

City of Salem Contributory Retirement System

**Governmental Accounting Standards Board
(GASB) Statements No. 67 and 68
Accounting Valuation Report**

as of December 31, 2019



This report has been prepared at the request of the City of Salem Contributory Retirement Board to assist the Board and the member units in preparing their financial reports for their liabilities associated with the City of Salem Contributory Retirement System. This valuation report may not otherwise be copied or reproduced in any form without the consent of the City of Salem Contributory Retirement Board 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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October 1, 2020

Retirement Board
City of Salem Contributory Retirement System
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Dear Board Members:

We are pleased to submit this Governmental Accounting Standards Board (GASB) Statements No. 67 and 68 Accounting Valuation as of December 31, 2019 for the City of Salem Contributory Retirement System, a cost-sharing multiple employer defined benefit pension plan. It contains the actuarial information that will need to be disclosed in order to comply with GASB 67 and 68.

This report was prepared in accordance with generally accepted actuarial principles and practices at the request of the Board to assist the Board and the member units in preparing their financial reports for their liabilities associated with the City of Salem Contributory Retirement System. The census and financial information on which our calculations were based were provided by the staff of the City of Salem Contributory Retirement System. That assistance is gratefully acknowledged.

The measurements shown in this actuarial valuation may not be applicable for other purposes. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; and changes in plan provisions or applicable law.

The actuarial calculations were completed under the supervision of Kathleen A. Riley, FSA, MAAA, EA. She is a member of the American Academy of Actuaries and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the best of her knowledge, the information supplied in the actuarial valuation is complete and accurate. Further, in her opinion, the assumptions as approved by the Board are reasonably related to the experience of and expectations for the City of Salem Contributory Retirement System.

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



Lisa VanDermark, FSA, MAAA, EA
Vice President and Consulting Actuary

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Section 1: Actuarial Valuation Summary

Purpose

This report has been prepared by Segal to present certain disclosure information required by Governmental Accounting Standards Board (GASB) Statements No. 67 and 68 as of December 31, 2019. This report is based on the City of Salem Contributory Retirement System Actuarial Valuation and Review as of January 1, 2020, which reflects:

- The benefit provisions of Massachusetts General Law Chapter 32;
- The characteristics of covered active participants, inactive participants, and retired participants and beneficiaries as of December 31, 2019, provided by the staff of the Retirement System;
- The assets of the System as of December 31, 2019, provided by the staff of the Retirement System;
- Economic assumptions regarding future salary increases and investment earnings; and
- Other actuarial assumptions, regarding employee terminations, retirement, death, etc.

Significant issues

The following key findings were the result of this actuarial valuation:

1. It is important to note that this valuation is based on plan assets as of December 31, 2019. Due to the COVID-19 pandemic, market conditions have changed significantly since the valuation date. The Plan's actuarial status does not reflect short-term fluctuations of the market, but rather is based on the market values on the last day of the Plan Year.
2. The Net Pension Liability (NPL) is equal to the difference between the Total Pension Liability (TPL) and the Plan's Fiduciary Net Position. The Plan Fiduciary Net Position is equal to the market value of assets and therefore, the NPL measure is very similar to an Unfunded Actuarial Accrued Liability (UAAL) on a market value basis. The NPL decreased from \$135.5 million as of December 31, 2018 to \$130.2 million as of December 31, 2019 and the Plan's Fiduciary Net Position as a percent of the TPL increased from 56.33% to 61.16%.
3. The NPL measured as of December 31, 2019 and December 31, 2018 was determined based upon the results of the actuarial valuations as of January 1, 2020 and January 1, 2018, respectively.
4. The discount rate used to measure the TPL and NPL as of December 31, 2019 and December 31, 2018 was 7.375% and 7.15%, respectively.

Section 1: Actuarial Valuation Summary

Important information about actuarial valuations

In order to prepare an actuarial 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. It is important to keep Segal informed with respect to plan provisions and administrative procedures, and to review the plan description in this report (as well as the plan summary included in our funding valuation 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 Retirement System. 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 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 Retirement System. The Retirement System uses an “actuarial value of assets” that differs from market value to gradually reflect year-to-year changes in the market value of assets in determining the contribution requirements.
Actuarial Assumptions:	In preparing an actuarial valuation, Segal projects the benefits to be paid to existing plan participants for the rest of their lives and the lives of their beneficiaries. This projection requires actuarial assumptions as to the probability of death, disability, withdrawal, and retirement of each participant for each year. In addition, the benefits projected to be paid for each of those events in each future year reflect actuarial assumptions as to salary increases and cost-of-living adjustments. The projected benefits are then discounted to a present value, based on the assumed rate of return that is expected to be achieved on the plan’s assets. There is a reasonable range for each assumption used in the projection and the results may vary materially based on which assumptions are selected. It is important for any user of an actuarial valuation to understand this concept. Actuarial assumptions are periodically reviewed to ensure that future valuations reflect emerging plan experience. While future changes in actuarial assumptions may have a significant impact on the reported results, that does not mean that the previous assumptions were unreasonable.

Section 1: Actuarial Valuation Summary

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

The valuation is prepared at the request of the Board to assist the Retirement Board and the member units in preparing items related to the pension plan in their financial reports. Segal is not responsible for the use or misuse of its report, particularly by any other party.

An actuarial valuation is a measurement of the plan's assets and liabilities at a specific date. Accordingly, except where otherwise noted, Segal did not perform an analysis of the potential range of future financial measures. 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 may include actuarial results that are not rounded, but that does not imply precision.

If the Retirement Board 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.

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 Board should look to their other advisors for expertise in these areas.

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

Section 2: GASB Information

Exhibit 1 – Net Pension Liability

	December 31, 2019	December 31, 2018
Components of the Net Pension Liability		
Total Pension Liability	\$335,214,056	\$310,234,441
Plan Fiduciary Net Position	205,018,140	174,745,329
Net Pension Liability	130,195,916	135,489,112
Plan Fiduciary Net Position as a percentage of the Total Pension Liability*	61.16%	56.33%

* These funded percentages are not necessarily appropriate for assessing the sufficiency of Plan assets to cover the estimated cost of settling the Plan's benefit obligation or the need for or the amount of future contributions.

