City of Bristol
Retirement Board

INFORMATION TO ACCESS THIS MEETING

https://bristolct-gov.zoom.us/j/83439580558?pwd=Ug8rh29U14SGv8ZZoPnK1ZC9maqmE0.1

Meeting ID: 834 3958 0558
Passcode: 687473

Ladies and Gentlemen:

The regular meeting will be held on Thursday, March 14, 2024, at 5:00 PM. in City Hall Council Chambers, 111 North Main Street, Bristol, CT.

AGENDA

1. Call to Order

2. Public Participation

3. Approval of the minutes

   a. Minutes

4. Treasurer's Report

   a. February 2024

5. Consent Agenda

   a. March 24 Retirements

6. To review and accept the June 30,2023 Actuarial Valuation and to place it on file

   a. Actuarial Valuation Report

7. Investment Review- Beirne Wealth Consulting, LLC.

   a. Investment Review

8. Any other business proper to come before meeting

9. Adjournment

PER ORDER OF THE CHAIRPERSON
Thomas Barnes, Jr

MEETING OF THE GENERAL
GOVERNMENT RETIREMENT BOARD

February 08, 2024

A Regular meeting of the General Government Retirement Board was held on **February 08, 2024 at 5:59 p.m.** in the City Council Chambers at City Hall, Bristol, CT. Members present: Chairman Tom Barnes Jr., Vice Chairman Robert Parenti, Comptroller Diane M. Waldron, Mayor Jeffrey Caggiano (Zoom), Council member Jacqueline Olsen, Commissioners David Maikowski, Frank Rossi, Peter Dauphinais, absent Commissioners David Butkus, Craig Vibert, William Veits and Tom DeNoto.

1. **Call to Order**

   Pledge of Allegiance

The meeting was called to order at 5:59 p.m. by Chairman Tom Barnes Jr.

2. **Public Participation**

None.

3. **Approval of the minutes**

   a. **General Government Retirement Board – Regular Meeting on January 11, 2024.**

A motion was made by Council member Olsen and seconded by Commissioner Maikowski and it was unanimously voted to:

> "Approve the minutes of the General Government Retirement Board Regular Meeting of January 11, 2024 and place them on file."

4. **Treasurers Report**

   a. **January 2024.**

A motion was made by Council member Olsen and seconded by Commissioner Maikowski and it was unanimously voted to:

> "Accept the Treasurer's Report for January 2024 and place it on file."

5. **Consent Agenda**.

   a. Consideration of a request to approve the Normal Retirement from Richard Condon, Bristol Water and Sewer/ WPC Department, Local 1338 effective January 05, 2024 with an annual pension amount of $36,311.83 or $3,025.99 monthly.

A motion was made by Comptroller Waldron and seconded by Council member Olsen and it was unanimously voted to:

> "Approve Consent Agenda Items 5a."

6. **Investment Review – Beirne Wealth Consulting, LLC.**

John Oliver addressed the board and reported that he received a call from Neuberger Berman about their guidelines and their policy specific to the large cap growth portfolio. They currently have a cap on any position in the portfolio of 10% relative to their index. What they are requesting is to have the board vote to amend their guidelines to go up to any position to 15% in order to be benchmark neutral on Microsoft.

Chairman Barnes asked the motion to be moved by one of the members present.

A motion was made by Commissioner Maikowski seconded by Council member Olsen and it was unanimously voted to:

“Approve the increase of threshold from 10% to 15%.”

John Oliver notified the board about getting a big distribution back from the Arsenal III fund that would be about $7.5 million, which will reduce the portfolio’s allocation to private equity. John Oliver presented a co-investment form Arsenal which is involved with technology and they are requesting if the board would be interested to invest in this. John Oliver also request the board to continue to allocate to private equity and to vote to potentially commit based on the allocation amount within the fund for another co-investment which could be between 3.5 to 5 million. He explained that by doing a co-investment the overall cost of this private equity investment will be lower since there are no manager fees only performance fees. Chairman Barnes requested more information regarding this investment, he would like to see a presentation on it. John explained that there is no need to commit today, but they need a vote to show interest in this investment. Chairman Barnes recommend the board to take a vote to show interest but it will be a nonbinding vote.

A motion was made by Commissioner Maikowski seconded by Comptroller Waldron and it was unanimously voted to:

“To express interest in this investment that can be range from 3 to 5 million.”

John Oliver inform the board that he has three managers line up for the next managers meeting he’s tentative date as of now would be March 20th.

John Oliver reviewed the portfolio, highlighting that approximately 22% of portfolio is unvalued as of 1/31/24. Additionally, as a reminder, approximately 33% is only valued quarterly.

The total portfolio market value is $748,340,167.
Credits market value $175,145,754 =23.40% of portfolio.
High Quality Credit market value $106,816,888 = 14.27% of portfolio.
Multi-Credit market value $68,328,866 = 9.13% of portfolio.
Equity market value $346,548,948 = 46.31% of portfolio.
Public Equity market value $280,041,627 = 37.42% of portfolio.
Private Equity market value $66,507,321 = 8.89% of portfolio.
Alternatives market value $214,328,929 = 28.64% of portfolio.
Real Estate market value $72,675,374 = 9.71% of portfolio.
Commodities market value $ 5,869,240 = .78% of portfolio.
Differentiated Return Stream market value $135,784,315 = 18.14% of portfolio.
Cash market value $12,316,536 = 1.65% of portfolio

7.Any other business proper to come before meeting.

At 6:22 p.m. a motion was made by Council member Olsen and second by Comptroller Waldron and it was unanimously voted to:
“Adjourn.”

Respectively submitted,
Diane M. Waldron
Comptroller and Secretary, Retirement Board

MEETING OF THE GENERAL
GOVERNMENT RETIREMENT BOARD

February 08, 2024

A Workshop of the General Government Retirement Board was held on **February 08, 2024 at 5:00 p.m.** in the City Council Chambers at City Hall, Bristol, CT. Members present: Chairman Tom Barnes Jr., Vice Chairman Robert Parenti, Comptroller Diane M. Waldron, Mayor Jeffrey Caggiano (Zoom), Council member Jacqueline Olsen, Commissioners David Maikowski, Frank Rossi, Peter Dauphinais, absent Commissioners David Butkus, Craig Vibert, William Veits and Tom DeNoto.

1. **Call to Order**

The meeting was called to order at 5:00 p.m. by Chairman Tom Barnes Jr.

2. **Discussion with Milliman and Board of Finance**

Rebecca Sielman from Milliman made important highlights of the July 1, 2023 Actuary Valuation:

Membership:

Terminated Members 2023 = 205
Members in Pay Status 2023 = 942
Active Members 2023 = 941

Assets:

Market Value, 7/01/2023 = $733,844,047
Expected rate of return = 6.50%
Expected investment income = $44,695,337
Market(gains)/losses = (16,77,942)

As of July 1, 2023, the Actuarial Value exceeds the Market Value by $10.4 million. This figure represents investment losses that will be gradually recognized over the next five years. This process will exert upward pressure on the City’s contribution, unless there are offsetting market gains.

Interest Rate Assumption

Asset Allocation:

The interest rate assumption is based on the expected long-term return of the plan’s investments. Using Milliman’s June 30, 2023 Capital Market Assumptions, the actual asset allocation has the following risk/return dimensions:

US Cash (5.7%)
US Core Fixed Income (15.8%)
Differentiated Return Stream (17.8%)
US High Yield Bonds (4.1%)
US Large& Mid Cap Value Equity (12.6%)
Real Estate Property (10.3%)
Foreign Developed Equity (2.8%)
Commodities (3.7%)
Non-US Equity (0.4%)
US Large & Mid Cap Growth Equity (10.4%)
US Small & Mid Cap Growth Equity (4.6%)

Emerging Markets Equity (3.6%)
Private Equity (8.3%)

Distribution of Expected Returns:

In any given year, the plan's investment return can range from very high to very low. As we look at longer and longer periods, the high and low years balance out and the annualized return should converge to the 50th percentile, or median. Using Milliman's June 30, 2023 Capital Market Assumptions, the expected long-term annualized median return on the portfolio, without reflecting a margin for manager alpha, is 6.6%.

Funded Status:

Accrued Liability: Grows as active members earn benefits, goes down as retired members receive benefits 2023 = $601.3 million.
Unfunded Accrued Liability: Dollar difference between the Accrued Liability and the Actuarial Value of Assets 2023 ($142.9) million.
Breakdown By Member Group:
Terminated Members= $9.5 million
Members in Pay Status = $392.5 million
Active Members = $199.3 million

Funded Ratio:

Ratio of the Actuarial Value of Assets to the Accrued Liability= 123.8%.

Discussion was held and questions answered from the Retirement Board. Becky indicated the full report will be available in a few weeks.

At 5:59 p.m. a motion was made by Chairman Barnes to adjourn the workshop and continue with the Regular Retirement Board meeting.

"Adjourn."

Respectively submitted,
Diane M. Waldron
Comptroller and Secretary, Retirement Board

DRAFT

Treasurer's Report
Police, Firefighters, Retirement System Fund
February 2024

		Police 710		Firefighter 711		Retirement 712/715		Total
<u>Pension Funds in Pension Bank Accounts</u>								
CASH & CASH EQUIVALENTS: 02/1/2024	$	183,131.11	$	110,760.64	$	156,451.00	$	450,342.75
<u>RECEIPTS:</u>								
Employee Contributions City/BDA/WPC		39,936.24		14,560.28		78,144.14		132,640.66
Employee Contributions BOE						149,245.15		149,245.15
Employee Contributions Health Dept						19,279.17		19,279.17
Employee Contributions Water Dept						9,837.73		9,837.73
Employer Contributions BOE								-
Employer Contributions City/BDA/WPC								-
Employer Contributions Water Dept								-
Employee Contributions Buy Back						305.62		305.62
Employee Contributions Fire Dept Healthcare 1.00%						4,853.64		4,853.64
Employee Contributions Police Healthcare 1.625%,1.875%						13,311.86		13,311.86
Employee Contributions Retiree Healthcare -Health Dept - 1.5%						4,678.32		4,678.32
Employee Contributions Retiree Healthcare 233 - 1.5%, 1.75%						9,324.05		9,324.05
Employee Contributions Retiree Healthcare BPSA - 1.5%, 1.75%						6,622.08		6,622.08
Employee Contributions Retiree Healthcare - 1338 -1.5%, 1.75%						11,134.84		11,134.84
Employee Contributions Retiree Healthcare -NBAR - 1.5%, 1.75%						2,071.06		2,071.06
Employee Contributions Retiree Healthcare -BOE NBAR / 818- 1.5%						7,464.61		7,464.61
Miscellaneous Income						2,753.49		2,753.49
Interest		110.79		71.34		75.28		257.41
Total Receipts, Contributions and Interest		40,047.03		14,631.62		319,101.04		373,779.69
<u>EXPENDITURES:</u>								
Pensions Paid *P , F, R .... **total retirees***		717,877.66		420,998.61		1,638,931.12		2,777,807.39
Refund of Contributions / Interest		-		-		48,157.41		48,157.41
Fiduciary Insurance		-		-		-		-
Legal- Robinson & Cole		-		-				-
Actuary- Milliman								-
Accountant/Bookkeeper Salaries **(Note 1)**		-		-		-		-
Comptroller/Assistant to Comptroller Salaries **(Note 1)**		-		-		-		-
Postage **(Note 1)**		-		-		-		-
Other Expenses / (Revenue) (Tyler Technologies)								-
Total Expenditures		717,877.66		420,998.61		1,687,088.53		2,825,964.80
CURRENT MONTH, Surplus/(deficit)		(677,830.63)		(406,366.99)		(1,367,987.49)		(2,452,185.11)
TRSFR IN-FIDELITY TO PENSION		750,000.00		460,000.00		1,385,000.00		2,595,000.00
CASH & CASH EQUIVALENTS: 02/29/2024 (Beginning Bal+Current Month+Transfer in)	$	255,300.48	$	164,393.65	$	173,463.51	$	593,157.64

Pension Trust Funds

Market Value at July 1, 2022 **(Note 2)**	$	703,604,157
Actuarial Value at July 1, 2022 **(Note 2)**	$	733,028,950
Accrued Liability	$	572,448,612
Pension Surplus (Unfunded Liability)	$	(160,580,338)
Funded Ratio= Actuarial Value divided by Accrued Liability		128.1%

Note 1: Amount will be invoiced quarterly by the Comptroller's office to the Pension fund.
Note 2: Source: Milliman Actuarial Valuation as of July 1, 2021 projected for fiscal year 2022-23, final report dated February 28, 2022.

