Milliman

THE POLICE PENSION TRUST FUND OF THE CITY OF STAMFORD

Actuarial Valuation as of July 1, 2022
To Determine Funding For Fiscal Year 2023-24

Prepared by

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March 17, 2023

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Certification

We have performed an actuarial valuation of the Plan as of July 1, 2022 to determine funding for fiscal year 2023-24. 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.

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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. Figures for periods prior to July 1, 2018 have been obtained from actuarial valuation reports prepared by Hooker & Holcombe and from the City's Comprehensive Annual Financial Reports.

The valuation results were developed using models intended for valuations that use standard actuarial techniques. In addition to the models described previously, Milliman has developed certain models to develop the expected long term rate of return on assets used in this analysis. We have reviewed the models, including their inputs, calculations, and outputs for consistency, reasonableness, and appropriateness to the intended purpose and in compliance with generally accepted actuarial practice and relevant actuarial standards of practice (ASOP). The models, including all input, calculations, and output may not be appropriate for any other purpose.

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. 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.

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. Sielman, FSA
Consulting Actuary

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Consulting Actuary

Section I - Executive Summary
Changes Since the Prior Valuation

Plan Changes

None.

Changes in Actuarial Methods and Assumptions

This valuation reflects a change in the mortality improvement assumption from the MP-2019 ultimate scale to the MP-2021 ultimate scale. This change caused the Unfunded Accrued Liability to decrease by about $1,145,500 and the Actuarially Determined Contribution to decrease by about $127,100.

This valuation reflects changes in the actuarial cost method from Projected Unit Credit to Entry Age Normal and modifying the amortization method from 15 year open amortization to layered 15-year amortization. In addition, in the event the plan as a whole is more than 100% funded and therefore has a negative Past Service Cost, this negative result will only be used to offset the Normal Cost if the plan is at least 120% funded; this change is designed to deliberately build up a modest cushion against market downturns. These changes in combination caused the Unfunded Accrued Liability to decrease by about $10.9 million and the Actuarially Determined Contribution to increase by about $428,300.

Other Significant Changes

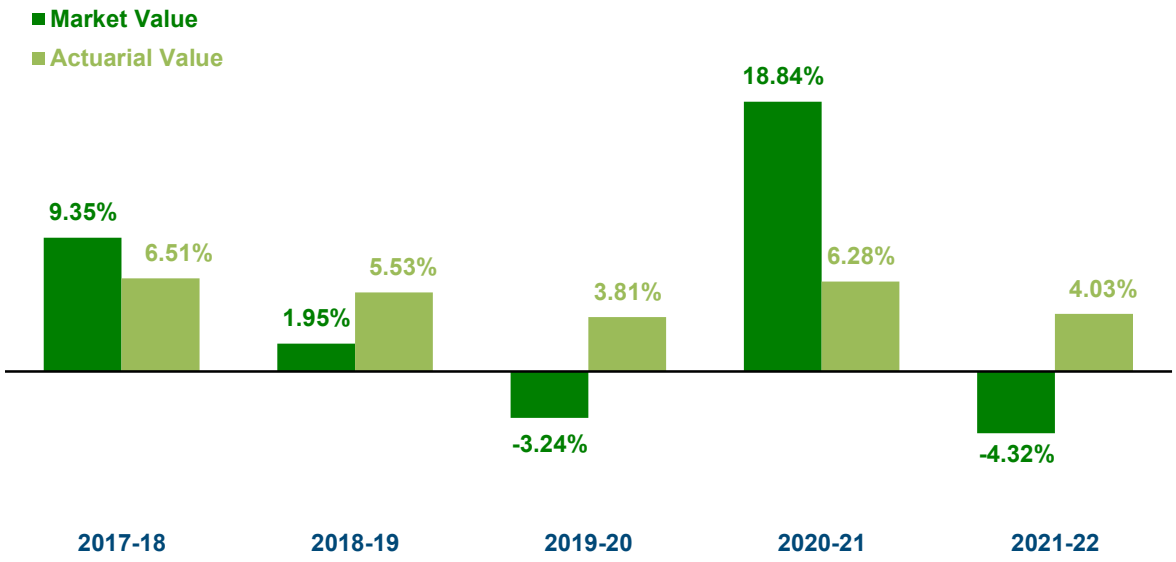
Although it is possible that the COVID-19 pandemic could have a material impact on the projected mortality, liabilities, and contribution requirements, we have chosen not to make an adjustment in the projections at this time, given the substantial current uncertainty regarding the impact of COVID-19 on mortality and plan costs, including whether the pandemic will increase or decrease mortality during the term of our projections. We will be monitoring this development closely and may adjust future projections to reflect the impact of COVID-19, if and when it becomes appropriate.

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 asymptotically over five years.

	Market	Actuarial
Value as of July 1, 2021	$233,580,310	$240,712,260
City and Member Contributions	13,795,810	13,795,810
Investment Income	(10,002,476)	9,695,722
Benefit Payments and Administrative Expenses	(18,231,549)	(18,231,549)
Value as of July 1, 2022	219,142,095	245,972,243

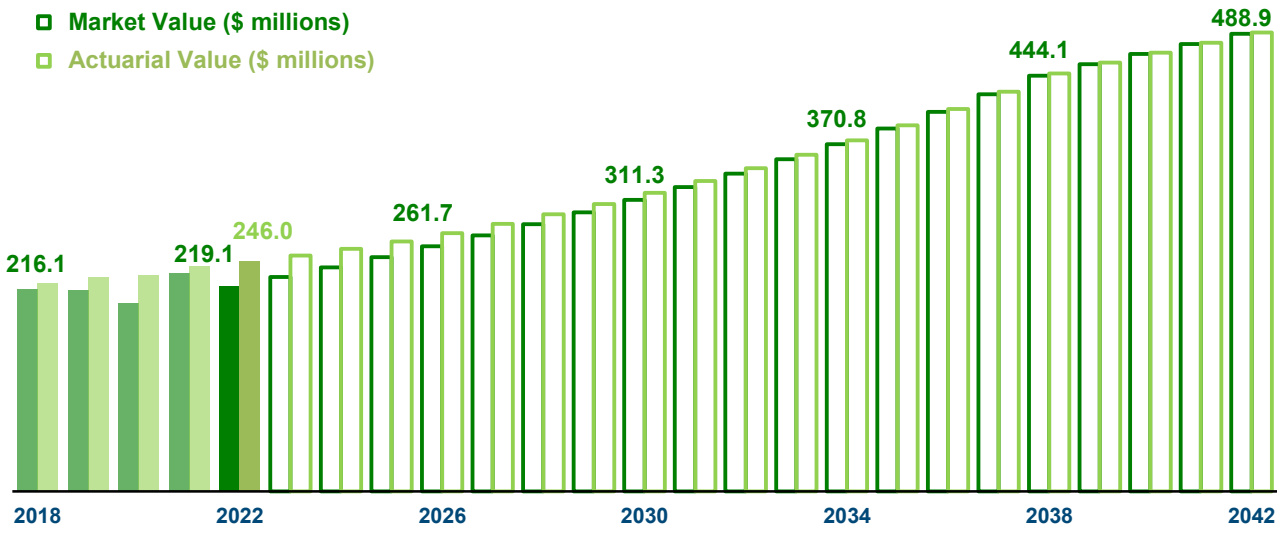
For fiscal year 2021-22, the plan's assets earned -4.32% on a Market Value basis and 4.03% on an Actuarial Value basis. The actuarial assumption for this period was 6.70%; the result is an asset loss of about $25.5 million on a Market Value basis and a loss of about $6.7 million on an Actuarial Value basis. Historical rates of return are shown in the graph below.