Actuarial assumptions. The total pension liability as of December 31, 2019 was measured by an actuarial valuation as of January 1, 2020, using the following actuarial assumptions, applied to all periods included in the measurement:

Salary Increases:	Varies by length of service with ultimate rates of 3.75% for Group 1, 4.00% for Group 2, and 4.25% for Group 4 (previously, varied by length of service with ultimate rates of 4.25% for Group 1, 4.50% for Group 2, and 4.75% for Group 4)
Wage Inflation:	3.00% (previously, 3.50%)
Net Investment Return:	7.15%, net of plan investment expenses, including inflation (previously, 7.375%)
Cost of Living Adjustment:	3% of first \$12,000
Mortality Rates:	Pre-Retirement: RP-2014 Blue Collar Employee Mortality Table set forward one year for female participants projected generationally with Scale MP-2017 Healthy Retiree: RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year for female participants projected generationally with Scale MP-2017 Disabled Retiree: RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year projected generationally with Scale MP-2017

Section 2: GASB Information

Target asset allocation

The long-term expected rate of return on pension plan investments was determined using a building-block method in which expected future real rates of return (expected returns, net of inflation) are developed for each major asset class. These returns are combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and adding expected inflation. The target allocation (approved by the Board) and projected arithmetic real rates of return for each major asset class, after deducting inflation, but before investment expenses, used in the derivation of the long-term expected investment rate of return assumption are summarized in the following table:

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return
Domestic equity	21.00%	6.15%
International developed markets equity	13.00%	6.78%
International emerging markets equity	5.00%	8.65%
Core fixed income	15.00%	1.11%
High-yield fixed income	8.00%	3.51%
Real estate	10.00%	4.33%
Commodities	4.00%	4.13%
Hedge fund, GTAA, Risk parity	11.00%	3.19%
Private equity	<u>13.00%</u>	9.99%
Total	100.00%	

Note: Some asset classes included in the pension plan's target asset allocation have been combined.

Discount rate. The discount rate used to measure the Total Pension Liability (TPL) was 7.15% as of December 31, 2019 and 7.375% as of December 31, 2018. The projection of cash flows used to determine the discount rate assumed plan member contributions will be made at the current contribution rate and that employer contributions will be made at rates equal to the actuarially determined contribution rates. For this purpose, only employer contributions that are intended to fund benefits for current plan members and their beneficiaries are included. Projected employer contributions that are intended to fund the service costs for future plan members and their beneficiaries, as well as projected contributions from future plan members, are not included. Based on those assumptions, the Plan Fiduciary Net Position (FNP) was projected to be available to make all projected future benefit payments for current plan members. Therefore, the long-term expected rate of return on pension plan investments was applied to all periods of projected benefit payments to determine the TPL as of both December 31, 2019 and December 31, 2018.

Section 2: GASB Information

Discount rate sensitivity

Sensitivity of the Net Pension Liability to changes in the discount rate. The following presents the Net Pension Liability (NPL) of the City of Salem Contributory Retirement System as of December 31, 2019 calculated using the discount rate of 7.15%, as well as what the City of Salem Contributory Retirement System's NPL would be if it were calculated using a discount rate that is 1-percentage-point lower (6.15%) or 1-percentage-point higher (8.15%) than the current rate.

Net Pension Liability	1% Decrease (6.15%)	Current Discount Rate (7.15%)	1% Increase (8.15%)
City of Salem Contributory Retirement System's net pension liability as of December 31, 2019	\$167,690,813	\$130,195,916	\$98,552,061

Section 2: GASB Information

Exhibit 2 – Schedule of Changes in Net Pension Liability – Last Two Fiscal Years

	December 31, 2019	December 31, 2018
Total Pension Liability		
Service cost	\$7,442,135	\$7,179,699
Interest	22,806,632	21,882,674
Change of benefit terms	0	0
Differences between expected and actual experience	1,818,559	0
Changes of assumptions	9,780,518	0
Benefit payments, including refunds of member contributions	<u>-16,868,229</u>	<u>-16,724,906</u>
Net change in Total Pension Liability	\$24,979,615	\$12,337,467
Total Pension Liability – beginning	<u>310,234,441</u>	<u>297,896,974</u>
Total Pension Liability – ending	\$335,214,056	\$310,234,441
Plan Fiduciary Net Position		
Contributions – employer	\$14,620,061	\$13,851,313
Contributions – employee	4,972,299	4,640,866
Net investment income	27,850,445	-4,217,148
Benefit payments, including refunds of member contributions	<u>-16,868,229</u>	<u>-16,724,906</u>
Administrative expense	<u>-301,765</u>	<u>-321,268</u>
Net change in Plan Fiduciary Net Position	\$30,272,811	-\$2,771,143
Plan Fiduciary Net Position – beginning	<u>174,745,329</u>	<u>177,516,472</u>
Plan Fiduciary Net Position – ending	\$205,018,140	\$174,745,329
Net Pension Liability – ending	130,195,916	135,489,112
Plan Fiduciary Net Position as a percentage of the Total Pension Liability	61.16%	56.33%
Covered employee payroll ¹	\$50,117,547	\$48,663,234
Plan Net Pension Liability as percentage of covered employee payroll	259.78%	278.42%

¹ Covered employee payroll for 2019 and 2018 as estimated in the January 1, 2020 and January 1, 2018 funding valuations, respectively.
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City of Salem Contributory Retirement System

Section 2: GASB Information

Notes to schedule:

Changes in Actuarial Assumptions:	Effective January 1, 2020: <ul style="list-style-type: none">• The investment return assumption was lowered from 7.375% to 7.15%.• The salary increase assumption was revised from a scale that varies by length of service with ultimate rates of 4.25% for Group 1, 4.50% for Group 2, and 4.75% for Group 4 to a scale that varies by length of service with ultimate rates of 3.75% for Group 1, 4.00% for Group 2, and 4.25% for Group 4• The wage inflation rate was lowered from 3.50% to 3.00%.• A liability of approximately \$5.0 million was added to estimate the value of benefits paid to or received from other municipal retirement systems (net 3(8)(c) benefits).
Changes in Plan Provisions:	None.

