$3,134,363,864	\$2,176,185,913
2023	85,996,850	127,346,234	213,343,084	133,681,233	0	40,000,000	173,681,233	1,060,564,073	3,283,837,798	2,223,273,725
2024	88,924,936	134,286,448	223,211,384	144,568,236	0	40,000,000	184,568,236	1,169,349,327	3,434,542,878	2,265,193,551
2025	91,952,719	141,502,082	233,454,801	155,029,439	0	40,000,000	195,029,439	1,284,933,660	3,587,100,883	2,302,167,223
2026	95,083,594	149,062,841	244,146,435	166,222,334	0	40,000,000	206,222,334	1,407,742,014	3,740,982,947	2,333,240,933
2027	98,321,071	156,973,022	255,294,093	176,876,697	0	40,000,000	216,876,697	1,538,225,890	3,896,940,193	2,358,714,303
2028	101,668,781	165,329,032	266,997,813	187,826,210	0	125,000,000	312,826,210	1,767,177,508	4,054,915,208	2,287,737,700
2029	105,130,476	167,572,037	272,702,513	199,048,240	0	125,000,000	324,048,240	2,010,438,602	4,214,874,310	2,204,435,707
2030	108,710,037	169,313,003	278,023,040	209,563,333	0	125,000,000	334,563,333	2,268,903,515	4,377,795,429	2,108,891,914
2031	112,411,478	170,496,377	282,907,855	218,993,683	0	125,000,000	343,993,683	2,543,522,485	4,545,111,316	2,001,588,832
2032	116,238,948	171,083,744	287,322,692	228,848,399	0	125,000,000	353,848,399	2,835,305,140	4,716,793,126	1,881,487,986
2033	120,196,739	170,883,597	291,080,336	239,146,577	0	125,000,000	364,146,577	3,145,324,211	4,892,795,082	1,747,470,871
2034	124,289,288	169,637,499	293,926,787	249,908,173	0	125,000,000	374,908,173	3,474,719,474	5,073,052,694	1,598,333,220
2035	128,521,183	166,989,502	295,510,685	261,154,041	0	125,000,000	386,154,041	3,824,701,942	5,257,480,821	1,432,778,879
2036	132,897,168	162,437,212	295,334,380	272,905,973	0	125,000,000	397,905,973	4,196,558,313	5,445,971,576	1,249,413,263
2037	137,422,151	155,250,217	292,672,368	285,186,741	0	125,000,000	410,186,741	4,591,655,707	5,638,392,070	1,046,736,362
2038	142,101,203	144,327,340	286,428,543	298,020,145	0	125,000,000	423,020,145	5,011,446,689	5,834,581,969	823,135,280
2039	146,939,572	127,931,507	274,871,079	311,431,051	0	125,000,000	436,431,051	5,457,474,607	6,034,350,857	576,876,249
2040	151,942,680	103,159,488	255,102,168	325,445,449	0	125,000,000	450,445,449	5,931,379,270	6,237,475,393	306,096,123
2041	157,116,139	64,775,291	221,891,430	340,090,494	0	125,000,000	465,090,494	6,434,902,975	6,443,696,245	8,793,271
2042	162,465,747	2,293,645	164,759,392	0	355,394,566	171,259,018	171,259,018	6,652,714,783	6,652,714,783	0
2043	167,997,502	0	167,997,502	0	371,387,321	167,997,502	167,997,502	6,864,189,515	6,864,189,515	0
2044	173,717,607	0	173,717,607	0	388,099,751	173,717,607	173,717,607	7,077,732,251	7,077,732,251	0
2045	179,632,475	0	179,632,475	0	405,564,240	179,632,475	179,632,475	7,292,903,971	7,292,903,971	0
2046	185,748,736	0	185,748,736	0	423,814,630	185,748,736	185,748,736	7,509,210,379	7,509,210,379	0
2047	192,073,248	0	192,073,248	0	442,886,289	192,073,248	192,073,248	7,726,097,117	7,726,097,117	0
2048	198,613,102	0	198,613,102	0	462,816,172	198,613,102	198,613,102	7,942,944,618	7,942,944,618	0
2049	205,375,630	0	205,375,630	0	483,642,900	205,375,630	205,375,630	8,159,062,573	8,159,062,573	0

Notes:

Assumes payment at the beginning of the fiscal year.

Normal cost is projected to increase 3.25% per year for inflation and 0.15% per year for mortality improvement and does not reflect the future impact of pension reform for new hires.

Section 2: Valuation Results

Total City (Boston Public Schools and All Other City Departments)
Fully Funded in 2041, 24-Year Closed Amortization
\$150,000,000 Contribution to OPEB Trust Beginning in 2028

