



**CITY OF BRISTOL
RETIREMENT SYSTEM**

**Actuarial Valuation as of July 1, 2018
For Fiscal Year 2019-20**

Prepared by

Rebecca A. Sielman, FSA
Consulting Actuary

80 Lamberton Road
Windsor, CT 06095 USA
Tel +1 860.687.2110
Fax +1 860.687.2111
milliman.com

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Certification

We have performed an actuarial valuation of the Plan as of July 1, 2018 for fiscal year 2019-20. This report presents the results of our valuation.

The ultimate cost of a pension plan is the total amount needed to provide benefits for plan members and beneficiaries and to pay the expenses of administering the plan. Pension costs are met by contributions and by investment return on plan assets. The principal purpose of this report is to set forth an actuarial recommendation of the contribution, or range of contributions, which will properly fund the plan, in accordance with applicable government regulations. In addition, this report provides:

- A valuation of plan assets and liabilities to review the year-to-year progress of funding.
- Information needed to meet disclosure requirements.
- Review of plan experience for the previous year to ascertain whether the assumptions and methods employed for valuation purposes are reflective of actual events and remain appropriate for prospective application.
- Assessment of the relative funded position of the plan, i.e., through a comparison of plan assets and projected plan liabilities.
- Comments on any other matters which may be of assistance in the funding and operation of the plan.

This report may not be used for purposes other than those listed above without Milliman's prior written consent. If this report is distributed to other parties, it must be copied in its entirety, including this certification section.

Milliman's work is prepared solely for the internal business use of the City of Bristol ("City"). To the extent that Milliman's work is not subject to disclosure under applicable public records laws, Milliman's work may not be provided to third parties without Milliman's prior written consent. Milliman does not intend to benefit or create a legal duty to any third party recipient of its work product. Milliman's consent to release its work product to any third party may be conditioned on the third party signing a Release, subject to the following exceptions: (a) the City may provide a copy of Milliman's work, in its entirety, to the City's professional service advisors who are subject to a duty of confidentiality and who agree to not use Milliman's work for any purpose other than to benefit the City; and (b) the City may provide a copy of Milliman's work, in its entirety, to other governmental entities, as required by law. No third party recipient of Milliman's work product should rely upon Milliman's work product. Such recipients should engage qualified professionals for advice appropriate to their own specific needs.

In preparing this report, we relied on employee census data and financial information as of the valuation date, furnished by the City. We performed a limited review of the data used directly in our analysis for reasonableness and consistency and have found them to be reasonably consistent and comparable with data used for other purposes. If the underlying data or information is inaccurate or incomplete, the results of our analysis may likewise be inaccurate or incomplete and our calculations may need to be revised. If there are material defects in the data, it is possible that they would be uncovered by a detailed, systematic review and comparison of the data to search for data values that are questionable or for relationships that are materially inconsistent. Such a review was beyond the scope of our assignment.

Certification

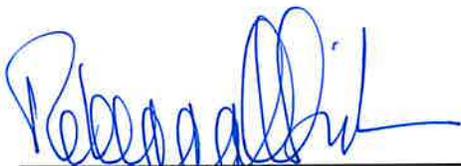
The calculations reported herein have been made on a basis consistent with our understanding of ERISA and the related sections of the tax code. Additional determinations may be needed for purposes other than meeting funding requirements, such as judging benefit security at plan termination or meeting employer accounting requirements. On the basis of the foregoing, we hereby certify that, to the best of our knowledge, this report is complete and accurate and all costs and liabilities were determined in conformance with generally accepted actuarial principles and practices.

I further certify that, in my opinion, each actuarial assumption, method and technique used is reasonable taking into account the experience of the Plan and reasonable expectations or would, in the aggregate, result in a total contribution equivalent to that which would be determined if each such assumption, method, or technique were reasonable. Future actuarial measurements may differ significantly from the current measurements presented in this report due to factors such as, but not limited to, the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic 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 or additional cost or contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of the actuarial assignment, we did not perform an analysis of the potential range of such future measurement.

The consultants who worked on this assignment are pension actuaries. Milliman's advice is not intended to be a substitute for qualified legal or accounting counsel.

The signing actuaries are independent of the plan sponsor. We are not aware of any relationship that would impact the objectivity of our work.

We are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.



Rebecca A. Stelman, FSA
Consulting Actuary

Section I - Executive Summary Changes Since the Prior Valuation

Plan Changes

None.

Changes in Actuarial Methods and Assumptions

The following actuarial method and assumption changes were reflected in this valuation based on recommendations resulting from the most recent experience study.

- We are phasing over 5 years a change to the interest rate assumption from 7.5% to 7.0%.
- We are phasing over 5 years a change to the generational mortality projection table from Scale AA to Scale BB.

The effect of these changes was an increase in the Unfunded Accrued Liability of \$7.1 million.

Significant Changes

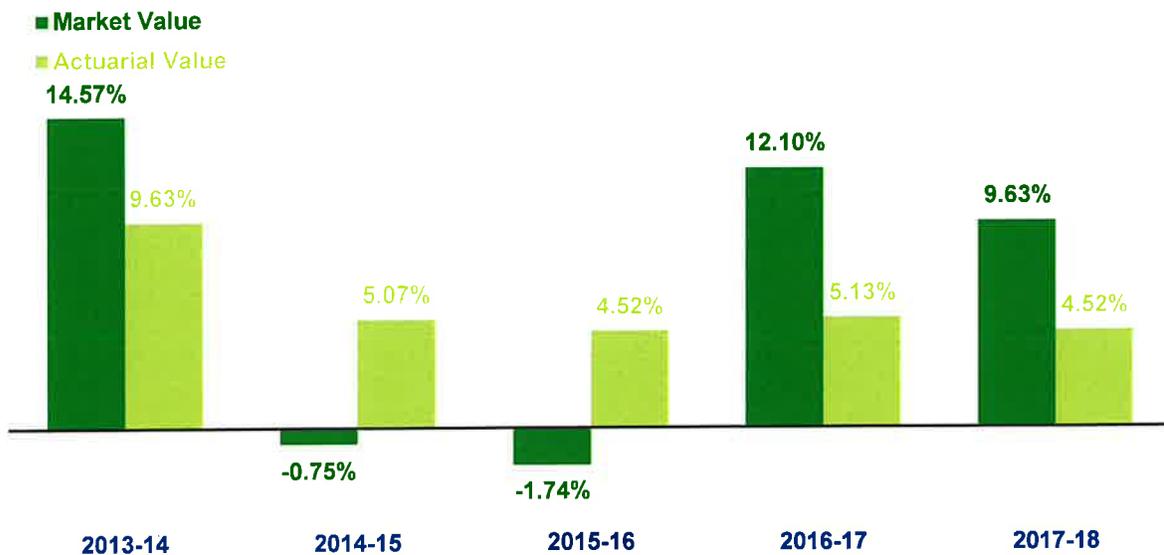
Effective June 30, 2018, the City of Bristol Retirement System, the City of Bristol Police Benefit Fund, and the City of Bristol Firefighters' Benefit Fund became part of an umbrella plan known as the City of Bristol Retirement System. All historical figures from the three plans have been summed and presented on an aggregate basis. Please see the prior year reports for historical results for each plan.

Section I - Executive Summary Assets

There are two different measures of the plan's assets that are used throughout this report. The **Market Value** is a snapshot of the plan's investments as of the valuation date. The **Actuarial Value** is a smoothed asset value designed to temper the volatile fluctuations in the market by recognizing investment gains or losses over four years.

	Market	Actuarial
Value as of July 1, 2017	\$608,364,860	\$627,928,376
Contributions	5,399,075	5,399,075
Net Investment Income	57,653,093	27,974,331
Benefit Payments	<u>(24,245,472)</u>	<u>(24,245,472)</u>
Value as of July 1, 2018	647,171,556	637,056,310

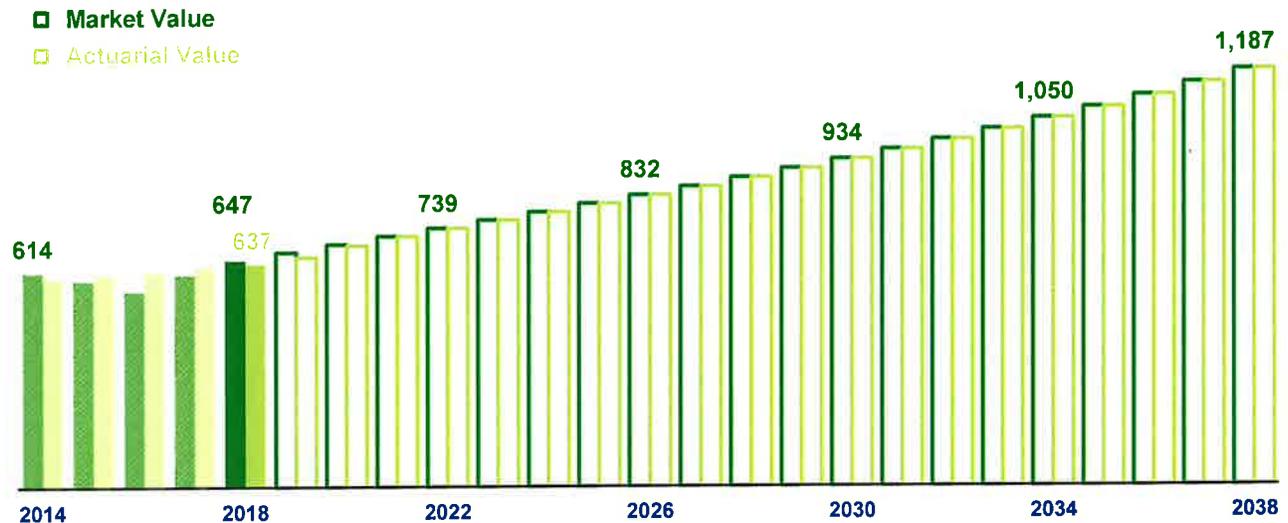
For fiscal year 2017-18, the plan's assets earned 9.63% on a Market Value basis and 4.52% on an Actuarial Value basis. The actuarial assumption for this period was 7.30%; the result is an asset gain of about \$13.9 million on a Market Value basis and a loss of about \$17.2 million on an Actuarial Value basis. Historical rates of return are shown in the graph below.