Section 2: GASB Information

Exhibit 3 – Schedule of Contributions – Last Six Fiscal Years

Year Ended December 31	Actuarially Determined Contributions	Contributions in Relation to the Actuarially Determined Contributions	Contribution Deficiency / (Excess)	Covered-Employee Payroll	Contributions as a Percentage of Covered Employee Payroll
2014	\$11,942,341	\$11,942,341	\$0	\$40,399,678	\$29.56%
2015	12,013,682	12,181,169	-167,487	42,015,665	28.99%
2016	12,527,730	12,527,730	0	45,841,256	27.33%
2017	13,172,909	13,172,909	0	46,608,505	28.26%
2018	13,851,313	13,851,313	0	48,663,234	28.46%
2019	14,620,061	14,620,061	0	50,117,547	29.17%

Notes to schedule:

Valuation date:	Actuarial determined contribution for year ended December 31, 2019 is determined with the January 1, 2018 actuarial valuation.	
Actuarial cost method:	Entry Age Normal Cost Method	
Amortization method:	Appropriation increasing 5.55% per year through 2031	
Remaining amortization period:	As of July 1, 2018, 13 years	
Asset valuation method:	The difference between the expected return and the actual investment return on a market value basis is recognized over a five-year period. Asset value is adjusted as necessary to be within 20% of the market value.	
Actuarial assumptions:		
• Investment rate of return	7.375% (previously, 7.50%)	
• Discount rate	7.375% (previously, 7.50%)	
• Wage inflation rate	3.50%	
• Projected salary increases	Varies by length of service with ultimate rates of 4.25% for Group 1, 4.50% for Group 2, and 4.75% for Group 4	
• Cost of living adjustments	3.00% of the first \$12,000	
Plan membership:		
• Retired participants and beneficiaries receiving benefits	589	
• Inactive participants entitled to a return of their employee contributions	227	
• Inactive participants with a vested right to a deferred or immediate benefit	24	
• Active participants	910	
• Total	1,750	

Section 2: GASB Information

Exhibit 4 – Pension Expense

Reporting Date for Employer under GASB 68 Measurement Date for Employer under GASB 68	June 30, 2020 December 31, 2019	June 30, 2019 December 31, 2018
Components of Pension Expense		
Service cost	\$7,442,135	\$7,179,699
Interest on the Total Pension Liability	22,806,632	21,882,674
Current-period benefit changes	0	0
Expensed portion of current-period difference between expected and actual experience in the Total Pension Liability	363,711	0
Expensed portion of current-period changes of assumptions	1,956,102	0
Member contributions	-4,972,299	-4,640,866
Projected earnings on plan investments	-12,976,793	-13,145,161
Expensed portion of current-period differences between actual and projected earnings on plan investments	-2,974,732	3,472,461
Administrative expense	301,765	321,268
Recognition of beginning of year deferred outflows of resources as pension expense	9,179,500	5,853,679
Recognition of beginning of year deferred inflows of resources as pension expense	-4,134,838	-4,134,838
Pension Expense	\$16,991,183	\$16,788,916

Section 2: GASB Information

Deferred outflows of resources and deferred inflows of resources

Reporting Date for Employer under GASB 68	June 30, 2020	June 30, 2019
Measurement Date for Employer under GASB 68	December 31, 2019	December 31, 2018
Deferred Outflows of Resources		
Changes in proportion and differences between employer's contributions and proportionate share of contributions	\$522,321	\$490,862
Changes of assumptions	12,483,788	8,225,152
Net difference between projected and actual earnings on plan investments	0	7,759,210
Difference between expected and actual experience in the Total Pension Liability	<u>1,454,848</u>	<u>0</u>
Total Deferred Outflows of Resources	\$14,460,957	\$16,475,224
Deferred Inflows of Resources		
Changes in proportion and differences between employer's contributions and proportionate share of contributions	\$522,321	\$490,862
Changes of assumptions	0	0
Net difference between projected and actual earnings on plan investments	6,945,153	0
Difference between expected and actual experience in the Total Pension Liability	<u>1,538,209</u>	<u>2,864,770</u>
Total Deferred Inflows of Resources	\$9,005,683	\$3,355,632
Deferred outflows of resources and deferred inflows of resources related to pension will be recognized as follows:		
Reporting Date for Employer under GASB 68 Year Ended June 30:		
2020	N/A	\$5,044,662
2021	\$2,401,424	3,056,338
2022	891,216	1,546,130
2023	2,817,548	3,472,462
2024	-654,914	0
Thereafter	0	0

Note: Average expected remaining service life as of December 31, 2019 and December 31, 2018 is 5 years.

Section 2: GASB Information

Exhibit 5 – Determination of Proportionate Share

Employer Name	FY 2019 Total Appropriation	Percent of FY 2019 Total Appropriation	Share of NPL as of January 1, 2019	FY 2020 Total Appropriation	Percent of FY 2020 Total Appropriation	Share of NPL as of January 1, 2020
City of Salem	\$11,657,254	84.159920%	\$114,027,529	\$12,287,979	84.048753%	\$109,428,044
Water	313,388	2.262515%	3,065,461	333,752	2.282836%	2,972,159
South Essex Sewerage	843,228	6.087712%	8,248,187	896,743	6.133647%	7,985,758
Housing	376,116	2.715382%	3,679,046	378,006	2.585530%	3,366,254
Essex Tech	661,327	4.774472%	6,468,889	723,581	4.949234%	6,443,701
Grand Totals	\$13,851,313	100.000000%	\$135,489,112	\$14,620,061	100.000000%	\$130,195,916