CITY OF BRISTOL-GENERAL CITY RETIREMENT
BENEFIT CALCULATION

[redacted]

Department: BOE   Employee: **Philip Saglimbeni**
Group : Local #2267   Soc.Sec: **"On File"**   Date of Retire: 2/28/2024   88 rule:80/85

Normal Retirement

CALENDAR YEAR	GROSS EARNINGS	
2024	$ 23,103.82	*
2023	$ 53,823.48	
2022	$ 53,410.00	
2021	$ 54,403.79	*
2020	$ 51,596.35	
2019	$ 52,896.97	
2018	$ 54,628.19	*
2017	$ 54,227.72	*
	$ (8,617.01)	*
2016	$ 48,682.56	
2015	$ 52,814.44	

PENSION CALCULATION

Highest Three Years:

$ 23,103.82
$ 54,403.79
$ 54,628.19
$ 54,227.72
$ (8,617.01)

Calculation: $ 177,746.51

Sum Of Highest Three Years Divided By 3

= Average Annual Earnings

$ 177,746.51 x 1/3 =
$ 59,248.84

$ 59,248.84 Average Annual Earnings
x .0240 Percentage Factor

$ 1,421.97
x 33 Years of Service

$ 46,925.01 Annual Pension: Normal Retirement

$ 3,910.42 Monthly Pension: Normal Retirement

Comments: City Retirement Benefits are Exclusive of Social Security Benefits.
2024 Gross Wages include an accrual payout of $11,494.06

Prepared by: Lindsey Scheffel   Date: 3/12/2024

Reviewed by: Robin A. Manuele   Date: 3-13-24

Approved by: Diane M Waldron   Date: 3/13/24

Board Approved: ____   Date: ____

CITY OF BRISTOL-GENERAL CITY RETIREMENT
BENEFIT CALCULATION

[redacted]

Department: Board of Education   Employee: **Maira Jaquez**
Group : Local #2267   Soc.Sec: **"On File"**   Date of Retire: 3/1/2024   79 rule:80/85

Normal Retirement   **Normal Retirement per WC Settlement**

FISCAL YEAR	GROSS EARNINGS		
2023	$	27,810.23	*
2022	$	27,515.89	*
2021	$	26,405.75	*
	$	(25,175.89)	*
2020	$	13,557.00	
2019	$	24,722.02	
2018	$	22,740.56	
2017	$	19,930.16	
2016	$	23,261.13	
2015	$	23,190.35	
2014	$	28,656.70	*

PENSION CALCULATION

Highest Three Years:

	$	27,810.23
	$	27,515.89
	$	26,405.75
	$	(25,175.89)
	$	28,656.70
Calculation:	$	85,212.68

Sum Of Highest Three Years Divided By 3

= Average Annual Earnings

$	85,212.68	x 1/3 =
$	28,404.23	
$	28,404.23	Average Annual Earnings
	x .0240	Percentage Factor
$	681.70	
x	19	Years of Service
$	12,952.30	Annual Pension: Normal Retirement
$	1,079.36	Monthly Pension: Normal Retirement

Comments: City Retirement Benefits are Exclusive of Social Security Benefits.
2023 Gross Wages include a Payout of $1,862.46
2020 - 720 hour minimum not met. Not included as a year of service.

Prepared by: Lindsey Scheffel   Date: 3/13/2024

Reviewed by: Robin D Manuel   Date: 3-13-24

Approved by: Diane M Waldron   Date: 3/13/24

Board Approved: ____   Date: ____

CITY OF BRISTOL
RETIREMENT SYSTEM

Actuarial Valuation as of July 1, 2023
To Determine Funding for Fiscal Year 2024-25

Prepared by

Rebecca A. Sielman, FSA
Consulting Actuary

March 8, 2024

Table of Contents

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.

Certification

As part of our engagement with the City of Bristol ("City"), we have performed an actuarial valuation of the Plan as of July 1, 2023. Our findings are set forth in this actuary's report. The main purposes of this valuation are to determine funding for fiscal year 2024-25, to review the Plan's experience since the prior valuation, and to assess the funded position of the Plan.

Actuarial computations presented in this report are for the purposes of determining the recommended funding amounts for the Plan. The calculations in this report have been made on a basis consistent with our understanding of the Plan's funding policy and on our understanding of the plan provisions as summarized in this report. Determinations for purposes other than meeting these requirements, such as for financial reporting in accordance with GASB standards, may be significantly different from the results contained in this report. Accordingly, additional determinations may be needed for other purposes.

We believe that the measures of funded status contained herein are appropriate for assessing the sufficiency of Plan assets to cover the estimated cost of settling the Plan's benefit obligations and for assessing the need for or the amount of future contributions. Note that a Plan's funded status is dependent on the selection of both the actuarial cost method and the asset smoothing method; different measurements would result if, for instance, the Market Value of Assets were used in place of the Actuarial Value of Assets.

Actuarial assumptions, including interest rates, mortality tables, and others identified in this report, and actuarial cost methods are adopted by the City, who is responsible for selecting the Plan's funding policy, actuarial cost methods, asset valuation methods, and actuarial assumptions. The policies, methods, and assumptions used in this valuation are those that have been so adopted and are described in this report. The City is solely responsible for communicating to Milliman any changes thereto. All costs, liabilities, rates of interest, and other factors for the Plan have been determined on the basis of actuarial assumptions and methods which, in our professional opinion, are individually reasonable (taking into account the experience of the Plan and reasonable expectations); and which, in combination, offer a reasonable estimate of anticipated future experience affecting the Plan and are expected to have no significant bias.

This valuation is only an estimate of the Plan's financial condition as of a single date. It can neither predict the Plan's future condition nor guarantee future financial soundness. Actuarial valuations do not affect the ultimate cost of Plan benefits, only the timing of Plan contributions. While the valuation is based on an array of individually reasonable assumptions, other assumption sets may also be reasonable and valuation results based on those assumptions would be different. No one set of assumptions is uniquely correct. Determining results using alternative assumptions is outside the scope of our engagement.

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 modifications to contribution calculations 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 future measurements.

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.

Certification

In preparing this report, we relied, without audit, on information (some oral and some in writing) supplied by the City. This information includes, but is not limited to, benefit provisions, member census data, and financial information. We found this information to be reasonably consistent and comparable with information used for other purposes. The valuation results depend on the integrity of this information. If any of this information is inaccurate or incomplete our results may be different, and our calculations may need to be revised.

Milliman's work is prepared solely for the use and benefit of the 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.

The valuation results were developed using models intended for valuations that use standard actuarial techniques. 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.

The consultants who worked on this assignment are 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 impair the objectivity of our work.

On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this report is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices which are consistent with the principles prescribed by the Actuarial Standards Board and the *Code of Professional Conduct* and *Qualification Standards for Actuaries Issuing Statements of Actuarial Opinion in the United States*, published by the American Academy of Actuaries. We are members of the American Academy of Actuaries and meet the Qualification Standards to render the actuarial opinion contained herein.

Rebecca A. Sielman, FSA
Consulting Actuary

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 I - Executive Summary
Changes Since the Prior Valuation

Plan Experience

From July 1, 2022 to July 1, 2023, the plan's assets earned 8.94% on a Market Value basis and 5.90% on an Actuarial Value basis. The interest rate assumption for this period was 6.50%; the result is an asset gain of about $16.8 million on a Market Value basis and a loss of about $4.3 million on an Actuarial Value basis.

From July 1, 2022 to July 1, 2023, the Accrued Liability was expected to grow from $572.4 million to $588.7 million, based on expected changes in the plan's membership per the actuarial assumptions. Actual changes in the plan's membership during this period resulted in an Accrued Liability as of July 1, 2023 of $601.3 million (measured before any changes in the plan provisions or the actuarial methods and assumptions). This difference of $12.6 million between the expected Accrued Liability and the actual Accrued Liability is termed a 'liability loss'. The primary factors contributing to this liability loss were: (1) a significant loss from retirement experience, with many more retirements than expected; (2) a modest loss from salary growth, with bigger pay increases than expected; and (3) a modest loss from mortality experience, with more retiree deaths than expected and the tragic deaths of two young Police officers.

Plan Changes

None.

Changes in Actuarial Assumptions

None.

Changes in Actuarial Methods

None.

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.

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.

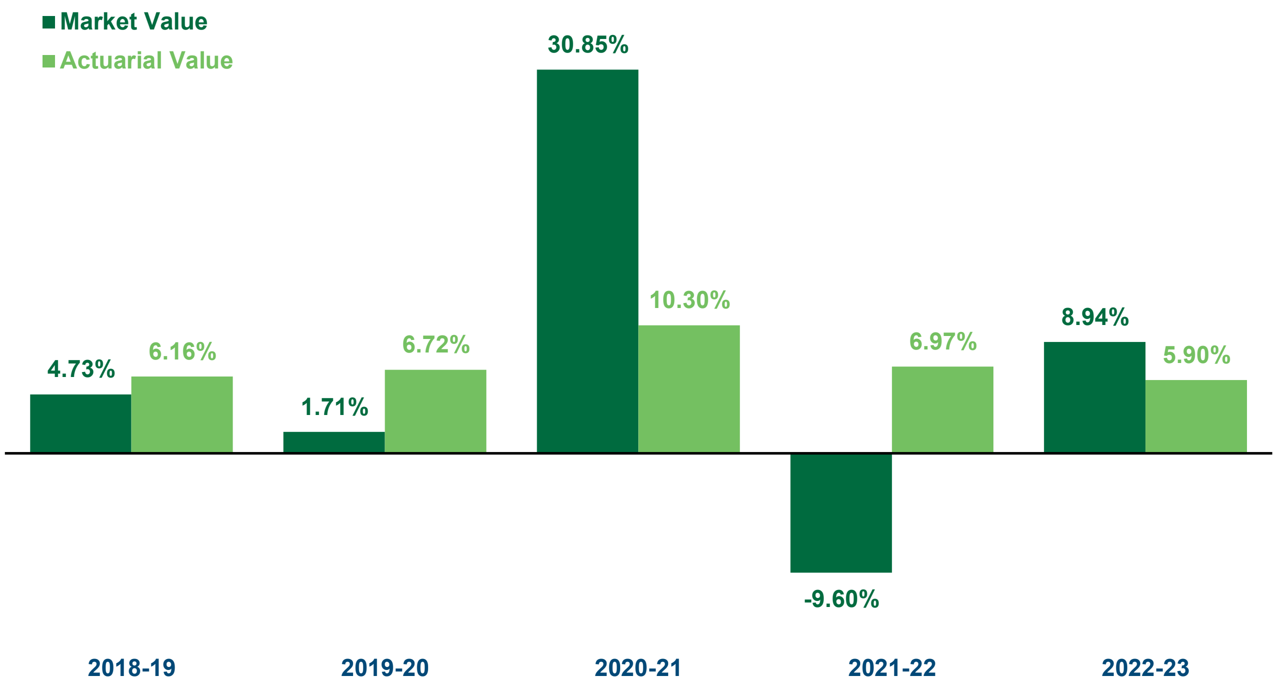
Section I - Executive Summary
Assets

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 non-asymptotically over five years.

	Market	Actuarial
Value as of July 1, 2022	$703,604,157	$733,028,950
City and Member Contributions	2,945,446	2,945,446
Investment Income	61,473,279	42,354,978
Benefit Payments and Administrative Expenses	(34,178,835)	(34,178,835)
Value as of July 1, 2023	733,844,047	744,150,539

The Actuarial Value currently exceeds the Market Value by $10.4 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.

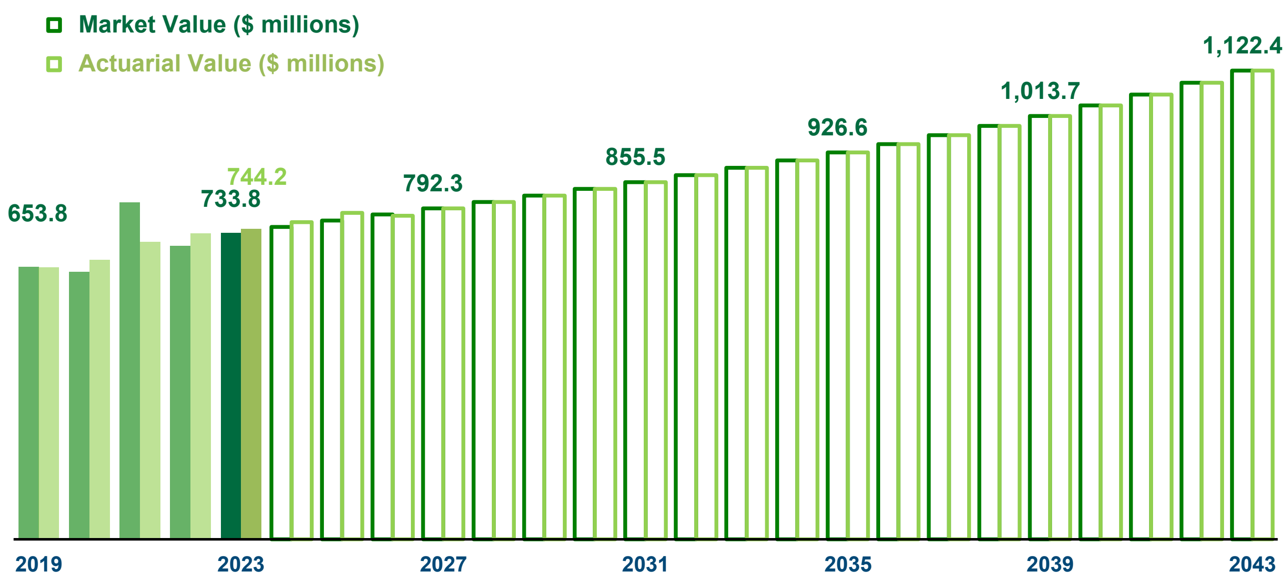
Historical rates of return are shown in the graph below:



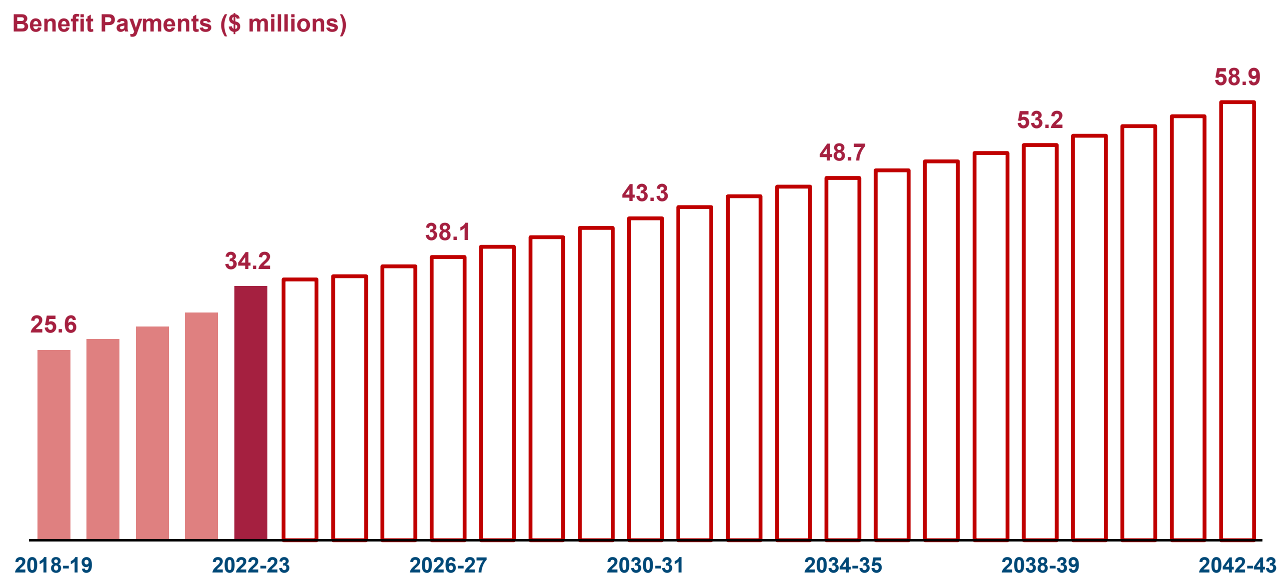
This work product was prepared solely for the City for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their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

Section 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.



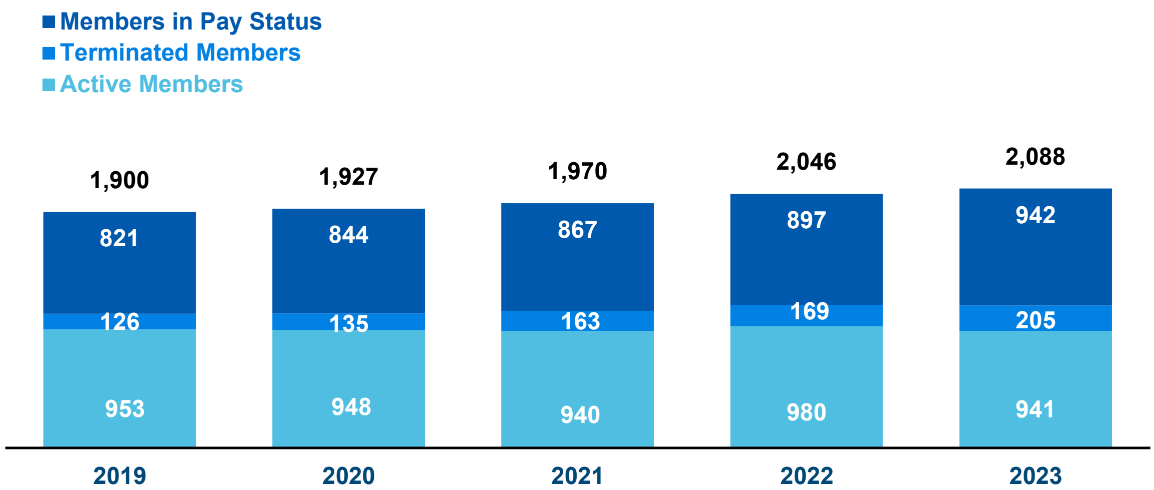
In 2022-23, the plan paid out $34.2 million in benefits to members. Over the next 20 years, the plan is projected to pay out a total of $930 million in benefits to members.



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 I - Executive Summary
Membership

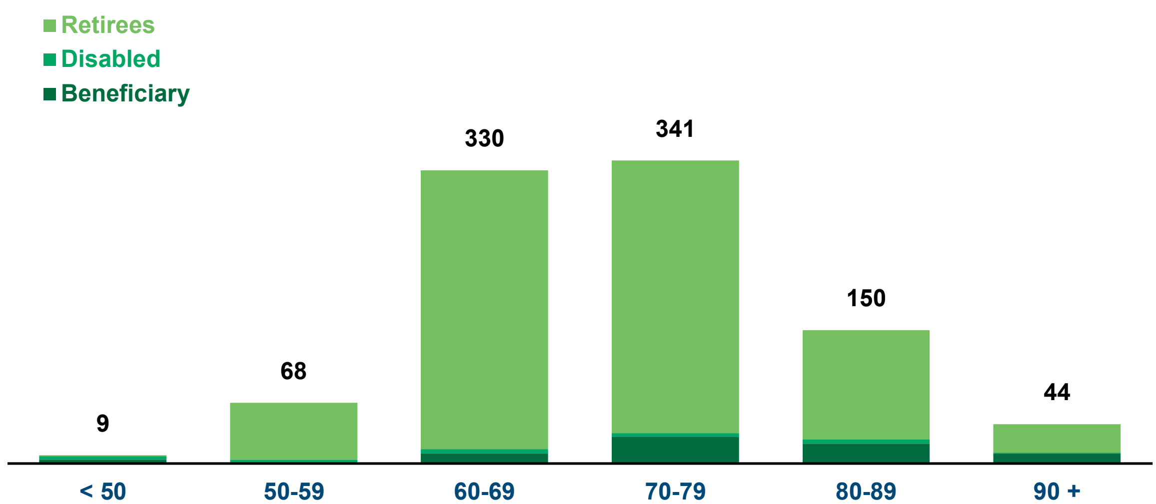
There are three basic categories of plan members included in the valuation: (1) members who are receiving monthly pension benefits, (2) former employees who have a vested right to benefits but have not yet started collecting, and (3) active employees who have met the eligibility requirements for membership.



Members in Pay Status on July 1, 2023

City	691	Average Age	71.8
Fire	105	Total Annual Benefit	$33,604,612
Police	146	Average Annual Benefit	35,674
Total	942		

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



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 I - Executive Summary
Membership (continued)

Terminated Vested Members on July 1, 2023

City	45	Average Age	55.7
Fire	0	Total Annual Benefit	$862,550
Police	5	Average Annual Benefit	17,251
Total	50		

Nonvested Members Due Refunds on July 1, 2023

City	154
Fire	0
Police	1
Total	155

Active Members on July 1, 2023

City	742	Average Age	46.1
Fire	86	Average Service	10.1
Police	113	Payroll	$58,875,339
Total	941	Average Payroll	62,567

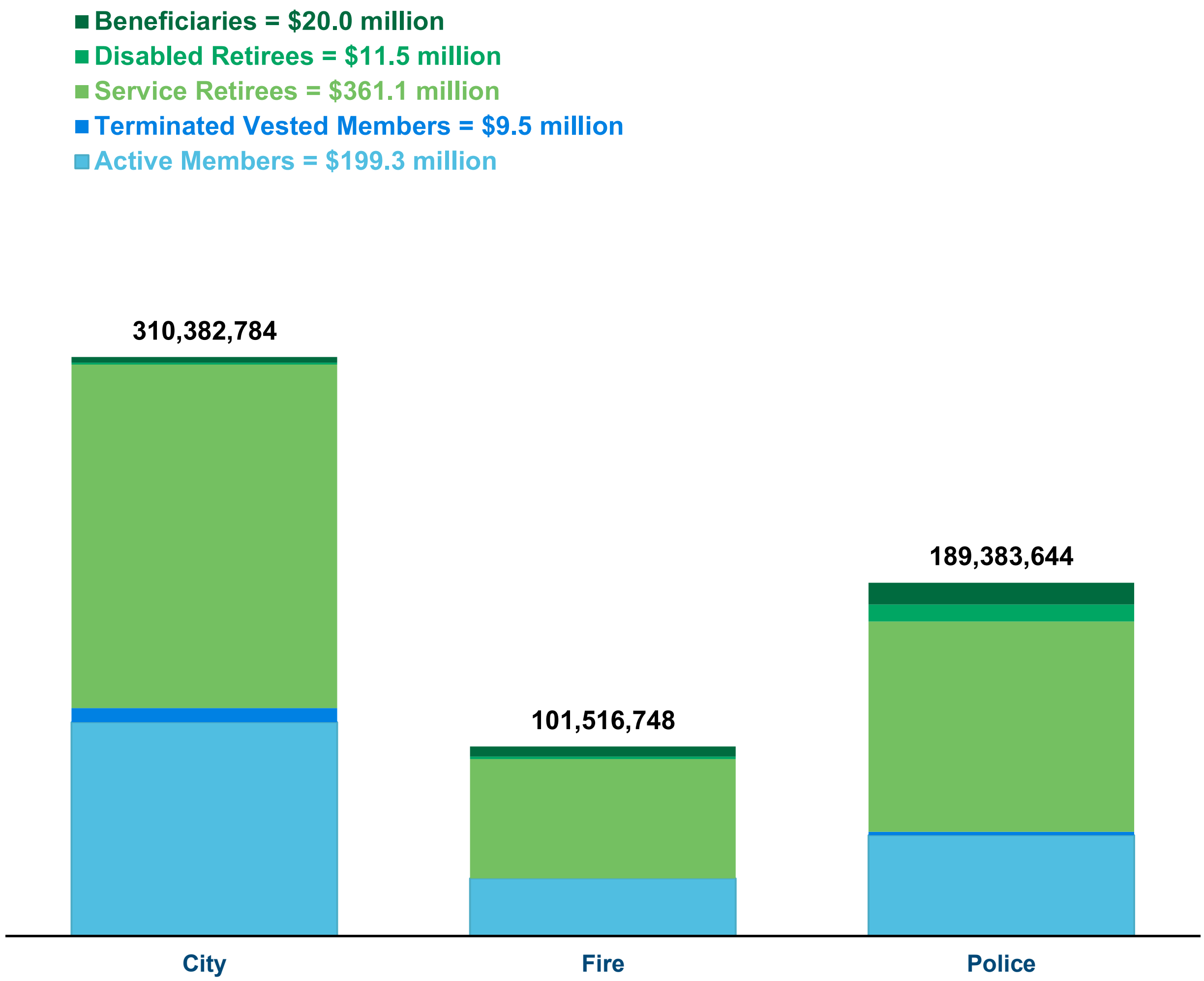
The table below illustrates the age and years of service of the active membership:

	Years of Service							
Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-29**	**30+**	**Total**
< 25	23							23
25-29	69	5						74
30-34	52	33	10					95
35-39	48	36	27	6				117
40-44	41	29	13	27	4			114
45-49	27	21	12	27	14			101
50-54	45	21	14	24	21	11	3	139
55-59	28	20	15	39	29	8	6	145
60-64	17	18	14	20	17	10	4	100
65+	6	7	7	4	6	1	2	33
Total	356	190	112	147	91	30	15	941

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 I - Executive Summary
Accrued Liability

The Accrued Liability as of July 1, 2023 equals $601,283,176, which consists of the following pieces:

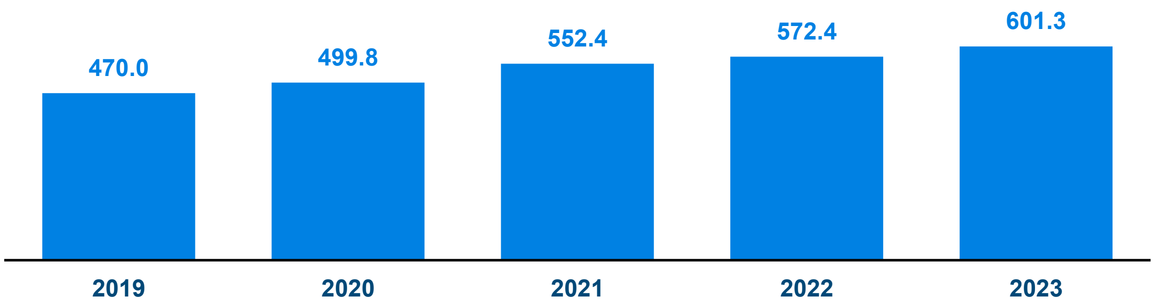


This work product was prepared solely for the City for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their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

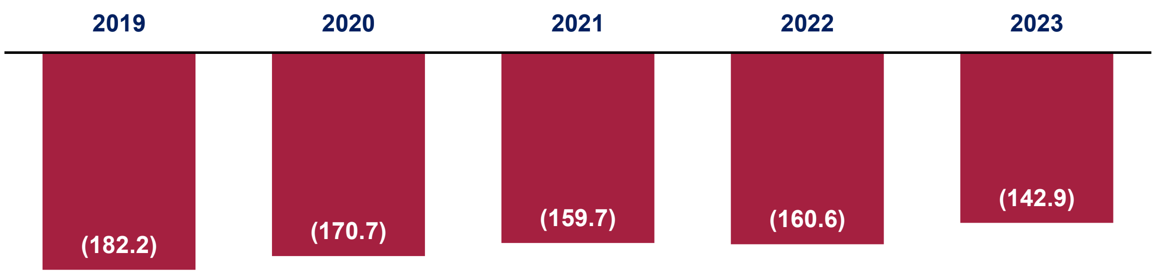
Section I - Executive Summary
Funded Status

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.