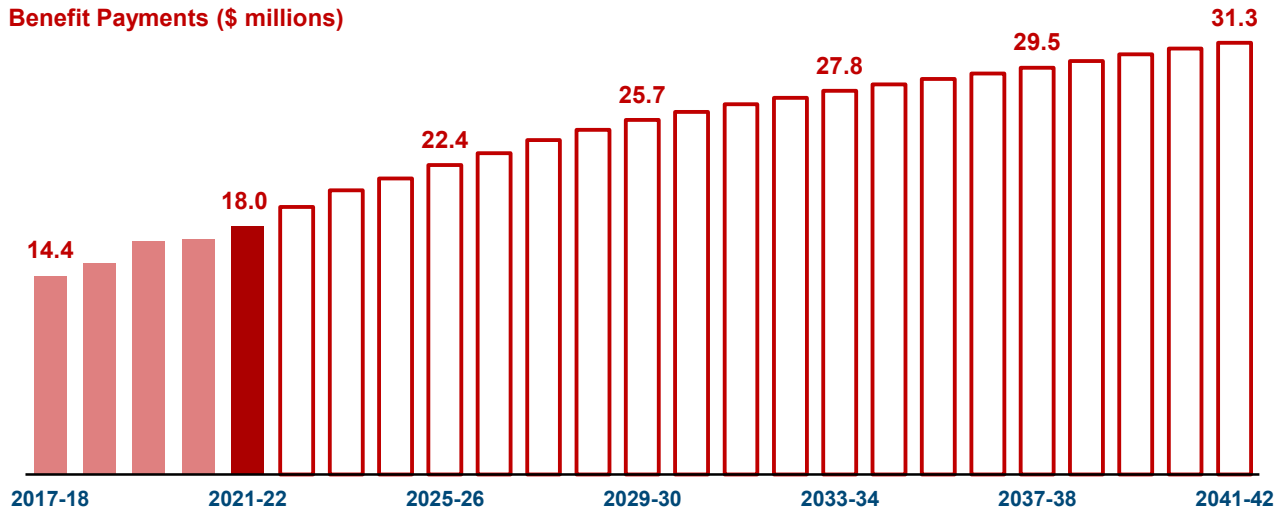
Please note that the Actuarial Value currently exceeds the Market Value by $26.8 million. This figure represents investment losses that will be gradually recognized in future years. This process will exert upward pressure on the City's contribution, unless there are offsetting market gains.

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.

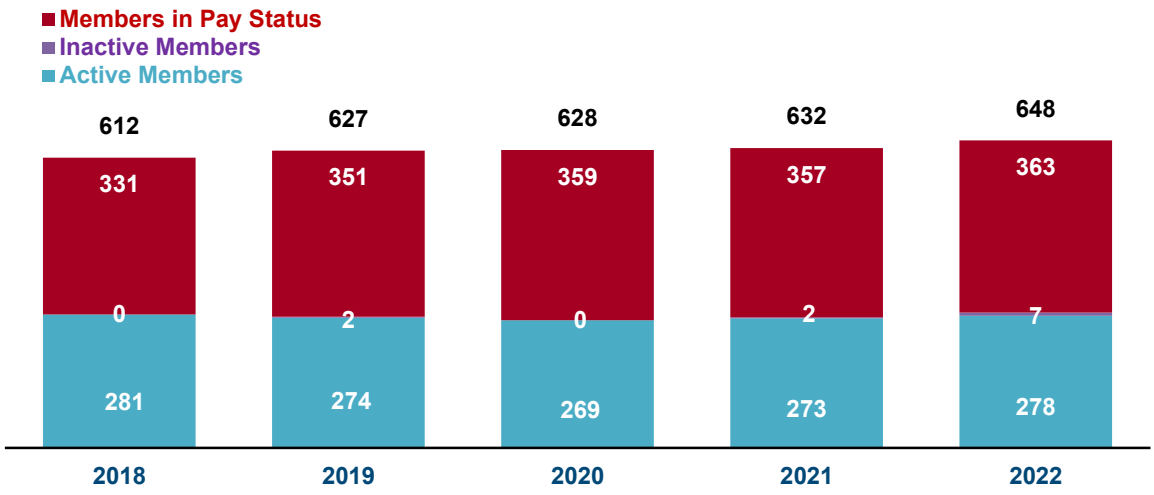


In 2021-22, the plan paid out $18.0 million in benefits to members. Over the next 20 years, the plan is projected to pay out a total of $528 million in benefits to members.



Section I - Executive Summary
Membership

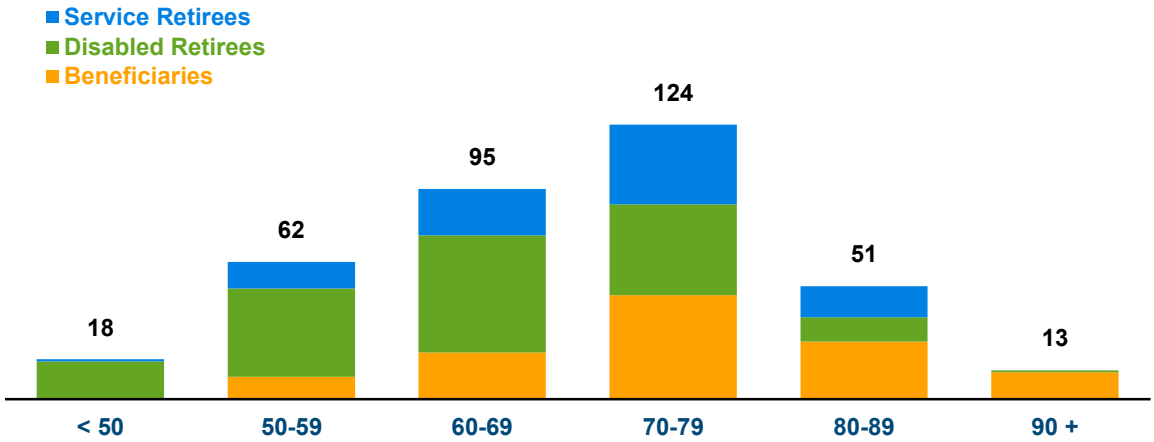
There are three basic categories of plan members included in the valuation: (1) members who are receiving monthly pension benefits, (2) former employees who have a vested right to benefits but have not yet started collecting, and (3) active employees who have met the eligibility requirements for membership.



Members in Pay Status on July 1, 2022

Service Retirees	84	Average Age	70.0
Disabled Retirees	163	Total Annual Benefit	$18,137,789
Beneficiaries	116	Average Annual Benefit	49,966
Total	363		

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



Section I - Executive Summary
Membership (continued)

Terminated Vested Members on July 1, 2022

Count	1
Average Age	33.1
Total Annual Benefit	$19,000
Average Annual Benefit	19,000

Nonvested Members Due Refunds on July 1, 2022

Count	6

Active Members on July 1, 2022

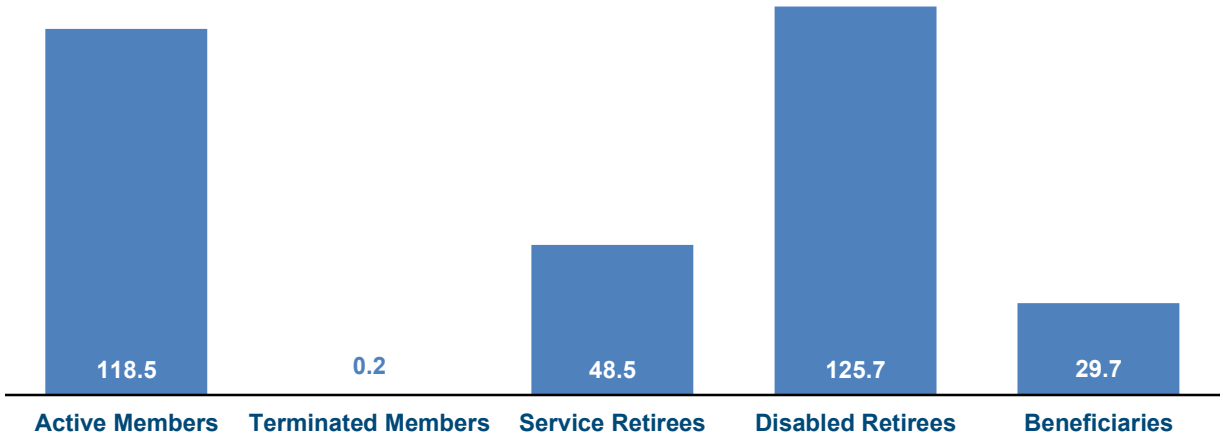
Count	278
Average Age	43.1
Average Service	15.1
Payroll	$26,003,550
Average Payroll	93,538