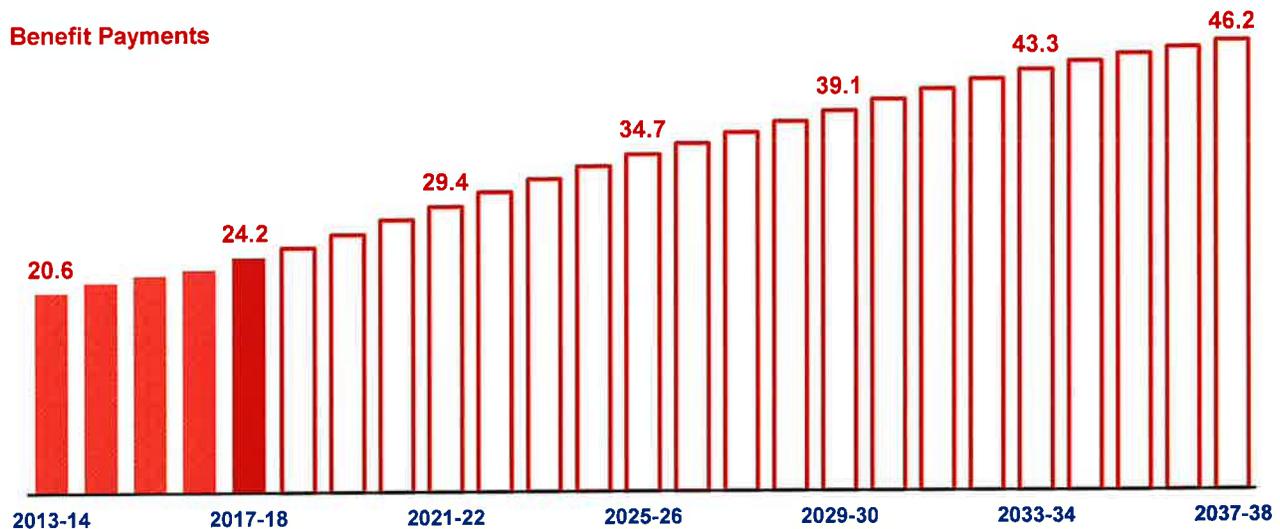
Please note that the Actuarial Value currently is less than the Market Value by \$10.1 million. This figure represents investment gains that will be gradually recognized in future years. This process will exert downward pressure on the City's contribution, unless there are offsetting market losses.

Section I - Executive Summary Assets (continued)

The graph below shows how this year's asset values compare to where the plan's assets have been over the past several years and how they are projected to change over the next 20 years. For purposes of this projection, we have assumed that the City always contributes the Actuarially Determined Contribution and the investments always earn the assumed interest rate each year.

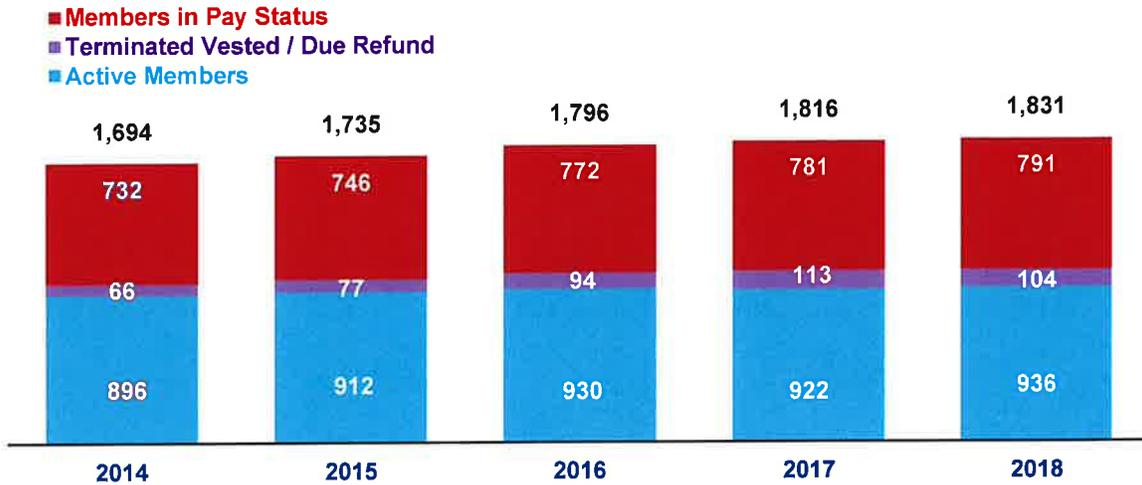


In 2017-18, the plan paid out \$24.2 million in benefits to members. Over the next 20 years, the plan is projected to pay out a total of \$738 million in benefits to members.



Section I - Executive Summary Membership

There are three basic categories of plan members included in the valuation: (1) members who are receiving monthly pension benefits, (2) former employees who have a vested right to benefits but have not yet started collecting, and (3) active employees who have met the eligibility requirements for membership.

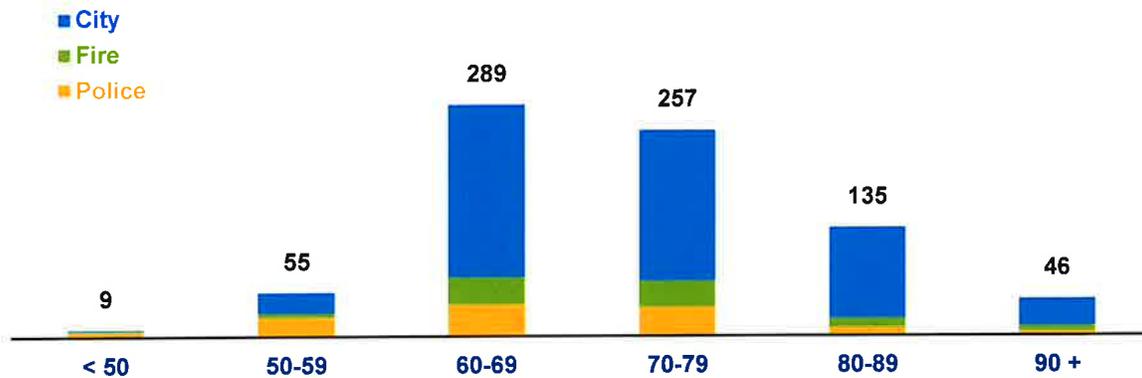


Members in Pay Status on July 1, 2018

City	577	Average Age	71.9
Fire	92	Total Annual Benefit	\$24,206,528
Police	<u>122</u>	Average Annual Benefit	30,602
Total	791		

As of July 1, 2018, there were 701 service retirees, 24 disabled retirees, and 66 beneficiaries.

The members in pay status fall across a wide distribution of ages:



Section I - Executive Summary Membership (continued)

Terminated Vested Members on July 1, 2018

City	36	Average Age	45.7
Fire	0	Total Annual Benefit	\$575,931
Police	<u>5</u>	Average Annual Benefit	14,047
Total	41		

Nonvested Members Due Refunds on July 1, 2018

City	63
Fire	0
Police	<u>0</u>
Total	63

Active Members on July 1, 2018

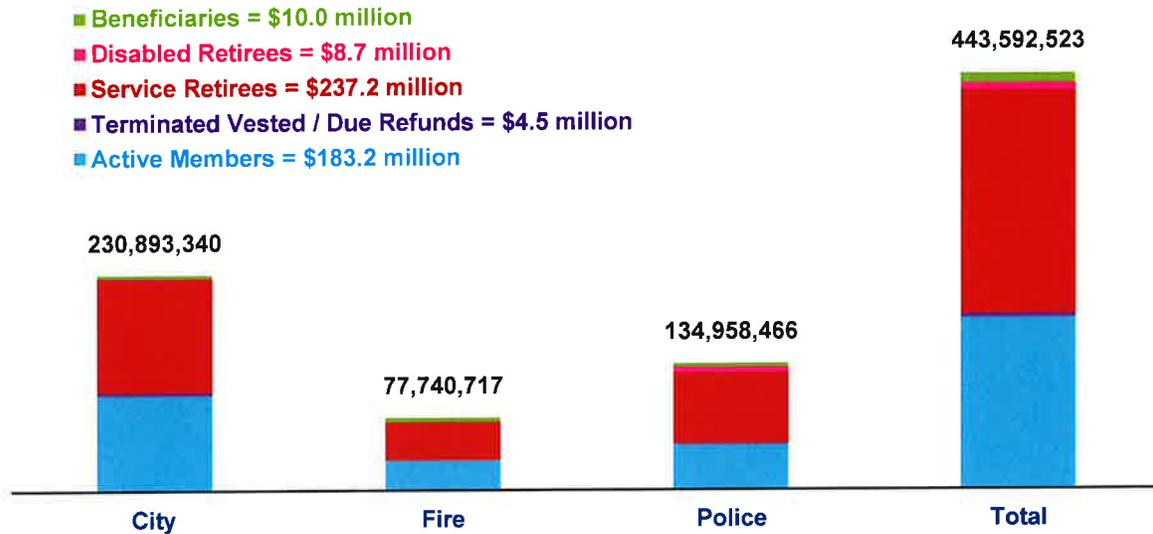
City	727	Average Age	48.4
Fire	87	Average Service	12.4
Police	<u>122</u>	Payroll	\$51,163,929
Total	936	Average Annual Pay	54,662

