City of Boston

Actuarial Valuation and Review of Other Postemployment Benefits (OPEB)

Measured at June 30, 2019

Segal

★ Segal

July 1, 2020

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, 2019. 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 year ending June 30, 2020. 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, 2020 will be provided in a separate report when the June 30, 2020 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.
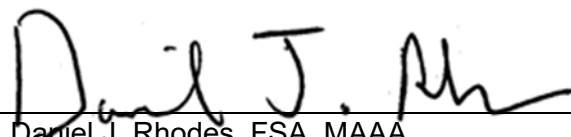
The actuarial valuation has been completed in accordance with generally accepted actuarial principles and practices. The actuarial calculations were directed under our supervision. We are members of the American Academy of Actuaries and collectively meet the Qualification Standards of the American Academy 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. Further, in our opinion, the assumptions as approved by the City of Boston are reasonably related to the experience of and the expectations for the Plan.

Sincerely,

Segal

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

Daniel J. Rhodes, FSA, MAAA
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, 2019. The purpose of this report is to calculate a recommended Actuarially Determined Contribution for the OPEB plan for the fiscal year ending June 30, 2020. 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, 2019, provided by the City;

- The assets of the Plan as of June 30, 2019, provided by the City;

- Economic assumptions regarding future salary increases and investment earnings; and

- Other actuarial assumptions, regarding employee terminations, retirement, death, etc.

Highlights of the valuation

- The Coronavirus (COVID-19) pandemic is rapidly evolving and is having a significant impact on the US economy in 2020, including most retiree health plans, and will likely continue to have an impact in the future. Our results do not include the impact of the following:
  - Short-term increases in health plan costs related to the testing or treatment of COVID-19;
  - Changes in the market value of plan assets since June 30, 2019;
  - Changes in interest rates since June 30, 2019;
  - Short-term or long-term impacts on mortality of the covered population; or
  - The potential for federal or state fiscal relief.

- 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 maintaining the 6.75% expected return on assets.

Section 1: Actuarial Valuation Summary

- The unfunded actuarial accrued liability (UAAL) as of June 30, 2019 is $2,128 million based on an actuarial accrued liability (AAL) of $2,746 million and an actuarial value of assets of $617 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, 2019 the ratio of assets to the AAL (the funded ratio) is 22.52%, compared to 16.59% 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.

- The following assumptions were revised with this valuation:
  - The per capita costs, retiree contributions, and trends were updated to reflect current experience.
  - The mortality assumptions were updated to the Pub-2010 headcount-weighted mortality tables released by the Society of Actuaries in 2019.
  - The impact of the excise tax on high cost health plans (part of the Patient Protection and Affordable Care Act) was removed, as the tax was repealed effective December 20, 2019.

- The UAAL was expected to increase by $127 million from $2,365 million as of June 30, 2017 to $2,492 million as of June 30, 2019. The actual unfunded liability of $2,128 million is $364 million less than expected. The difference between the actual and expected increase was the net effect of the following:

	(In Millions)
June 30, 2017 unfunded actuarial liability	$2,365
June 30, 2019 expected unfunded actuarial liability	2,492
Change due to:	
• Experience loss	$14
• Investment loss	11
• Removing excise tax	-7
• Updating future trends	231
• Updating per capita costs, contributions	-28
• Updating the mortality assumptions	-146
• Plan changes	-439
Net decrease	-$364
June 30, 2019 unfunded actuarial accrued liability	$2,128

Section 1: Actuarial Valuation Summary

- The participant data received for the June 30, 2019 actuarial valuation included 15,427 active employees with health coverage and 15,575 retirees and beneficiaries receiving retiree health benefits compared to 15,114 active employees and 15,090 retirees and beneficiaries in the prior valuation. There were 1,021 beneficiaries reported in the June 30, 2019 data who were not included in the previous valuation. These beneficiaries were not reported with a department code. Their liability was allocated to the departments in proportion to the retiree liability.

- The Actuarially Determined Contribution (ADC) for fiscal year 2020 is $182 million for the City and $8 million for the Public Health Commission (PHC). The ADC is calculated using a 26-year amortization of the UAAL for the City and a 30-year amortization of the UAAL for the PHC, with payments increasing at 3.25% per year.