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

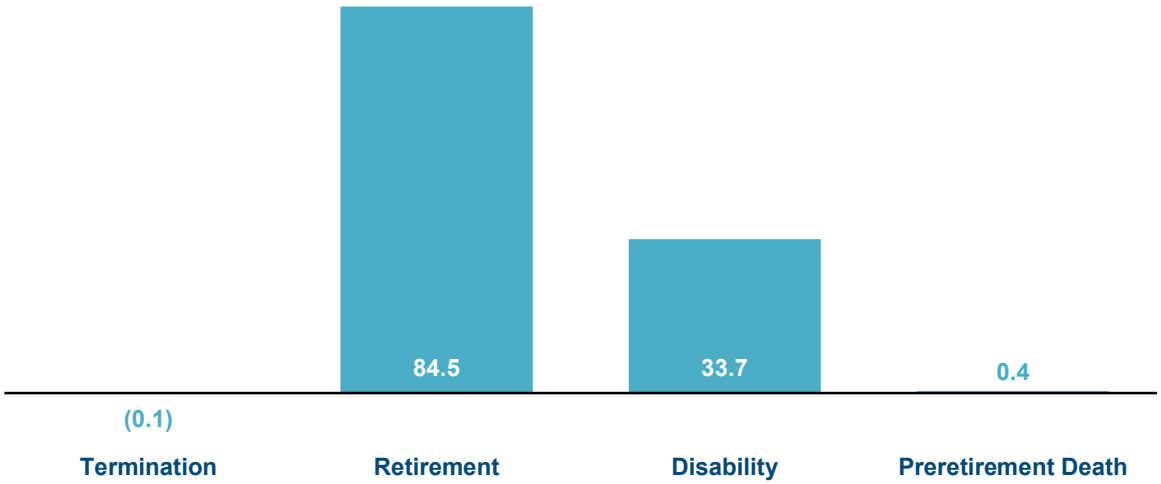
	Years of Service							
Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-29**	**30+**	**Total**
< 25	4							4
25-29	31	9						40
30-34	24	17	2					43
35-39	9	18	7	8				42
40-44	4	4	2	12	1			23
45-49		2	3	12	13	8		38
50-54		1		4	8	24	2	39
55-59				4	6	6	12	28
60-64						2	11	13
65+				1	1		6	8
Total	72	51	14	41	29	40	31	278

Section I - Executive Summary
Accrued Liability

The Accrued Liability as of July 1, 2022 is $322,571,385 and consists of the following pieces (in $ millions):

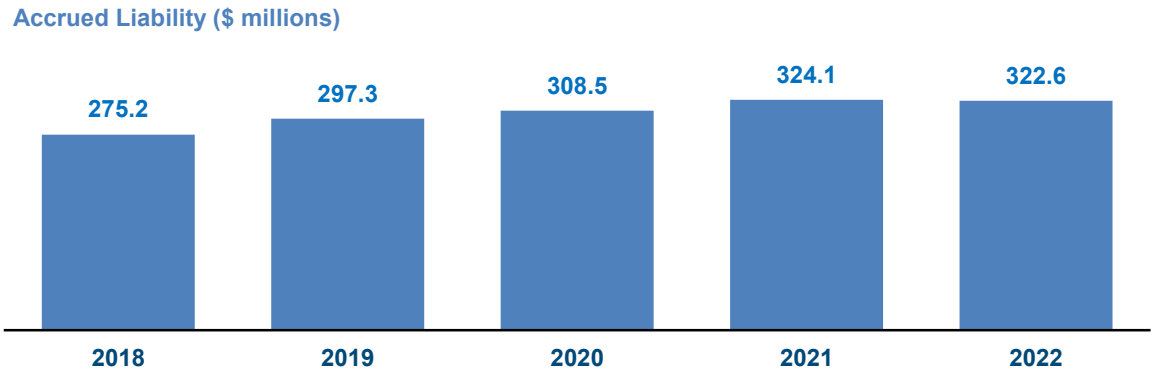


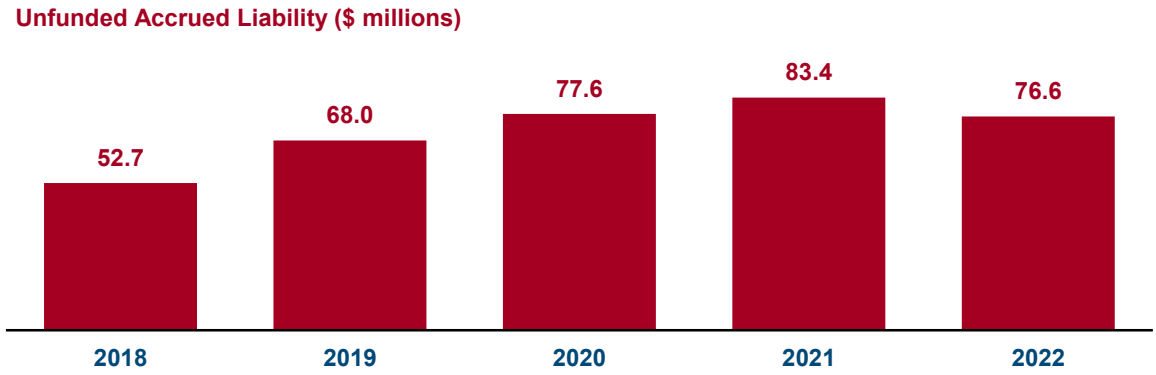
The Accrued Liability for active members can be broken down further by the different types of benefits provided by the plan:

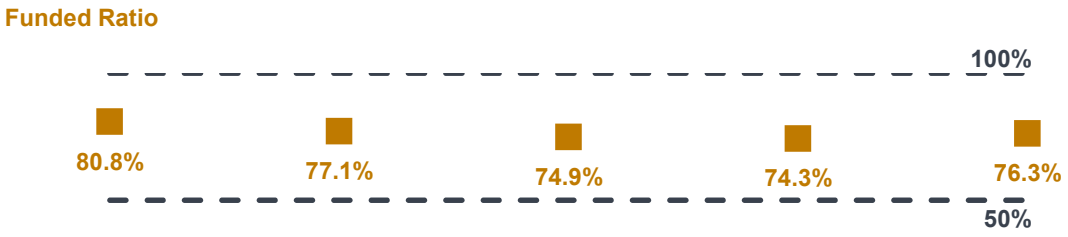


Section I - Executive Summary
Funded Status

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.



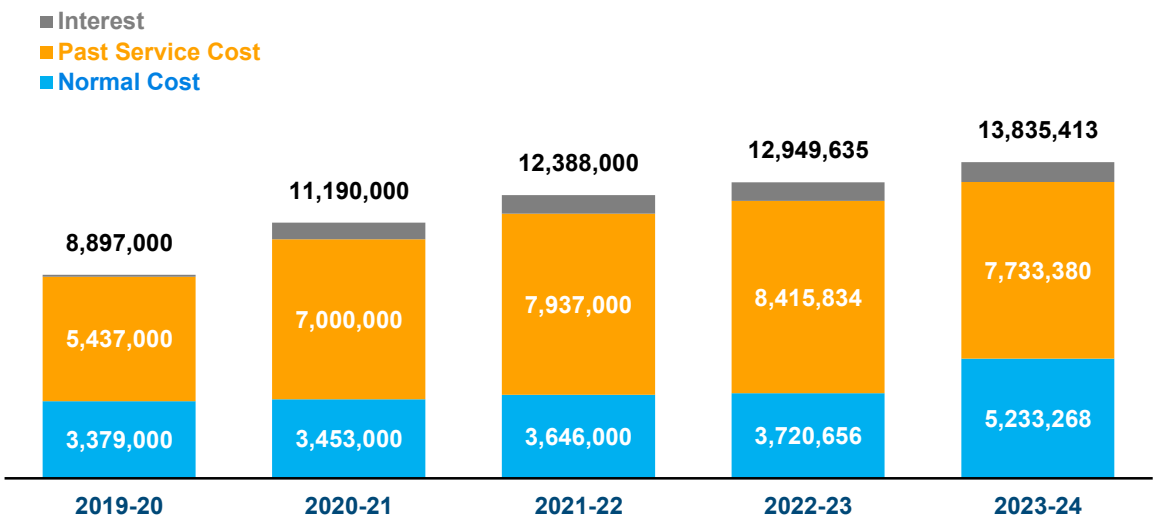




Section I - Executive Summary
Actuarially Determined Contribution

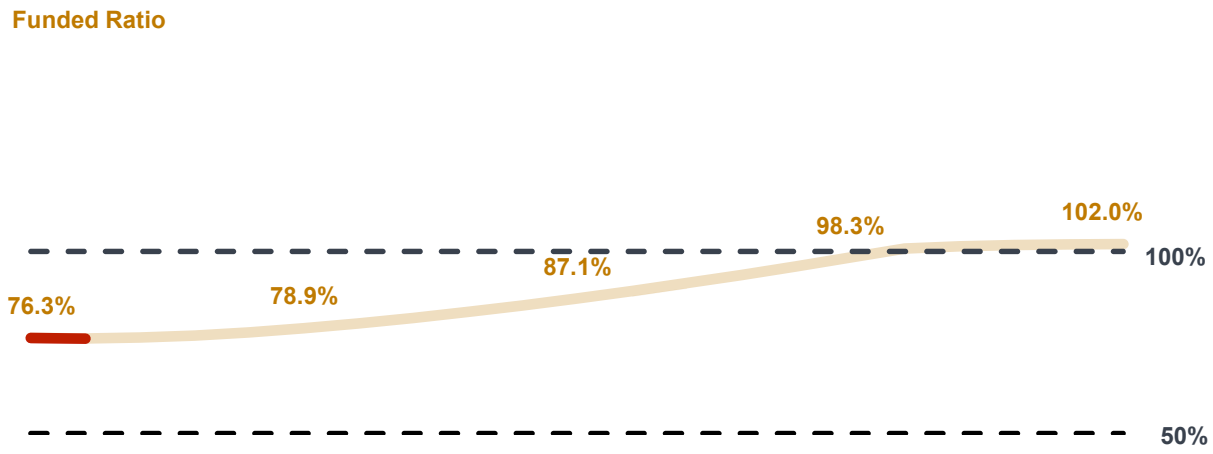
The Actuarially Determined Contribution consists of three pieces: a Normal Cost payment to fund the benefits earned each year, a Past Service Cost to gradually reduce any unfunded or surplus liability, and a a Timing Adjustment to reflect the timing of the contribution relative to the valuation date.