Fiscal Year Ending June 30	(1) Normal Cost	(2) Amortization of UAAL	(3) Actuarially Determined Contribution (1) + (2)	(4) Projected Benefits to be paid by the City	(5) Projected Benefits to be paid by OPEB Trust	(6) Contribution to OPEB Trust	(7) Total City Cost (4) + (6)	(8) Assets at End of Year	(9) AAL at End of Year	(10) UAAL at End of Year (9) - (8)
2022	\$83,165,180	\$120,691,406	\$203,856,586	\$123,601,109	\$0	\$40,000,000	\$163,601,109	\$958,177,951	\$3,134,363,864	\$2,176,185,913
2023	85,996,850	127,346,234	213,343,084	133,681,233	0	40,000,000	173,681,233	1,060,564,073	3,283,837,798	2,223,273,725
2024	88,924,936	134,286,448	223,211,384	144,568,236	0	40,000,000	184,568,236	1,169,349,327	3,434,542,878	2,265,193,551
2025	91,952,719	141,502,082	233,454,801	155,029,439	0	40,000,000	195,029,439	1,284,933,660	3,587,100,883	2,302,167,223
2026	95,083,594	149,062,841	244,146,435	166,222,334	0	40,000,000	206,222,334	1,407,742,014	3,740,982,947	2,333,240,933
2027	98,321,071	156,973,022	255,294,093	176,876,697	0	40,000,000	216,876,697	1,538,225,890	3,896,940,193	2,358,714,303
2028	101,668,781	165,329,032	266,997,813	187,826,210	0	150,000,000	337,826,210	1,793,740,008	4,054,915,208	2,261,175,200
2029	105,130,476	165,626,389	270,756,865	199,048,240	0	150,000,000	349,048,240	2,065,223,759	4,214,874,310	2,149,650,551
2030	108,710,037	165,105,196	273,815,233	209,563,333	0	150,000,000	359,563,333	2,353,675,244	4,377,795,429	2,024,120,185
2031	112,411,478	163,642,886	276,054,364	218,993,683	0	150,000,000	368,993,683	2,660,154,946	4,545,111,316	1,884,956,370
2032	116,238,948	161,114,704	277,353,652	228,848,399	0	150,000,000	378,848,399	2,985,789,630	4,716,793,126	1,731,003,495
2033	120,196,739	157,216,047	277,412,786	239,146,577	0	150,000,000	389,146,577	3,331,776,482	4,892,795,082	1,561,018,600
2034	124,289,288	151,537,456	275,826,744	249,908,173	0	150,000,000	399,908,173	3,699,387,512	5,073,052,694	1,373,665,182
2035	128,521,183	143,516,798	272,037,981	261,154,041	0	150,000,000	411,154,041	4,089,974,232	5,257,480,821	1,167,506,589
2036	132,897,168	132,362,724	265,259,892	272,905,973	0	150,000,000	422,905,973	4,504,972,621	5,445,971,576	940,998,954
2037	137,422,151	116,927,118	254,349,269	285,186,741	0	150,000,000	435,186,741	4,945,908,410	5,638,392,070	692,483,660
2038	142,101,203	95,481,850	237,583,053	298,020,145	0	150,000,000	448,020,145	5,414,402,686	5,834,581,969	420,179,283
2039	146,939,572	65,304,173	212,243,745	311,431,051	0	150,000,000	461,431,051	5,912,177,854	6,034,350,857	122,173,003
2040	151,942,680	21,847,501	173,790,181	0	325,445,449	274,115,683	274,115,683	6,237,475,393	6,237,475,393	0
2041	157,116,139	0	157,116,139	0	340,090,494	157,116,139	157,116,139	6,443,696,245	6,443,696,245	0
2042	162,465,747	0	162,465,747	0	355,394,566	162,465,747	162,465,747	6,652,714,783	6,652,714,783	0
2043	167,997,502	0	167,997,502	0	371,387,321	167,997,502	167,997,502	6,864,189,515	6,864,189,515	0
2044	173,717,607	0	173,717,607	0	388,099,751	173,717,607	173,717,607	7,077,732,251	7,077,732,251	0
2045	179,632,475	0	179,632,475	0	405,564,240	179,632,475	179,632,475	7,292,903,971	7,292,903,971	0
2046	185,748,736	0	185,748,736	0	423,814,630	185,748,736	185,748,736	7,509,210,379	7,509,210,379	0
2047	192,073,248	0	192,073,248	0	442,886,289	192,073,248	192,073,248	7,726,097,117	7,726,097,117	0
2048	198,613,102	0	198,613,102	0	462,816,172	198,613,102	198,613,102	7,942,944,618	7,942,944,618	0
2049	205,375,630	0	205,375,630	0	483,642,900	205,375,630	205,375,630	8,159,062,573	8,159,062,573	0

Notes:

Assumes payment at the beginning of the fiscal year.

Normal cost is projected to increase 3.25% per year for inflation and 0.15% per year for mortality improvement and does not reflect the future impact of pension reform for new hires.