The table below illustrates the age and years of service of the active membership:

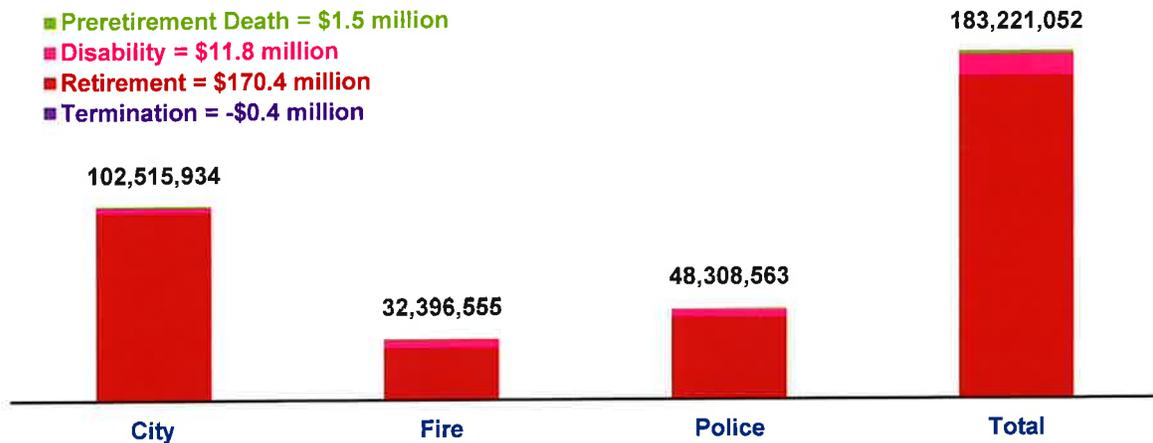
Age	Years of Service							Total
	0-4	5-9	10-14	15-19	20-24	25-29	30+	
< 25	12							12
25-29	49	15						64
30-34	42	28	6					76
35-39	31	18	28	5				82
40-44	24	13	30	16				83
45-49	24	19	26	21	22	5		117
50-54	26	17	45	32	20	18	11	169
55-59	28	15	27	44	23	9	23	169
60-64	12	11	26	41	15	5	9	119
65+	3	5	16	6	7	3	5	45
Total	251	141	204	165	87	40	48	936

Section I - Executive Summary Accrued Liability

The Accrued Liability as of July 1, 2018 consists of the following pieces:



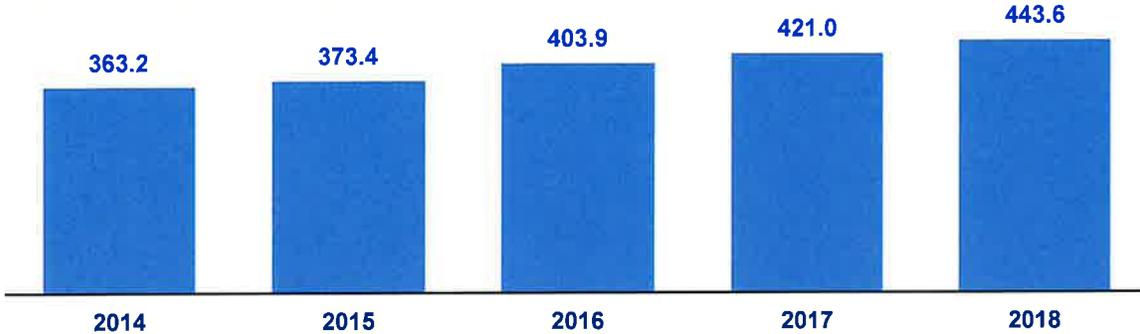
The Accrued Liability for active members can be broken down further by the different types of benefits provided by the plan:



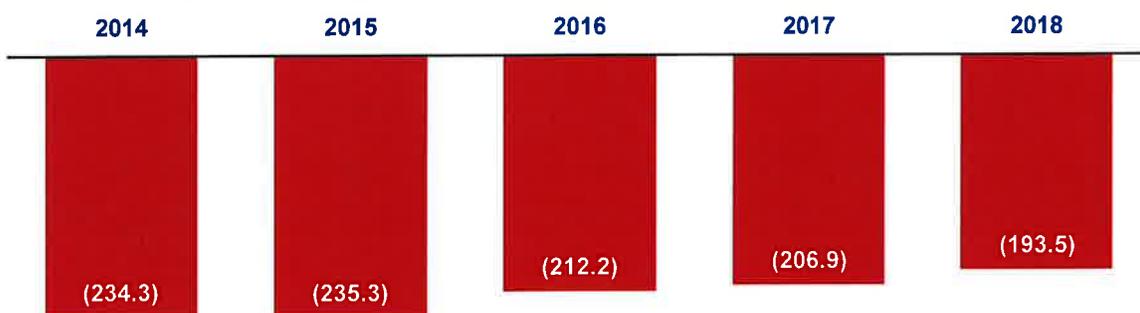
Section I - Executive Summary Funded Status

The Accrued Liability grows over time as active members earn additional benefits, and goes down over time as members receive benefits; it may also change when there are changes to the plan provisions or changes in the actuarial assumptions. The Unfunded Accrued Liability is the dollar difference between the Accrued Liability and the Actuarial Value of Assets; the Funded Ratio is the ratio of the two.

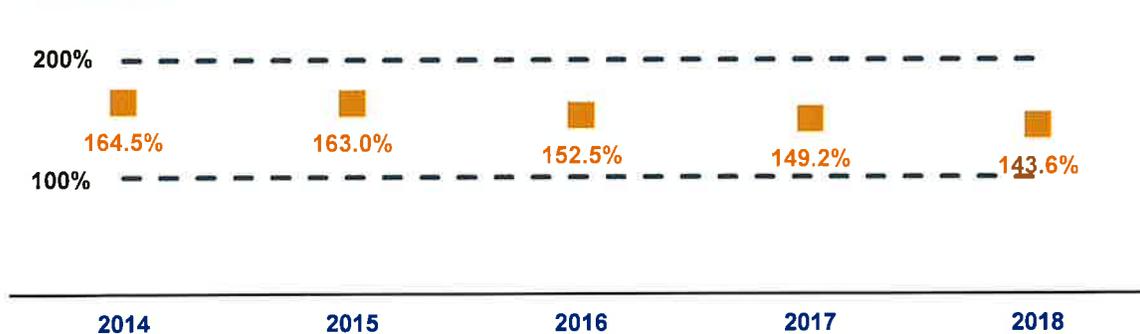
Accrued Liability (\$ millions)



Unfunded Accrued Liability (\$ millions)