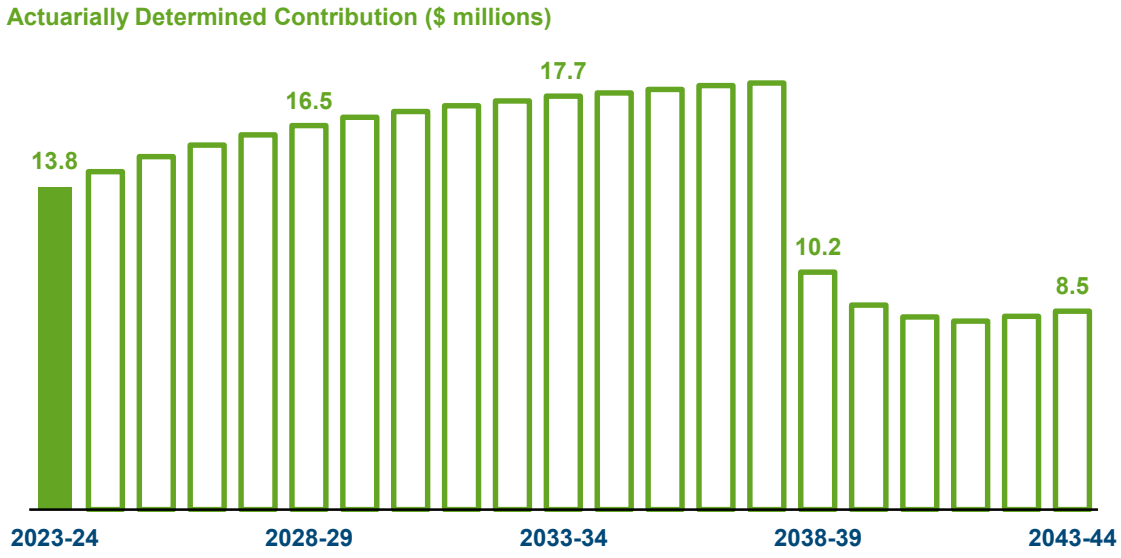
The Actuarially Determined Contribution for fiscal year 2023-24 is shown graphically below, along with the comparable figures for the preceding four fiscal years. Note that the Normal Cost is relatively consistent from year to year, whereas the Past Service Cost tends to be more volatile since it reflects the impact of asset performance. The increase in the Normal Cost for the 2023-24 fiscal year is due to the change in the funding cost method from Projected Unit Credit to Eanty Age Normal.



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 and the long-range contribution levels:

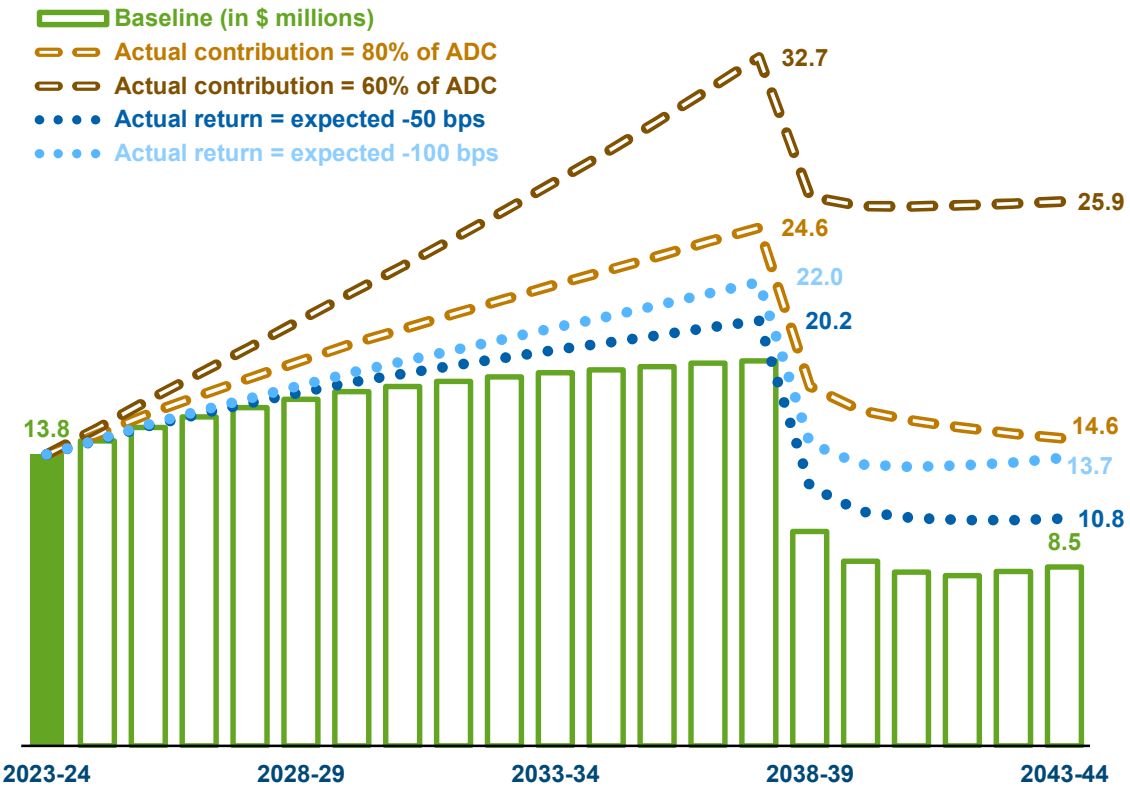




To the extent that there are future investment or liability gains or losses, changes in the actuarial assumptions or methods, or plan changes, the actual valuation results will differ from these forecasts. Please see Section III C for more details of the long range forecast.

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 City pays less than the Actuarially Determined Contribution each year, or 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 underfunding and 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 as of	July 1, 2022	July 1, 2021
Active Members	278	273
Inactive Members	7	2
Members in Pay Status	363	357
Total Count	648	632
Payroll	$26,003,550	$25,101,103

Assets and Liabilities as of	July 1, 2022	July 1, 2021
Market Value of Assets	$219,142,095	$233,580,310
Actuarial Value of Assets	245,972,243	240,712,260
Accrued Liabiilty for Active Members	118,492,224	129,814,029
Accrued Liabiilty for Inactive Members	164,093	9,511
Accrued Liabiilty for Members in Pay Status	203,915,068	194,247,568
Total Accrued Liability	322,571,385	324,071,108
Unfunded Accrued Liability	76,599,142	83,358,848
Funded Ratio	76.3%	74.3%

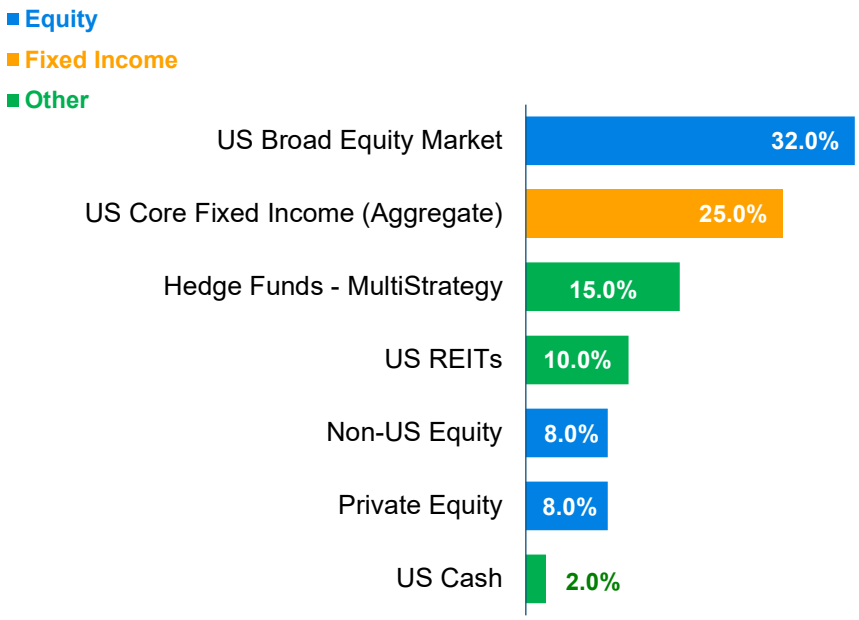
Actuarially Determined Contribution for Fiscal Year	2023-24	2022-23
Normal Cost	$5,233,268	$3,720,656
Past Service Cost	7,733,380	8,415,834
Interest	868,765	813,145
Actuarially Determined Contribution	13,835,413	12,949,635