- 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. The Boston Retirement Board recently extended the funding schedule for the Boston Retirement System to fiscal 2027. Accordingly, the $100 million contribution to the OPEB Trust will begin in fiscal 2028. The liabilities are projected to be fully funded in 2041, if all assumptions are met and there are no future changes in assumptions or the plan of benefits. This is two years earlier than in the prior valuation report.

  Through fiscal 2040, the City will pay projected benefit payments in addition to the contribution to the OPEB Trust. In fiscal 2041, a larger payment to the OPEB trust will be made, at which point benefit payments will be made from the trust. In fiscal 2042, the funding contribution to the Trust is equal to the normal cost payment and benefit payments continue to be made from the Trust.

- A projection of the ADC for the PHC appears on page 14. 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.

Section 1: Actuarial Valuation Summary

OPEB Trust information

As of June 30, 2019, the City of Boston (including PHC) has $618,464,455 in assets. The table below shows the increase in assets from June 30, 2017 to June 30, 2019.

Reconciliation of OPEB Balance from June 30, 2017 through June 30, 2019	City	PHC	Total
Balance as of June 30, 2017	$452,986,251	$17,275,875	$470,262,126
• Contributions	40,000,000	2,250,000	42,250,000
• Net investment income	27,642,843	1,080,543	28,723,386
Balance as of June 30, 2018	$520,629,094	$20,606,418	$541,235,512
• Contributions	40,000,000	2,250,000	42,250,000
• Net investment income	33,619,859	1,359,084	34,978,943
Balance as of June 30, 2019	$594,248,953	$24,215,502	$618,464,455

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

	Boston Public Schools (A)	All Other Departments (City) (B)	Total City (C): (A) + (B)	Public Health Commission (D)	All Departments Total (C) + (D)
Actuarial Accrued Liability by Participant Category					
1. Current retirees, beneficiaries and dependents	$766,045,216	$757,561,502	$1,523,606,718	$39,648,665	$1,563,255,383
2. Current active employees	566,703,274	560,367,766	1,127,071,040	55,953,435	1,183,024,475
3. Total as of June 30, 2019: **(1) + (2)**	$1,332,748,490	$1,317,929,268	$2,650,677,758	$95,602,100	$2,746,279,858
4. Actuarial value of assets as of June 30, 2019	298,788,374	295,460,579	594,248,953	24,215,502	618,464,455
5. Unfunded actuarial accrued liability (UAAL) as of June 30, 2019: **(3) – (4)**	$1,033,960,116	$1,022,468,689	$2,056,428,805	$71,386,598	$2,127,815,403
6. Funded ratio: **(4) / (3)**	22.42%	22.42%	22.42%	25.33%	22.52%
Actuarially Determined Contribution for Fiscal Year Ending June 30, 2020					
7. Normal Cost as of June 30, 2019	$32,351,319	$33,701,310	$66,052,629	$4,338,111	$70,390,740
8. 26-year increasing amortization for City (30-year increasing amortization for PHC) (3.25% per year) of the UAAL as of June 30, 2019	58,480,775	57,830,820	116,311,595	3,702,487	120,014,082
9. Total Actuarially Determined Contribution (ADC): **(6) + (7)**	$90,832,094	$91,532,130	$182,364,224	$8,040,598	$190,404,822
10. Projected benefit payments	66,297,197	71,126,903	137,424,100	3,438,159	140,862,259

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.
Beneficiaries with unknown department codes were allocated in proportion to retiree liability.