Section 2: Valuation Results

Public Health Commission 30-Year Open Amortization

Fiscal Year Ending June 30	(1) Normal Cost	(2) Amortization of UAAL	(3) Actuarially Determined Contribution (1) + (2)	(4) Projected Benefits to be paid by the City	(5) Contribution to OPEB Trust	(6) Total City Cost (4) + (5)	(7) Assets at End of Year	(8) AAL at End of Year	(9) UAAL at End of Year (8) - (7)
2022	\$4,493,033	\$3,395,464	\$7,888,497	\$3,362,950	\$2,250,000	\$5,612,950	\$41,336,155	\$113,915,950	\$72,579,796
2023	4,646,015	3,554,629	8,200,644	3,823,946	2,250,000	6,073,946	46,310,289	122,030,455	75,720,166
2024	4,804,206	3,708,430	8,512,636	4,300,021	2,250,000	6,550,021	51,595,307	130,329,468	78,734,161
2025	4,967,783	3,856,041	8,823,824	4,808,526	2,250,000	7,058,526	57,210,639	138,796,815	81,586,176
2026	5,136,930	3,995,720	9,132,650	5,276,119	2,250,000	7,526,119	63,176,929	147,491,105	84,314,176
2027	5,311,836	4,129,325	9,441,161	5,725,544	2,250,000	7,975,544	69,516,112	156,451,370	86,935,258
2028	5,492,698	4,257,694	9,750,392	6,236,423	2,250,000	8,486,423	76,251,494	165,637,214	89,385,720
2029	5,679,717	4,377,706	10,057,423	6,807,730	2,250,000	9,057,730	83,407,837	175,006,992	91,599,155
2030	5,873,104	4,486,110	10,359,214	7,344,548	2,250,000	9,594,548	91,011,452	184,614,515	93,603,063
2031	6,073,076	4,584,253	10,657,329	7,872,425	2,250,000	10,122,425	99,090,293	194,490,856	95,400,563
2032	6,279,857	4,672,286	10,952,143	8,397,751	2,250,000	10,647,751	107,674,061	204,662,680	96,988,618
2033	6,493,678	4,750,062	11,243,740	8,787,316	2,250,000	11,037,316	116,794,315	215,295,872	98,501,557
2034	6,714,780	4,824,159	11,538,939	9,182,745	2,250,000	11,432,745	126,484,585	226,420,960	99,936,375
2035	6,943,410	4,894,430	11,837,840	9,595,969	2,250,000	11,845,969	136,780,496	238,058,344	101,277,848
2036	7,179,824	4,960,129	12,139,953	10,027,788	2,250,000	12,277,788	147,719,902	250,229,147	102,509,245
2037	7,424,288	5,020,437	12,444,725	10,479,038	2,250,000	12,729,038	159,343,021	262,955,230	103,612,209
2038	7,677,076	5,074,455	12,751,531	10,950,595	2,250,000	13,200,595	171,692,585	276,259,210	104,566,625
2039	7,938,471	5,121,198	13,059,669	11,443,372	2,250,000	13,693,372	184,813,997	290,164,478	105,350,482
2040	8,208,766	5,159,588	13,368,354	11,958,323	2,250,000	14,208,323	198,755,496	304,695,214	105,939,718
2041	8,488,264	5,188,446	13,676,710	12,496,448	2,250,000	14,746,448	213,568,340	319,876,402	106,308,062
2042	8,777,279	5,206,486	13,983,765	13,058,788	2,250,000	15,308,788	229,306,986	335,733,845	106,426,859
2043	9,076,134	5,212,304	14,288,438	13,646,433	2,250,000	15,896,433	246,029,298	352,294,181	106,264,884
2044	9,385,165	5,204,371	14,589,536	14,260,523	2,250,000	16,510,523	263,796,754	369,584,895	105,788,141
2045	9,704,718	5,181,022	14,885,740	14,902,246	2,250,000	17,152,246	282,674,676	387,634,330	104,959,654
2046	10,035,152	5,140,447	15,175,599	15,572,848	2,250,000	17,822,848	302,732,468	406,471,701	103,739,233
2047	10,376,836	5,080,676	15,457,512	16,273,626	2,250,000	18,523,626	324,043,872	426,127,101	102,083,229
2048	10,730,154	4,999,573	15,729,727	17,005,939	2,250,000	19,255,939	346,687,239	446,631,513	99,944,274
2049	11,095,503	4,894,816	15,990,319	17,771,206	2,250,000	20,021,206	370,745,817	468,016,815	97,270,998
2050	11,473,291	4,763,891	16,237,182	18,570,910	2,250,000	20,820,910	396,308,055	490,315,781	94,007,725
2051	11,863,942	4,604,071	16,468,013	19,406,601	2,250,000	21,656,601	423,467,934	513,562,089	90,094,155

Notes:

Assumes payment at the beginning of the fiscal year.

Normal cost is projected to increase 3.25% per year for inflation and 0.15% per year for mortality improvement and does not reflect the future impact of pension reform for new hires.

Section 3: Supporting Information

Exhibit I: Summary of Participant Data as of June 30, 2021 and June 30, 2019

Summary of Participant Data as of June 30, 2021	Boston Public Schools (A)	All Other Departments (City) (B)	Total City (C): (A) + (B)	Public Health Commission (D)	Unknown ¹ (E)	All Departments Total (F): (C) + (D) + (E)
Retirees and Beneficiaries						
• Number	5,518	9,555	15,073	314	N/A	15,387
• Average age	73.7	73.0	73.3	66.0	N/A	73.1
Active Employees						
• Number	8,661	6,779	15,440	965	N/A	16,405
• Average age	44.2	46.4	45.2	44.4	N/A	45.1
• Average years of service	13.6	16.9	15.0	11.4	N/A	14.8
• Average age at hire	30.6	29.6	30.1	33.0	N/A	30.3
Summary of Participant Data as of June 30, 2019						
Retirees and Beneficiaries						
• Number	6,906	7,368	14,274	280	1,021	15,575
• Average age	73.3	72.3	72.8	66.2	77	72.9
Active Employees						
• Number	7,869	6,647	14,516	911	N/A	15,427
• Average age	43.9	46.7	45.2	44.8	N/A	45.2
• Average years of service	13.1	17.1	14.9	12.8	N/A	14.8
• Average age at hire	30.8	29.6	30.3	32.0	N/A	30.4

¹ Data received as of June 30, 2019 contained a large group of beneficiaries with an unknown department code.