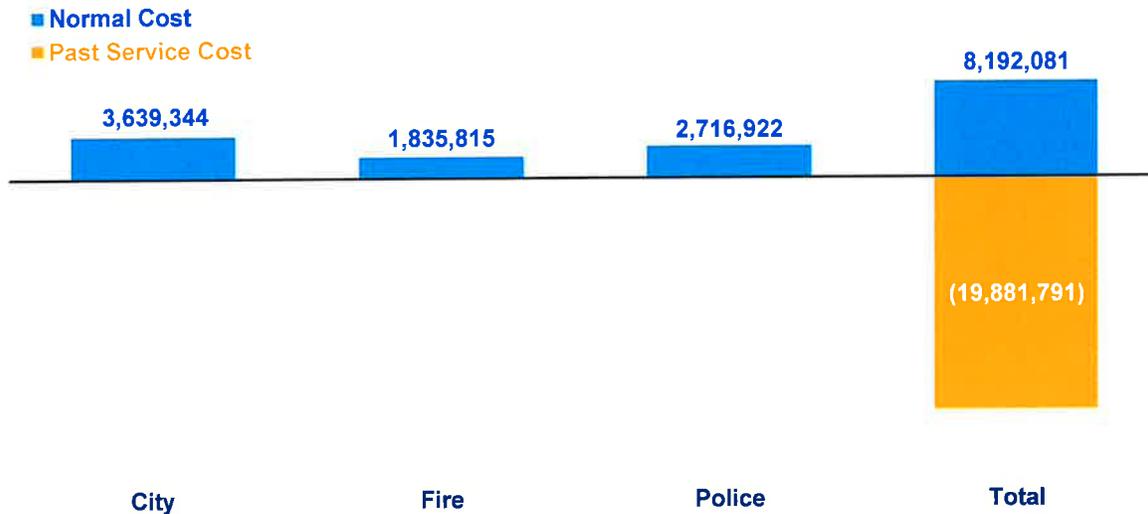
Funded Ratio



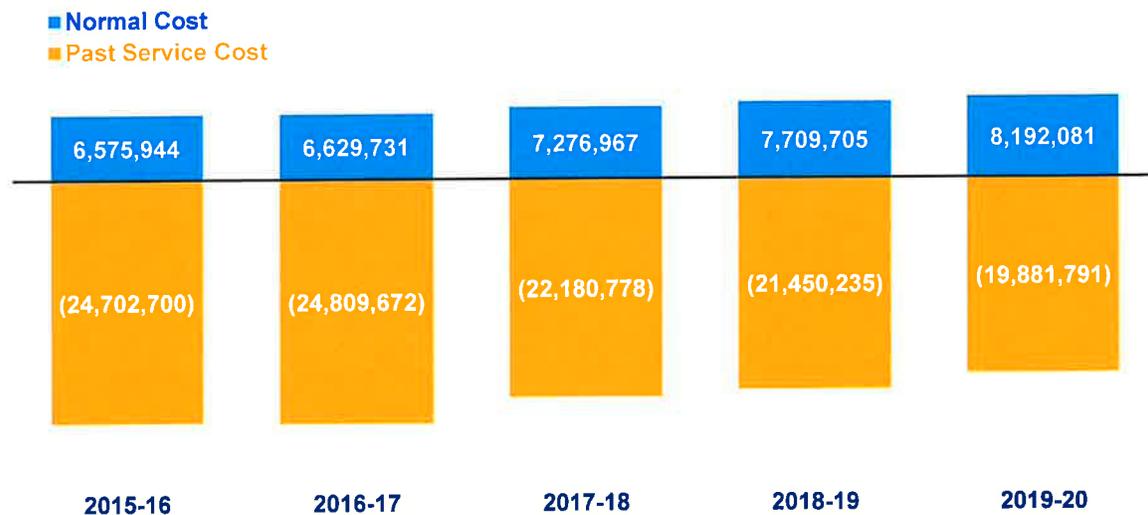
Section I - Executive Summary Actuarially Determined Contribution

The Actuarially Determined Contribution consists of two pieces: a **Normal Cost** payment to fund the benefits earned each year, and a **Past Service Cost** to gradually reduce any unfunded or surplus liability. If the surplus is sufficiently large, it can be used to subsidize the Normal Cost and little or no contribution may be necessary to maintain the funded status of the plan.

The Actuarially Determined Contribution for fiscal year 2019-20 is shown graphically below.

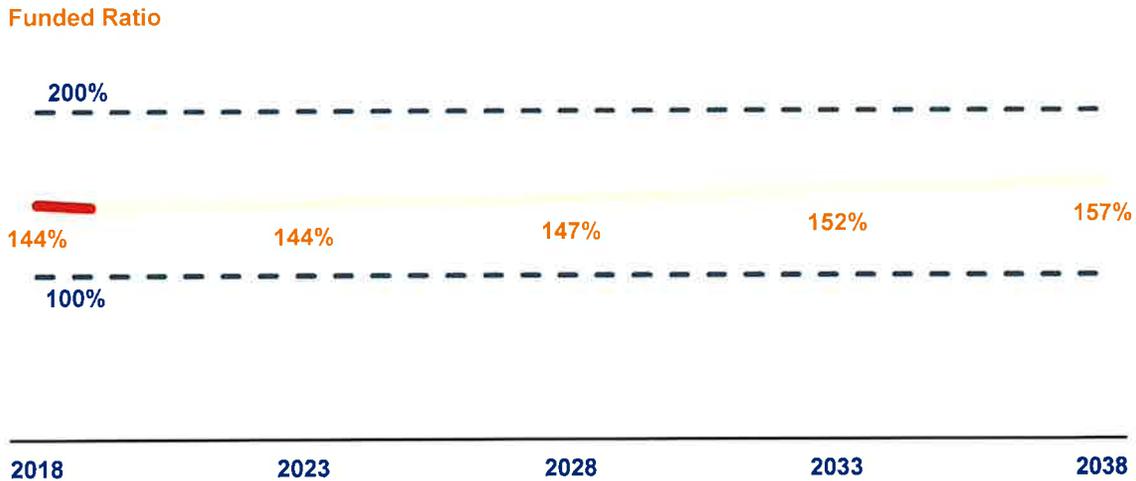


The chart below shows the Actuarially Determined Contribution for the past five fiscal years. Note that the Normal Cost is relatively consistent from year to year, whereas the Past Service Cost tends to be more volatile since it reflects the impact of asset performance.



Section I - Executive Summary Long-Range Forecast

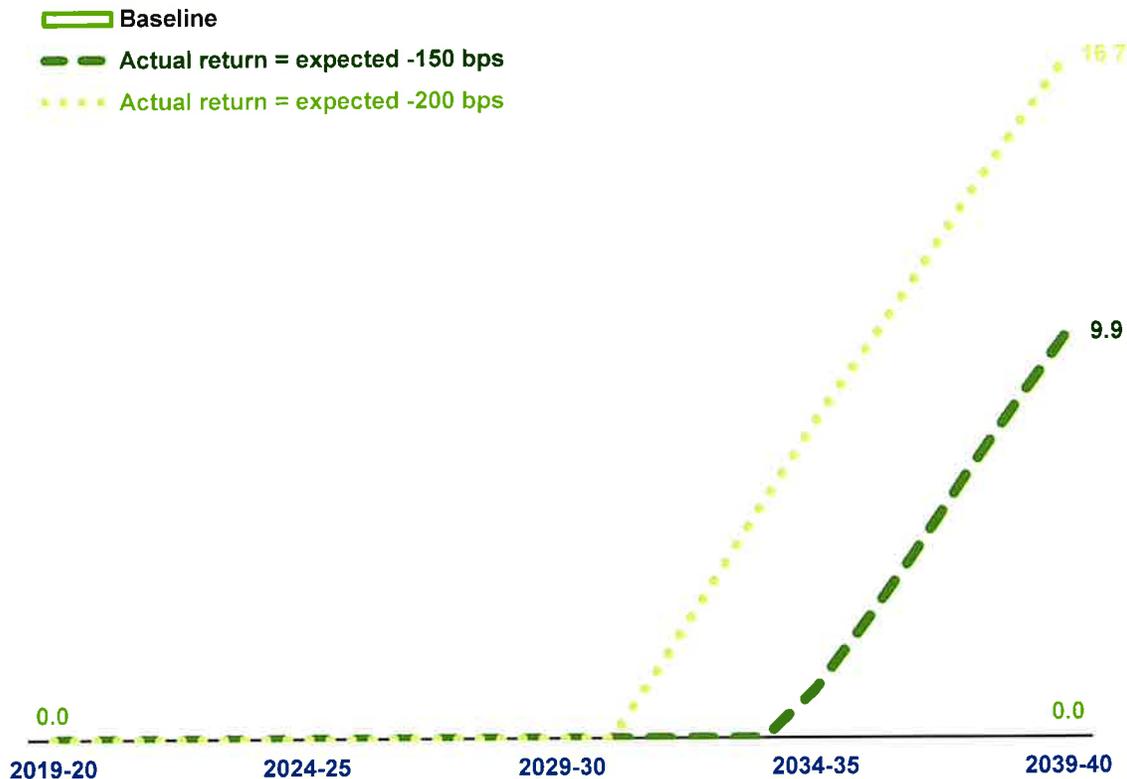
If the City pays the Actuarially Determined Contribution each year, the investments earn exactly the assumed interest rate each year, and there are no changes in the plan provisions or in the actuarial methods and assumptions, then we project the following changes in the plan's funded status:



To the extent that there are future investment or liability gains or losses, changes in the actuarial assumptions or methods, or plan changes, the actual valuation results will differ from these forecasts. Please see Section III C for more details of the long range forecast.

Section I - Executive Summary Long-Range Forecast (continued)

Pension benefits are paid for through a combination of contributions from the City and from employees, and from investment income. If the investments persistently earn less than the assumed interest rate, then the plan's funded status would suffer, and to compensate, the City's contribution levels would be pushed higher. The risks of the investments underearning are illustrated in the hypothetical scenarios below:



The scenarios illustrated above are based on deterministic projections that assume emerging plan experience always exactly matches the actuarial assumptions; in particular that actual asset returns will be constant in every year of the projection period. Variation in asset returns, contribution amounts, and many other factors may have a significant impact on the long-term financial health of the plan, the liquidity constraints on plan assets, and the City's future contribution levels. Stochastic projections could be prepared that would enable the City to understand the potential range of future results based on the expected variability in asset returns and other factors. Such analysis was beyond the scope of this engagement.