Section 2: Valuation Results

Projection of the Actuarially Determined Contribution

Total City (Boston Public Schools and All Other City Departments)
Fully Funded in 2041, 26-Year Closed 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)
2020	$66,052,629	$116,311,595	$182,364,224	$137,424,100	$40,000,000	$177,424,100	$677,060,757	$2,758,123,257	$2,081,062,500
2021	68,301,638	120,670,842	188,972,480	131,071,810	40,000,000	171,071,810	765,462,358	2,881,785,324	2,116,322,966
2022	70,627,224	125,997,991	196,625,215	140,937,434	40,000,000	180,937,434	859,831,068	3,006,083,991	2,146,252,923
2023	73,031,993	131,414,323	204,446,316	150,369,258	40,000,000	190,369,258	960,569,665	3,131,594,958	2,171,025,293
2024	75,518,641	136,958,661	212,477,302	160,669,435	40,000,000	200,669,435	1,068,108,117	3,257,590,281	2,189,482,164
2025	78,089,956	142,589,620	220,679,576	170,376,059	40,000,000	210,376,059	1,182,905,415	3,384,806,293	2,201,900,878
2026	80,748,821	148,358,629	229,107,450	180,595,788	40,000,000	220,595,788	1,305,451,530	3,512,888,712	2,207,437,182
2027	83,498,218	154,248,055	237,746,273	190,498,966	40,000,000	230,498,966	1,436,269,509	3,642,319,722	2,206,050,213
2028	86,341,228	160,298,077	246,639,305	200,189,274	100,000,000	300,189,274	1,639,967,701	3,773,510,223	2,133,542,522
2029	89,281,039	161,695,815	250,976,854	209,197,791	100,000,000	309,197,791	1,857,415,520	3,907,386,741	2,049,971,220
2030	92,320,946	162,590,651	254,911,597	218,611,692	100,000,000	318,611,692	2,089,541,068	4,043,818,593	1,954,277,525
2031	95,464,359	162,833,780	258,298,139	228,449,218	100,000,000	328,449,218	2,337,335,090	4,182,651,067	1,845,315,977
2032	98,714,801	162,231,150	260,945,951	238,729,433	100,000,000	338,729,433	2,601,855,209	4,323,703,074	1,721,847,865
2033	102,075,917	160,525,930	262,601,847	249,472,257	100,000,000	349,472,257	2,884,230,435	4,466,764,607	1,582,534,171
2034	105,551,474	157,372,197	262,923,671	260,698,509	100,000,000	360,698,509	3,185,665,990	4,611,594,000	1,425,928,010
2035	109,145,370	152,294,268	261,439,638	272,429,942	100,000,000	372,429,942	3,507,448,444	4,757,914,957	1,250,466,513
2036	112,861,633	144,621,628	257,483,261	284,689,289	100,000,000	384,689,289	3,850,951,214	4,905,413,345	1,054,462,131
2037	116,704,431	133,380,455	250,084,886	297,500,307	100,000,000	397,500,307	4,217,640,421	5,053,733,731	836,093,310
2038	120,678,071	117,103,797	237,781,868	310,887,821	100,000,000	410,887,821	4,609,081,149	5,202,475,640	593,394,490
2039	124,787,008	93,479,011	218,266,019	324,877,773	100,000,000	424,877,773	5,026,944,127	5,351,189,514	324,245,387
2040	129,035,850	58,642,639	187,678,489	339,497,272	100,000,000	439,497,272	5,473,012,856	5,499,372,362	26,359,507
2041	133,429,359	5,629,119	139,058,478	0	159,788,866	159,788,866	5,646,463,054	5,646,463,054	0
2042	137,972,462	0	137,972,462	0	137,972,462	137,972,462	5,791,837,255	5,791,837,255	0
2043	142,670,252	0	142,670,252	0	142,670,252	142,670,252	5,934,801,961	5,934,801,961	0
2044	147,527,996	0	147,527,996	0	147,527,996	147,527,996	6,074,589,609	6,074,589,609	0
2045	152,551,140	0	152,551,140	0	152,551,140	152,551,140	6,210,351,737	6,210,351,737	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)