Section 3: Supporting Information

Exhibit II: Actuarial Assumptions and Actuarial Cost Method

Data:	Detailed census data, claims experience, administrative fees, premium rates and summary plan descriptions for postemployment welfare benefits were provided by the City of Boston.
Actuarial Cost Method:	Entry Age Normal – Level percentage of payroll
Per Capita Cost Development:	Per capita costs were based on the following:
Medicare Plans – Fully Insured	<ul style="list-style-type: none">• The fully insured premium rates effective January 1, 2021 and January 1, 2022 for Blue Cross Blue Shield Managed Blue for Seniors, Medicare HMO Blue, and Tufts Medicare Preferred Supplement were averaged to estimate the premium rate for the valuation year. Actuarial factors were applied to the premium to estimate individual retiree and spouse costs by age and by gender.
<ul style="list-style-type: none">• <i>Blue Cross Blue Shield Managed Blue for Seniors</i>• <i>Blue Cross Blue Shield Medicare HMO Blue</i>• <i>Tufts Medicare Preferred HMO</i>	
Medicare Plans – Self-Insured medical coverage with Fully Insured PDP (prescription drugs)	Per capita costs were based on a combination of the following:
<ul style="list-style-type: none">• <i>Blue Cross Blue Shield Medex</i>• <i>Harvard Pilgrim Health Care Medicare Enhance</i>• <i>Tufts Medicare Preferred Supplement</i>	<ul style="list-style-type: none">• The fully insured PDP rates effective January 1, 2021 and January 1, 2022 for BCBS Medex, HPHC Medicare Enhance, and Tufts Medicare Preferred Supplement were averaged to estimate the premium rate for the valuation year. Actuarial factors were applied to the premium to estimate individual retiree and spouse costs by age and by gender.• The monthly paid medical claims experience for the period April 1, 2020 through March 31, 2022 for BCBS Medex, March 1, 2020 through February 28, 2022 for HPHC Medicare Enhance, and May 1, 2020 through April 30, 2022 for Tufts Medicare Preferred Supplement were separated into two 12-month periods and adjusted as follows:<ul style="list-style-type: none">– claims provided on a paid basis were multiplied by a factor to yield an estimate of incurred claims,– total claims were divided by the number of adult members to yield a per capita claim cost, and– the per capita claim cost was trended to the midpoint of the valuation year at assumed trend rates.Taking a weighted average, per capita claims for the two periods were combined. The weights used in this average account for a number of factors including each plan year's volatility of claims experience and distance to the valuation year. Actuarial factors were then applied to the weighted average cost to estimate individual retiree and spouse costs by age and by gender.

Section 3: Supporting Information

Non-Medicare Plans – Self-Insured

- *AllWays Health Partners HMO*
- *Blue Care Elect Preferred PPO*
- *Blue Cross Blue Shield HMO (Harvard Pilgrim Health Care HMO prior to July 1, 2021)*

Per capita claims costs were based on the following:

- The monthly claims experience by participant group for the period April 1, 2020 through March 31, 2022 were separated into two 12-month periods and adjusted as follows:
 - claims provided on a paid basis were multiplied by a factor to yield an estimate of incurred claims,
 - pharmacy claims were adjusted to reflect estimated rebates;
 - claims incurred prior to June 30, 2021, were adjusted to reflect changes in contract terms related to the non-Medicare plan Request for Proposal (RFP) process, effective July 1, 2021;
 - total claims were divided by the number of adult members to yield a per capita claim cost, and
 - the per capita claim cost was trended to the midpoint of the valuation year at assumed trend rates.
- Taking a weighted average, per capita claims for the two periods were combined. The weights used in this average account for a number of factors including each plan year's volatility of claims experience and distance to the valuation year. Actuarial factors were then applied to the weighted average cost to estimate individual retiree and spouse costs by age and by gender.

Actuarial Valuation Date:

June 30, 2021

Roll-Forward Techniques:

The results of the June 30, 2021 actuarial valuation were rolled forward using standard actuarial techniques to determine the Actuarially Determined Contribution for the fiscal year ending June 30, 2023 and later years.

Expected Return on Assets:

6.25% (previously, 6.75%)

The long-term expected rate of return on OPEB investments was determined using a building-block method in which best-estimate ranges of expected future real rates of return (expected returns, net of pension plan investment expense and inflation) are developed for each major asset class. These ranges are combined to produce a 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.

Discount Rate:

6.25% (previously, 6.75%)

The discount rate is equal to the expected return on assets.

Section 3: Supporting Information

Salary Increases:

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

Note: Includes allowance for inflation of 3.25%.

Asset Valuation Method:

Market Value

Mortality Rates:

Groups 1 and 2 (Excluding Teachers)

- *Pre-Retirement (Non-Teachers)*: Pub-2010 General Employee Headcount-Weighted Mortality Table set forward one year projected generationally using Scale MP-2021 (previously, projected generationally using Scale MP-2019)
- *Healthy (Non-Teachers)*: Pub-2010 General Healthy Retiree Headcount-Weighted Mortality Table set forward one year projected generationally using Scale MP-2021 (previously, projected generationally using Scale MP-2019)
- *Disabled (Non-Teachers)*: Pub-2010 General Healthy Retiree Headcount-Weighted Mortality Table set forward one year projected generationally using scale MP-2021 (previously, projected generationally using Scale MP-2019)
- *Surviving Spouse (Non-Teachers)*: Pub-2010 General Contingent Survivor Headcount-Weighted Mortality Table set forward one year projected generationally using scale MP-2021 (previously, projected generationally using Scale MP-2019)