Section I - Executive Summary Summary of Principal Results

Membership	July 1, 2017	July 1, 2018
Active Members	922	936
Terminated Vested Members	113	104
Members in Pay Status	<u>781</u>	<u>791</u>
Total Count	1,816	1,831
 Payroll	 \$49,004,030	 \$51,163,929
 Assets and Liabilities	 July 1, 2017	 July 1, 2018
Market Value of Assets	\$608,364,860	\$647,171,556
Actuarial Value of Assets	627,928,376	637,056,310
 Accrued Liability for Active Members	 171,766,389	 183,221,052
Accrued Liability for Terminated Vested / Due Refunds	4,428,025	4,532,811
Accrued Liability for Members in Pay Status	<u>244,799,723</u>	<u>255,838,660</u>
Total Accrued Liability	420,994,137	443,592,523
 Unfunded Accrued Liability	 (206,934,239)	 (193,463,787)
 Funded Ratio	 149.2%	 143.6%
 Actuarially Determined Contribution for Fiscal Year	 2018-19	 2019-20
Normal Cost	\$7,709,705	\$8,192,081
Past Service Cost	(21,450,236)	(19,881,791)
Actuarially Determined Contribution	0	0

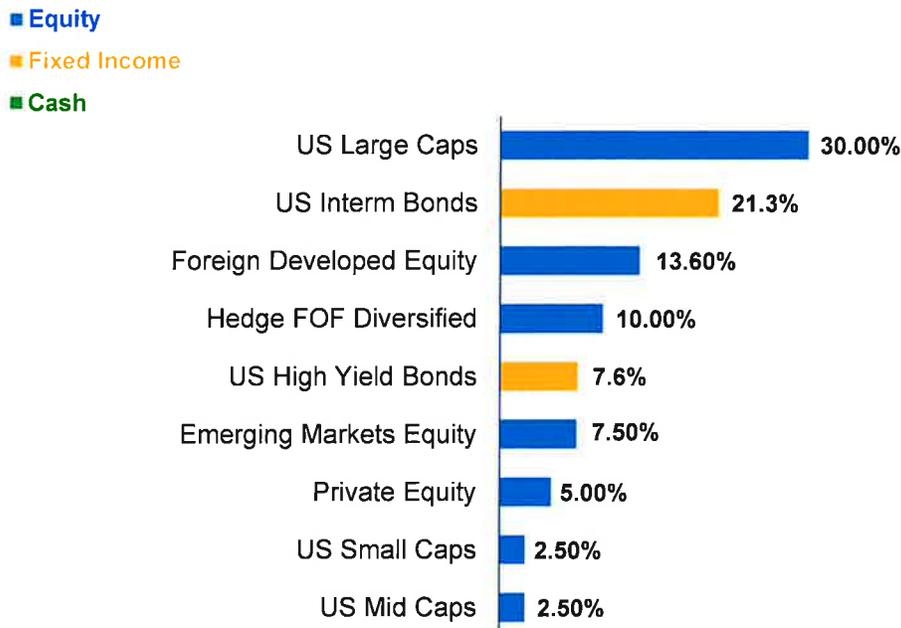
Section II - Plan Assets

A. Summary of Fund Transactions

Market Value as of July 1, 2017	\$608,364,860
City Contributions	2,617,369
Employee Contributions	2,781,706
Investment Income	57,843,541
Benefit Payments	(24,245,472)
Administrative Expenses	(190,448)
Market Value as of June 30, 2018	647,171,556
Expected Return on Market Value of Assets	43,703,798
Market Value (Gain)/Loss	(13,949,295)
Approximate Rate of Return *	9.63%

* The rate shown here is not the dollar or time weighted investment yield rate which measures investment performance. It is an approximate net return assuming all activity occurred on average midway through the fiscal year.

Target Asset Allocation as of June 30, 2018



Section II - Plan Assets

B. Development of Actuarial Value of Assets

In order to minimize the impact of market fluctuations on the contribution level, we use an Actuarial Value of Assets that recognizes gains and losses over a four year period. The Actuarial Value of Assets as of July 1, 2018 is determined below.

1.	Expected Market Value of Assets:		
	a. Market Value of Assets as of July 1, 2017		\$608,364,860
	b. City and Employee Contributions		5,399,075
	c. Benefit Payments		(24,245,472)
	d. Expected Earnings Based on 7.30% Interest		<u>43,703,798</u>
	e. Expected Market Value of Assets as of July 1, 2018		633,222,261
2.	Market Value of Assets as of July 1, 2018		647,171,556
3.	Market Value Gains/(Losses): (2) - (1e)		13,949,295
4.	Delayed Recognition of Market (Gains)/Losses:		
		Percent Not	Amount Not
	Plan Year End	Gain/(Loss)	Recognized
	06/30/2018	\$13,949,295	75%
	06/30/2017	25,910,074	50%
	06/30/2016	(53,207,049)	25%
			<u>(13,301,762)</u>
			10,115,246
5.	Preliminary Actuarial Value of Assets as of July 1, 2018: (2) - (4)		637,056,310
6.	Corridor Limit: 80% of Market Value		517,737,245
	120% of Market Value		776,605,867
7.	Final Actuarial Value of Assets as of July 1, 2018: (5) constrained by (6)		637,056,310
8.	Approximate Rate of Return on Actuarial Value		4.52%
9.	Actuarial Value of Assets (Gain)/Loss		17,205,451

Section III - Development of Contribution

A. Past Service Cost

In determining the Past Service Cost, the Unfunded Accrued Liability is amortized as a level dollar amount over a period of 20 years.

	City	Fire	Police	Total
1. Accrued Liability				
Active Members	\$102,515,934	\$32,396,555	\$48,308,563	\$183,221,052
Terminated Vested / Due Refunds	3,365,143	0	1,167,668	4,532,811
Service Retirees	120,943,205	40,758,678	75,473,295	237,175,178
Disabled Retirees	1,335,718	594,370	6,782,602	8,712,690
Beneficiaries	<u>2,733,340</u>	<u>3,991,114</u>	<u>3,226,338</u>	<u>9,950,792</u>
Total Accrued Liability	230,893,340	77,740,717	134,958,466	443,592,523
2. Actuarial Value of Assets (see Section IIB)				637,056,310
3. Unfunded Accrued Liability: (1) - (2)				(193,463,787)
4. Funded Ratio: (2) / (1)				143.6%
5. Amortization Period				20
6. Past Service Cost: (3) amortized over (5)				(18,546,447)
7. Interest on (6) to Following Fiscal Year				(1,335,344)
8. Past Service Cost for Following Fiscal Year: (6) + (7)				(19,881,791)

Section III - Development of Contribution
B. Actuarially Determined Contribution for FY 2019-20

	City	Fire	Police	Total
1. Total Normal Cost	\$5,218,283	\$1,775,092	\$2,860,643	\$9,854,018
2. Expected Employee Contributions	2,051,389	177,598	496,425	2,725,412
3. City Normal Cost: (1) - (2)	3,166,894	1,597,494	2,364,218	7,128,606
4. City Normal Cost at End of Fiscal Year	3,639,344	1,835,815	2,716,922	8,192,081
5. Past Service Cost (see Section IIIA)				(19,881,791)
6. Actuarially Determined Contribution for FY 2019-20: (4) + (5), not less than zero				0

Section III - Development of Contribution C. Long Range Forecast

This forecast is based on the results of the July 1, 2018 actuarial valuation and assumes that the City will pay the Actuarially Determined Contribution each year, the assets will return the assumed interest rate on a market value basis each year, and there are no future changes in the actuarial methods or assumptions or in the plan provisions. Actual results at each point in time will yield different values, reflecting the actual experience of the plan membership and assets.

Valuation Date	Interest Rate	Accrued Liability	Actuarial Value of Assets	Values as of the Valuation Date			Funded Ratio	Fiscal Year	Cash Flows Projected to the Following Fiscal Year			
				Accrued Liability	Unfunded Accrued Liability	City Contributions			Employee Contributions	Benefit Payments	Net Cash Flows	
7/1/2018	7.2%	\$443,592,523	\$637,056,310	(\$193,463,787)	143.6%	2019-20	\$0	\$2,791,952	(\$26,548,150)	(\$23,756,198)		
7/1/2019	7.1%	463,275,000	657,024,000	(193,749,000)	141.8%	2020-21	0	2,836,000	(28,032,000)	(25,196,000)		
7/1/2020	7.0%	486,139,000	689,993,000	(203,854,000)	141.9%	2021-22	0	2,908,000	(29,387,000)	(26,479,000)		
7/1/2021	7.0%	500,769,000	715,946,000	(215,177,000)	143.0%	2022-23	0	2,950,000	(30,861,000)	(27,911,000)		
7/1/2022	7.0%	515,272,000	738,657,000	(223,385,000)	143.4%	2023-24	0	3,033,000	(32,176,000)	(29,143,000)		
7/1/2023	7.0%	529,233,000	761,475,000	(232,242,000)	143.9%	2024-25	0	3,100,000	(33,444,000)	(30,344,000)		
7/1/2024	7.0%	543,227,000	784,615,000	(241,388,000)	144.4%	2025-26	0	3,177,000	(34,664,000)	(31,487,000)		
7/1/2025	7.0%	557,210,000	808,133,000	(250,923,000)	145.0%	2026-27	0	3,243,000	(35,778,000)	(32,535,000)		
7/1/2026	7.0%	571,141,000	832,113,000	(260,972,000)	145.7%	2027-28	0	3,285,000	(36,900,000)	(33,615,000)		
7/1/2027	7.0%	585,185,000	856,687,000	(271,502,000)	146.4%	2028-29	0	3,361,000	(38,007,000)	(34,646,000)		
7/1/2028	7.0%	599,204,000	881,864,000	(282,660,000)	147.2%	2029-30	0	3,408,000	(39,086,000)	(35,678,000)		
7/1/2029	7.0%	613,427,000	907,736,000	(294,309,000)	148.0%	2030-31	0	3,461,000	(40,282,000)	(36,821,000)		
7/1/2030	7.0%	627,599,000	934,351,000	(306,752,000)	148.9%	2031-32	0	3,560,000	(41,347,000)	(37,787,000)		
7/1/2031	7.0%	641,638,000	961,645,000	(320,007,000)	149.9%	2032-33	0	3,662,000	(42,340,000)	(38,678,000)		
7/1/2032	7.0%	656,034,000	989,850,000	(333,816,000)	150.9%	2033-34	0	3,749,000	(43,288,000)	(39,539,000)		
7/1/2033	7.0%	670,782,000	1,019,109,000	(348,327,000)	151.9%	2034-35	0	3,891,000	(44,160,000)	(40,269,000)		
7/1/2034	7.0%	685,929,000	1,049,523,000	(363,594,000)	153.0%	2035-36	0	4,031,000	(44,908,000)	(40,877,000)		
7/1/2035	7.0%	701,735,000	1,081,311,000	(379,576,000)	154.1%	2036-37	0	4,104,000	(45,557,000)	(41,453,000)		
7/1/2036	7.0%	718,488,000	1,114,694,000	(396,206,000)	155.1%	2037-38	0	4,208,000	(46,236,000)	(42,028,000)		
7/1/2037	7.0%	735,997,000	1,149,818,000	(413,821,000)	156.2%	2038-39	0	4,284,000	(47,027,000)	(42,743,000)		

This work product was prepared solely for the City for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their own actuary or other qualified professional when reviewing the Milliman work product.