2020	$4,338,111	$3,702,487	$8,040,598	$3,438,159	$2,250,000	$5,688,159	$28,251,923	$103,133,873	$74,881,949
2021	4,485,818	3,883,774	8,369,592	3,706,985	2,250,000	5,956,985	32,560,803	111,053,967	78,493,164
2022	4,638,555	4,071,071	8,709,626	4,205,141	2,250,000	6,455,141	37,160,532	119,157,020	81,996,488
2023	4,796,492	4,252,772	9,049,264	4,740,489	2,250,000	6,990,489	42,070,743	127,422,506	85,351,762
2024	4,959,806	4,426,794	9,386,600	5,303,536	2,250,000	7,553,536	47,312,394	135,838,510	88,526,117
2025	5,128,682	4,591,433	9,720,115	5,856,649	2,250,000	8,106,649	52,907,855	144,431,394	91,523,539
2026	5,303,307	4,746,895	10,050,202	6,380,974	2,250,000	8,630,974	58,881,010	153,248,977	94,367,967
2027	5,483,878	4,894,422	10,378,300	6,945,124	2,250,000	9,195,124	65,257,354	162,271,628	97,014,274
2028	5,670,597	5,031,674	10,702,271	7,543,545	2,250,000	9,793,545	72,064,100	171,484,342	99,420,243
2029	5,863,674	5,156,460	11,020,134	8,154,758	2,250,000	10,404,758	79,330,302	180,893,519	101,563,218
2030	6,063,324	5,267,606	11,330,930	8,739,531	2,250,000	10,989,531	87,086,972	190,546,757	103,459,785
2031	6,269,773	5,365,972	11,635,745	9,194,221	2,250,000	11,444,221	95,367,218	200,602,186	105,234,969
2032	6,483,251	5,458,043	11,941,294	9,607,961	2,250,000	11,857,961	104,206,380	211,136,770	106,930,390
2033	6,703,997	5,545,976	12,249,973	10,040,319	2,250,000	12,290,319	113,642,185	222,171,372	108,529,187
2034	6,932,260	5,628,898	12,561,158	10,492,133	2,250,000	12,742,133	123,714,908	233,727,667	110,012,759
2035	7,168,295	5,705,844	12,874,139	10,964,279	2,250,000	13,214,279	134,467,539	245,828,158	111,360,619
2036	7,412,366	5,775,751	13,188,117	11,457,672	2,250,000	13,707,672	145,945,973	258,496,206	112,550,232
2037	7,664,748	5,837,451	13,502,199	11,973,267	2,250,000	14,223,267	158,199,201	271,756,052	113,556,850
2038	7,925,723	5,889,659	13,815,382	12,512,064	2,250,000	14,762,064	171,279,522	285,632,844	114,353,321
2039	8,195,584	5,930,969	14,126,553	13,075,107	2,250,000	15,325,107	185,242,765	300,152,661	114,909,896
2040	8,474,634	5,959,835	14,434,469	13,663,487	2,250,000	15,913,487	200,148,527	315,342,537	115,194,010
2041	8,763,184	5,974,571	14,737,755	14,278,344	2,250,000	16,528,344	216,060,427	331,230,488	115,170,061
2042	9,061,560	5,973,329	15,034,889	14,920,869	2,250,000	17,170,869	233,046,381	347,845,536	114,799,155
2043	9,370,095	5,954,092	15,324,187	15,592,308	2,250,000	17,842,308	251,178,887	365,217,730	114,038,843
2044	9,689,135	5,914,658	15,603,793	16,293,962	2,250,000	18,543,962	270,535,337	383,378,174	112,842,837
2045	10,019,038	5,852,627	15,871,665	17,027,190	2,250,000	19,277,190	291,198,347	402,359,048	111,160,701
2046	10,360,173	5,765,382	16,125,555	17,793,414	2,250,000	20,043,414	313,256,110	422,193,633	108,937,523
2047	10,712,924	5,650,077	16,363,001	18,594,118	2,250,000	20,844,118	336,802,773	442,916,328	106,113,555
2048	11,077,686	5,503,611	16,581,297	19,430,853	2,250,000	21,680,853	361,938,835	464,562,673	102,623,838
2049	11,454,867	5,322,616	16,777,483	20,305,241	2,250,000	22,555,241	388,771,581	487,169,371	98,397,790