Section 2: GASB Information

Exhibit 6 – Determination of Proportionate Share Amounts by Employer

Employer Name	2020 Share of Cost Allocation (1)	Net Pension Liability (2)	Covered Employee Payroll (3)	Discount Rate Sensitivity		
				1% Decrease (6.15%) (4)	Current Discount Rate (7.15%) (5)	1% Increase (8.15%) (6)
City of Salem	84.048753%	\$109,428,044	\$39,401,443	\$140,942,037	\$109,428,044	\$82,831,778
Water	2.282836%	2,972,159	1,149,202	3,828,106	2,972,159	2,249,782
South Essex Sewerage	6.133647%	7,985,758	4,092,638	10,285,563	7,985,758	6,044,836
Housing	2.585530%	3,366,254	1,389,359	4,335,696	3,366,254	2,548,093
Essex Tech	4.949234%	6,443,701	4,084,905	8,299,411	6,443,701	4,877,572
Grand Totals	100.000000%	\$130,195,916	\$50,117,547	\$167,690,813	\$130,195,916	\$98,552,061

Section 2: GASB Information

Employer Name	Schedule of Contributions				Pension Expense		
	Statutory Required Contribution (7)	Contributions In Relation to the Statutory Required Contribution (8)	Contribution Deficiency/ (Excess) (9)	Contributions as a Percentage of Covered Employee Payroll (10)	Proportionate Share of Plan Pension Expense (11)	Net Amortization of Deferred Amounts from Changes in Proportion and Differences Between Employer Contributions and Proportionate Share of Contributions (12)	Total Employer Pension Expense (13)
City of Salem	\$12,287,979	\$12,287,979	\$0	31.19%	\$14,280,877	-\$169,484	\$14,111,393
Water	333,752	333,752	0	29.04%	387,881	9,411	397,292
South Essex Sewerage	896,743	896,743	0	21.91%	1,042,179	61,159	1,103,338
Housing	378,006	378,006	0	27.21%	439,312	-16,955	422,357
Essex Tech	723,581	723,581	0	17.71%	840,934	115,869	956,803
Grand Totals	\$14,620,061	\$14,620,061	\$0	29.17%	\$16,991,183	\$0	\$16,991,183

Section 2: GASB Information

Employer Name	Deferred Outflows of Resources				Deferred Inflows of Resources				
	Differences Between Expected and Actual Experience (14)	Changes of Assumptions (15)	Changes in Proportion and Differences Between Employer Contributions and Proportionate Share of Contributions (16)	Total Deferred Outflows of Resources (17)	Differences Between Expected and Actual Experience (18)	Net Difference Between Projected and Actual Investment Earnings on Pension Plan Investments (19)	Changes of Assumptions (20)	Changes in Proportion and Differences Between Employer Contributions and Proportionate Share of Contributions (21)	Total Deferred Inflows of Resources (22)
City of Salem	\$1,222,782	\$10,492,468	\$0	\$11,715,250	\$1,292,844	\$5,837,315	\$0	\$388,978	\$7,519,137
Water	33,211	284,984	30,507	348,702	35,115	158,546	0	141	193,802
South Essex Sewerage	89,235	765,711	139,422	994,368	94,348	425,991	0	0	520,339
Housing	37,616	322,772	30,768	391,156	39,772	179,569	0	127,253	346,594
Essex Tech	72,004	617,853	321,624	1,011,481	76,130	343,732	0	5,949	425,811
Grand Totals	\$1,454,848	\$12,483,788	\$522,321	\$14,460,957	\$1,538,209	\$6,945,153	\$0	\$522,321	\$9,005,683

Section 2: GASB Information

Deferred Inflows/(Outflows) Recognized In Future Pension Expense (Year Ended June 30)

Employer Name	2021 (23)	2022 (24)	2023 (25)	2024 (26)	Thereafter (27)
City of Salem	\$1,848,881	\$586,487	\$2,338,397	-\$577,654	\$0
Water	64,230	29,896	70,753	-9,978	0
South Essex Sewerage	208,455	108,350	186,152	-28,928	0
Housing	45,137	6,224	41,916	-48,713	0
Essex Tech	234,721	160,259	180,330	10,359	0
Grand Totals	\$2,401,424	\$891,216	\$2,817,548	-\$654,914	\$0

Section 3: Actuarial Valuation Basis

Exhibit I – Actuarial Assumptions and Actuarial Cost Method

Net Investment Return: 7.15% (previously, 7.375%)
 The net investment return assumption is a long-term estimate derived from historical data, current and recent market expectations, and professional judgment. As part of the analysis, a building block approach was used that reflects inflation expectations and anticipated risk premiums for each of the portfolio’s asset classes, as well as the System’s target asset allocation.

Salary Increases:	Years of Service	Group 1		Group 2		Group 4	
		Current	Previous	Current	Previous	Current	Previous
	0	6.00%	6.00%	6.00%	6.00%	7.00%	7.00%
	1	5.50%	5.50%	5.50%	5.50%	6.50%	6.50%
	2	5.50%	5.50%	5.50%	5.50%	6.00%	6.00%
	3	5.25%	5.25%	5.25%	5.25%	5.75%	5.75%
	4	5.25%	5.25%	5.25%	5.25%	5.50%	5.25%
	5	5.00%	4.75%	5.00%	4.75%	5.25%	5.25%
	6	4.75%	4.75%	4.75%	4.75%	5.00%	4.75%
	7	4.50%	4.50%	4.50%	4.50%	4.75%	4.75%
	8	4.25%	4.50%	4.25%	4.50%	4.50%	4.75%
	9	4.00%	4.25%	4.00%	4.50%	4.25%	4.75%
	10+	3.75%	4.25%	4.00%	4.50%	4.25%	4.75%

Includes an allowance for inflation of 3.0% per year (previously, 3.5%).
 The salary increase assumption is a long-term estimate derived from historical data, current and recent market expectations, and professional judgement.

Interest on Employee Contributions: 3.5%

Administrative Expenses: \$350,000 for calendar 2020, increasing 3.00% per year (previously, \$350,000 for calendar 2018, increasing 3.50% per year)
 The administrative expense assumption is based on information on expenses provided by the Retirement System.