Section II - Plan Assets
A. Summary of Fund Transactions

Market Value as of July 1, 2021	$233,580,310
City Contributions	12,388,000
Member Contributions	1,407,810
Net Investment Income	(10,002,476)
Benefit Payments	(18,014,336)
Administrative Expenses	(217,213)
Market Value as of June 30, 2022	219,142,095
Expected Return on Market Value of Assets	15,513,099
Market Value (Gain)/Loss	25,515,575
Approximate Rate of Return *	-4.32%

* 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, 2022



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 asymptotically over a five year period. The Actuarial Value of Assets as of July 1, 2022 is determined below.

1.	Expected Actuarial Value of Assets:	
	a. Actuarial Value of Assets as of July 1, 2021	$240,712,260
	b. City and Member Contributions	13,795,810
	c. Benefit Payments and Administrative Expenses	(18,231,549)
	d. Expected Earnings Based on 6.70% Interest	16,403,259
	e. Expected Actuarial Value of Assets as of July 1, 2022	252,679,780
2.	Market Value of Assets as of July 1, 2022	219,142,095
3.	Unrecognized Gains/(Losses): (2) - (1e)	(33,537,685)
4.	Amount Recognized as of July 1, 2022: 20% of (3)	(6,707,537)
5.	Preliminary Actuarial Value of Assets as of July 1, 2022: (1e) + (4)	245,972,243
6.	Preliminary Actuarial Value of Assets as a % of Market Value: (5) / (2)	112.2%
7.	Actuarial Value of Assets as of July 1, 2022: (5), within +/- 30% of (2)	245,972,243
8.	Actual Earnings on Actuarial Value of Assets: (7) - [(1a) + (1b) + (1c)]	9,695,722
9.	Approximate Rate of Return on Actuarial Value of Assets	4.03%
10.	Actuarial Value (Gain)/Loss: (1d) - (8)	6,707,537

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 15 years. Starting with the July 1, 2022 valuation, each year a new amortization base will be established for the actuarial gains or losses that have emerged since the last valuation. Because this is the initial year of the new funding method, no prior amortization bases exist.

		July 1, 2022	July 1, 2021
1.	Accrued Liability		
	Active Members	$118,492,224	$129,814,029
	Inactive Members	164,093	9,511
	Service Retirees	48,519,814	67,328,372
	Disabled Retirees	125,699,798	97,397,165
	Beneficiaries	29,695,456	29,522,031
	Total Accrued Liability	322,571,385	324,071,108
2.	Actuarial Value of Assets (see Section IIB)	245,972,243	240,712,260
3.	Unfunded Accrued Liability: (1) - (2)	76,599,142	83,358,848
4.	Funded Ratio: (2) / (1)	76.3%	74.3%
5.	Amortization Period	15	15
6.	Amortization Growth Rate	0.00%	0.00%
7.	Past Service Cost: (3) amortized over (5)	7,733,380	8,415,834

Section III - Development of Contribution
B. Actuarially Determined Contribution

		2023-24	2022-23
1.	Total Normal Cost	$6,614,267	$4,938,077
2.	Expected Member Contributions	1,579,999	1,471,421
3.	Expected Administrative Expenses	199,000	254,000
4.	Net Normal Cost: (1) - (2) + (3)	5,233,268	3,720,656
5.	Past Service Cost (see Section IIIA)*	7,733,380	8,415,834
6.	Interest on (4) + (5) to start of the fiscal year	868,765	813,145
7.	Actuarially Determined Contribution: (4) + (5) + (6)	13,835,413	12,949,635

* In the event the funded ratio for the plan as a whole is between 100% and 120%, the resulting negative Past Service Cost will not be used to offset the Net Normal Cost.

Section III - Development of Contribution
C. Long Range Forecast

This forecast is based on the results of the July 1, 2022 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.

	Values as of the Valuation Date					Cash Flows Projected to the Following Fiscal Year			
Valuation Date	Accrued Liability	Actuarial Value of Assets	Unfunded Accrued Liability	Funded Ratio	Fiscal Year	City Contributions	Member Contributions	Benefit Payments	Net Cash Flows
7/1/2022	$322,571,385	$245,972,243	$76,599,142	76.3%	2023-24	$13,835,413	$1,686,477	($20,590,849)	($5,068,959)
7/1/2023	331,169,000	251,930,000	79,239,000	76.1%	2024-25	14,483,000	1,784,000	(21,451,000)	(5,184,000)
7/1/2024	339,202,000	258,919,000	80,283,000	76.3%	2025-26	15,119,000	1,801,000	(22,418,000)	(5,498,000)
7/1/2025	347,118,000	266,987,000	80,131,000	76.9%	2026-27	15,616,000	1,875,000	(23,283,000)	(5,792,000)
7/1/2026	354,657,000	275,898,000	78,759,000	77.8%	2027-28	16,053,000	1,848,000	(24,241,000)	(6,340,000)
7/1/2027	361,985,000	285,632,000	76,353,000	78.9%	2028-29	16,452,000	1,916,000	(24,987,000)	(6,619,000)
7/1/2028	368,911,000	295,904,000	73,007,000	80.2%	2029-30	16,813,000	2,007,000	(25,692,000)	(6,872,000)
7/1/2029	375,747,000	306,962,000	68,785,000	81.7%	2030-31	17,063,000	2,090,000	(26,281,000)	(7,128,000)
7/1/2030	382,491,000	318,828,000	63,663,000	83.4%	2031-32	17,306,000	2,178,000	(26,829,000)	(7,345,000)
7/1/2031	389,292,000	331,501,000	57,791,000	85.2%	2032-33	17,513,000	2,257,000	(27,302,000)	(7,532,000)
7/1/2032	396,195,000	345,035,000	51,160,000	87.1%	2033-34	17,712,000	2,348,000	(27,816,000)	(7,756,000)
7/1/2033	403,299,000	359,481,000	43,818,000	89.1%	2034-35	17,856,000	2,418,000	(28,271,000)	(7,997,000)
7/1/2034	410,558,000	374,834,000	35,724,000	91.3%	2035-36	18,007,000	2,481,000	(28,672,000)	(8,184,000)
7/1/2035	418,053,000	391,109,000	26,944,000	93.6%	2036-37	18,167,000	2,569,000	(29,063,000)	(8,327,000)
7/1/2036	425,872,000	408,402,000	17,470,000	95.9%	2037-38	18,276,000	2,618,000	(29,480,000)	(8,586,000)
7/1/2037	434,037,000	426,807,000	7,230,000	98.3%	2038-39	10,176,000	2,698,000	(29,974,000)	(17,100,000)
7/1/2038	442,564,000	446,263,000	(3,699,000)	100.8%	2039-40	8,760,000	2,790,000	(30,464,000)	(18,914,000)
7/1/2039	451,377,000	458,020,000	(6,643,000)	101.5%	2040-41	8,249,000	2,881,000	(30,865,000)	(19,735,000)
7/1/2040	460,522,000	468,698,000	(8,176,000)	101.8%	2041-42	8,076,000	2,976,000	(31,292,000)	(20,240,000)
7/1/2041	470,154,000	479,272,000	(9,118,000)	101.9%	2042-43	8,278,000	3,049,000	(31,822,000)	(20,495,000)

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, 2022	$245,972,243	$322,571,385	$76,599,142	76.3%
July 1, 2021	240,712,260	324,071,108	83,358,848	74.3%
July 1, 2020	230,966,457	308,525,801	77,559,344	74.9%
July 1, 2019	229,224,489	297,255,906	68,031,417	77.1%
July 1, 2018	222,457,678	275,160,754	52,703,076	80.8%
July 1, 2017	213,613,510	263,886,403	50,272,893	80.9%
July 1, 2016	206,260,036	254,339,167	48,079,131	81.1%
July 1, 2015	200,353,566	238,471,000	38,117,434	84.0%
July 1, 2014	190,899,353	225,233,000	34,333,647	84.8%
July 1, 2013	180,800,365	213,642,000	32,841,635	84.6%