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, 2019 and June 30, 2017

Summary of Participant Data as of June 30, 2019	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	6,906	7,368	14,274	280	1,021	15,575
• Average age	73.3	72.3	72.8	66.2	77.2	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
Summary of Participant Data as of June 30, 2017						
Retirees and Beneficiaries						
• Number	6,883	7,980	14,863	251	N/A	15,114
• Average age	72.7	72.7	72.7	65.7	N/A	72.6
Active Employees						
• Number	7,560	6,626	14,186	904	N/A	15,090
• Average age	44.2	46.9	45.5	44.6	N/A	45.4
• Average years of service	13.3	17.3	15.2	12.0	N/A	15.0
• Average age at hire	31.0	29.6	30.3	32.7	N/A	30.5

[1] Data received as of June 30, 2019 contained a large group of beneficiaries with an unknown department code. This group was not present in previously received data.

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: Medicare Plans – Fully Insured • *Blue Cross Blue Shield Managed Blue for Seniors* • *Medicare HMO Blue* • *Tufts Medicare Preferred HMO*	Per capita costs were based on the following: • The fully insured premium rates effective July 1, 2019 and January 1, 2020 for Blue Cross Blue Shield Managed Blue for Seniors, and January 1, 2019 and January 1, 2020 for Medicare HMO Blue and Tufts Medicare Preferred Supplement, trended to the midpoint of the valuation year at assumed trend rates. Actuarial factors were applied to the premium to estimate individual retiree and spouse costs by age and by gender.

Medicare Plans - Self-Insured medical coverage with Fully Insured PDP
• *Blue Cross Blue Shield Medex*
• *Harvard Pilgrim Health Care Medicare Enhance*
• *Tufts Medicare Preferred Supplement*
	Per capita costs were based on a combination of the following:
	• The fully insured PDP rates effective January 1, 2020 for BCBS Medex, July 1, 2020 for HPHC Medicare Enhance, and January 1, 2019 and January 1, 2020 for Tufts Medicare Preferred Supplement, trended to the midpoint of the valuation year at assumed trend rates. 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 by participant group for the period July 1, 2017 through June 30, 2019. Claims were separated into two 12-month periods and adjusted as follows:
	  – paid claims 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.

Non-Medicare Plans – Self-Insured
• *AllWays Health Partners HMO*
• *Blue Care Elect Preferred PPO*
• *Harvard Pilgrim Health Care HMO*
	Per capita claims costs were based on the following:
	• The monthly paid claims experience by participant group for the period October 1, 2017 through September 30, 2019. Claims were separated into two 12-month periods and adjusted as follows:
	  – paid claims 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

Actuarial Valuation Date:	June 30, 2019
Roll-Forward Techniques:	The results of the June 30, 2019 actuarial valuation will be used to determine the Actuarially Determined Contribution for the fiscal year ending June 30, 2020 and later.
Expected Return on Assets:	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:	6.75% The discount rate is equal to the expected return on assets.

Salary Increases:

Years of Service	Rate per year (%)			
		BRS Excluding Teachers		
	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

Section 3: Supporting Information

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-2019 (previously, RP-2014 Blue Collar Employee Mortality Table projected generationally with Scale MP-2017 set forward 1 year for females) • *Healthy (Non-Teachers):* Pub-2010 General Healthy Retiree Headcount-Weighted Mortality Table set forward one year projected generationally using scale MP-2019 (previously, RP-2014 Blue Collar Annuitant Mortality Table projected generationally with Scale MP-2017 set forward 1 year for females) • *Disabled (Non-Teachers):* Pub-2010 General Healthy Retiree Headcount-Weighted Mortality Table set forward one year projected generationally using scale MP-2019 (previously, RP-2014 Blue Collar Annuitant Mortality Table projected generationally with Scale MP-2017 set forward 1 year) • *Surviving Spouse (Non-Teachers):* Pub-2010 General Contingent Survivor Headcount-Weighted Mortality Table set forward one year projected generationally using scale MP-2019 (previously, RP-2014 Blue Collar Annuitant Mortality Table projected generationally with Scale MP-2017 set forward 1 year for females)
Group 4	• *Pre-Retirement:* Pub-2010 Safety Employee Headcount-Weighted Mortality Table projected generationally using scale MP-2019 (previously, RP-2014 Blue Collar Employee Mortality Table projected generationally with Scale MP-2017 set forward 1 year for females) • *Healthy:* Pub-2010 Safety Healthy Retiree Headcount-Weighted Mortality Table projected generationally using scale MP-2019 (previously, RP-2014 Blue Collar Annuitant Mortality Table projected generationally with Scale MP-2017 set forward 1 year for females) • *Disabled:* Pub-2010 Disabled Retiree Headcount-Weighted Mortality Table projected generationally using scale MP-2019 (previously, RP-2014 Blue Collar Annuitant Mortality Table projected generationally with Scale MP-2017 set forward 1 year) • *Surviving Spouse:* Pub-2010 Safety Contingent Survivor Headcount-Weighted Mortality Table projected generationally with Scale MP-2019 (previously, RP-2014 Blue Collar Annuitant Mortality Table projected generationally with Scale MP-2017 set forward 1 year for females)
Teachers	• *Pre-Retirement (Teachers):* Pub-2010 Teacher Employee Headcount-Weighted Mortality Table projected generationally with Scale MP-2019 (previously, RP-2014 White Collar Employee Mortality Table projected generationally with Scale MP-2016) • *Healthy (Teachers):* Pub-2010 Teacher Healthy Retiree Headcount-Weighted Mortality Table projected generationally with Scale MP-2019 (previously, RP-2014 White Collar Healthy Annuitant Mortality Table projected generationally with Scale MP-2016) • *Disabled (Teachers):* Pub-2010 Teacher Healthy Retiree Headcount-Weighted Mortality Table projected generationally with Scale MP-2019 (previously, RP-2014 Healthy Annuitant Mortality Table set forward 4 years projected generationally with Scale BB2D from 2014) • *Surviving Spouse (Teachers):* Pub-2010 Teacher Contingent Survivor Headcount-Weighted Mortality Table projected generationally with Scale MP-2019 (previously, RP-2014 White Collar Healthy Annuitant Mortality Table projected generationally with Scale MP-2016)
	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.