Section 3: Supporting Information

- Group 4
 - *Pre-Retirement*: Pub-2010 Safety Employee Headcount-Weighted Mortality Table projected generationally using scale MP-2021 (previously, projected generationally using Scale MP-2019)
 - *Healthy*: Pub-2010 Safety Healthy Retiree Headcount-Weighted Mortality Table projected generationally using scale MP-2021 (previously, projected generationally using Scale MP-2019)
 - *Disabled*: Pub-2010 Disabled Retiree Headcount-Weighted Mortality Table projected generationally using scale MP-2021 (previously, projected generationally using Scale MP-2019)
 - *Surviving Spouse*: Pub-2010 Safety Contingent Survivor Headcount-Weighted Mortality Table projected generationally with Scale MP-2021 (previously, projected generationally using Scale MP-2019)
- Teachers
 - *Pre-Retirement (Teachers)*: Pub-2010 Teacher Employee Headcount-Weighted Mortality Table projected generationally with Scale MP-2021 (previously, projected generationally using Scale MP-2019)
 - *Healthy (Teachers)*: Pub-2010 Teacher Healthy Retiree Headcount-Weighted Mortality Table projected generationally with Scale MP-2021 (previously, projected generationally using Scale MP-2019)
 - *Disabled (Teachers)*: Pub-2010 Teacher Healthy Retiree Headcount-Weighted Mortality Table projected generationally with Scale MP-2021 (previously, projected generationally using Scale MP-2019)
 - *Surviving Spouse (Teachers)*: Pub-2010 Teacher Contingent Survivor Headcount-Weighted Mortality Table projected generationally with Scale MP-2021 (previously, projected generationally using Scale MP-2019)

Due to software limitations, the Contingent Survivor mortality table is only applied to current beneficiaries.

The underlying tables with generational projection to the ages of participants as of the measurement date reasonably reflect the mortality experience of the plan as of the measurement date. The mortality tables were then adjusted to future years using generational projection to reflect future mortality improvement between the measurement date and those years.

Annuitant Mortality Rates:

Age	Groups 1 and 2 (Excluding Teachers) – Rate per year (%)			
	Healthy		Disabled	
	Male	Female	Male	Female
60	0.85	0.49	0.85	0.49
70	2.02	1.30	2.02	1.30
80	6.03	3.99	6.03	3.99
90	17.36	13.57	17.36	13.57

Note: Rates shown are before generational projection.

Section 3: Supporting Information

Group 4 – Rate per year (%)				
Age	Healthy		Disabled	
	Male	Female	Male	Female
60	0.63	0.52	0.94	0.87
70	1.74	1.45	2.22	1.89
80	5.70	4.05	6.04	5.32
90	16.90	11.82	16.90	12.60

Note: Rates shown are before generational projection.

Teachers – Rate per year (%)				
Age	Healthy		Disabled	
	Male	Female	Male	Female
60	0.42	0.32	0.42	0.32
70	1.16	0.80	1.16	0.80
80	4.09	2.88	4.09	2.88
90	13.75	10.40	13.75	10.40

Note: Rates shown are before generational projection.

Surviving Spouse Mortality Rates:

Groups 1 and 2 (Excluding Teachers) – Rate per year (%)			
Age	Male		Female
60	1.21		0.81
70	2.56		1.72
80	6.28		4.38
90	16.13		13.22

Note: Rates shown are before generational projection.

Section 3: Supporting Information

Age	Group 4 – Rate per year (%)	
	Male	Female
60	1.15	0.75
70	2.35	1.59
80	5.71	3.96
90	14.71	11.91

Note: Rates shown are before generational projection.

Age	Teachers – Rate per year (%)	
	Male	Female
60	1.15	0.75
70	2.35	1.59
80	5.71	3.96
90	14.71	11.91

Note: Rates shown are before generational projection.

Section 3: Supporting Information

Termination Rates Before Retirement:

Groups 1 and 2 (excluding Teachers) – Rate per year (%)

Age	Mortality			
	Male	Female	Disability	Withdrawal
20	0.04	0.01	0.03	6.58
25	0.04	0.01	0.04	5.27
30	0.05	0.02	0.06	4.83
35	0.06	0.03	0.07	4.47
40	0.09	0.05	0.11	3.84
45	0.13	0.07	0.18	3.21
50	0.19	0.11	0.30	1.52
55	0.28	0.15	0.50	0.33
60	0.40	0.23	0.81	0.00

Notes:

50% of the disability rates shown represent accidental disability.

20% of the mortality rates shown represent accidental death.

Rates shown are before generational projection.

Section 3: Supporting Information

Group 4– Rate per year (%)				
Age	Mortality		Disability	Withdrawal
	Male	Female		
20	0.04	0.02	0.15	0.00
25	0.04	0.02	0.21	0.00
30	0.05	0.03	0.28	0.00
35	0.05	0.04	0.37	0.00
40	0.07	0.05	0.55	0.00
45	0.09	0.08	0.90	0.00
50	0.13	0.10	1.51	0.00
55	0.20	0.14	2.52	0.00
60	0.30	0.20	4.07	0.00

Notes:

90% of the disability rates shown represent accidental disability.

50% of the mortality rates shown represent accidental death.

Rates shown are before generational projection.

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Teachers – Rate per year (%)			
Mortality			
Age	Male	Female	Disability
20	0.04	0.01	0.00
25	0.02	0.01	0.01
30	0.03	0.02	0.01
35	0.04	0.02	0.01
40	0.05	0.03	0.01
45	0.08	0.05	0.03
50	0.13	0.08	0.05
55	0.19	0.12	0.07
60	0.29	0.18	0.07

Notes:

35% of the rates shown represent accidental disability.

75% of the mortality rates shown represent accidental death (previously, 55%).

Rates shown are before generational projection.