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
2023-24	$13,835,413	TBD	$26,003,550	TBD
2022-23	12,949,635	TBD	25,101,103	TBD
2021-22	12,388,000	$12,388,000	24,418,270	50.7%
2020-21	11,190,000	11,190,000	24,244,956	46.2%
2019-20	8,897,000	8,897,000	24,435,134	36.4%
2018-19	8,711,000	8,711,000	22,344,105	39.0%
2017-18	8,275,000	8,275,000	22,958,568	36.0%
2016-17	7,903,000	7,903,000	22,320,912	35.4%
2015-16	7,158,000	7,158,000	23,328,220	30.7%
2014-15	6,645,000	6,645,000	22,648,757	29.3%

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 Members	Terminated Vested Members	Nonvested Members Due Refunds	Service Retirees	Disabled Retirees	Beneficiaries	Total
Count July 1, 2021	273	0	2	106	137	114	632
Terminated							
- no benefits due	(1)	-	-	-	-	-	(1)
- paid refund	-	-	-	-	-	-	0
- vested benefits due	(5)	1	4	-	-	-	0
Retired	(5)	-	-	5	-	-	0
Disabled	(9)	-	-	-	9	-	0
Died							
- with beneficiary	-	-	-	(3)	(3)	6	0
- no beneficiary	-	-	-	(2)	(2)	(6)	(10)
Benefits expired	-	-	-	-	-	-	0
New member	24	-	-	-	-	-	24
Rehired	1	-	-	-	-	-	1
New Alternate Payee	-	-	-	-	-	2	2
Correction	-	-	-	(22)	22	-	0
Count July 1, 2022	278	1	6	84	163	116	648

Section IV - Membership Data
B. Statistics of Active Membership

	As of July 1, 2022	As of July 1, 2021
Number of Active Members	278	273
Average Age	43.1	43.7
Average Service	15.1	15.9
Total Payroll	$26,003,550	$25,101,103
Average Payroll	93,538	91,945

Section IV - Membership Data
C. Statistics of Inactive Membership

	As of July 1, 2022	As of July 1, 2021
Terminated Vested Members		
Number	1	0
Total Annual Benefit	$19,000	$0
Average Annual Benefit	19,000	0
Average Age	33.1	0.0
Nonvested Members Due Refunds		
Number	6	2
Service Retirees		
Number	84	106
Total Annual Benefit	$4,397,163	$5,773,374
Average Annual Benefit	52,347	54,466
Average Age	72.1	69.7
Disabled Retirees		
Number	163	137
Total Annual Benefit	$10,192,464	$7,981,242
Average Annual Benefit	62,530	58,257
Average Age	64.6	65.7
Beneficiaries		
Number	116	114
Total Annual Benefit	$3,548,162	$3,443,254
Average Annual Benefit	30,588	30,204
Average Age	76.2	76.4

Section IV - Membership Data
D. Distribution of Inactive Members as of July 1, 2022

	Age	Number	Annual Benefits
Terminated Vested Members	< 50	1	$19,000
	50 - 59	0	0
	60 - 69	0	0
	70 - 79	0	0
	80 - 89	0	0
	90 +	0	0
	Total	1	19,000
Service Retirees	< 50	1	$51,312
	50 - 59	12	700,875
	60 - 69	21	1,397,463
	70 - 79	36	1,785,370
	80 - 89	14	462,143
	90 +	0	0
	Total	84	4,397,163
Disabled Retirees	< 50	17	$1,092,546
	50 - 59	40	2,666,082
	60 - 69	53	3,663,036
	70 - 79	41	2,439,189
	80 - 89	11	323,183
	90 +	1	8,428
	Total	163	10,192,464
Beneficiaries	< 50	0	$0
	50 - 59	10	237,940
	60 - 69	21	668,917
	70 - 79	47	1,637,280
	80 - 89	26	646,390
	90 +	12	357,635
	Total	116	3,548,162

Section V - Analysis of Risk
A. Introduction

The results of this actuarial valuation are based on one set of reasonable assumptions. However, it is almost certain that future experience will not exactly match these assumptions. As an example, the plan's investments may perform better or worse than assumed in any single year and over any longer time horizon. It is therefore important to consider the potential impacts of these likely differences when making decisions that may affect the future financial health of the plan, or of the plan's members.

In addition, as plans mature they accumulate larger pools of assets and liabilities. The increase in size in turn increases the potential magnitude of adverse experience. As an example, the dollar impact of a 10% investment loss on a plan with $1 billion in assets and liabilities is much greater than the dollar impact for a plan with $1 million in assets and liabilities. Since pension plans make long-term promises and rely on long-term funding, it is important to consider how mature the plan is today, and how mature it may become in the future.

Actuarial Standard of Practice No. 51 (ASOP 51) directs actuaries to provide pension plan sponsors with information concerning the risks associated with the plan:

- Identify risks that may be significant to the plan.
- Assess the risks identified as significant to the plan. The assessment does not need to include numerical calculations.
- Disclose plan maturity measures and historical information that are significant to understanding the plan's risks.

This section of the report uses the framework of ASOP 51 to communicate important information about significant risks to the plan, the plan's maturity, and relevant historical plan data.

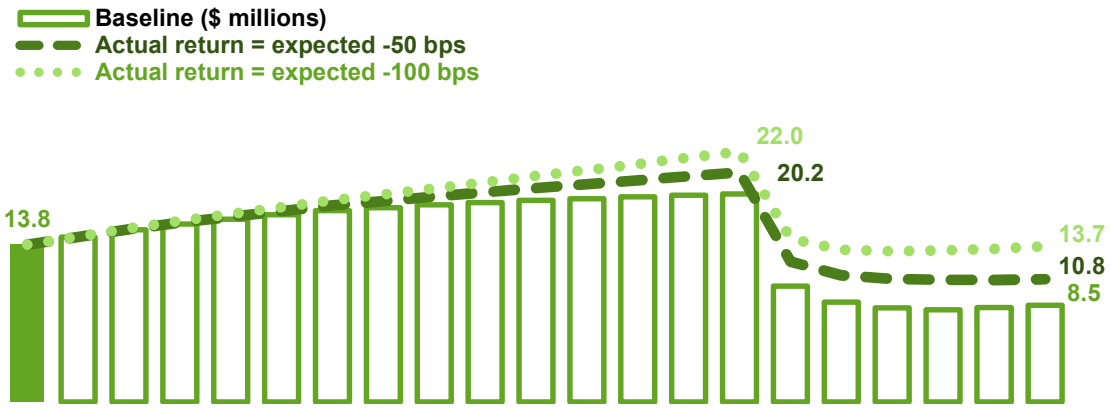
Please see Section III C for more information on the basis for the projected results shown on the following pages.

Section V - Analysis of Risk
B. Risk Identification and Assessment

Investment Risk

Definition: This is the potential that investment returns will be different than expected.

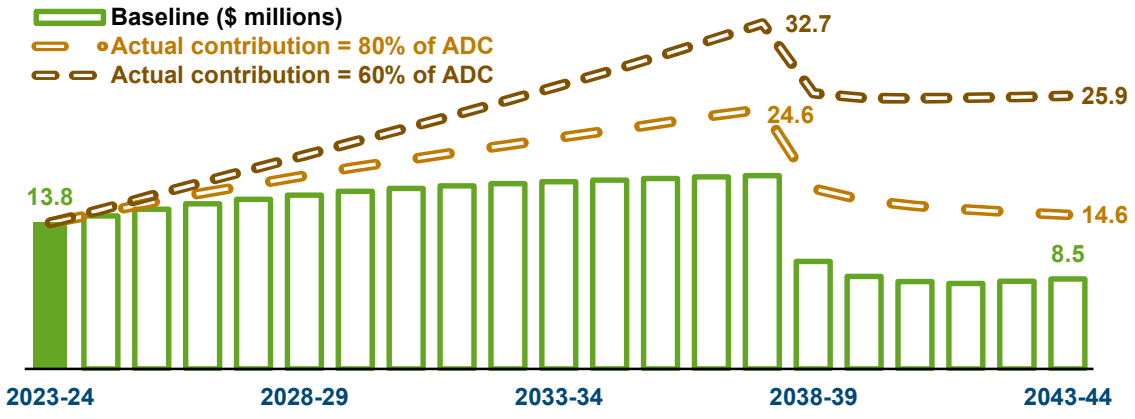
Identification: To the extent that actual investment returns differ from the assumed investment return, the plan's future assets, Actuarially Determined Contributions, and funded status may differ significantly from those presented in this valuation. The consequences of persistent underperformance on future Actuarially Determined Contribution levels are illustrated below:



Contribution Risk

Definition: This is the potential that actual future contributions will be less than the Actuarially Determined Contribution.