**Section III - Development of Contribution
D. History of Funded Status**

Valuation Date	Actuarial Value of Assets	Accrued Liability	Unfunded Accrued Liability	Funded Ratio
July 1, 2009	\$529,075,648	\$295,384,386	(\$233,691,262)	179.1%
July 1, 2010	533,071,565	304,750,180	(228,321,385)	174.9%
July 1, 2011	535,327,012	318,622,353	(216,704,659)	168.0%
July 1, 2012	535,331,814	332,042,091	(203,289,723)	161.2%
July 1, 2013	562,862,195	351,182,741	(211,679,454)	160.3%
July 1, 2014	597,487,036	363,225,204	(234,261,832)	164.5%
July 1, 2015	608,722,415	373,446,139	(235,276,276)	163.0%
July 1, 2016	616,089,755	403,937,301	(212,152,454)	152.5%
July 1, 2017	627,928,376	420,994,137	(206,934,239)	149.2%
July 1, 2018	637,056,310	443,592,523	(193,463,787)	143.6%

Section III - Development of Contribution
E. History of City Contributions

Fiscal Year	Actuarially Determined Contribution	Actual City Contribution	Payroll	Actual Contribution as a Percent of Payroll
2010-11	\$0	\$0	\$44,434,575	0.0%
2011-12	0	0	44,359,243	0.0%
2012-13	0	0	44,638,648	0.0%
2013-14	604,612	227,500	44,891,754	0.5%
2014-15	507,245	127,325	44,715,823	0.3%
2015-16	352,543	44,000	45,357,037	0.1%
2016-17	756,393	1,064,936	44,945,681	2.4%
2017-18	2,617,369	2,617,369	48,452,620	5.4%
2018-19	0	TBD	49,004,030	TBD
2019-20	0	TBD	51,163,929	TBD

Section IV - Membership Data

A. Reconciliation of Membership from Prior Valuation

Details of the changes in the Plan membership since the last valuation are shown below. Additional details on the Plan membership are provided in the remainder of Section IV.

	Active	Term. Vested	Due Refund	Retirees	Disabled Retirees	Bene- ficiaries	Total
Count July 1, 2017	922	43	70	692	25	64	1,816
Terminated							
- no benefits due	0	0	0	0	0	0	0
- paid refund	0	0	0	0	0	0	0
- vested benefits due	(6)	3	3	0	0	0	0
Retired	(28)	(4)	0	32	0	0	0
Died							
- with beneficiary	0	0	0	(5)	0	5	0
- no beneficiary	0	0	0	(18)	(1)	(3)	(22)
Lump sum paid	(16)	(1)	(9)	0	0	0	(26)
New members	62	0	0	0	0	0	62
Rehired	1	0	(1)	0	0	0	0
New Alternate Payee	0	0	0	0	0	0	0
Correction	1	0	0	0	0	0	1
Count July 1, 2018	936	41	63	701	24	66	1,831
Breakdown July 1, 2018							
City	727	36	63	533	14	30	1,403
Fire	87	0	0	69	2	21	179
Police	122	5	0	99	8	15	249
Total	936	41	63	701	24	66	1,831

Section IV - Membership Data
B. Statistics of Active Membership

		As of July 1, 2017	As of July 1, 2018
Number of Active Members	City	717	727
	Fire	87	87
	Police	<u>118</u>	<u>122</u>
	Total	922	936
Total Compensation	City	\$33,585,329	\$34,676,915
	Fire	5,997,926	6,316,033
	Police	<u>9,420,775</u>	<u>10,170,981</u>
	Total	49,004,030	51,163,929
Average Compensation	City	\$46,841	\$47,699
	Fire	68,942	72,598
	Police	79,837	83,369
	Total	53,150	54,662
Average Age	City	50.4	50.3
	Fire	45.0	45.4
	Police	40.0	39.5
	Total	49.0	48.4
Average Service	City	11.5	11.6
	Fire	17.0	16.7
	Police	14.1	13.6
	Total	12.0	12.4

Section IV - Membership Data

C. Distribution of Active Members as of July 1, 2018

City	Age	Years of Service						Total
		0-4	5-9	10-14	15-19	20-24	25-29	
	< 25	7						7
	25-29	33	6					39
	30-34	29	12	3				44
	35-39	30	9	10	1			50
	40-44	23	10	17	9			59
	45-49	23	19	18	11	7	3	81
	50-54	26	16	41	30	16	12	148
	55-59	27	15	27	44	19	5	145
	60-64	12	11	25	41	13	5	109
	65 +	3	5	16	6	7	3	45
	Total	213	103	157	142	62	28	727

Fire	Age	Years of Service						Total
		0-4	5-9	10-14	15-19	20-24	25-29	
	< 25							0
	25-29	5	2					7
	30-34	1	4					5
	35-39		6	9	1			16
	40-44		1	8	2			11
	45-49			8	6	3		17
	50-54			2	2	3	1	9
	55-59	1				2	2	16
	60-64			1		1		6
	65 +							0
	Total	7	13	28	11	9	3	87

Police	Age	Years of Service						Total
		0-4	5-9	10-14	15-19	20-24	25-29	
	< 25	5						5
	25-29	11	7					18
	30-34	12	12	3				27
	35-39	1	3	9	3			16
	40-44	1	2	5	5			13
	45-49	1			4	12	2	19
	50-54		1	2		1	5	12
	55-59					2	2	8
	60-64					1		4
	65 +							0
	Total	31	25	19	12	16	9	122

Section IV - Membership Data
D. Statistics of Inactive Membership

	As of July 1, 2017	As of July 1, 2018
Terminated Vested Members		
Number	43	41
Total Annual Benefit	\$571,857	\$575,931
Average Annual Benefit	13,299	14,047
Average Age	44.6	45.7
Nonvested Members Due Refund		
Number	70	63
Retirees		
Number	692	701
Total Annual Benefit	\$21,538,142	\$22,427,761
Average Annual Benefit	31,124	31,994
Average Age	71.4	71.6
Disabled Retirees		
Number	25	24
Total Annual Benefit	\$623,227	\$631,352
Average Annual Benefit	24,929	26,306
Average Age	66.3	66.3
Beneficiaries		
Number	64	66
Total Annual Benefit	\$1,079,434	\$1,147,415
Average Annual Benefit	16,866	17,385
Average Age	76.8	77.3

Section IV - Membership Data
E. Distribution of Inactive Members as of July 1, 2018

	Age	Number	Annual Benefits
Terminated Vested Members	< 30	10	\$0
(counts include Terminated Nonvested	30 - 39	23	72,059
Members Due Refunds and	40 - 49	36	276,529
Deferred Beneficiaries)	50 - 59	20	123,950
	60 - 64	7	69,622
	65 +	<u>8</u>	<u>33,774</u>
	Total	104	575,934
 Retirees	< 50	5	235,549
	50 - 59	49	2,621,073
	60 - 69	272	9,866,971
	70 - 79	225	6,749,073
	80 - 89	117	2,479,499
	90 +	33	475,595
	Total	701	22,427,760
 Disabled Retirees	< 50	3	164,944
	50 - 59	4	210,477
	60 - 69	6	108,449
	70 - 79	8	125,243
	80 - 89	2	20,351
	90 +	<u>1</u>	<u>1,890</u>
	Total	24	631,354
 Beneficiaries	< 50	1	7,426
	50 - 59	2	37,196
	60 - 69	11	209,456
	70 - 79	24	413,501
	80 - 89	16	270,464
	90 +	<u>12</u>	<u>209,369</u>
	Total	66	1,147,412

Appendix A - Actuarial Funding Method

The actuarial funding method used in the valuation of this Plan is the **Entry Age Normal Cost Method**. Recommended annual contributions until the accrued liability is completely funded will consist of two pieces: Normal Cost plus a payment towards the Unfunded Accrued Liability; both pieces include interest to adjust for the lag between the valuation date and the end of the fiscal year.

The **Normal Cost** is determined by calculating the present value of future benefits for present active Members that will become payable as the result of death, disability, retirement or termination. This cost is then spread as a level percentage of earnings from entry age to termination as an Active Member. If Normal Costs had been paid at this level for all prior years, a fund would have accumulated. Because this fund represents the portion of benefits that would have been funded to date, it is termed the **Accrued Liability**. In fact, it is calculated by adding the present value of benefits for Retired Members and Terminated Vested Members to the present value of benefits for Active Members and subtracting the present value of future Normal Cost contributions.

The funding cost of the Plan is derived by making certain specific assumptions as to rates of interest, mortality, turnover, etc. which are assumed to hold for many years into the future. Since actual experience may differ somewhat from the assumptions, the costs determined by the valuation must be regarded as estimates of the true costs of the Plan.

The **Unfunded Accrued Liability** is the excess of the Accrued Liability over the assets which have been accumulated for the plan. This Unfunded Accrued Liability is amortized as a level dollar amount over an open period of 20 years.

The **Actuarial Value of Assets** is determined by recognizing market gains and losses over a four year period; the result is constrained to within +/- 20% of the market value of assets as of the valuation date.