Withdrawal Rates:

Teachers – Rate per year (%)						
Age	0 – 4 Years of Service		5 – 9 Years of Service		10+ Years of Service	
	Male	Female	Male	Female	Male	Female
20	13.0	10.0	5.5	7.0	1.5	5.0
30	15.0	15.0	5.4	8.8	1.5	4.5
40	13.3	10.5	5.2	5.0	1.7	2.2
50	16.2	9.8	7.0	5.0	2.3	2.0

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Retirement Rates:

<u>All Groups (excluding Teachers) – Rate per year (%)</u>			
Age	Groups 1 and 2	Age	Group 4
55	3.0	50	1.0
56	3.0	51	1.0
57	3.0	52	1.0
58	3.0	53	1.0
59	3.0	54	1.0
60	8.0	55	10.0
61	8.0	56	5.0
62	15.0	57	5.0
63	10.0	58	5.0
64	10.0	59	5.0
65	35.0	60	10.0
66	20.0	61	15.0
67	20.0	62	15.0
68	20.0	63	15.0
69	20.0	64	25.0
70	100.00	65	100.00

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Age	Non-TARP Teachers – Rate per year (%)			
	Years of Service			
	Less than 20		20 or more	
	Male	Female	Male	Female
50	0.0	0.0	2.0	1.0
51	0.0	0.0	2.0	1.0
52	0.0	0.0	2.0	1.5
53	0.0	0.0	2.0	2.0
54	0.0	0.0	3.0	2.0
55	3.5	3.5	3.0	4.0
56	3.5	3.5	3.5	4.0
57	5.0	3.5	4.0	4.0
58	5.5	5.0	5.0	6.0
59	6.0	6.5	6.0	8.0
60	7.5	8.5	15.0	15.0
61	12.0	10.0	25.0	20.0
62	14.0	12.0	30.0	20.0
63	14.0	12.0	30.0	25.0
64	14.0	20.0	30.0	30.0
65	30.0	30.0	30.0	40.0
66	30.0	30.0	25.0	30.0
67	30.0	30.0	25.0	30.0
68	30.0	30.0	25.0	30.0
69	30.0	30.0	25.0	30.0
70	100.0	100.0	100.0	100.0

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TARP Teachers – Rate per year (%)						
Age	Years of Service					
	Less than 20		20 – 29		30 or more	
	Male	Female	Male	Female	Male	Female
50	0.0	0.0	1.0	1.0	2.0	1.5
51	0.0	0.0	1.0	1.0	2.0	1.5
52	0.0	0.0	1.0	1.0	2.0	1.5
53	0.0	0.0	1.5	1.0	2.0	1.5
54	0.0	0.0	2.5	1.0	2.0	2.0
55	5.0	3.0	3.0	3.0	6.0	5.0
56	5.0	3.0	6.0	5.0	20.0	15.0
57	5.0	4.0	10.0	8.0	40.0	35.0
58	5.0	8.0	15.0	10.0	50.0	35.0
59	10.0	8.0	20.0	15.0	50.0	35.0
60	10.0	10.0	25.0	20.0	40.0	35.0
61	20.0	12.0	30.0	25.0	40.0	35.0
62	20.0	12.0	35.0	30.0	35.0	35.0
63	25.0	15.0	40.0	30.0	35.0	35.0
64	25.0	20.0	40.0	30.0	35.0	35.0
65	25.0	25.0	40.0	40.0	35.0	35.0
66	30.0	25.0	40.0	30.0	40.0	35.0
67	30.0	30.0	30.0	30.0	40.0	30.0
68	30.0	30.0	30.0	30.0	40.0	30.0
69	30.0	30.0	30.0	30.0	40.0	30.0
70	100.0	100.0	100.0	100.0	100.0	100.0

Dependents:

Demographic data was available for spouses of current retirees. For future retirees, husbands were assumed to be three years older than their wives. For future retirees who elect to continue their health coverage at retirement, 60% were assumed to have an eligible spouse who also opts for health coverage at that time.

Section 3: Supporting Information

Per Capita Health Costs:

2021-2022 medical and prescription drug claims costs are shown in the table below for retirees and for spouses at selected ages. These costs are net of deductibles and other benefit plan cost sharing provisions.

Age	Non-Medicare Plans			
	Retiree		Spouse	
	Male	Female	Male	Female
45	\$10,698	\$13,421	\$6,636	\$10,018
50	12,698	14,463	8,869	11,613
55	15,080	15,569	11,868	13,442
60	17,908	16,781	15,888	15,590
64	20,546	17,802	20,057	17,547
65	21,269	18,079	21,269	18,079
70	24,651	19,482	24,651	19,482
75	26,565	20,971	26,565	20,971
80	28,607	22,609	28,607	22,609

Age	Medicare Plans – Self-Insured Medical with PDP				Medicare Plans – Fully Insured			
	Retiree		Spouse		Retiree		Spouse	
	Male	Female	Male	Female	Male	Female	Male	Female
65	\$3,504	\$2,978	\$3,504	\$2,978	\$4,547	\$3,865	\$4,547	\$3,865
70	4,061	3,210	4,061	3,210	5,270	4,165	5,270	4,165
75	4,376	3,455	4,376	3,455	5,679	4,483	5,679	4,483
80	4,713	3,725	4,713	3,725	6,116	4,833	6,116	4,833

Medicare Part B Premium

\$1,912

Section 3: Supporting Information

Weighted Average Annual Retiree Contribution Amounts:

	Retiree	Married Spouse
Non-Medicare Plans	\$2,683	\$4,427
Medicare Plans – Self-Insured Medical with PDP	544	544
Medicare Plans – Fully Insured	656	656

Health Care Cost Trend Rates:

Health care trend measures the anticipated overall rate at which health plan costs are expected to increase in future years. The rates shown below are “net” and are applied to the net per capita costs shown above. The trend shown for a particular plan year is the rate that is applied to that year’s cost to yield the next year’s projected cost.