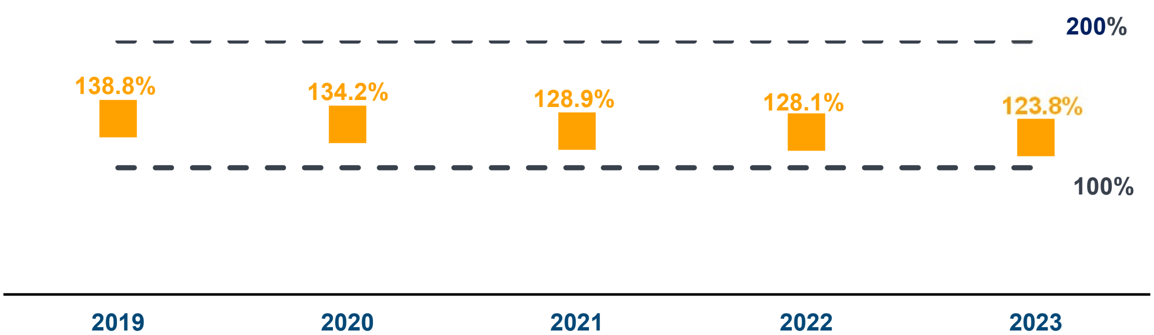
Accrued Liability ($ millions)



Unfunded Accrued Liability ($ millions)



Funded Ratio

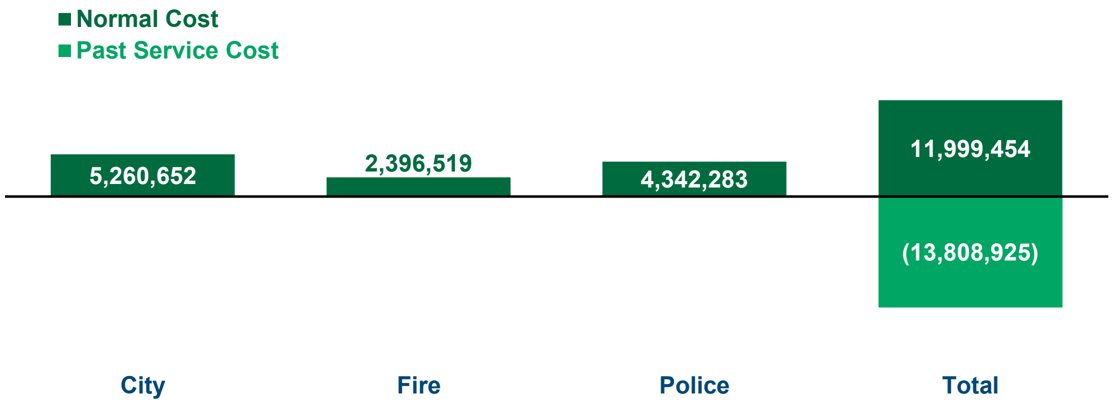


This work product was prepared solely for the City for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their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

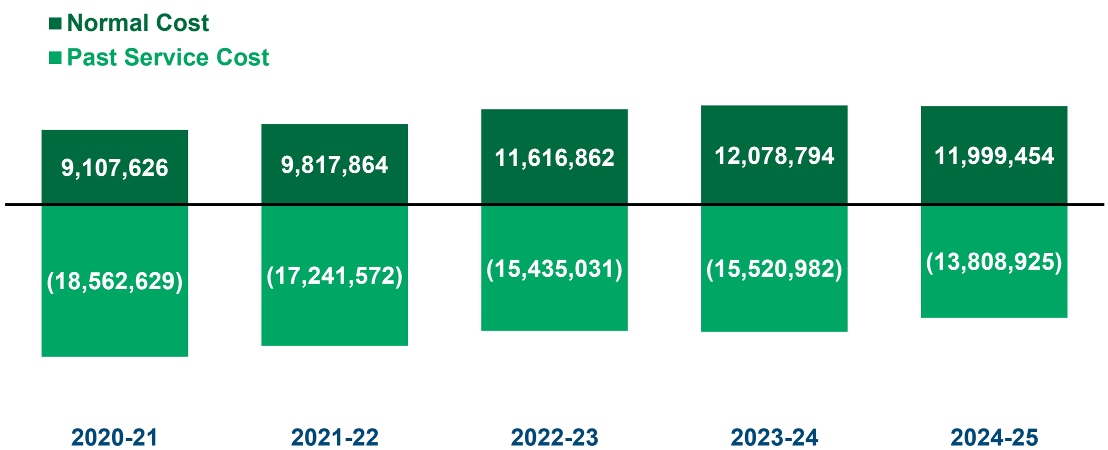
Section I - Executive Summary
Actuarially Determined Contribution (ADC)

The ADC 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 sibsidize the Normal Cost and little or no contribution may be necessary to maintain the funded status of the plan. The ADC for fiscal year 2024-25 is shown graphically below:

By group:



By year:

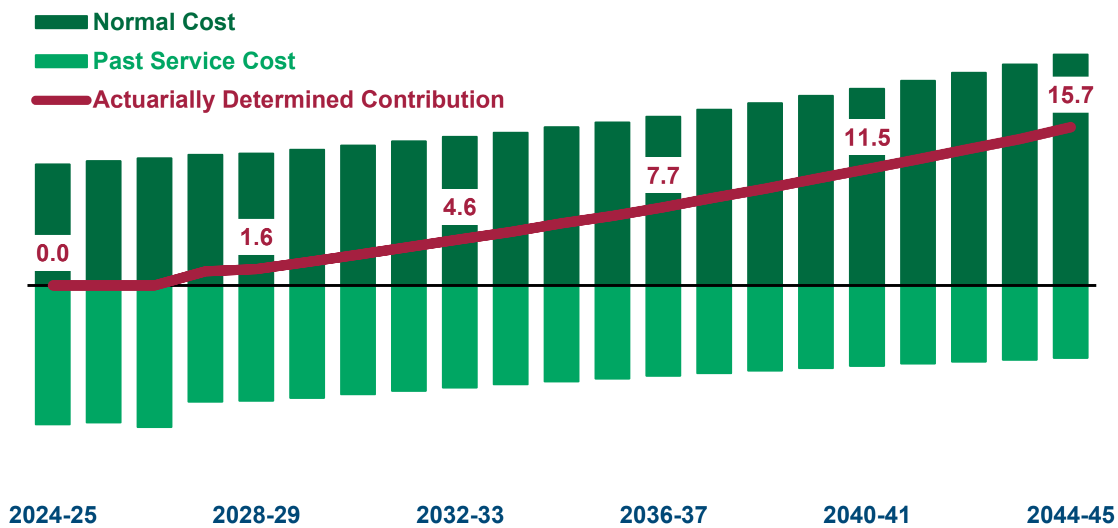


Actuarial Standard of Practice (ASOP) No. 4 requires the actuary to calculate and disclose a 'reasonable' ADC, which considers whether the actuarial methods and actuarial assumptions are in compliance with all applicable ASOPs. Based on the actuarial assumptions and methods used in this report, we believe the ADC is reasonable in accordance with ASOP 4 and reflects a balance among benefit security for plan members, intergenerational equity among stakeholders, and stability of periodic costs.

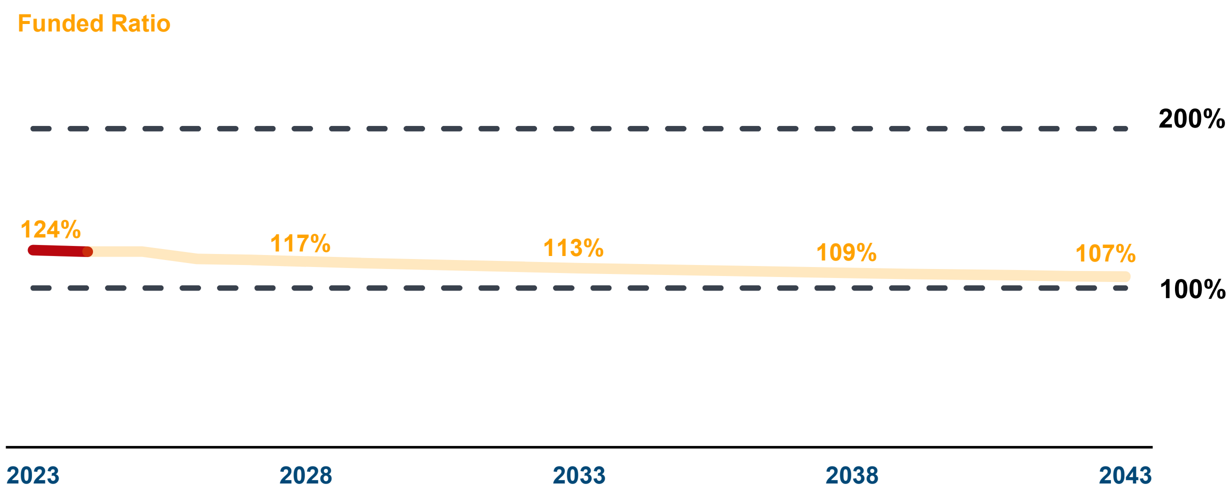
This work product was prepared solely for the City for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their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

Section 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 long-range Actuarially Determined Contributions:



On the basis of this forecast, the plan is expected to have a surplus for the entirety of the projection period. Over time, the funded ratio is expected to change as follows:

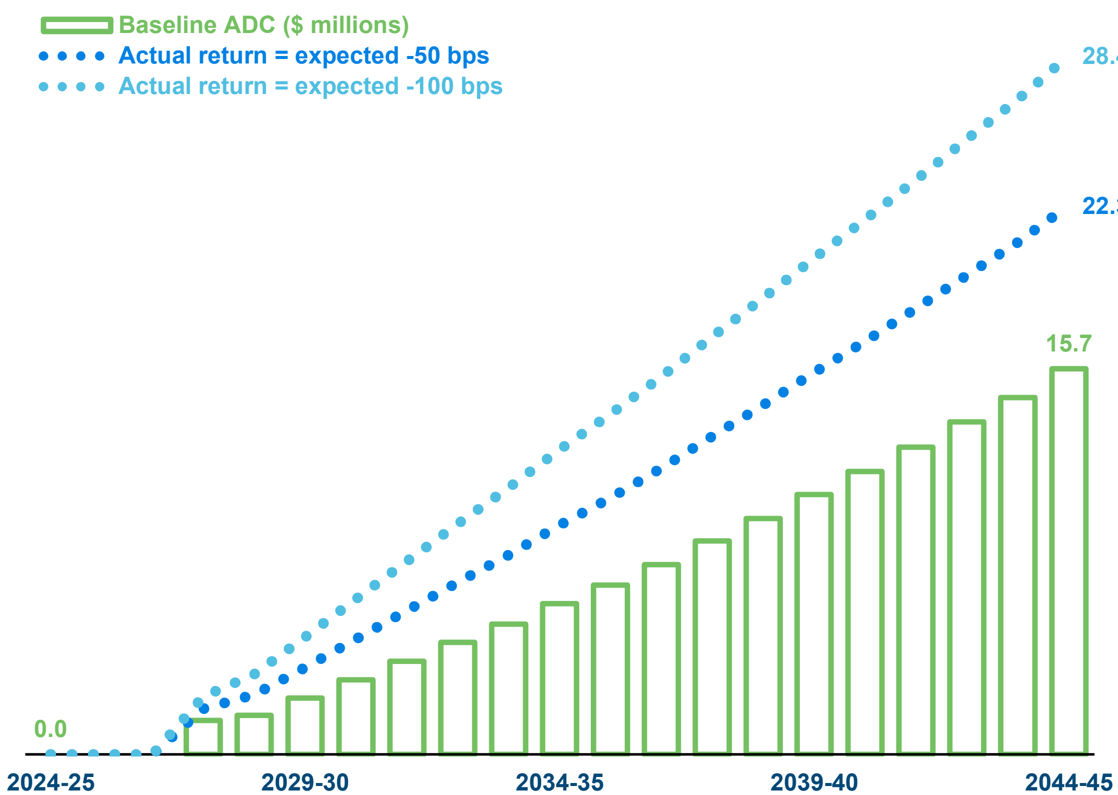


To the extent that there are future investment or liability gains or losses, changes in the actuarial assumptions or methods, or plan changes, the actual valuation results will differ from these forecasts. Please see Section III D for more details of the long range forecast.

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 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.

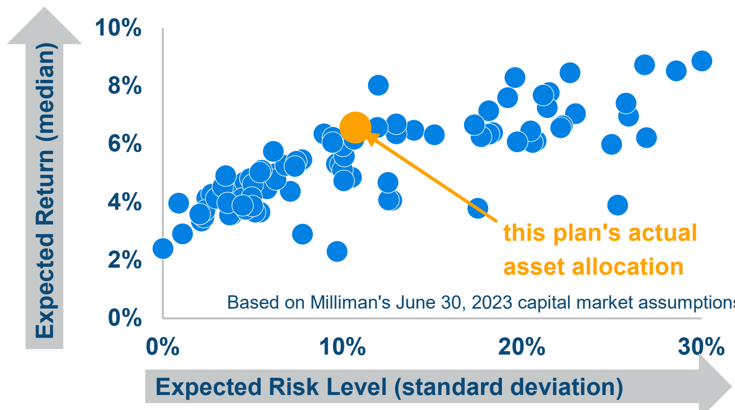
This work product was prepared solely for the City for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their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

Section I - Executive Summary
Asset Allocation

Monies that flow out of a pension plan (benefits and expenses) must be matched over the long term by monies that flow into the plan (contributions and investment income). This is expressed in a classic equation: **B** (benefits) + **E** (expenses) = **C** (contributions) + **I** (investment income).