Section 3: Actuarial Valuation Basis

Mortality Rates:

Pre-Retirement: RP-2014 Blue Collar Employee Mortality Table set forward one year for females and projected generationally with Scale MP-2017

Healthy Retiree: RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year for females and projected generationally with Scale MP-2017

Disabled Retiree: RP-2014 Blue Collar Healthy Annuitant Mortality Table set forward one year and projected generationally with Scale MP-2017

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 based on historical and current demographic data. As part of the analysis, a comparison was made between the actual number of retiree deaths and the projected number based on the prior years' assumption over the most recent ten years. The mortality tables were then adjusted to future years using the generational projection to reflect future mortality improvement between the measurement date and those years.

Termination Rates before Retirement:

Age	Groups 1 and 2 – Rate (%)		
	Mortality		
	Male	Female	Disability
20	0.05	0.02	0.01
25	0.06	0.02	0.02
30	0.06	0.03	0.03
35	0.07	0.03	0.06
40	0.08	0.05	0.10
45	0.13	0.08	0.15
50	0.22	0.14	0.19
55	0.36	0.20	0.24
60	0.61	0.30	0.28

Notes:

Mortality rates do not reflect generational projection.

55% of the disability rates shown represent accidental disability.

20% of the accidental disabilities will die from the same cause as the disability.

55% of the death rates shown represent accidental death.

Section 3: Actuarial Valuation Basis

Group 4 – Rate (%)			
Mortality			
Age	Male	Female	Disability
20	0.05	0.02	0.10
25	0.06	0.02	0.20
30	0.06	0.03	0.30
35	0.07	0.03	0.30
40	0.08	0.05	0.30
45	0.13	0.08	1.00
50	0.22	0.14	1.25
55	0.36	0.20	1.20
60	0.61	0.30	0.85

Notes:

Mortality rates do not reflect generational projection.

90% of the disability rates shown represent accidental disability.

60% of the accidental disabilities will die from the same cause as the disability.

90% of the death rates shown represent accidental death.

The disability rates were based on historical and current demographic data, adjusted to reflect economic conditions of the area and estimated future experience and professional judgment. As part of the analysis, a comparison was made between the actual number of disability retirements and the projected number based on the prior years' assumptions over the past ten years.

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Withdrawal Rates:

		Rate per year (%)	
Years of Service	Groups 1 and 2	Years of Service	Group 4
0	15.0	0 – 10	1.5
1	12.0	11+	0.0
2	10.0		
3	9.0		
4	8.0		
5	7.6		
6	7.5		
7	6.7		
8	6.3		
9	5.9		
10	5.4		
11	5.0		
12	4.6		
13	4.1		
14	3.7		
15	3.3		
16 – 20	2.0		
21 – 29	1.0		
30+	0.0		

The termination rates were based on historical and current demographic data, adjusted to reflect economic conditions of the area and estimated future experience and professional judgment. As part of the analysis, a comparison was made between the actual number of terminations and the projected number based on the prior years' assumptions over the past ten years.

Section 3: Actuarial Valuation Basis

Retirement Rates:

Age	Rate per year (%)		
	Groups 1 and 2		Group 4
	Male	Female	
45 – 49	--	--	1.0
50 – 51	1.0	1.5	2.0
52	1.0	2.0	2.0
53	1.0	2.5	5.0
54	2.0	2.5	7.5
55	2.0	5.5	15.0
56 – 57	2.5	6.5	10.0
58	5.0	6.5	10.0
59	6.5	6.5	15.0
60	12.0	5.0	20.0
61	20.0	13.0	20.0
62	30.0	15.0	25.0
63	25.0	12.5	25.0
64	22.0	18.0	30.0
65	40.0	15.0	100.0
66 – 67	25.0	20.0	--
68	30.0	25.0	--
69	30.0	20.0	--
70	100.0	100.0	--

The retirement rates were based on historical and current demographic data, adjusted to reflect economic conditions of the area and estimated future experience and professional judgment. As part of the analysis, a comparison was made between the actual number of retirements by age and the projected number based on the prior years' assumptions over the past ten years.

Section 3: Actuarial Valuation Basis

Retirement Age for Inactive Vested Participants:	Age 55 for participants hired prior to April 2, 2012. For participants hired April 2, 2012 or later, 60 for Group 1, 55 for Group 2 and 50 for Group 4. The retirement age for inactive vested participants was based on historical and current demographic data, adjusted to reflect economic conditions of the area and estimated future experience and professional judgment.
Unknown Data for Participants:	Same as those exhibited by participants with similar known characteristics.
Family Composition:	80% of participants are assumed to be married. None are assumed to have dependent children. Females are assumed to be three years younger than their spouses.
Benefit Election:	All participants are assumed to elect Option A. The benefit election reflects the fact that all benefit options are actuarially equivalent.
2019 Salary:	2019 salaries are equal to salaries provided in the data except for new hires where salaries are annualized based on date of hire.
Total Service:	Total creditable service reported in the data.
Net 3(8)(c) Liability:	Estimated liability of approximately \$5.0 million based on the average annual net 3(8)(c) benefits of the prior four years and the average characteristics of retired participants and beneficiaries (previously, no liability was included for benefits paid to or received from other municipal retirement systems).
Actuarial Value of Assets:	Market value of assets as reported in the System's Annual Statement less unrecognized return in each of the last five years. Unrecognized return is equal to the difference between the actual market value return and the expected market value return and is recognized over a five-year period, further adjusted, if necessary, to be within 20% of the market value.
Actuarial Cost Method:	Entry Age Normal Actuarial Cost Method. Entry Age is the attained age of the participant less Total Service as defined above. Normal Cost and Actuarial Accrued Liability are calculated on an individual basis and are allocated by salary. Normal Cost is determined using the plan of benefits applicable to each participant.
Justification for Change in Actuarial Assumptions:	Based on past experience and future expectations, the following actuarial assumptions were changed as of January 1, 2020: <ul style="list-style-type: none"> • The investment return assumption was lowered from 7.375% to 7.15%. • We have updated the salary increase assumption from a scale that varies by length of service with ultimate rates of 4.25% for Group 1, 4.50% for Group 2, and 4.75% for Group 4 to a scale that varies by length of service with ultimate rates of 3.75% for Group 1, 4.00% for Group 2, and 4.25% for Group 4. • The wage inflation rate was lowered from 3.50% to 3.00%. • A liability of approximately \$5.0 million was added to estimate the value of benefits paid to or received from other municipal retirement systems (net 3(8)(c) benefits).