The long-range forecasts included in this report have been developed by assuming that members will terminate, retire, become disabled, and die according to the actuarial assumptions with respect to these causes of decrement, and that pay increases, cost of living adjustments, and so forth will likewise occur according to the actuarial assumptions. For those unions whose new employees are eligible to participate in this plan, members who are projected to leave active employment are assumed to be replaced by new active members with the same age, service, gender, and pay characteristics as those hired in the past few years.

Appendix B - Actuarial Assumptions - City

Each of the assumptions used in this valuation was set based on a formal study of the plan's experience for the period July 1, 2011 through June 30, 2015 which reflected industry standard published tables and data, the particular characteristics of the plan, relevant information from the plan sponsor or other sources about future expectations, and our professional judgment regarding future plan experience. We believe the assumptions are reasonable for the contingencies they are measuring, and are not anticipated to produce significant cumulative actuarial gains or losses over the measurement period.

Interest Rate 7.2% (Prior: 7.3%) This assumption will decline by 0.1% until it reaches 7.0%.

Salary Scale Salaries are assumed to increase at the following rates:

Age	Rate
25 and below	6.75%
30	5.75%
35	5.00%
40	4.50%
45	4.00%
50	3.75%
55	3.50%
60 and above	3.25%

Expenses None.

Mortality Current: RP-2000 Mortality Table for Employees and Healthy Annuitants with generational projection 60% phase-in from Scale AA to BB. The projection scale will continue to be phased in by 20% each year. This assumption includes a margin for mortality improvements beyond the valuation date.

Prior: RP-2000 Mortality Table for Employees and Healthy Annuitants with generational projection 40% phase-in from Scale AA to BB.

Pre-Retirement Disability 50% of the 1985 Pension Disability Table (DP-85) Class 1. 40% of disabilities are assumed to be service-connected and 60% are assumed to be non-service-connected.

Percent Married 80% of active members are assumed to have an eligible spouse.

Age of Spouse The female spouse is assumed to be three years younger than the male spouse.

Form of Payment Retirement benefits are assumed to be paid as a life annuity for current active members. The actual payment form elected is reflected for current retired members.

Appendix B - Actuarial Assumptions - City

Turnover

Rates according to the following table:

Age	Rate
20	18.00%
25	18.00%
30	12.00%
35	7.00%
40	5.00%
45	2.50%
50	1.75%
55	1.00%

Assumed Retirement Age

Members are assumed to retire according to the following rates:

Age	Attained Rule of 80	Not Yet Attained
53-54	10%	0%
55-56	22%	1%
57-59	20%	1%
60-61	25%	2%
62	25%	5%
63	28%	5%
64	25%	5%
65	20%	10%
66-69	30%	10%
70	100%	100%

Compensated Absences

The Actuarial Accrued Liability and Normal Cost have been increased by 5% for active Board of Education members and 13% for active General City members in order to reflect an explicit assumption regarding compensated absences.

Appendix B - Actuarial Assumptions - Fire

Each of the assumptions used in this valuation was set based on a formal study of the plan's experience for the period July 1, 2011 through June 30, 2015 which reflected industry standard published tables and data, the particular characteristics of the plan, relevant information from the plan sponsor or other sources about future expectations, and our professional judgment regarding future plan experience. We believe the assumptions are reasonable for the contingencies they are measuring, and are not anticipated to produce significant cumulative actuarial gains or losses over the measurement period.

Interest Rate 7.2% (Prior: 7.3%) This assumption will decline by 0.1% until it reaches 7.0%.

Salary Scale Salaries are assumed to increase at the following rates:

Age	Rate
25 and below	7.00%
30	5.00%
35	4.00%
40	3.75%
45	3.50%
50 and above	3.25%

Expenses None.

Mortality Current: RP-2000 Mortality Table for Employees and Healthy Annuitants with generational projection 60% phase-in from Scale AA to BB. The projection scale will continue to be phased in by 20% each year. This assumption includes a margin for mortality improvements beyond the valuation date.

Prior: RP-2000 Mortality Table for Employees and Healthy Annuitants with generational projection 40% phase-in from Scale AA to BB.

Pre-Retirement Disability 1985 Pension Disability Table (DP-85) Class 4. 100% of disabilities are assumed to be service-connected.

Percent Married 80% of active members are assumed to have an eligible spouse.

Age of Spouse The female spouse is assumed to be three years younger than the male spouse.

Appendix B - Actuarial Assumptions - Fire

Turnover

Rates according to the following table:

Age	Rate
20	5%
25	5%
30	2%
35 and above	0%

Retirement

Members who have satisfied normal retirement eligibility are assumed to retire according to the following rates:

Age	Rate
49	10%
50-54	5%
55-56	10%
57-59	15%
60	50%
61	70%
62-64	40%
65+	100%

Annuity Election

85% of active members are assumed to elect a 50% Joint & Survivor Annuity and 15% of active members are assumed to elect Life Annuity.

Pension Escalation

Pre-July 1, 1999 retirees: 3.25% per year.

Retirees between July 1, 1999 and June 30, 2003: 2.50% per year.

Post-June 30, 2003 retirees: 2.25% per year.

Compensated Absences

The Actuarial Accrued Liability and Normal Cost have been increased by 11.0% for active members in order to reflect an explicit assumption regarding compensated absences.

Appendix B - Actuarial Assumptions - Police

Each of the assumptions used in this valuation was set based on a formal study of the plan's experience for the period July 1, 2011 through June 30, 2015 which reflected industry standard published tables and data, the particular characteristics of the plan, relevant information from the plan sponsor or other sources about future expectations, and our professional judgment regarding future plan experience. We believe the assumptions are reasonable for the contingencies they are measuring, and are not anticipated to produce significant cumulative actuarial gains or losses over the measurement period.

Interest Rate 7.2% (Prior: 7.3%) This assumption will decline by 0.1% until it reaches 7.0%.

Salary Basis Base Pay

Salary Scale Salaries are assumed to increase at the following rates:

Age	Rate
25 and below	7.00%
30	5.00%
35	4.00%
40	3.75%
45	3.50%
50 and above	3.25%

Expenses None.

Mortality Current: RP-2000 Mortality Table for Employees and Healthy Annuitants with generational projection 60% phase-in from Scale AA to BB. The projection scale will continue to be phased in by 20% each year. This assumption includes a margin for mortality improvements beyond the valuation date.

Prior: RP-2000 Mortality Table for Employees and Healthy Annuitants with generational projection 40% phase-in from Scale AA to BB.

Pre-Retirement Disability 1985 Pension Disability Table (DP-85) Class 4 with 100% of disabilities assumed to be service-connected.

Percent Married 80% of active members are assumed to have an eligible spouse.

Age of Spouse The female spouse is assumed to be three years younger than the male spouse.

Appendix B - Actuarial Assumptions - Police

Turnover

Based on the following table:

Age	Rate
20	5.0%
25	5.0%
30	2.0%
35	1.0%
40	1.0%
45	1.0%
50	0.0%

Retirement

Members who have satisfied normal retirement eligibility are assumed to retire according to the following rates:

Age	Rate
47-49	25%
50	40%
51-54	25%
55-57	25%
58-59	40%
60-64	30%
65+	100%

Annuity Election

85% of active members are assumed to elect a 50% Joint & Survivor Annuity and 15% of active members are assumed to elect Life Annuity.

Pension Escalation

Pre-December 15, 2002 retirees: 3.25% per year.

Post-December 15, 2002 retirees: 2.25% per year.

Compensated Absences

The Actuarial Accrued Liability and Normal Cost have been increased by 9% for active members in order to reflect an explicit assumption regarding compensated absences.

Appendix C - Summary of Plan Provisions - City

This exhibit summarizes the major provisions of the Plan. It is not intended to be, nor should it be interpreted as a complete statement of all plan provisions. All eligibility requirements and benefit amounts shall be determined in strict accordance with the plan document itself. To the extent that this summary does not accurately reflect the plan provisions, then the results of this valuation may not be accurate.

Eligibility	Membership is compulsory for all full-time employees except firemen, policemen and teachers except that no employee over age 65 at date of hire shall be eligible. Membership is optional with officials. Effective September 24, 1981, full-time definition means minimum employment of 720 hours and at least nine months a year and eligible for City payment of Health Insurance benefits.
Compensation	Salary for service with the City including grants and allowances for maintenance, but not including any general temporary increase or reduction thereof.
Final Average Earnings	The average of the 3 highest years out of the final 10 years.
Credited Service	Years and months of continuous service.
Normal Retirement Date	Any member who has attained age 55, whose age plus service total 80, or any member hired before November 23, 1988 whose age plus service total 85 is eligible for normal retirement.
Normal Retirement Benefit	2.4% of Final Average Earnings multiplied by the number of completed years of Credited Service.
Early Retirement Eligibility	Age 55 with 10 years of Credited Service.
Early Retirement Benefit	Accrued Benefit, actuarially reduced if payments begin prior to the member's Normal Retirement Date.
Disability Retirement Eligibility	Ten years of continuous service and total and permanent disability.
Disability Retirement Benefit	The pension during continuance of disability is computed with the same formula as normal retirement except that if disability was service-connected, there is no service requirement and the minimum pension is 50% of the member's annual rate of regular compensation at date of disability, including Social Security and Workmens' Compensation payments.