Actuarial assumptions enable us to anticipate the long-term levels of **B** (benefits) and **E** (expenses) that will be paid out of the plan. In order to determine the appropriate level of **C** (contributions) that should come in to the plan, we must first anticipate the long-term level of **I** (investment income) the plan is likely to receive. That is why, for purposes of calculating the Actuarially Determined Contribution, we measure this plan's liability using the long-term rate of investment returns this plan's portfolio is expected to generate.

Pension plans construct their portfolios by allocating assets across a wide range of asset classes with different risk and return profiles; the graph includes nearly 100 asset classes that pension plans invest in. As the graph illustrates, asset classes with higher expected returns also have higher risk levels; that is, a higher likelihood of experiencing both very good returns and very bad returns. Asset classes with lower expected returns also have lower risk levels.



The plan's actual allocation represents a balance. Investing in lower-returning asset classes should reduce future investment returns and therefore increase future City contributions, but the lower risk levels would result in lower year-over-year volatility in the Actuarially Determined Contribution and might provide more benefit security for plan members. Conversely, investing in higher-returning asset classes should increase future investment returns and therefore reduce future City contributions, but would also increase the volatility of those contributions and potentially reduce benefit security for plan members.

In the graph above, the asset class with the lowest risk level is US Cash, and the asset class with the highest risk level is Private Equity. If the plan were invested 100% in either of these extremes, it would impact the interest rate assumption and therefore the Accrued Liability, Funded Ratio, and ultimately the City's annual contributions; the volatility of the contributions would also change based on the risk level of the portfolio:

	100% US Cash *	Plan's Interest Rate Assumption	100% Private Equity
Expected long-term return (median)	2.9%	6.50%	8.9%
Expected risk level (standard deviation)	1.1%	10.7%	30.0%
Accrued Liability on July 1, 2023 **	$892.6 million	$601.3 million	$464.1 million
Funded Ratio on July 1, 2023 ***	83%	124%	160%

* This would be considered a "low-default-risk obligation measure" (LDROM) using the language of ASOP 4.

** Calculated using the same actuarial assumptions and methods that were used for this valuation, except for the interest rate; the plan's duration on the valuation date, as measured for GASB 68 purposes, was used to estimate the impact of the interest rate difference relative to the valuation interest rate assumption.

*** Measured using the Actuarial Value of Assets

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 I - Executive Summary
Summary of Principal Results

Membership as of	July 1, 2022	July 1, 2023
Active Members	980	941
Terminated Members	169	205
Members in Pay Status	897	942
Total Count	2,046	2,088
Payroll	$59,113,919	$58,875,339

Assets and Liabilities as of	July 1, 2022	July 1, 2023
Market Value of Assets	$703,604,157	$733,844,047
Actuarial Value of Assets	733,028,950	744,150,539
Accrued Liability for Active Members	215,460,110	199,261,322
Accrued Liability for Terminated Members	7,532,638	9,477,701
Accrued Liability for Members in Pay Status	349,455,864	392,544,153
Total Accrued Liability	572,448,612	601,283,176
Unfunded Accrued Liability	(160,580,338)	(142,867,363)
Funded Ratio	128.1%	123.8%

Actuarially Determined Contribution for Fiscal Year	2023-24	2024-25
Normal Cost	$12,078,794	$11,999,454
Past Service Cost	(15,520,982)	(13,808,925)
Actuarially Determined Contribution	0	0

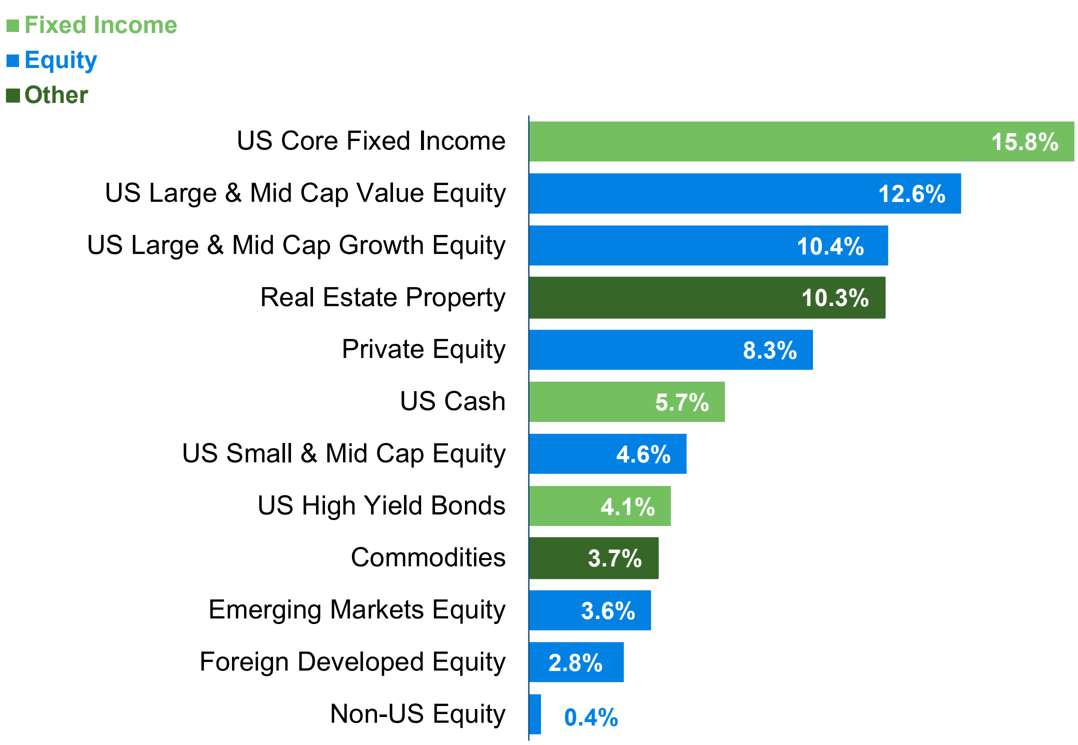
This work product was prepared solely for the City for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their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

Section II - Plan Assets
A. Summary of Fund Transactions

Market Value as of July 1, 2022	$703,604,157
City Contributions	0
Member Contributions	2,945,446
Net Investment Income	61,473,279
Benefit Payments	(34,178,835)
Administrative Expenses	0
Market Value as of June 30, 2023	733,844,047
Expected Return on Market Value of Assets	44,695,337
Market Value (Gain)/Loss	(16,777,942)
Approximate Rate of Return *	8.94%

* 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.

Actual Asset Allocation as of June 30, 2023



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 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 in equal installments ('non-asymptotically') over a five year period. The Actuarial Value of Assets as of July 1, 2023 is determined below.

1.	Expected Market Value of Assets:	
	a. Market Value of Assets as of July 1, 2022	$703,604,157
	b. City and Member Contributions	2,945,446
	c. Benefit Payments	(34,178,835)
	d. Expected Earnings Based on 6.50% Interest	44,695,337
	e. Expected Market Value of Assets as of July 1, 2023	717,066,105
2.	Actual Market Value of Assets as of July 1, 2023	733,844,047
3.	Market Value (Gain)/Loss: (1e) - (2)	(16,777,942)
4.	Delayed Recognition of Market (Gains)/Losses	

Plan Year End	(Gain)/Loss	Percent Not Recognized	Amount Not Recognized
6/30/2023	($16,777,942)	80%	($13,422,354)
6/30/2022	127,718,836	60%	76,631,302
6/30/2021	(149,570,251)	40%	(59,828,100)
6/30/2020	34,628,219	20%	6,925,644

		10,306,492
5.	Preliminary Actuarial Value of Assets as of July 1, 2023: (2) + (4)	744,150,539
6.	Approximate Rate of Return on Actuarial Value of Assets	5.90%
7.	Actuarial Value (Gain)/Loss	4,307,286

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
A. Past Service Cost

In determining the Past Service Cost, the Unfunded Accrued Liability is amortized over an open period of 20 years.

		City	Fire	Police	Total
1.	Accrued Liability				
	Active Members	$114,524,586	$30,850,257	$53,886,479	$199,261,322
	Terminated Members	7,563,361	0	1,914,340	9,477,701
	Service Retirees	184,305,962	63,927,343	112,841,468	361,074,773
	Disabled Retirees	995,420	1,387,569	9,108,299	11,491,288
	Beneficiaries	2,993,455	5,351,579	11,633,058	19,978,092
	Total Accrued Liability	310,382,784	101,516,748	189,383,644	601,283,176
2.	Actuarial Value of Assets (see Section IIB)				744,150,539
3.	Unfunded Accrued Liability: (1) - (2)				(142,867,363)
4.	Funded Ratio: (2) / (1)				123.8%
5.	Amortization Period				20
6.	Amortization Growth Rate				0.00%
7.	Past Service Cost: (3) amortized over (5)				(12,174,767)
8.	Interest on (7) to End of Following Fiscal Year				(1,634,158)
9.	Past Service Cost for Following Fiscal Year: (7) + (8)				(13,808,925)

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
B. Actuarial Gains / (Losses)

From one valuation to the next, the Accrued Liability and Actuarial Value of Assets may change in ways that were not anticipated by the actuarial assumptions that were used in the last valuation. If the Accrued Liability is lower than expected or the Actuarial Value of Assets is higher than expected, we say that the plan has experienced an 'actuarial gain', and if the Accrued Liability is higher than expected or the Actuarial Value of Assets is lower than expected, we say that the plan has experienced an 'actuarial loss'. The actuarial gains / (losses) that arose during 2022-23 are shown below, along with the impact of plan changes and changes in the actuarial assumptions and method. Please see page 3 for more details on any changes since the last valuation.

	Accrued Liability A	Actuarial Value of Assets B	Unfunded Accrued Liability = A - B
1. Value as of July 1, 2022	$572,448,612	$733,028,950	($160,580,338)
2. Normal Cost as of July 1, 2022	13,417,025		13,417,025
3. City Contributions during 2022-23		0	0
4. Employee Contributions during 2022-23		2,945,446	(2,945,446)
5. Benefit Payments during 2022-23	(34,178,835)	(34,178,835)	0
6. Administrative Expenses during 2022-23		0	0
7. One year of interest on (1) thru (2) at 6.50%	38,081,266	47,646,882	(9,565,616)
8. Half year of interest on (3) thru (6) at 6.50%	(1,110,812)	(984,618)	(126,194)
9. Expected value as of July 1, 2023	588,657,256	748,457,825	(159,800,569)
10. Actual value as of July 1, 2023 before any plan, assumption, or method changes	601,283,176	744,150,539	(142,867,363)
11. Experience gains / losses: (10) - (9)	12,625,920	(4,307,286)	16,933,206
12. Impact of plan changes (see page 3)	0	0	0
13. Impact of assumption changes (see page 3)	0	0	0
14. Impact of method changes (see page 3)	0	0	0
15. Final value as of July 1, 2023	601,283,176	744,150,539	(142,867,363)

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
C. Actuarially Determined Contribution for FY 2024-25

		City	Fire	Police	Total
1.	Total Normal Cost	$6,814,102	$2,301,353	$4,317,246	$13,432,701
2.	Expected Member Contributions	2,176,000	188,439	488,832	2,853,271
3.	Net Normal Cost: (1) - (2)	4,638,102	2,112,914	3,828,414	10,579,430
4.	Interest on (3) to End of Following Fiscal Year	622,550	283,605	513,869	1,420,024
5.	Normal Cost for Following Fiscal Year (3) + (4)	5,260,652	2,396,519	4,342,283	11,999,454
6.	Past Service Cost (see Section IIIA)				(13,808,925)
7.	Actuarially Determined Contribution for FY 2024-25: (5) + (6), not less than zero				0