Section 3: Actuarial Valuation Basis

Exhibit II – Summary of Plan Provisions

This exhibit summarizes the major provisions of the Plan included in the valuation. It is not intended to be, nor should it be interpreted as, a complete statement of all plan provisions.

Plan Year: January 1 through December 31

Plan Status: Ongoing

Retirement Benefits: Employees covered by the Contributory Retirement Law are classified into one of four groups depending on job classification. Group 1 comprises most positions in state and local government. It is the general category of public employees. Group 4 comprises mainly police and firefighters. Group 2 is for other specified hazardous occupations. (Officers and inspectors of the State Police are classified as Group 3.)

For employees hired prior to April 2, 2012, the annual amount of the retirement allowance is based on the member's final three-year average salary multiplied by the number of years and full months of creditable service at the time of retirement and multiplied by a percentage according to the following table based on the age of the member at retirement:

Age Last Birthday at Date of Retirement			
Percent	Group 1	Group 2	Group 4
2.5	65 or over	60 or over	55 or over
2.4	64	59	54
2.3	63	58	53
2.2	62	57	52
2.1	61	56	51
2.0	60	55	50
1.9	59	--	49
1.8	58	--	48
1.7	57	--	47
1.6	56	--	46
1.5	55	--	45

A member's final three-year average salary is defined as the greater of the highest consecutive three-year average annual rate of regular compensation and the average annual rate of regular compensation received during the last three years of creditable service prior to retirement.

Section 3: Actuarial Valuation Basis

For employees hired on April 2, 2012 or later, the annual amount of the retirement allowance is based on the member's final five-year average salary multiplied by the number of years and full months of creditable service at the time of retirement and multiplied by a percentage according to the following tables based on the age and years of creditable service of the member at retirement:

**For members with less than 30 years of creditable service:
Age Last Birthday at Date of Retirement**

Percent	Group 1	Group 2	Group 4
2.50	67 or over	62 or over	57 or over
2.35	66	61	56
2.20	65	60	55
2.05	64	59	54
1.90	63	58	53
1.75	62	57	52
1.60	61	56	51
1.45	60	55	50

**For members with 30 years of creditable service or greater:
Age Last Birthday at Date of Retirement**

Percent	Group 1	Group 2	Group 4
2.500	67 or over	62 or over	57 or over
2.375	66	61	56
2.250	65	60	55
2.125	64	59	54
2.000	63	58	53
1.875	62	57	52
1.750	61	56	51
1.625	60	55	50

A member's final five-year average salary is defined as the greater of the highest consecutive five-year average annual rate of regular compensation and the average annual rate of regular compensation received during the last five years of creditable service prior to retirement.

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For employees who became members after January 1, 2011, regular compensation is limited to 64% of the federal limit found in 26 U.S.C. 401(a)(17). In addition, regular compensation for members who retire after April 2, 2012 will be limited to prohibit “spiking” of a member’s salary to increase the retirement benefit.

For all employees, the maximum annual amount of the retirement allowance is 80 percent of the member’s final average salary. Any member who is a veteran also receives an additional yearly retirement allowance of \$15 per year of creditable service, not exceeding \$300. The veteran allowance is paid in addition to the 80 percent maximum.

Employee Contributions:

Date of Hire	Contribution Rate
Prior to January 1, 1975	5%
January 1, 1975 – December 31, 1983	7%
January 1, 1984 – June 30, 1996	8%
July 1, 1996 onward	9%

In addition, employees hired after December 31, 1978 contribute an additional 2 percent of salary in excess of \$30,000.

Employees hired after 1983 who voluntarily withdraw their contributions with less than 10 ten years of credited service receive 3% interest on their contributions.

Employees in Group 1 hired on or after April 2, 2012 with 30 years of creditable service or greater will pay a base contribution rate of 6%.

Retirement Benefits (Superannuation):

Members of Group 1, 2 or 4 hired prior to April 2, 2012 may retire upon the attainment of age 55. For retirement at ages below 55, twenty years of creditable service is required.

Members hired prior to April 2, 2012 who terminate before age 55 with ten or more years of creditable service are eligible for a retirement allowance upon the attainment of age 55 (provided they have not withdrawn their accumulated deductions from the Annuity Savings Fund of the System).

Members of Group 1 hired April 2, 2012 or later may retire upon the attainment of age 60. Members of Group 2 or 4 hired April 2, 2012 or later may retire upon the attainment of age 55. Members of Group 4 may retire upon attainment of age 50 with ten years of creditable service.

Members hired April 2, 2012 or later who terminate before age 55 (60 for members of Group 1) with ten or more years of creditable service are eligible for a retirement allowance upon the attainment of age 55 (60 for members of Group 1) provided they have not withdrawn their accumulated deductions from the Annuity Savings Fund of the System.

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Ordinary Disability Benefit:

A member who is unable to perform his or her job due to a non-occupational disability will receive a retirement allowance if he or she has ten or more years of creditable service and has not reached age 55. The annual amount of such allowance shall be determined as if the member retired for superannuation at age 55 (age 60 for Group 1 members hired on or after April 2, 2012), based on the amount of creditable service at the date of disability. For veterans, there is a minimum benefit of 50 percent of the member's most recent year's pay plus an annuity based on his or her own contributions.

Accidental Disability Benefit:

For a job-connected disability, the benefit is 72 percent of the member's most recent annual pay plus an annuity based on his or her own contributions, plus additional amounts for surviving children. Benefits are capped at 75 percent of annual rate of regular compensation for employees who become members after January 1, 1988.

Death Benefits:

In general, the beneficiary of an employee who dies in active service will receive a refund of the employee's own contributions. Alternatively, if the employee were eligible to retire on the date of death, a spouse's benefit will be paid equal to the amount the employee would have received under Option C. The surviving spouse of a member who dies with two or more years of credited service has the option of a refund of the employee's contributions or a monthly benefit regardless of eligibility to retire, if they were married for at least one year. There is also a minimum widow's pension of \$500 per month, and there are additional amounts for surviving children.