Year Ending June 30	Rate per year (%)		
	Non-Medicare	Medicare	Medicare Part B
2022	7.00	7.00	4.50
2023	6.75	6.75	4.50
2024	6.50	6.50	4.50
2025	6.25	6.25	4.50
2026	6.00	6.00	4.50
2027	5.75	5.75	4.50
2028	5.50	5.50	4.50
2029	5.25	5.25	4.50
2030	5.00	5.00	4.50
2031	4.75	4.75	4.50
2032 & later	4.50	4.50	4.50

The trend rate assumptions were developed using Segal’s internal guidelines, which are established each year using data sources such as the 2022 Segal Health Trend Survey, internal client results, trends from other published surveys prepared by the S&P Dow Jones Indices, consulting firms and brokers, and CPI statistics published by the Bureau of Labor Statistics.

Retiree Contribution Increase Rate:

Retiree contributions for medical and prescription drug coverage are expected to increase with medical trend. Contributions are adjusted for increases in contribution percentages negotiated in the 2020-2025 PEC Agreement.

Section 3: Supporting Information

Administrative Expenses:	<p>Administrative expense loads of \$413 per participant for non-Medicare plans (AllWays HMO, BCBS PPO, and BCBS HMO) and \$368 per participant for the Medicare self-insured medical with PDP plans (BCBS Medex, HPHC Medicare Enhance, Tufts Medicare Supplement). Administrative expenses were based on the current contractual rates for each vendor. Administrative expenses are assumed to increase at 3.0% per year.</p> <p>Administrative expenses are not added to fully insured premium rates, as these expenses are a component of the rate.</p>
Participation and Coverage Election:	<p>100% of active employees with coverage are assumed to elect retiree coverage. This assumption includes an allowance for current and future inactive vested participants who may elect retiree coverage at retirement.</p> <p>100% of retirees over age 65 are assumed to remain with their current medical plan for life.</p> <p>For future retirees hired before 1986 and current retirees under age 65, 85% are assumed to be eligible for Medicare and are assumed to enroll in a self-insured Medicare plan upon reaching age 65. 15% are assumed to be ineligible for Medicare and remain enrolled in the non-Medicare plans.</p> <p>For future retirees hired after 1986, 100% are assumed to enroll in a self-insured Medicare plan.</p> <p>The participation and coverage election assumptions were based on a review of recent experience and reflect new plan offerings.</p>
Plan Design:	<p>Development of plan liabilities was based on the substantive plan of benefits in effect as described in Exhibit III.</p>
Health Care Reform Assumption:	<p>The valuation does not reflect the potential impact of any future changes due to prior or pending legislation.</p>
Missing Participant Data:	<p>A missing census item for a given participant was assumed to equal the average value of that item over all other participants of the same status for whom the item is known.</p>
Demographic and Salary Increase Assumptions:	<p>The demographic and salary increase assumptions used in this valuation, are the same as used in the Boston Retirement System Actuarial Valuation and Review as of January 1, 2022, completed by Segal, with the exception of the headcount-weighted versus amount-weighted mortality tables for the non-Teachers.</p> <p>A review of the demographic assumptions is beyond the scope of this assignment however, we have no reason to doubt the reasonableness of the assumptions.</p> <p>The remaining demographic assumptions, such as percent married, relative ages of spouses and enrollment elections, were based on the experience of the Plan and the experience of similar plans.</p>

Section 3: Supporting Information

Actuarial Models

Segal valuation results are based on proprietary actuarial modeling software. The actuarial valuation models generate a comprehensive set of liability and cost calculations that are presented to meet regulatory, legislative and client requirements. Our Actuarial Technology and Systems Unit, comprised of both actuaries and programmers, is responsible for the initial development and maintenance of these models. The models have a modular structure that allows for a high degree of accuracy, flexibility and user control. The client team programs the assumptions and the plan provisions, validates the model and reviews the test lives and results, under the supervision of the responsible actuary.

Our claims costs assumptions are based on proprietary modeling software as well as models that were developed by others. These models generate per capita claims cost calculations that are used in our valuation software. Our Health Technical Services Unit, comprised of actuaries and programmers, is responsible for the initial development and maintenance of our health models. They are also responsible for testing models that we purchase from other vendors for reasonableness. The client team inputs the paid claims, enrollments, plan provisions and assumptions into these models and reviews the results for reasonableness, under the supervision of the responsible actuary.

Justification for Assumption Changes Since Prior Valuation:

Based on past experience and future expectations, the following actuarial assumptions were changed:

- The per capita health care costs, retiree contributions, and trend assumptions were updated.
- The mortality projection scale was updated.
- The discount rate was lowered from 6.75% to 6.25%.

Section 3: Supporting Information

Exhibit III: Summary of Plan

This exhibit summarizes the major benefit provisions as included in the valuation. To the best of our knowledge, the summary represents the substantive plans as of the measurement date. It is not intended to be, nor should it be interpreted as, a complete statement of all benefit provisions.