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. Long Range Forecast

This forecast is based on the results of the July 1, 2023 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
7/1/2023	$601,283,176	$744,150,539	($142,867,363)	123.8%	2024-25	$0	$2,916,921	($35,511,876)	($32,594,955)
7/1/2024	618,391,000	759,377,000	(140,986,000)	122.8%	2025-26	0	3,006,000	(36,836,000)	(33,830,000)
7/1/2025	636,553,000	782,086,000	(145,533,000)	122.9%	2026-27	0	3,089,000	(38,106,000)	(35,017,000)
7/1/2026	654,896,000	774,581,000	(119,685,000)	118.3%	2027-28	1,373,000	3,145,000	(39,471,000)	(34,953,000)
7/1/2027	673,533,000	792,347,000	(118,814,000)	117.6%	2028-29	1,582,000	3,248,000	(40,760,000)	(35,930,000)
7/1/2028	692,178,000	807,761,000	(115,583,000)	116.7%	2029-30	2,283,000	3,306,000	(41,993,000)	(36,404,000)
7/1/2029	711,161,000	823,168,000	(112,007,000)	115.7%	2030-31	3,031,000	3,377,000	(43,315,000)	(36,907,000)
7/1/2030	730,575,000	839,088,000	(108,513,000)	114.9%	2031-32	3,793,000	3,470,000	(44,805,000)	(37,542,000)
7/1/2031	750,373,000	855,522,000	(105,149,000)	114.0%	2032-33	4,556,000	3,570,000	(46,252,000)	(38,126,000)
7/1/2032	770,448,000	872,369,000	(101,921,000)	113.2%	2033-34	5,300,000	3,651,000	(47,550,000)	(38,599,000)
7/1/2033	790,826,000	889,708,000	(98,882,000)	112.5%	2034-35	6,131,000	3,793,000	(48,717,000)	(38,793,000)
7/1/2034	811,811,000	907,685,000	(95,874,000)	111.8%	2035-36	6,881,000	3,925,000	(49,776,000)	(38,970,000)
7/1/2035	833,480,000	926,630,000	(93,150,000)	111.2%	2036-37	7,722,000	3,996,000	(50,956,000)	(39,238,000)
7/1/2036	856,139,000	946,624,000	(90,485,000)	110.6%	2037-38	8,680,000	4,115,000	(52,086,000)	(39,291,000)
7/1/2037	879,853,000	967,642,000	(87,789,000)	110.0%	2038-39	9,593,000	4,202,000	(53,156,000)	(39,361,000)
7/1/2038	904,685,000	989,971,000	(85,286,000)	109.4%	2039-40	10,570,000	4,328,000	(54,425,000)	(39,527,000)
7/1/2039	930,806,000	1,013,679,000	(82,873,000)	108.9%	2040-41	11,504,000	4,486,000	(55,692,000)	(39,702,000)
7/1/2040	958,162,000	1,038,755,000	(80,593,000)	108.4%	2041-42	12,498,000	4,637,000	(57,041,000)	(39,906,000)
7/1/2041	986,831,000	1,065,283,000	(78,452,000)	107.9%	2042-43	13,522,000	4,784,000	(58,939,000)	(40,633,000)
7/1/2042	1,016,880,000	1,093,324,000	(76,444,000)	107.5%	2043-44	14,521,000	4,960,000	(60,913,000)	(41,432,000)

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
E. History of Funded Status

Valuation Date	Actuarial Value of Assets	Accrued Liability	Unfunded Accrued Liability	Funded Ratio
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%
July 1, 2019	652,163,189	469,965,671	(182,197,518)	138.8%
July 1, 2020	670,545,781	499,837,872	(170,707,909)	134.2%
July 1, 2021	712,136,845	552,445,763	(159,691,082)	128.9%
July 1, 2022	733,028,950	572,448,612	(160,580,338)	128.1%
July 1, 2023	744,150,539	601,283,176	(142,867,363)	123.8%

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
F. History of City Contributions

Fiscal Year	Actuarially Determined Contribution	Actual City Contribution	Payroll	Actual Contribution as a Percent of Payroll
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	0	49,004,030	0.0%
2019-20	0	0	51,163,929	0.0%
2020-21	0	0	52,204,668	0.0%
2021-22	0	0	53,660,972	0.0%
2022-23	0	0	56,446,054	0.0%
2023-24	0	TBD	59,113,919	TBD
2024-25	0	TBD	58,875,339	TBD

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 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, 2022	980	46	123	796	23	78	2,046
Terminated							
- no benefits due	-	-	-	-	-	-	0
- paid refund	(26)	-	(17)	-	-	-	(43)
- benefits due	(60)	10	50	-	-	-	0
Retired	(64)	(4)	(1)	69	-	-	0
Died							
- with beneficiary	(2)	(1)	-	(2)	-	5	0
- no beneficiary	-	-	-	(22)	(1)	(4)	(27)
Returned to Active	-	-	-	-	-	-	0
New member	112	-	-	-	-	-	112
Rehired	1	-	-	-	-	-	1
New Alternate Payee	-	-	-	-	-	-	0
Correction	-	(1)	-	-	-	-	(1)
Count July 1, 2023	941	50	155	841	22	79	2,088
Breakdown July 1, 2023							
City	742	45	154	649	11	31	1,632
Fire	86	0	0	80	2	23	191
Police	113	5	1	112	9	25	265
Total	941	50	155	841	22	79	2,088

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 IV - Membership Data
B. Statistics of Active Membership

		As of July 1, 2022	As of July 1, 2023
Number of Active Members	City	773	742
	Fire	88	86
	Police	119	113
	Total	980	941
Average Age	City	47.8	47.7
	Fire	44.3	41.7
	Police	39.5	38.9
	Total	46.5	46.1
Average Service	City	9.8	9.5
	Fire	15.9	13.0
	Police	13.4	12.4
	Total	10.8	10.1
Total Payroll	City	$41,298,909	$41,304,197
	Fire	6,870,930	6,831,219
	Police	10,944,080	10,739,923
	Total	59,113,919	58,875,339
Average Payroll	City	$53,427	$55,666
	Fire	78,079	79,433
	Police	91,967	95,044
	Total	60,320	62,567

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 IV - Membership Data
C. Distribution of Active Members as of July 1, 2023

City

	Years of Service							
Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-29**	**30+**	**Total**
< 25	16							16
25-29	47	2						49
30-34	39	18	2					59
35-39	42	25	12	3				82
40-44	40	28	5	9	1			83
45-49	26	20	9	14	8			77
50-54	45	20	14	17	11	7	3	117
55-59	28	20	14	35	27	6	3	133
60-64	16	17	14	20	17	8	1	93
65+	6	7	7	4	6	1	2	33
Total	305	157	77	102	70	22	9	742

Fire

	Years of Service							
Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-29**	**30+**	**Total**
< 25	2							2
25-29	9							9
30-34	9	4	2					15
35-39	5	1	4					10
40-44	1		5	9	1			16
45-49			1	8	2			11
50-54				7	6	1		14
55-59				2	2	1	1	6
60-64		1					2	3
65+								0
Total	26	6	12	26	11	2	3	86

Police

	Years of Service							
Age	**0-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-29**	**30+**	**Total**
< 25	5							5
25-29	13	3						16
30-34	4	11	6					21
35-39	1	10	11	3				25
40-44		1	3	9	2			15
45-49	1	1	2	5	4			13
50-54		1			4	3		8
55-59			1	2		1	2	6
60-64	1					2	1	4
65+								0
Total	25	27	23	19	10	6	3	113

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 IV - Membership Data
D. Statistics of Inactive Membership

	As of July 1, 2022	As of July 1, 2023
Terminated Vested Members		
Number	46	50
Total Annual Benefit	$672,509	$862,550
Average Annual Benefit	14,620	17,251
Average Age	55.0	55.7
Nonvested Members Due Refunds		
Number	123	155
Service Retirees		
Number	796	841
Total Annual Benefit	$28,092,013	$30,982,199
Average Annual Benefit	35,291	36,840
Average Age	71.7	71.4
Disabled Retirees		
Number	23	22
Total Annual Benefit	$739,579	$749,995
Average Annual Benefit	32,156	34,091
Average Age	66.1	66.5
Beneficiaries		
Number	78	79
Total Annual Benefit	$1,676,304	$1,872,418
Average Annual Benefit	21,491	23,701
Average Age	78.5	77.1

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 IV - Membership Data
E. Distribution of Inactive Members as of July 1, 2023

	Age	Number	Annual Benefits
Terminated Vested Members	< 30	25	$0
(counts include Terminated Nonvested	30 - 39	57	20,799
Members Due Refunds and	40 - 49	47	323,428
Deferred Beneficiaries)	50 - 59	50	346,098
	60 - 64	9	13,976
	65 +	17	158,250
	Total	205	862,551
Service Retirees	< 50	1	$60,726
	50 - 59	64	4,110,872
	60 - 69	314	12,110,299
	70 - 79	307	10,905,435
	80 - 89	123	3,115,921
	90 +	32	678,946
	Total	841	30,982,200
Disabled Retirees	< 50	4	$244,248
	50 - 59	3	188,153
	60 - 69	5	156,047
	70 - 79	4	80,661
	80 - 89	5	78,996
	90 +	1	1,890
	Total	22	749,995
Beneficiaries	< 50	4	$190,868
	50 - 59	1	23,936
	60 - 69	11	328,416
	70 - 79	30	640,033
	80 - 89	22	439,408
	90 +	11	249,757
	Total	79	1,872,418

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 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 D for more information on the basis for the projected results shown on the following pages.

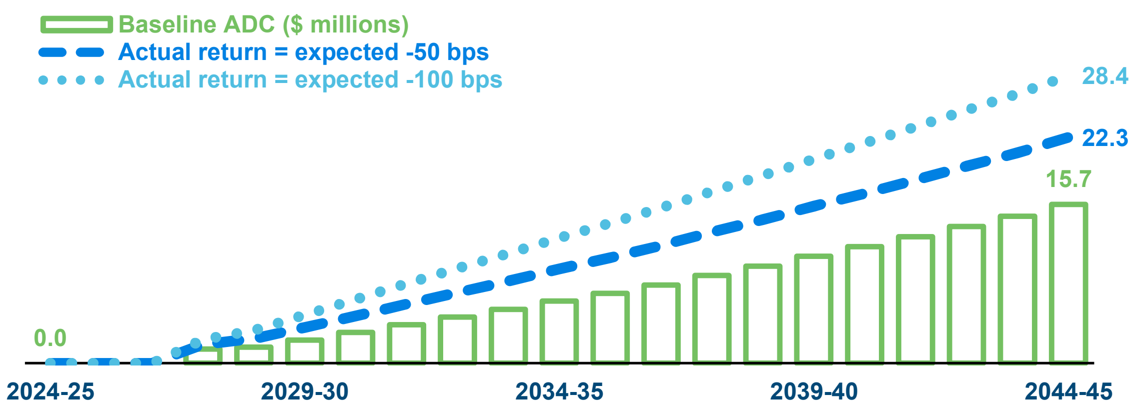
This work product was prepared solely for the City for the purposes described herein and may not be appropriate to use for other purposes. Milliman does not intend to benefit and assumes no duty or liability to other parties who receive this work. Milliman recommends that third parties be aided by their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

Section 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: The Actuarially Determined Contribution for the Retirement System is $0 and is projected to remain at $0 for a few more years, absent any market recovery or changes to the actuarial methods or assumptions. This situation should be monitored over the next few years.

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 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.

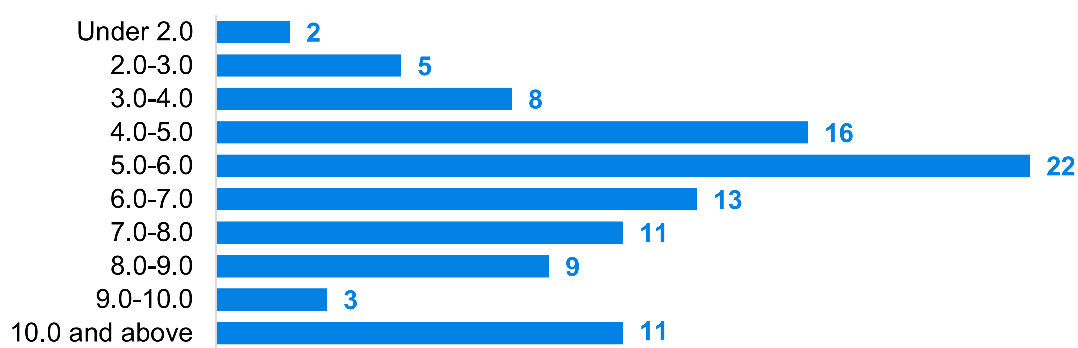
Identification: In 2022-23, the plan had negative cash flow, with city and member contributions to the plan of $2,945,446 compared to $34,178,835 of benefit payments paid out of the plan. We suggest that you consult with your investment advisors with respect to the liquidity characteristics of the plan's 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, 2023, the plan's Asset Volatility Ratio (the ratio of the market value of plan assets to payroll) is 12.5. According to Milliman's 2022 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 provides for some postretirement benefit increases, but the increases are not directly tied to each year's rate of actual inflation and not all members are eligible for these increases; this leaves members bearing some inflation risk.

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 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 has valuable retirement benefits. If members retire at earlier ages than are anticipated by the actuarial assumptions, this will put upward pressure on subsequent Actuarially Determined Contributions.

Pensionable Earnings Risk

Definition: This is the potential for active members to add items to their pensionable earnings and receive pension benefits that are higher than expected.

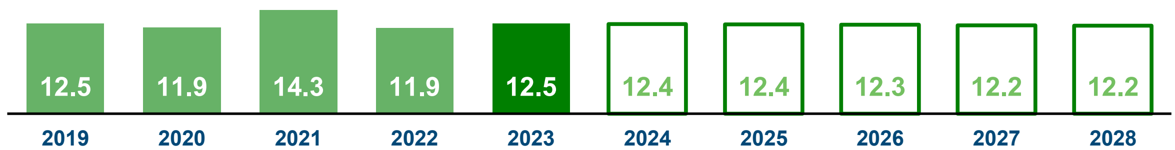
Identification: Compensation for benefit purposes includes compensated absences paid out at retirement. This valuation includes an assumed load for compensated absences, based on the referenced experience study. To the extent that actual compensated absences are different from expected, this could put additional pressure on subsequent Actuarially Determined Contributions.

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.