Section 3: Supporting Information

Annuitant Mortality Rates:

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

| | Healthy | | | | Disabled | | | |
| | Current | | Previously | | Current | | Previously | |
Age	Male	Female	Male	Female	Male	Female	Male	Female
60	0.85	0.49	0.85	0.62	0.85	0.49	0.91	0.28
70	2.02	1.30	1.97	1.54	2.02	1.30	2.16	0.30
80	6.03	3.99	5.19	4.24	6.03	3.99	5.74	0.62
90	17.36	13.57	14.64	12.43	17.36	13.57	16.18	1.54

Note: Rates shown are before generational projection.

Group 4 – Rate per year (%)

| | Healthy | | | | Disabled | | | |
| | Current | | Previously | | Current | | Previously | |
Age	Male	Female	Male	Female	Male	Female	Male	Female
60	0.63	0.52	0.85	0.62	0.94	0.87	0.91	0.28
70	1.74	1.45	1.97	1.54	2.22	1.89	2.16	0.30
80	5.70	4.05	5.19	4.24	6.04	5.32	5.74	0.62
90	16.90	11.82	14.64	12.43	16.90	12.60	16.18	1.54

Note: Rates shown are before generational projection.

Teachers – Rate per year (%)

| | Healthy | | | | Disabled | | | |
| | Current | | Previously | | Current | | Previously | |
Age	Male	Female	Male	Female	Male	Female	Male	Female
60	0.42	0.32	0.52	0.39	0.42	0.32	1.02	0.74
70	1.16	0.80	1.24	1.06	1.16	0.80	2.43	1.90
80	4.09	2.88	3.73	3.04	4.09	2.88	6.93	5.40
90	13.75	10.40	12.62	10.02	13.75	10.40	20.11	16.30

Note: Rates shown are before generational projection.

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Surviving Spouse Mortality Rates:

	Groups 1 and 2 (Excluding Teachers) – Rate per year (%)			
	Current		Previously	
Age	Male	Female	Male	Female
60	1.21	0.81	0.85	0.62
70	2.56	1.72	1.97	1.54
80	6.28	4.38	5.19	4.24
90	16.13	13.22	14.64	12.43

Note: Rates shown are before generational projection.

	Group 4 – Rate per year (%)			
	Current		Previously	
Age	Male	Female	Male	Female
60	1.15	0.75	0.85	0.62
70	2.35	1.59	1.97	1.54
80	5.71	3.96	5.19	4.24
90	14.71	11.91	14.64	12.43

Note: Rates shown are before generational projection.

	Teachers – Rate per year (%)			
	Current		Previously	
Age	Male	Female	Male	Female
60	1.15	0.75	0.52	0.39
70	2.35	1.59	1.24	1.06
80	5.71	3.96	3.73	3.04
90	14.71	11.91	12.62	10.02

Note: Rates shown are before generational projection.