If an employee's death is job-connected, the spouse will receive 72 percent of the member's most recent annual pay, in addition to a refund of the member's accumulated deductions, plus additional amounts for surviving children. However, in accordance with Section 100 of Chapter 32, the surviving spouse of a police officer, firefighter or corrections officer is killed in the line of duty will be eligible to receive an annual benefit equal to the maximum salary held by the member at the time of death.

Upon the death of a job-connected disability retiree who retired prior to November 7, 1996 and could not elect an Option C benefit, a surviving spouse will receive an allowance of \$9,000 per year if the member dies for a reason unrelated to cause of disability.

"Heart And Lung Law" And Cancer Presumption:

Any case of hypertension or heart disease resulting in total or partial disability or death to a uniformed fireman, permanent member of a police department, or certain employees of a county correctional facility is presumed to have been suffered in the line of duty, unless the contrary is shown by competent evidence. Any case of disease of the lungs or respiratory tract resulting in total disability or death to a uniformed fireman is presumed to have been suffered in the line of duty, unless the contrary is shown by competent evidence. There is an additional presumption for uniformed firemen that certain types of cancer are job-related if onset occurs while actively employed or within five years of retirement.

Options:

Members may elect to receive a full retirement allowance payable for life under Option A. Under Option B a member may elect to receive a lower monthly allowance in exchange for a guarantee that at the time of death any contributions not expended for annuity payments will be refunded to the beneficiary. Option C allows the member to take a lesser retirement allowance in exchange for providing a survivor with two-thirds of the lesser amount. Option C pensioners will have benefits converted from a reduced to a full retirement if the beneficiary predeceases the retiree.

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Post-Retirement Benefits:

The Board has adopted the provisions of Section 51 of Chapter 127 of the Acts of 1999, which provide that the Retirement Board may approve an annual COLA in excess of the Consumer Price Index but not to exceed a 3% COLA on the first \$12,000 of a retirement allowance. Cost-of-living increases granted prior to July 1, 1998 are reimbursed by the Commonwealth and not reflected in this report.

Changes in Plan Provisions:

There have been no changes in plan provisions since the last valuation.

Section 3: Actuarial Valuation Basis

Appendix – Glossary of Terms

Definitions of certain terms as they are used in Statement 68. The terms may have different meanings in other contexts.

Active Employees:	Individuals employed at the end of the reporting or measurement period, as applicable.
Actual Contributions:	Cash contributions recognized as additions to a pension Plan Fiduciary Net Position.
Actuarial Present Value of Projected Benefit Payments:	Projected benefit payments discounted to reflect the expected effects of the time value (present value) of money and the probabilities of payment.
Actuarial Valuation:	The determination, as of a point in time (the actuarial valuation date), of the service cost, Total Pension Liability, and related actuarial present value of projected benefit payments for pensions performed in conformity with Actuarial Standards of Practice unless otherwise specified by the GASB.
Actuarial Valuation Date:	The date as of which an actuarial valuation is performed.
Actuarially Determined Contribution:	A target or recommended contribution to a defined benefit pension plan for the reporting period, determined in conformity with Actuarial Standards of Practice based on the most recent measurement available when the contribution for the reporting period was adopted.
Ad Hoc Cost-of-Living Adjustments (Ad Hoc COLAs):	Cost-of-living adjustments that require a decision to grant by the authority responsible for making such decisions.
Ad Hoc Postemployment Benefit Changes:	Postemployment benefit changes that require a decision to grant by the authority responsible for making such decisions.
Agent Employer:	An employer whose employees are provided with pensions through an agent multiple-employer defined benefit pension plan.
Agent Multiple-Employer Defined Benefit Pension Plan (Agent Pension Plan):	A multiple-employer defined benefit pension plan in which pension plan assets are pooled for investment purposes but separate accounts are maintained for each individual employer so that each employer's share of the pooled assets is legally available to pay the benefits of only its employees.
Allocated Insurance Contract:	A contract with an insurance company under which related payments to the insurance company are currently used to purchase immediate or deferred annuities for individual employees. Also may be referred to as an annuity contract.
Automatic Cost-of-Living Adjustments (Automatic COLAs):	Cost-of-living adjustments that occur without a requirement for a decision to grant by a responsible authority, including those for which the amounts are determined by reference to a specified experience factor (such as the earnings experience of the pension plan) or to another variable (such as an increase in the consumer price index).
Automatic Postemployment Benefit Changes:	Postemployment benefit changes that occur without a requirement for a decision to grant by a responsible authority, including those for which the amounts are determined by reference to a specified experience factor (such as the earnings experience of the pension plan) or to another variable (such as an increase in the consumer price index).

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Closed Period:	A specific number of years that is counted from one date and declines to zero with the passage of time. For example, if the recognition period initially is five years on a closed basis, four years remain after the first year, three years after the second year, and so forth.
Collective Deferred Outflows of Resources and Deferred Inflows of Resources Related to Pensions:	Deferred outflows of resources and deferred inflows of resources related to pensions arising from certain changes in the collective Net Pension Liability.
Collective Net Pension Liability:	The Net Pension Liability for benefits provided through (1) a cost-sharing pension plan or (2) a single-employer or agent pension plan in circumstances in which there is a special funding situation.
Collective Pension Expense:	Pension expense arising from certain changes in the collective Net Pension Liability.
Contributions:	Additions to a pension Plan Fiduciary Net Position for amounts from employers, non-employer contributing entities (for example, state government contributions to a local government pension plan), or employees. Contributions can result from cash receipts by the pension plan or from recognition by the pension plan of a receivable from one of these sources.
Cost-of-Living Adjustments:	Postemployment benefit changes intended to adjust benefit payments for the effects of inflation.
Cost-Sharing Employer:	An employer whose employees are provided with pensions through a cost-sharing multiple-employer defined benefit pension plan.
Cost-Sharing Multiple-Employer Defined Benefit Pension Plan (Cost-Sharing Pension Plan):	A multiple-employer defined benefit pension plan in which the pension obligations to the employees of more than one employer are pooled and pension plan assets can be used to pay the benefits of the employees of any employer that provides pensions through the pension plan.
Covered-Employee Payroll:	The payroll of employees that are provided with pensions through the pension plan.
Deferred Retirement Option Program (DROP):	A program that permits an employee to elect a calculation of benefit payments based on service credits and salary, as applicable, as of the DROP entry date. The employee continues to provide service to the employer and is paid for that service by the employer after the DROP entry date; however, the pensions that would have been paid to the employee (if the employee had retired and not entered the DROP) are credited to an individual employee account within the defined benefit pension plan until the end of the DROP period.
Defined Benefit Pension Plans:	Pension plans that are used to provide defined benefit pensions.
Defined Benefit Pensions:	Pensions for which the income or other benefits that the employee will receive at or after separation from employment are defined by the benefit terms. The pensions may be stated as a specified dollar amount or as an amount that is calculated based on one or more factors such as age, years of service, and compensation. (A pension that does not meet the criteria of a defined contribution pension is classified as a defined benefit pension for purposes of Statement 68.)
Defined Contribution Pension Plans:	Pension plans that are used to provide defined contribution pensions.