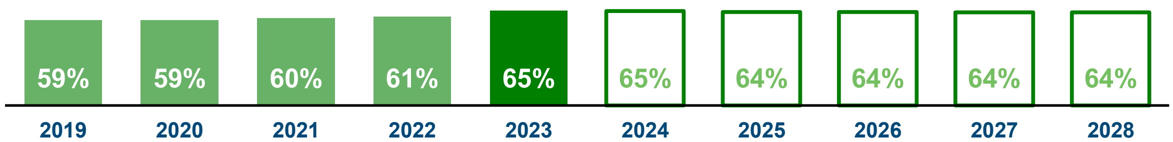
Section V - Analysis of Risk
C. Maturity Measures

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.

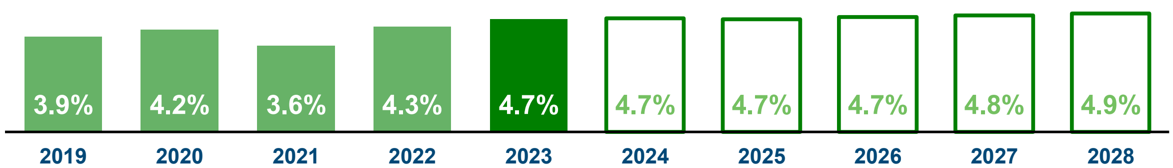
Asset Volatility Ratio: Market Value of Assets compared to Payroll



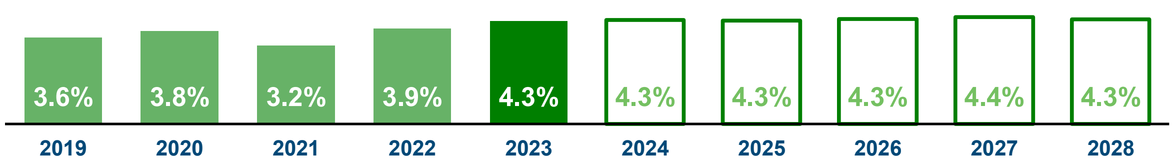
Accrued Liability for members in pay status compared to total Accrued Liability



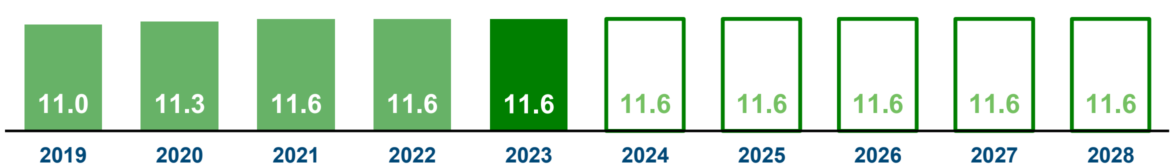
Benefit Payments compared to Market Value of Assets



Net Cash Flows compared to Market Value of Assets



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



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.

Appendix A - Actuarial Funding Method

The actuarial funding method used in the valuation of this Plan is known as the Entry Age Normal Method. The Actuarially Determined Contribution 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 non-asymptotically over a five year period.

Census data is gathered as of the January 1 preceding the valuation date. The benefits for retirees who are eligible for the pension escalator reflect the benefits payable as of the valuation date. No other adjustments are made to the census data except that age and service are measured as of the valuation date, assuming no change in status since the census 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.

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.

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, 2015 through June 30, 2020 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 6.50%

Inflation 2.40%

Salary Scale

Service	City	Fire	Police
1	10.00%	10.00%	11.00%
2	5.00%	10.00%	7.00%
3	5.00%	7.00%	7.00%
4	5.00%	3.25%	3.25%
5	4.00%	3.25%	3.25%
10	4.00%	3.25%	4.00%
15	3.50%	3.25%	3.25%
26+	3.00%	3.25%	3.25%

Expenses None.

Mortality

City

PubG-2010 Mortality Table with generational projection per the MP-2019 ultimate scale, with employee rates before benefit commencement and healthy or disabled annuitant rates after benefit commencement. This assumption includes a margin for improvements in longevity beyond the valuation date.

Fire and Police

PubS-2010 Mortality Table with generational projection per the MP-2019 ultimate scale, with employee rates before benefit commencement and healthy or disabled annuitant rates after benefit commencement. This assumption includes a margin for improvements in longevity beyond the valuation date.

Turnover

City

Service	Rate
<5	10.00%
5-7	5.00%
8-9	2.00%
10-11	5.00%
12-14	3.00%
15-24	1.50%
25+	0.00%

Fire and Police None

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.

Appendix B - Actuarial Assumptions

Retirement

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

City

Age	Attained Rule of 80	Not Yet Attained
55	50%	2%
56-59	20%	2%
60	22%	2%
61	25%	2%
62	40%	2%
63	30%	2%
64	25%	2%
65	28%	2%
66	40%	2%
67-69	25%	2%
70-74	30%	30%
75+	100%	100%

Fire

Age	Rate
49-54	5%
55-59	10%
60-64	40%
65+	100%

Police

Service	Rate
25	35%
26+	10%

Age	Rate
65+	100%

Pre-Retirement Disability

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

Fire and Police
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.

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.

Appendix B - Actuarial Assumptions

Form of Payment

City
100% of active members are assumed to elect a Life Annuity.

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

Deferred Retirement Option Plan (DROP)

Fire
Current active members are not assumed to elect the DROP. The DROP option was determined to have a de minimis impact on active liability. As members elect the DROP, their benefits are reflected accordingly, based on their status as of the January 1 census date preceding the valuation date.

City and Police
Not available.

Pension Escalation

Fire and Police
3% per year, limited based on date of retirement in accordance with the plan provisions.

City
None.

Compensated Absences

The Actuarial Accrued Liability for active members and Normal Cost have been increased by the following:

Group	Load
Board of Education	6.0%
City	14.0%
Fire	11.0%
Police	14.4%

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.

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

For employees of BPSA, BBHD, and Non-Bargaining hired after June 30, 2018, Local 233 hired after June 30, 2019, and Local 1338 hired after January 30, 2020: 2.0% x Final Average Earnings x years of Credited Service.

For all others: 2.4% x Final Average Earnings x years of Credited Service.

Maximum Benefit

For employees of BPSA, BBHD, and Non-Bargaining hired after June 30, 2018, Local 233 hired after June 30, 2019, and Local 1338 hired after January 30, 2020: Maximum benefit of 72% of Final Average Earnings.

For employees of BPSA and Non-Bargaining hired before June 30, 2018, without 25 years of Credited Service or not eligible for Unreduced Early Retirement at January 1, 2018: Maximum benefit of 100% of Final Average Earnings.

For all others: No maximum benefit.

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.

Appendix C - Summary of Plan Provisions - City

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.
Pre-Retirement Spouse's Death Benefit	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. 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.
Vesting	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.
Member Contributions	Board of Education Employees: 6.0% of pay. Employees of BPSA, BBHD, and Non-Bargaining hired after June 30, 2018, Local 233 hired after June 30, 2019, and Local 1338 hired after January 30, 2020: 5.5% of pay. All others: 4.5% of pay.

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.

Appendix C - Summary of Plan Provisions - City

Normal Form of Annuity	Life Annuity.
Prior Service Purchase	Members' dates of participation are adjusted to reflect periods purchased.
Ad hoc Retiree Cost-of-Living Adjustment (COLA)	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. 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.

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.

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 ¼ 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.

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.

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.

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 3.00% 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.

Deferred Retirement Option Plan (DROP)

An active member who completes 25 years of service may elect to participate in the DROP. During the DROP period, the member will have 55% (or 25% if hired after ratification of the 2019-2023 Agreement) of pension benefits earned through the DROP date credited to the DROP, without interest, and paid at actual retirement as a lump sum payment. Pension benefits will not increase during the DROP period, but at the end of the DROP period, any escalator will be applied to the pension benefit.

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.

Appendix C - Summary of Plan Provisions - Fire

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.

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.

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

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.

Any member after 30 years of continuous service as a regular police officer, by the request of the member.

Any regular member after 25 years of continuous service and attainment of age 60, by the request of the member.

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 Police 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 police 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.

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.

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. 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, 100% of the benefit that would have been payable to the member on retirement until the retiree would have attained age 75 and one-half of the benefit thereafter, 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.
Pension Escalation	Benefits increase as active members' salaries increase.
Pension Escalation Limit	Pre-December 15, 2002 retirees: no limit. Retirees between December 15, 2002 and June 30, 2018: 2.25% per year. Post-June 30, 2018 retirees: 2.50% per year.

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.

Appendix C - Summary of Plan Provisions - Police

Member Contributions	Members hired prior to March 10, 2020 contribute 4.875% (Prior: 6%) of Compensation on a pre-tax (Section 414(h)(2)) basis. Members hired after March 9, 2020 contribute 5.625% 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.

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.

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.

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.

PRELIMINARY REPORT PREPARED FOR:

Your Strategic Partner for Defined Benefit Plans

Month Ending 2/29/2024

John-Oliver Beirne, CRPC®, MBA
Partner & President
JOBeirne@beirnegroup.com
(203) 701-8976

Richard DeFrancesco, Jr.
Partner, Chief Operating Officer
RDeFrancesco@beirnegroup.com
(203) 951-3577

John Beirne, CIMA®
Founding Partner
JBeirne@beirnegroup.com
(203) 701-8974

Lindsey Allard, AWMA®, MBA
Partner, Managing Director
LAllard@beirnegroup.com
(203) 951-0305

Periods Ending 02/29/24

Name	1 Month	Last 3 Months	YTD	1 Year	3 Years	5 Years	10 Years	15 Years	20 Years
US Equity									
Russell 3000 Index	5.4	12.2	6.6	28.6	9.9	13.9	12.0	15.8	13.1
S&P 500 Index	5.3	12.0	7.1	30.5	11.9	14.8	12.7	16.0	13.4
Russell 1000 Index	5.4	12.1	6.9	29.8	10.7	14.4	12.4	16.0	13.3
Russell 1000 Growth Index	6.8	14.3	9.5	45.9	12.5	18.8	15.7	18.4	12.3
Russell 1000 Value Index	3.7	9.5	3.8	14.0	8.4	9.4	8.7	13.4	13.9
Russell Midcap Index	5.6	12.1	4.1	15.5	5.5	10.3	9.5	15.3	14.3
Russell 2000 Index	5.7	14.0	1.5	10.0	-0.9	6.9	7.1	13.3	10.9
Russell 2000 Growth Index	8.1	17.2	4.7	14.2	-4.6	6.5	7.3	13.8	7.8
Russell 2000 Value Index	3.3	10.8	-1.4	5.6	2.5	6.6	6.5	12.4	13.4
International Equity									
MSCI AC World Index	4.3	10.0	5.0	23.8	7.3	11.0	8.9	12.6	-
MSCI AC World ex USA	2.5	6.7	1.5	13.1	1.8	5.9	4.4	8.7	-
MSCI EAFE Index	1.8	7.9	2.4	15.0	5.0	7.3	4.9	9.1	11.0
MSCI Emerging Markets Index	4.8	3.9	-0.1	9.2	-5.9	2.3	3.4	7.8	-
Fixed Income									
90 Day U.S. Treasury Bill	0.4	1.3	0.8	5.2	2.4	2.0	1.3	0.9	5.5
Blmbg. U.S. Aggregate	-1.4	2.1	-1.7	3.3	-3.2	0.6	1.4	2.6	9.4
Blmbg. U.S. Gov't/Credit	-1.4	2.0	-1.6	3.7	-3.1	0.9	1.6	2.8	9.4
Bloomberg U.S. Municipal Bond Index	0.1	1.9	-0.4	5.4	-0.2	1.9	2.7	3.7	8.6
Blmbg. U.S. Corp: High Yield Index	0.3	4.0	0.3	11.0	1.8	4.2	4.3	9.0	9.9
Real Estate									
FTSE NAREIT All REITs Index	1.8	5.5	-3.1	4.2	3.2	4.0	6.5	13.3	10.2
NCREIF Property Index	-	-	-	-	-	-	-	-	-
Alternatives									
Barclay Hedge Fund Index	3.7	7.2	4.2	11.4	3.6	6.2	4.8	6.5	-
Inflation									
CPI - All Urban Consumers (SA)	-	-	-	-	-	-	-	-	3.0