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Termination Rates Before Retirement:

	Groups 1 and 2 (excluding Teachers) – Rate per year (%)					
	Mortality					
	Current		Previously			
Age	Male	Female	Male	Female	Disability	Withdrawal
20	0.04	0.01	0.05	0.02	0.03	6.58
25	0.04	0.01	0.06	0.02	0.04	5.27
30	0.05	0.02	0.06	0.03	0.06	4.83
35	0.06	0.03	0.07	0.03	0.07	4.47
40	0.09	0.05	0.08	0.05	0.11	3.84
45	0.13	0.07	0.13	0.08	0.18	3.21
50	0.19	0.11	0.22	0.14	0.30	1.52
55	0.28	0.15	0.36	0.20	0.50	0.33
60	0.40	0.23	0.61	0.30	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 (%)					
	Mortality					
	Current		Previously			
Age	Male	Female	Male	Female	Disability	Withdrawal
20	0.04	0.02	0.05	0.02	0.15	0.00
25	0.04	0.02	0.06	0.02	0.21	0.00
30	0.05	0.03	0.06	0.03	0.28	0.00
35	0.05	0.04	0.07	0.03	0.37	0.00
40	0.07	0.05	0.08	0.05	0.55	0.00
45	0.09	0.08	0.13	0.08	0.90	0.00
50	0.13	0.10	0.22	0.14	1.51	0.00
55	0.20	0.14	0.36	0.20	2.52	0.00
60	0.30	0.20	0.61	0.30	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				
	Current		Previous		
Age	Male	Female	Male	Female	Disability
20	0.04	0.01	0.03	0.01	0.00
25	0.02	0.01	0.03	0.01	0.01
30	0.03	0.02	0.03	0.02	0.01
35	0.04	0.02	0.04	0.02	0.01
40	0.05	0.03	0.04	0.03	0.01
45	0.08	0.05	0.07	0.06	0.03
50	0.13	0.08	0.12	0.09	0.05
55	0.19	0.12	0.20	0.14	0.07
60	0.29	0.18	0.33	0.21	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 (%)					
	0 – 4 Years of Service		5 – 9 Years of Service		10+ Years of Service	
Age	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:

	All Groups (excluding Teachers) – Rate per year (%)		
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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	Non-TARP Teachers – Rate per year (%)			
	Years of Service			
	Less than 20		20 or more	
Age	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 (%)					
	Years of Service					
	Less than 20		20 – 29		30 or more	
Age	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.

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Per Capita Health Costs:	2019-2020 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.

	Non-Medicare Plans			
	Retiree		Spouse	
Age	Male	Female	Male	Female
45	$9,835	$12,338	$6,101	$9,209
50	11,673	13,296	8,154	10,676
55	13,863	14,313	10,911	12,357
60	16,464	15,427	14,606	14,332
64	18,888	16,366	18,438	16,131
65	19,553	16,620	19,553	16,620
70	22,662	17,911	22,662	17,911
75	24,422	19,279	24,422	19,279
80	26,299	20,785	26,299	20,785

	Medicare Plans – Self-Insured Medical with PDP				Medicare Plans – Fully Insured			
	Retiree		Spouse		Retiree		Spouse	
Age	Male	Female	Male	Female	Male	Female	Male	Female
65	$4,967	$4,222	$4,967	$4,222	$4,299	$3,654	$4,299	$3,654
70	5,757	4,550	5,757	4,550	4,983	3,938	4,983	3,938
75	6,204	4,897	6,204	4,897	5,369	4,239	5,369	4,239
80	6,681	5,280	6,681	5,280	5,782	4,570	5,782	4,570

Medicare Part B Premium	$1,681

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Weighted Average Annual Retiree Contribution Amounts:		Retiree	Married Spouse
	Non-Medicare Plans	$2,676	$4,248
	Medicare Plans – Self-Insured Medical with PDP	583	583
	Medicare Plans – Fully Insured	573	573

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
2020	7.00	7.00	4.50
2021	6.75	6.75	4.50
2022	6.50	6.50	4.50
2023	6.25	6.25	4.50
2024	6.00	6.00	4.50
2025	5.75	5.75	4.50
2026	5.50	5.50	4.50
2027	5.25	5.25	4.50
2028	5.00	5.00	4.50
2029	4.75	4.75	4.50
2030 & 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 2020 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.