Eligibility:	Retired and receiving a pension from the Boston Retirement System. <ul style="list-style-type: none">• Members hired before April 2, 2012<ul style="list-style-type: none">– Group 1 and Group 2 (including Teachers):<ul style="list-style-type: none">• Retirees with at least 10 years of creditable service are eligible at age 55;• Retirees with at least 20 years of creditable service are eligible at any age.– Group 4<ul style="list-style-type: none">• Retirees are eligible at age 55;• Retirees with at least 20 years of creditable service are eligible at any age.• Members hired on or after April 2, 2012<ul style="list-style-type: none">– Group 1 (including Teachers):<ul style="list-style-type: none">• Retirees with at least 10 years of creditable service are eligible at age 60.– Group 2<ul style="list-style-type: none">• Retirees with at least 10 years of creditable service are eligible at age 55.– Group 4<ul style="list-style-type: none">• Retirees are eligible at age 55;• Retirees with at least 10 years of creditable service are eligible at age 50.
Disability:	Accidental (job-related) Disability has no age or service requirement. Ordinary (non-job related) Disability has no age requirement but requires 10 years of creditable service.
Pre-Retirement Death:	Surviving spouses of members who die in active service on Accidental (job-related) Death are eligible at any age. Surviving spouses of members who die in active service on Ordinary (non-job related) Death are eligible after two years of service.
Post-Retirement Death:	Surviving spouse is eligible.

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Benefit Types:	Medical and prescription drug benefits are provided to all eligible retirees not enrolled in Medicare through a variety of plans offered by AllWays Health Partners and Blue Cross Blue Shield of Massachusetts. Medical and prescription drug benefits are provided to retirees enrolled in Medicare through supplemental plans offered by Blue Cross Blue Shield of Massachusetts, Harvard Pilgrim Health Care, and Tufts Health Plan. The City of Boston also pays 50% of the retiree life insurance premium and reimburses retirees 50% of their Medicare Part B premium.
Medicare Part B Penalty:	Actual penalty amounts for 2,174 retirees and spouses were provided by the City.
Duration of Coverage:	Lifetime.
Dependent Benefits:	Medical and Prescription Drugs.
Dependent Coverage:	Benefits are payable to a spouse for their lifetime, regardless of when the retirees dies.
Retiree Life:	\$5,000

Section 3: Supporting Information

Retiree Contributions:

Premium rates and retiree contributions as of January 1, 2021 (for Medicare plans) and July 1, 2021 (for non-Medicare plans) are summarized below:

	Monthly Premium	City cost (\$)	Retiree cost (\$)	Retiree cost (%)
Non-Medicare Actives and Retirees				
BCBS HMO				
• Individual	\$908.73	\$722.44	\$186.29	20.50%
• Family	\$2,407.85	\$1,914.24	\$493.61	20.50%
AllWays HMO				
• Individual	\$754.00	\$599.43	\$154.57	20.50%
• Family	\$1,998.83	\$1,589.07	\$409.76	20.50%
Blue Care Elect Preferred PPO				
• Individual	\$1,135.90	\$789.45	\$346.45	30.50%
• Family	\$3,010.03	\$2,091.97	\$918.06	30.50%
Medicare – Self Funded Medical with PDP				
BCBS Medex	\$376.02	\$327.14	\$48.88	13.00%
Harvard Pilgrim Medicare Enhance	\$329.56	\$286.72	\$42.84	13.00%
Tufts Medicare Preferred Supplement	\$374.12	\$325.48	\$48.64	13.00%
Medicare – Fully Insured				
BCBS Managed Blue for Seniors	\$451.50	\$392.81	\$58.70	13.00%
Medicare HMO Blue	\$397.74	\$346.03	\$51.71	13.00%
Tufts Medicare Preferred HMO	\$344.00	\$299.28	\$44.72	13.00%
Plan Changes	• None			

Section 3: Supporting Information

Exhibit IV: Definition of Terms

The following list defines certain technical terms for the convenience of the reader:

Assumptions or Actuarial Assumptions:	The estimates on which the cost of the Plan is calculated including: <ul style="list-style-type: none">a) Investment return — the rate of investment yield that the Plan will earn over the long-term future;b) Mortality rates — the death rates of employees and pensioners; life expectancy is based on these rates;c) Retirement rates — the rate or probability of retirement at a given age;d) Turnover rates — the rates at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement.
Actuarial Accrued Liability (AAL):	Present value of all future benefit payments for current retirees and active employees taking into account assumptions about demographics, turnover, mortality, disability, retirement, health care trends, and other actuarial assumptions.
Unfunded Actuarial Accrued Liability (UAAL):	The extent to which the actuarial accrued liability of the Plan exceeds the assets of the Plan. There are many approaches to paying off the unfunded actuarial accrued liability, from meeting the interest accrual only to amortizing it over a specific period of time.
Normal Cost:	The amount of contributions required to fund the benefit allocated to the current year of service.
Actuarially Determined Contribution:	A target or recommended contribution to an OPEB plan for the reporting period based on the most recent measurement available
Valuation Date:	The date at which the actuarial valuation is performed
Covered Employee Payroll:	The payroll of the employees that are provided OPEB benefits
Entry Age Actuarial Cost Method:	An actuarial cost method where the present value of the projected benefits for an individual is allocated on a level basis over the earnings or service of the individual between entry age and assumed exit age
Healthcare Cost Trend Rates:	The rate of change in per capita health costs over time
Discount Rate:	The interest rate used to determine the actuarial present value of projected benefit payments.
Expected Return on Assets:	The rate of earnings of the Plan from its investments, including interest, dividends and capital gain and loss adjustments, computed as a percentage of the average value of the fund. For actuarial purposes, the investment return often reflects a smoothing of the capital gains and losses to avoid significant swings in the value of assets from one year to the next.
Real Rate of Return:	The rate of return on an investment after removing inflation