Appendix C - Summary of Plan Provisions - City

Pre-Retirement Spouse's Death Benefit	<p>If an employee works beyond the date of eligibility for early or normal retirement, and dies before actually retiring, then benefits shall be paid to his designated contingent annuitant, if any, as if the employee had retired immediately prior to his death. If no contingent annuitant has been designated, but the deceased employee leaves a surviving spouse from whom he has not been divorced, then benefits shall be paid to the surviving spouse as if the employee had designated such spouse as his contingent annuitant and had retired immediately prior to death.</p> <p>The benefits payable to a designated contingent annuitant or surviving spouse shall be 50% of the actuarially reduced benefit payable had the employee retired immediately prior to his death. This benefit is in lieu of the return of employee contributions with interest on death before retirement.</p>
Vesting	<p>A member terminating after at least 10 years of Credited Service, provided the member elects to leave all accumulated contributions in the retirement fund, is entitled to a vested deferred pension, to commence at the earliest normal retirement age.</p>
Member Contributions	<p>6.0% of pay on a pre-tax basis. No interest is credited. Effective upon creation of a retiree health account, 1½% of employee contributions shall be applied to the retiree health account. In the event the City's pension actuary recommends that any General City department make contributions to the pension fund, future contributions to the retiree health account will be directed into the pension fund.</p>
Normal Form of Annuity	<p>Life Annuity.</p>
Prior Service Purchase	<p>Members' dates of participation are adjusted to reflect periods purchased.</p>
Ad hoc Retiree Cost-of-Living Adjustment (COLA)	<p>Effective January 1, 2002, the City granted ad hoc COLAs to General City retirees who were in pay status as of December 31, 2000 equal to 50% of CPI-W from year of retirement through September 2001, with a maximum increase per year equal to 3%. The minimum benefit increase equaled \$10 per month, and the maximum benefit increase equaled \$300 per month.</p> <p>Effective June 1, 2008, the City granted ad hoc COLAs to General City retirees who were in pay status as of December 31, 2006 equal to 75% of CPI-W from September 2001 (or year of retirement if later) through August 2007, with a minimum benefit increase of \$10 per month, and a maximum benefit increase of \$350 per month.</p>

Appendix C - Summary of Plan Provisions - Fire

This exhibit summarizes the major provisions of the Plan. It is not intended to be, nor should it be interpreted as a complete statement of all plan provisions. All eligibility requirements and benefit amounts shall be determined in strict accordance with the plan document itself. To the extent that this summary does not accurately reflect the plan provisions, then the results of this valuation may not be accurate.

Eligibility	A member of the Fire Department.
Compensation	The annual rate of base salary for a member's rank and step as set in the applicable collective bargaining agreement, if any. This will include $\frac{1}{4}$ of a member's unused sick leave paid out at the time of retirement, if applicable.
Credited Service	Years and months of continuous service.
Normal Retirement Date	All members after the attainment of age 65. Any member after 25 years of continuous service as a regular fireman, by the request of the member and with the approval of the Trustees. Any regular member after 20 years of continuous service and attainment of age 65, by the request of the member. Note: All members of the regular Fire Department shall be retired on the day following attainment of age 65.
Normal Retirement Benefit	A pension for life at 70% of Compensation paid to the member in the year prior to his retirement, adjusted for escalation.
Disability Retirement Benefit	If any member becomes permanently disqualified for active duty through age or physical disabilities incurred in the discharge of duties, the member may be transferred to the "Veteran Reserve" at the rate of 70% of Compensation at the time of transfer. Such transfer may be revoked and the member returned to active duty if the disability is removed. If permanently disqualified from performing all fire duties, the member may be permanently retired at 70% of Compensation. If any member with at least 10 years of service who becomes disqualified for active duty due to a disability not incurred in the performance of duties, he shall be retired at a rate equal to 28% for the first 10 years plus 2.8% for each additional year, thereafter, subject to a maximum of 70% of Compensation.

Appendix C - Summary of Plan Provisions - Fire

Pre-Retirement Spouse's Death Benefit

In case of a service-connected death of a member, the surviving spouse shall receive annually a sum equal to 70% of Compensation until death or remarriage, with continuation to any children under age 18, share and share alike, or to any dependent if no surviving spouse or children exist. Worker's Compensation payments are deducted from amounts hereunder.

In case of the death of a member with at least 10 years of regular service, or of a retired member or a member placed on the "Veteran Reserve" at 70% of Compensation, one-half of the benefit that would have been payable to the member on retirement or, if a retired member, one-half of the benefit being paid to the member at time of death, shall be paid to the surviving spouse until death or remarriage.

Vesting

Effective July 1, 2003, a member terminating after at least 10 years of Credited Service as a regular firefighter, provided the member elects to leave all accumulated contributions in the retirement fund, is entitled to a vested deferred pension, to commence at the earliest normal retirement age. The vested deferred pension is based on 2.8% of Compensation per year of Credited Service completed prior to separation from employment. Such percentage shall be applied at the time of separation and the resulting allowance shall not be increased thereafter for any reason. This section shall not apply in the case of a discharge for just cause which is not reversed upon appeal or a resignation by a member who has been informed he is under investigation for an offense which constitutes just cause for discharge and from which the member is not exonerated. For purposes of this section, Compensation excludes sick leave payout as it is not applicable.

Member Contributions

Active members contribute 3.75% of Compensation on a pre-tax (Section 414(h)(2)) basis. Contributions cease upon the completion of 25 years of Credited Service.

Members' contributions are returnable on termination or death if active, or after retirement (less any benefits paid), provided in each case that no death benefits are otherwise payable.

Normal Form of Annuity

Life Annuity.

Prior Service Purchase

Members' dates of participation are adjusted to reflect periods purchased.

Pension Escalation

Benefits increase as active members' salaries increase.

Pension Escalation Limit

Pre-July 1, 1999 retirees: no limit.

Retirees between July 1, 1999 and June 30, 2003: 2.50% per year.

Post-June 30, 2003 retirees: 2.25% per year.

Appendix C - Summary of Plan Provisions - Police

This exhibit summarizes the major provisions of the Plan. It is not intended to be, nor should it be interpreted as a complete statement of all plan provisions. All eligibility requirements and benefit amounts shall be determined in strict accordance with the plan document itself. To the extent that this summary does not accurately reflect the plan provisions, then the results of this valuation may not be accurate.

Eligibility	Members of the Police Department. Includes the City's animal control officer and/or assistant animal control officer.
Compensation	Base Pay.
Credited Service	Years and months of continuous service.
Normal Retirement Date	<p>Any member after 25 years of continuous service as a regular police officer, by the request of the member and with the approval of the Trustees.</p> <p>Any member after 30 years of continuous service as a regular police officer, by the request of the member.</p> <p>Any regular member after 25 years of continuous service and attainment of age 60, by the request of the member.</p> <p>Any regular member after 20 years of continuous service and attainment of age 65, by the request of the member.</p> <p>Note: All members of the regular Police Department shall be retired on the day following attainment of age 65.</p>
Normal Retirement Benefit	A pension for life at 70% of Compensation paid to the member in the year prior to his retirement, adjusted for escalation.
Disability Retirement Benefit	<p>If any member becomes permanently disqualified for active duty through age or physical disabilities incurred in the discharge of duties, the member may be transferred to the "Veteran Reserve" at the rate of 70% of Compensation at the time of transfer. Such transfer may be revoked and the member returned to active duty if the disability is removed. If permanently disqualified from performing all police duties, the member may be permanently retired at 70% of Compensation.</p> <p>If any member with at least 10 years of service who becomes disqualified for active duty due to a disability not incurred in the performance of duties, he shall be retired at a rate equal to 28% for the first 10 years plus 2.8% for each additional year, thereafter, subject to a maximum of 70% of Compensation.</p>

Appendix C - Summary of Plan Provisions - Police

Pre-Retirement Spouse's Death Benefit

In case of a service-connected death of a member, the surviving spouse shall receive annually a sum equal to 70% of Compensation until death or remarriage, with continuation to any children under age 18, share and share alike, or to any dependent if no surviving spouse or children exist. Worker's Compensation payments are deducted from amounts hereunder.

In case of the death of a member with at least 10 years of regular service, or of a retired member or a member placed on the "Veteran Reserve" at 70% of Compensation, one-half of the benefit that would have been payable to the member on retirement or, if a retired member, one-half of the benefit being paid to the member at time of death, shall be paid to the surviving spouse until death or remarriage.

Vesting

Effective July, 1 2003, a member terminating after at least 10 years of Credited Service as a regular police officer, provided the member elects to leave all accumulated contributions in the retirement fund, is entitled to a vested deferred pension, to commence at the earliest normal retirement age. The vested deferred pension is based on 2.8% of Compensation per year of Credited Service completed prior to separation from employment. Such percentage shall be applied at the time of separation and the resulting allowance shall not be increased thereafter for any reason. This section shall not apply in the case of a discharge for just cause which is not reversed upon appeal or a resignation by a member who has been informed he is under investigation for an offense which constitutes just cause for discharge and from which the member is not exonerated.

Member Contributions

All members contribute 6% of Compensation on a pre-tax (Section 414(h)(2)) basis. Contributions shall cease upon the completion of 25 years of Credited Service.

Members' contributions are returnable on termination or death if active, or after retirement (less any benefits paid), provided in each case that no death benefits are otherwise payable.

Normal Form of Annuity

Life Annuity.

Prior Service Purchase

Members' dates of participation are adjusted to reflect periods purchased.

Pension Escalation

Pre-December 15, 2002 retirees: benefits increase as active members' salaries increase, with no limit.

Post-December 15, 2002 retirees: benefit increase is 50% of active members' salary increases, but not more than 2.25% per year.