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Administrative Expenses:	Administrative expense loads of $518 per participant for non-Medicare plans (AllWays HMO, BCBS PPO, and HPHC HMO) and $480 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. Administrative expenses are not added to fully insured premium rates, as these expenses are a component of the rate.
Participation and Coverage Election:	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. 100% of retirees over age 65 are assumed to remain with their current medical plan for life. 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. For future retirees hired after 1986, 100% are assumed to enroll in a self-insured Medicare plan. The participation and coverage election assumptions were based on a review of recent experience and reflect new plan offerings.
Plan Design:	Development of plan liabilities was based on the substantive plan of benefits in effect as described in Exhibit III.
Medicare Part D Subsidy Assumption:	GASB guidelines prohibit the offset of OPEB obligations by the future value of Medicare Part D subsidies. Therefore, these calculations do not include an estimate for retiree prescription drug plan federal subsidies that the City of Boston may be eligible to receive for plan years beginning in 2006.
Missing Participant Data:	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.
Health Care Reform Assumption:	This valuation does not include the potential impact of any future changes due to the Patient Protection and Affordable Care Act (PPACA) and the Health Care and Education Reconciliation Act (HCERA) of 2010 other than those previously adopted as of the valuation date.
Demographic and Increase Scale Assumptions:	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, 2020, completed by Segal. The mortality assumptions were updated to reflect mortality tables and mortality scales recently published by the Society of Actuaries. 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. 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.

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 assumptions were updated to the Pub-2010 headcount-weighted mortality tables released by the Society of Actuaries in 2019. • The impact of the excise tax on high cost health plans scheduled to begin in 2022 was repealed effective December 20, 2019 and as such has been removed with this valuation.

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.
	• Members hired before April 2, 2012
	   – Group 1 and Group 2 (including Teachers):
	     • 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
	     • 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
	   – Group 1 (including Teachers):
	     • Retirees with at least 10 years of creditable service are eligible at age 60.
	   – Group 2
	     • Retirees with at least 10 years of creditable service are eligible at age 55.
	   – Group 4
	     • 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, Blue Cross Blue Shield of Massachusetts, and Harvard Pilgrim Health Care. 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

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Retiree Contributions:	Premium rates and retiree contributions as of January 1, 2019 and July 1, 2019[1] are summarized below:			
		Monthly Premium	City cost ($)	Retiree cost ($)	Retiree cost (%)
	Non-Medicare Actives and Retirees				
	HPHC HMO				
	• Individual	$852.67	$686.40	$166.27	19.50%
	• Family	$2,294.67	$1,847.21	$447.46	19.50%
	AllWays HMO				
	• Individual	$710.67	$572.09	$138.58	19.50%
	• Family	$1,884.00	$1,516.62	$367.38	19.50%
	Blue Care Elect Preferred PPO				
	• Individual	$1,309.69	$923.33	$386.36	29.50%
	• Family	$3,232.81	$2,279.13	$953.68	29.50%
	Medicare – Self Funded Medical with PDP				
	BCBS Medex	$358.51	$315.49	$43.02	12.00%
	Harvard Pilgrim Medicare Enhance	$439.48	$386.74	$52.74	12.00%
	Tufts Medicare Preferred Supplement	$373.06	$328.29	$44.77	12.00%
	Medicare – Fully Insured				
	BCBS Managed Blue for Seniors	$432.43	$380.54	$51.89	12.00%
	Medicare HMO Blue	$383.16	$337.18	$45.98	12.00%
	Tufts Medicare Preferred HMO	$315.00	$277.20	$37.80	12.00%

[1] Non-Medicare and Managed Blue for Seniors premiums rates are effective July 1, 2019. All other rates are effective January 1, 2019.

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Plan Changes	• Effective January 1, 2018, the Tufts Medicare Preferred Supplement plan switched from fully insured to self-insured medical coverage, increased hospital copays, and increased office visit copays.
	• Effective January 1, 2018, the Harvard Pilgrim Health Care Medicare Enhance plan increased hospital copays.
	• Effective January 1, 2019, the Blue Cross Blue Shield Master Medical Carve Out A&B plan was replaced by the Blue Cross Blue Shield Medex plan, which was anticipated to lower member out-of-pocket costs. Additionally, the Medex plan transitioned from self-insured prescription drug coverage to a fully insured PDP.
	• Effective July 1, 2020, the Harvard Pilgrim Health Care Medicare Enhance plan transitioned from self-insured prescription drug coverage to a fully insured PDP.
	• Reflects all plan changes as negotiated in the PEC agreement effective July 1, 2020.

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: 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