Identification: Over the past 8 years, actual contributions have been 100.0% of the Actuarially Determined Contribution in total. The consequences of persistent underfunding on future Actuarially Determined Contribution levels are illustrated below:



Section V - Analysis of Risk
B. Risk Identification and Assessment

Liquidity Risk

Definition: This is the potential that assets must be liquidated at a loss earlier than planned in order to pay for the plan's benefits and operating costs. This risk is heightened for plans with negative cash flows, in which contributions are not sufficient to cover benefit payments plus expenses.

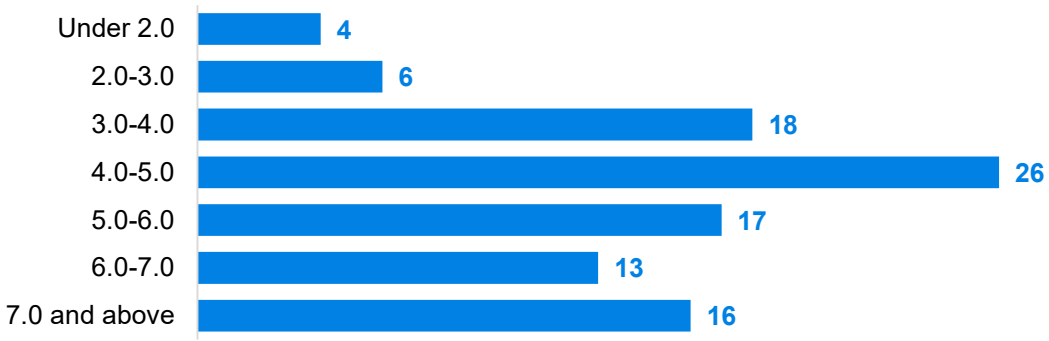
Identification: In 2021-22, the plan had negative cash flow, with city and member contributions to the plan of $13,795,810 compared to $18,231,549 of benefit payments and administrative expenses paid out of the plan. We suggest that you consult with your investment advisors with respect to the liquidity characteristics of the plan's investment holdings.

Maturity Risk

Definition: This is the potential for total plan liabilities to become more heavily weighted toward inactive liabilities over time, and for plan assets and/or liabilities to become larger relative to the active member liability.

Identification: The plan is subject to maturity risk because as plan assets and liabilities continue to grow, the dollar impact of any gains or losses on the assets or liabilities also becomes larger.

Assessment: As of July 1, 2022, the plan's Asset Voliatility Ratio (the ratio of the market value of plan assets to payroll) is 8.4. According to Milliman's 2021 Public Pension Funding Study, the 100 largest US public pension plans have the following range of Asset Volatility Ratios:



Inflation Risk

Definition: This is the potential for a pension to lose purchasing power over time due to inflation.

Identification: The members of pension plans without fully inflation-indexed benefits are subject to the risk that their purchasing power will be reduced over time due to inflation.

Assessment: This plan does not contain a mechanism to regularly increase benefits after retirement, so members bear all of the inflation risk.

Section V - Analysis of Risk
B. Risk Identification and Assessment

Insolvency Risk

Definition: This is the potential that a plan will become insolvent; that is, assets will be fully depleted.

Identification: If a plan becomes insolvent, contractually required benefits must be paid from the plan sponsor's other remaining assets.

Assessment: Under the GASB 68 depletion date methodology, the plan is not projected to become insolvent. Please see the GASB 68 report for more details on the underlying analysis.

Demographic Risks

Definition: This is the potential that mortality, turnover, retirement, or other demographic experience will be different than expected.

Identification: The pension liabilities reported herein have been calculated by assuming that members will follow patterns of demographic experience as described in Appendix B. If actual demographic experience or future demographic assumptions are different from what is assumed to occur in this valuation, future pension liabilities, Actuarially Determined Contributions, and funded status may differ significantly from those presented in this valuation. Formal Experience Studies performed on a regular basis are helpful in ensuring that the demographic assumptions reflect emerging plan experience.

Retirement Risk

Definition: This is the potential for members to retire and receive subsidized benefits that are more valuable than expected.

Identification: This plan permits members to retire with unreduced benefits at young ages. If members retire at earlier ages than are anticipated by the actuarial assumptions, this will put upward pressure on subsequent Actuarially Determined Contributions.

Additional Pension Credit Risk

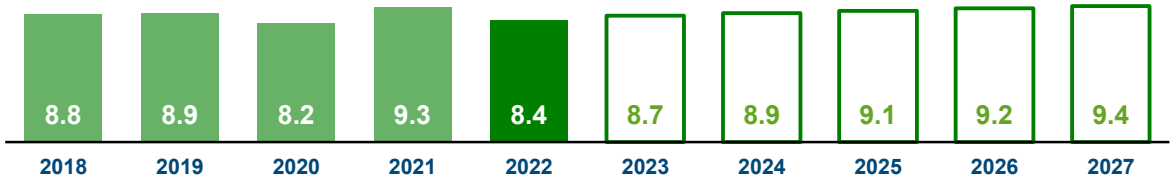
Definition: This is the potential for active members to trade in unused sick and/or vacation days and receive pension benefits that are higher than expected.

Identification: This plan permits some members to trade in unused sick and/or vacation days to increase their total pension multiplier. We assume that on average members elect to recieve 34% of the maximum additional pension credit. If members elect to recieve more than 34% of the maximum additional pension credit on average, this will put upward pressure on subsequent Actuarially Determined Contributions.

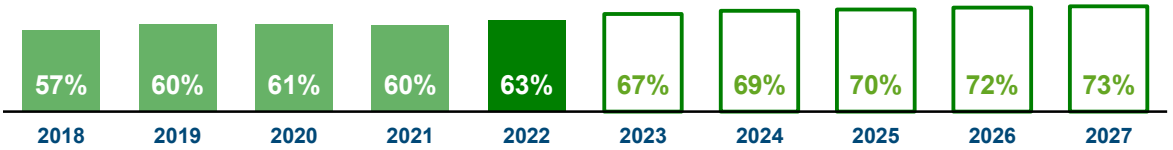
Section V - Analysis of Risk
C. Maturity Measures

The metrics presented below are different ways of understanding the plan's maturity level, both in the past and as it is expected to change in the coming years.

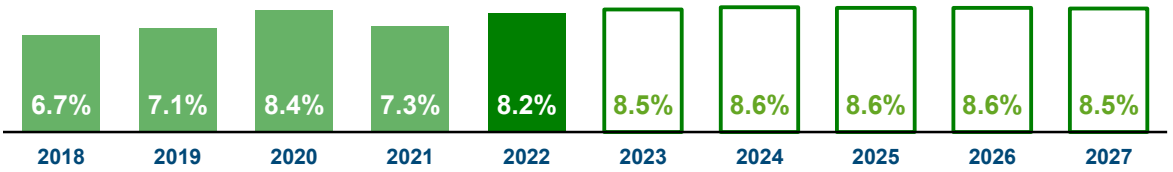
Asset Volatility Ratio: Market Value of Assets compared to Payroll



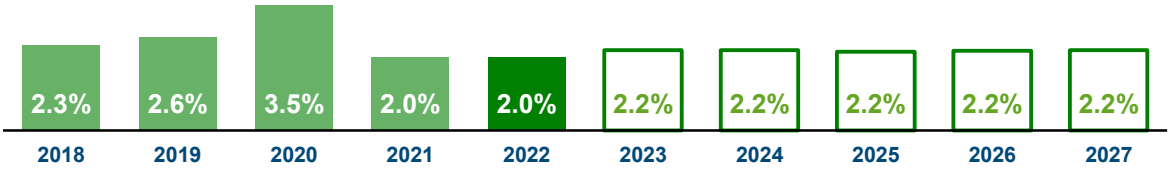
Accrued Liability for members in pay status compared to total Accrued Liability



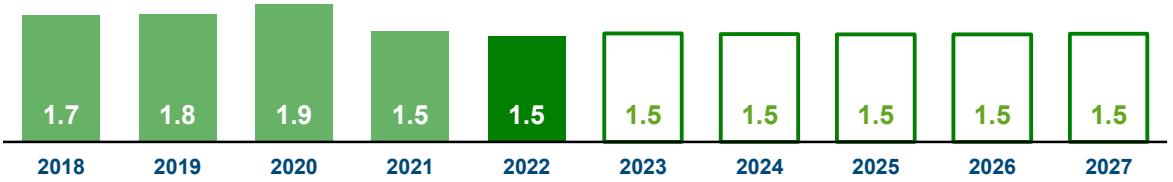
Benefit Payments compared to Market Value of Assets