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Defined Contribution Pensions:	Pensions having terms that (1) provide an individual account for each employee; (2) define the contributions that an employer is required to make (or the credits that it is required to provide) to an active employee's account for periods in which that employee renders service; and (3) provide that the pensions an employee will receive will depend only on the contributions (or credits) to the employee's account, actual earnings on investments of those contributions (or credits), and the effects of forfeitures of contributions (or credits) made for other employees, as well as pension plan administrative costs, that are allocated to the employee's account.
Discount Rate:	<p>The single rate of return that, when applied to all projected benefit payments, results in an actuarial present value of projected benefit payments equal to the total of the following:</p> <ol style="list-style-type: none"> 1. The actuarial present value of benefit payments projected to be made in future periods in which (a) the amount of the pension Plan Fiduciary Net Position is projected (under the requirements of Statement 68) to be greater than the benefit payments that are projected to be made in that period and (b) pension plan assets up to that point are expected to be invested using a strategy to achieve the long-term expected rate of return, calculated using the long-term expected rate of return on pension plan investments. 2. The actuarial present value of projected benefit payments not included in (1), calculated using the municipal bond rate.
Entry Age Actuarial Cost Method:	A method under which the actuarial present value of the projected benefits of each individual included in an actuarial valuation is allocated on a level basis over the earnings or service of the individual between entry age and assumed exit age(s). The portion of this actuarial present value allocated to a valuation year is called the normal cost. The portion of this actuarial present value not provided for at a valuation date by the actuarial present value of future normal costs is called the actuarial accrued liability.
Inactive Employees:	Terminated individuals that have accumulated benefits but are not yet receiving them, and retirees or their beneficiaries currently receiving benefits.
Measurement Period:	The period between the prior and the current measurement dates.
Multiple-Employer Defined Benefit Pension Plan:	A defined benefit pension plan that is used to provide pensions to the employees of more than one employer.
Net Pension Liability (NPL):	The liability of employers and non-employer contributing entities to employees for benefits provided through a defined benefit pension plan.
Non-Employer Contributing Entities:	Entities that make contributions to a pension plan that is used to provide pensions to the employees of other entities. For purposes of Statement 68, employees are not considered non-employer contributing entities.
Other Postemployment Benefits:	All postemployment benefits other than retirement income (such as death benefits, life insurance, disability, and long-term care) that are provided separately from a pension plan, as well as postemployment healthcare benefits, regardless of the manner in which they are provided. Other postemployment benefits do not include termination benefits.
Pension Plans:	Arrangements through which pensions are determined, assets dedicated for pensions are accumulated and managed and benefits are paid as they come due.

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Pensions:	Retirement income and, if provided through a pension plan, postemployment benefits other than retirement income (such as death benefits, life insurance, and disability benefits). Pensions do not include postemployment healthcare benefits and termination benefits.
Plan Members:	Individuals that are covered under the terms of a pension plan. Plan members generally include (1) employees in active service (active plan members) and (2) terminated employees who have accumulated benefits but are not yet receiving them and retirees or their beneficiaries currently receiving benefits (inactive plan members).
Postemployment:	The period after employment.
Postemployment Benefit Changes:	Adjustments to the pension of an inactive employee.
Postemployment Healthcare Benefits:	Medical, dental, vision, and other health-related benefits paid subsequent to the termination of employment.
Projected Benefit Payments:	All benefits estimated to be payable through the pension plan to current active and inactive employees as a result of their past service and their expected future service.
Public Employee Retirement System:	A special-purpose government that administers one or more pension plans; also may administer other types of employee benefit plans, including postemployment healthcare plans and deferred compensation plans.
Real Rate of Return:	The rate of return on an investment after adjustment to eliminate inflation.
Service Costs:	The portions of the actuarial present value of projected benefit payments that are attributed to valuation years.
Single Employer:	An employer whose employees are provided with pensions through a single-employer defined benefit pension plan.
Single-Employer Defined Benefit Pension Plan (Single-Employer Pension Plan):	A defined benefit pension plan that is used to provide pensions to employees of only one employer.
Special Funding Situations:	<p>Circumstances in which a non-employer entity is legally responsible for making contributions directly to a pension plan that is used to provide pensions to the employees of another entity or entities and either of the following conditions exists:</p> <ol style="list-style-type: none"> 1. The amount of contributions for which the non-employer entity legally is responsible is not dependent upon one or more events or circumstances unrelated to the pensions. 2. The non-employer entity is the only entity with a legal obligation to make contributions directly to a pension plan.
Termination Benefits:	Inducements offered by employers to active employees to hasten the termination of services, or payments made in consequence of the early termination of services. Termination benefits include early-retirement incentives, severance benefits, and other termination-related benefits.
Total Pension Liability (TPL):	The portion of the actuarial present value of projected benefit payments that is attributed to past periods of employee service in conformity with the requirements of Statement 68.