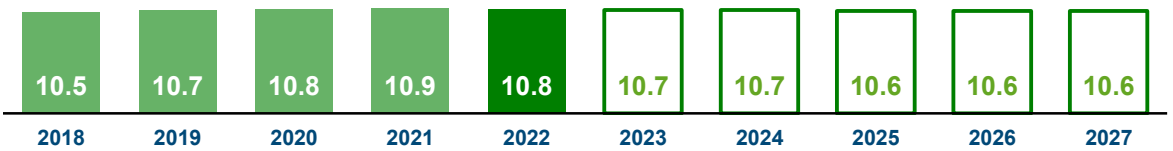
Net Cash Flows compared to Market Value of Assets



Benefit Payments compared to City Contributions



Duration of Accrued Liability (based on GASB 68 sensitivity disclosures)



Appendix A - Actuarial Funding Method

Starting with the July 1, 2022 valuation, the actuarial funding method used in the valuation of this Plan is known as the Entry Age Normal Method. The Actuarially Determined Contribution consists of three pieces: Normal Cost plus a Past Service Cost payment to gradually eliminate the Unfunded Accrued Liability plus a Timing Adjustment to reflect the timing of the contribution relative to the valuation date.

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 15 years. Starting with the July 1, 2023 valuation, each year a new amortization base is established for the actuarial gains or losses that have emerged since the last valuation. The City will continue to fund the Net Normal Cost so long as the Plan's funded ratio is below 120%. Should the funded ratio be 120% or more as of the valuation date, surplus would be used to offset the Net Normal Cost.

The Actuarial Value of Assets is determined by recognizing market gains and losses asymptotically over a five year period; the result is constrained to within +/- 30% 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, as well as incorporating the characteristics of the current active employees as a whole.

Appendix B - Actuarial Assumptions

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, 2008 to 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 6.70%

Inflation Rate 2.60%

Expenses The average of the prior year two year's administrative expenses, rounded to the nearest $1,000.

Salary Scale

Service	Rate
0-1	15.00%
2-5	6.00%
6+	2.75%

Turnover

Age	Rate
20	1.81%
25	1.63%
30	1.23%
35	0.78%
40+	0.00%

Retirement

Service	Rate	Service	Rate
20	13%	36	21%
21	11%	37	17%
22	8%	38	16%
23-26	7%	39	18%
27-29	8%	40-41	24%
30	11%	42	27%
31	13%	43	21%
32	14%	44	25%
33	13%	45	22%
34	19%	46	35%
35	20%	47	50%

Retirement rate at age 65 is 100%.

Appendix B - Actuarial Assumptions

Disability

Age	Rate
20	0.30%
25	0.30%
30	0.30%
35	0.36%
40	0.54%
45	1.08%
50	2.40%
55	5.10%
60	10.44%

Disability benefits are assumed to be service connected and equal to 75% of pay.

Mortality

PubS-2010 Mortality Table with generational projection per the MP-2021 (Prior: MP-2019) Ultimate scale, with employee rates before benefit commencement and healthy, disabled and contingent annuitant rates after benefit commencement. This assumption includes a margin for mortality improvement beyond the valuation date.

Pre-retirement deaths are assumed to be not service connected.

Marital Status

80% of active participants are assumed to be married. Female spouses are assumed to be 4 years younger than male spouses.

Sick/Vacation Bank

Retiring members are assumed to elect 34% of the maximum additional pension credit as an annuity from the fund.

Post-Retirement Life

100% of active and retired employees are assumed to have a $4,000 life insurance policy beginning at retirement.

COLA's

None assumed

Appendix C - Summary of Plan Provisions

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.

Pension Earnings	Base salary in the final year of employment plus 14 paid holidays for employees hired before April 11, 2016. Average of 3 highest base salaries (including 14 paid holidays) for employees hired after April 11, 2016.
Normal Retirement Eligibility	20 years of service.
Normal Retirement Benefit	2.50% of Pension Earnings multiplied by years of service up to 20 plus an additional 3.00% of Pension Earnings for each additional year of service up to 25 plus an additional 2.33% of Pension Earnings for each year of service up to 30 for employees hired before April 11, 2016. The maximum benefit is 76.65% of Pension Earnings. 2.25% of Pension Earnings multiplied by years of service for employees hired after April 11, 2016. The maximum benefit multiplier is 100% for these employees.
Disability Eligibility:	No service requirement.
Disability Benefit	100% or 75% of salary depending on the extent of the disability.
Non-Service Preretirement Death Eligibility	10 years of service.
Non-Service Preretirement Death Benefit	50% of salary.
Service Preretirement Death Eligibility	No service requirement.
Service Preretirement Death Benefit	50% of salary but not less than the accrued benefit.
Postretirement Spouse's Benefit	100% of the benefit the retiree was receiving for employees hired before April 11, 2016. Employees may elect a reduced joint & survivor annuity at retirement if hired after April 11, 2016.
Postretirement Lump Sum at Death	$4,000.

Appendix C - Summary of Plan Provisions

Termination Benefit	If the member is not vested, the member is paid a refund of their accumulated contributions.
Vesting	100% after 10 years of service.
Termination Benefit	If the member is not vested, the member is paid a refund of their accumulated contributions. If the member is vested, the member can elect to receive the member's accrued benefit beginning when the member would have reach the 20th anniversary of date of hire.
Employee Contributions	Active members contribute 7.0% of salary: Contributions cease at 30 years of service for employees hired before April 11, 2016. Contributions cease at 35 years of service for employees hired after April 11, 2016.
Sick/Vacation Exchange	Employees can trade in 50% of sick leave for additional pension credit. If an officer's sick bank has less than 200 days, unused vacation time may be added, subject to a maximum of 200 days total. Each 20 days grants an additional 1.5% of salary up to a maxmimum of 7.5%. Employees hired after April 11, 2016 are not eligible for this additional retirement benefit.
Deferred Retirement Option Plan ("DROP")	An active employee may elect the DROP upon reaching 20 years of service. They will continue to work while receiving their pension benefit. The DROP election period is 1-3 years.
Cost of Living Adjustments	A notional COLA adjustment account is maintained and a triennial calculation is performed to update the account and determine if a COLA is due. The COLA amount is based on the value of the account and the liability for eligible retirees. The maximum COLA is 4%.

Appendix D - Glossary

Actuarial Cost Method - This is a procedure for determining the Actuarial Present Value of Benefits and allocating it to time periods to produce the Actuarial Accrued Liability and the Normal Cost.

Accrued Liability - This is the portion of the Actuarial Present Value of Benefits attributable to periods prior to the valuation date by the Actuarial Cost Method (i.e., that portion not provided by future Normal Costs).

Actuarial Assumptions - With any valuation of future benefits, assumptions of anticipated future events are required. If actual events differ from the assumptions made, the actual cost of the plan will vary as well. Some examples of key assumptions include the interest rate, salary scale, and rates of mortality, turnover and retirement.

Actuarial Present Value of Benefits - This is the present value, as of the valuation date, of future payments for benefits and expenses under the Plan, where each payment is: a) multiplied by the probability of the event occurring on which the payment is conditioned, such as the probability of survival, death, disability, termination of employment, etc.; and b) discounted at the assumed interest rate.

Actuarial Value of Assets - This is the value of cash, investments and other property belonging to the plan, typically adjusted to recognize investment gains or losses over a period of years to dampen the impact of market volatility on the Actuarially Determined Contribution.

Actuarially Determined Contribution ("ADC") - This is the employer's periodic contributions to a defined benefit plan, calculated in accordance with actuarial standards of practice.

Attribution Period - The period of an employee's service to which the expected benefit obligation for that employee is assigned. The beginning of the attribution period is the employee's date of hire and costs are spread across all employment.

Interest Rate - This is the long-term expected rate of return on any investments set aside to pay for the benefits. In a financial reporting context (e.g., GASB 68) this is termed the Discount Rate.

Normal Cost - This is the portion of the Actuarial Present Value of Benefits allocated to a valuation year by the Actuarial Cost Method.

Past Service Cost - This is a catch-up payment to fund the Unfunded Accrued Liability over time (generally 10 to 30 years). A closed amortization period is a specific number of years counted from one date and reducing to zero with the passage of time; an open amortization period is one that begins again or is recalculated at each valuation date. Also known as the Amortization Payment.

Return on Plan Assets - This is the actual investment return on plan assets during the fiscal year.

Unfunded Accrued Liability - This is the excess of the Accrued Liability over the Actuarial Value of Assets.