Total Portfolio

Run Date: March 12, 2024
As of February 29, 2024

	Market Value ($)	% of Portfolio	Month	Quarter	YTD	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	15 Years	Inception (%)	Inception Date
Total Portfolio	761,601,607	100.00	1.64	4.59	2.32	12.34	4.50	8.00	6.39	8.01	8.54	Jan-92
Policy Index Blended New			*2.77*	*7.46*	*3.15*	*15.82*	*4.02*	*7.46*	*6.27*	*8.20*	*7.27*	
60% MSCI ACWI/40% BC Agg			*2.01*	*6.77*	*2.26*	*14.96*	*2.89*	*6.73*	*5.78*	*8.44*	*6.68*	
Credit	**175,639,121**	**23.06**	**-0.19**	**2.58**	**0.74**	**7.36**	**4.63**	**5.42**	**-**	**-**	**5.71**	**Jan-19**
Blmbg. U.S. Aggregate			*-1.41*	*2.08*	*-1.68*	*3.33*	*-3.16*	*0.56*	*1.43*	*2.65*	*0.74*	
High Quality Credit	**107,111,187**	**14.06**	**-0.35**	**3.51**	**0.29**	**5.70**	**1.49**	**3.63**	**-**	**-**	**3.97**	**Jan-19**
Blmbg. U.S. Aggregate			*-1.41*	*2.08*	*-1.68*	*3.33*	*-3.16*	*0.56*	*1.43*	*2.65*	*0.74*	
Boyd Watterson Fixed Income	29,209,467	3.84	-1.25	2.34	-1.29	3.36	-2.89	0.95	1.71	3.14	5.42	Apr-90
Blmbg. U.S. Aggregate			*-1.41*	*2.08*	*-1.68*	*3.33*	*-3.16*	*0.56*	*1.43*	*2.65*	*5.09*	
iShares Core US Aggregate Bond ETF(AGG)	15,040,458	1.97	-1.47	2.01	-1.62	-	-	-	-	-	1.66	Aug-23
Blmbg. U.S. Aggregate			*-1.41*	*2.08*	*-1.68*	*3.33*	*-3.16*	*0.56*	*1.43*	*2.65*	*1.70*	
GoldenTree High Grade Floating Rate Fund, Ltd.[CE]	37,214,586	4.89	0.59	3.09	2.17	10.75	4.53	4.00	-	-	3.61	Feb-18
Blmbg. U.S. Aggregate Float Adjusted			*-1.38*	*2.07*	*-1.62*	*3.48*	*-3.11*	*0.63*	*1.46*	*-*	*0.87*	
Golub Capital BDC 4, Inc.($22 million)	7,590,000	1.00	0.00	3.13	0.00	15.13	-	-	-	-	13.44	Dec-22
Blmbg. U.S. Aggregate			*-1.41*	*2.08*	*-1.68*	*3.33*	*-3.16*	*0.56*	*1.43*	*2.65*	*2.62*	
EnTrust Structured Income II-A	18,056,676	2.37	0.00	7.66	0.78	1.28	2.45	6.27	-	-	5.28	Jul-17
Blmbg. U.S. Aggregate			*-1.41*	*2.08*	*-1.68*	*3.33*	*-3.16*	*0.56*	*1.43*	*2.65*	*0.76*	
Multi-Credit	**68,527,934**	**9.00**	**0.06**	**1.14**	**1.46**	**9.86**	**10.31**	**8.34**	**-**	**-**	**8.58**	**Jan-19**
Blmbg. U.S. Corp: High Yield Index			*0.29*	*4.03*	*0.29*	*11.03*	*1.84*	*4.16*	*4.34*	*9.00*	*5.25*	
Prytania Athena Fund	13,679,710	1.80	0.00	3.67	2.79	19.22	5.63	0.69	3.56	-	3.56	Mar-14
Blmbg. Global High Yield Index			*0.79*	*4.65*	*0.60*	*12.25*	*0.39*	*2.86*	*3.44*	*8.53*	*3.43*	
EnTrust Structured Income Fund	6,974,664	0.92	0.00	14.45	6.40	10.41	8.61	7.89	7.06	-	6.48	Mar-13
Blmbg. U.S. Aggregate			*-1.41*	*2.08*	*-1.68*	*3.33*	*-3.16*	*0.56*	*1.43*	*2.65*	*1.32*	
Beach Point TR Offshore Fund II[CE]	9,830,280	1.29	0.42	3.92	1.64	12.41	4.47	5.68	4.31	-	5.84	Jan-12
Blmbg. U.S. Corp: High Yield Index			*0.29*	*4.03*	*0.29*	*11.03*	*1.84*	*4.16*	*4.34*	*9.00*	*5.67*	
Silver Point Specialty Credit Fund III, LP	6,652,272	0.87	0.00	3.15	0.00	-	-	-	-	-	8.65	Apr-23
Blmbg. U.S. Corporate Investment Grade Index			*-1.50*	*2.59*	*-1.67*	*5.97*	*-2.85*	*1.77*	*2.49*	*4.80*	*3.10*	
GWC Select Opportunities SPC1($2.6 million)	2,644,046	0.35	0.00	3.83	0.00	-	-	-	-	-	5.58	Sep-23
Blmbg. U.S. Corp: High Yield Index			*0.29*	*4.03*	*0.29*	*11.03*	*1.84*	*4.16*	*4.34*	*9.00*	*6.20*	
Greywolf Opportunities Offshore Fund II, LP($24 million)	12,721,663	1.67	0.00	-1.40	0.00	13.54	-	-	-	-	9.02	Oct-22
Blmbg. U.S. Corp: High Yield Index			*0.29*	*4.03*	*0.29*	*11.03*	*1.84*	*4.16*	*4.34*	*9.00*	*12.74*	
Greywolf Distressed Opp Fund, LP($17 million)	16,025,299	2.10	0.00	-6.87	0.00	0.19	6.73	-	-	-	6.71	Aug-20
Blmbg. U.S. Universal Index			*-1.20*	*2.30*	*-1.44*	*4.06*	*-2.81*	*0.85*	*1.73*	*3.15*	*-2.74*	

Total Portfolio

	Market Value ($)	% of Portfolio	Month	Quarter	YTD	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	15 Years	Inception (%)	Inception Date
Equity	**358,767,059**	**47.11**	**3.56**	**8.32**	**4.01**	**20.80**	**5.51**	**11.29**	**-**	**-**	**13.24**	**Jan-19**
MSCI AC World Index			*4.33*	*10.04*	*4.96*	*23.76*	*7.30*	*11.05*	*8.93*	*12.57*	*12.90*	
Public Equity	**292,383,828**	**38.39**	**4.41**	**10.45**	**4.97**	**24.35**	**5.33**	**11.04**	**-**	**-**	**13.03**	**Jan-19**
MSCI AC World Index			*4.33*	*10.04*	*4.96*	*23.76*	*7.30*	*11.05*	*8.93*	*12.57*	*12.90*	
Neuberger Berman Large Cap Growth	82,808,558	10.87	7.45	17.87	11.94	48.77	11.45	19.58	16.01	17.15	14.59	Feb-79
Russell 1000 Growth Index			*6.82*	*14.34*	*9.49*	*45.93*	*12.49*	*18.77*	*15.66*	*18.38*	*12.07*	
iShares Russell 1000 Value ETF(IWD)	6,436,835	0.85	3.57	9.38	3.64	13.75	8.21	9.16	-	-	9.69	Feb-19
Russell 1000 Value Index			*3.69*	*9.55*	*3.80*	*14.01*	*8.41*	*9.38*	*8.74*	*13.35*	*9.90*	
Columbia Dividend Income	16,938,089	2.22	3.40	9.33	4.73	17.04	10.96	-	-	-	11.20	May-19
Russell 1000 Value Index			*3.69*	*9.55*	*3.80*	*14.01*	*8.41*	*9.38*	*8.74*	*13.35*	*8.78*	
Eagle Equity	28,295,530	3.72	4.96	11.10	7.69	36.09	9.88	-	-	-	13.66	Apr-19
Russell 1000 Value Index			*3.69*	*9.55*	*3.80*	*14.01*	*8.41*	*9.38*	*8.74*	*13.35*	*9.40*	
Robeco LCV	46,507,620	6.11	4.19	11.59	5.44	18.29	11.77	11.28	9.48	-	10.20	Oct-13
Russell 1000 Value Index			*3.69*	*9.55*	*3.80*	*14.01*	*8.41*	*9.38*	*8.74*	*13.35*	*9.43*	
Patient Opportunity I(LMNOX)	7,438,969	0.98	6.54	19.39	5.43	27.57	-7.66	-	-	-	8.60	Apr-19
Russell 1000 Value Index			*3.69*	*9.55*	*3.80*	*14.01*	*8.41*	*9.38*	*8.74*	*13.35*	*9.40*	
Fiera SMID Growth	33,994,404	4.46	6.50	16.81	6.28	24.46	4.78	14.45	-	-	11.53	Nov-14
Russell 2500 Growth Index			*8.10*	*17.43*	*5.66*	*16.06*	*-2.79*	*8.76*	*9.03*	*15.22*	*9.62*	
Neuberger Berman International	21,565,499	2.83	0.90	6.35	1.51	10.94	0.83	5.95	4.72	9.54	6.23	Feb-05
MSCI EAFE Index			*1.84*	*7.90*	*2.44*	*15.01*	*4.97*	*7.29*	*4.89*	*9.13*	*5.57*	
Vanguard Developed Mkts Ind(VTMNX)	2,739,130	0.36	2.82	7.34	1.49	13.89	3.66	-	-	-	8.49	Mar-20
FTSE Developed x North America Index			*2.05*	*7.51*	*1.97*	*14.94*	*4.04*	*7.09*	*4.93*	*9.21*	*9.10*	
GAMCO Gold	10,621,284	1.39	-6.82	-15.66	-15.68	-4.40	-3.09	4.94	1.61	-	-4.01	Feb-12
Philadelphia Gold and Silver Index			*-7.20*	*-14.46*	*-16.13*	*-5.65*	*-4.40*	*8.95*	*2.00*	*-1.60*	*-4.16*	
Sprott Asset Management	8,283,703	1.09	-5.25	-10.11	-11.03	-0.71	-6.22	3.77	-0.25	-	-5.34	Feb-12
Philadelphia Gold and Silver Index			*-7.20*	*-14.46*	*-16.13*	*-5.65*	*-4.40*	*8.95*	*2.00*	*-1.60*	*-4.16*	
iShares MSCI Emerging Markets ETF(EEM)	14,071,800	1.85	4.17	3.01	-0.55	7.49	-7.22	1.11	-	-	3.22	Feb-17
MSCI Emerging Markets Index			*4.77*	*3.86*	*-0.08*	*9.18*	*-5.93*	*2.28*	*3.39*	*7.82*	*4.51*	
Glovista Emerging Markets	12,682,406	1.67	4.02	2.96	-0.60	5.05	-7.17	1.37	-	-	1.12	May-14
MSCI Emerging Markets Index			*4.77*	*3.86*	*-0.08*	*9.18*	*-5.93*	*2.28*	*3.39*	*7.82*	*3.09*	

Total Portfolio

	Market Value ($)	% of Portfolio	Month	Quarter	YTD	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	15 Years	Inception (%)	Inception Date
Private Equity	**66,383,231**	**8.72**	**0.00**	**-0.21**	**0.00**	**6.54**	**18.12**	**23.73**	**11.59**	**-**	**8.38**	**Jan-12**
7.5% Annual Return			*0.60*	*1.82*	*1.21*	*7.50*	*7.50*	*7.50*	*7.50*	*7.50*	*7.50*	
Arsenal III, LP($15 mill)	34,072,964	4.47	0.00	0.00	0.00	8.18	18.83	35.18	-	-	34.52	Feb-19
Arsenal Growth Equity IV, LP($35 mill)	10,883,298	1.43	0.00	0.00	0.00	-4.14	-	-	-	-	-3.83	Feb-23
Arsenal-Cart Investors II, LLC($2 million)	3,769,712	0.49	0.00	0.00	0.00	7.04	-	-	-	-	31.21	Nov-21
Arsenal-Elevate Investors I, LLC($4.6 million)	4,790,421	0.63	0.00	0.00	0.00	5.03	-	-	-	-	2.74	Sep-22
Arsenal-Sayari Investors, LLC($2 million)	3,246,159	0.43	0.00	0.00	0.00	35.92	-	-	-	-	23.07	Nov-21
GWC Select Opportunities SPC($2.5 million)	3,188,085	0.42	0.00	-0.52	0.00	24.11	-	-	-	-	20.00	Nov-22
Zephyr Peacock India Fund III Limited ($5 million)	2,908,630	0.38	0.00	-1.66	0.00	-15.83	4.87	2.11	4.75	-	1.23	Jun-12
Zephyr Peacock India Growth Fund US, LP($6 million)	3,523,962	0.46	0.00	-2.58	0.00	10.90	6.24	0.32	-	-	-2.21	Jul-18
Alternatives	**217,590,837**	**28.57**	**0.11**	**0.69**	**0.93**	**4.42**	**4.68**	**4.21**	**-**	**-**	**4.17**	**Jan-19**
Barclay Hedge Fund Index			*3.72*	*7.17*	*4.24*	*11.41*	*3.60*	*6.19*	*4.77*	*6.48*	*6.98*	
Real Estate	**71,460,183**	**9.38**	**0.00**	**-2.54**	**0.00**	**-3.66**	**2.66**	**3.67**	**-**	**-**	**3.71**	**Jan-19**
NCREIF Property Index			*0.00*	*-3.02*	*0.00*	*-7.94*	*4.57*	*4.33*	*6.80*	*6.43*	*4.19*	
Boyd Titanium GSA Fund ($34.5 million)	35,625,752	4.68	0.00	-2.19	0.00	-3.10	3.09	4.45	6.26	-	6.07	Oct-13
Boyd Watterson State Govt Fund, LP($10 million)	10,734,230	1.41	0.00	-1.98	0.00	-2.47	4.30	6.25	-	-	6.19	Feb-18
Boyd Diversified Gov't REIT($10 million)	24,267,528	3.19	0.00	1.44	0.00	5.74	-	-	-	-	4.90	Jan-23
Invesco Realty ($10 million)	37,944	0.00	0.00	0.00	0.00	-0.89	-0.99	-1.52	4.86	-	6.90	Dec-09
Invesco Mortgage Recovery Fund II, LP($10 million)	782,881	0.10	0.00	-60.84	0.00	-73.64	-39.28	-34.76	-	-	-17.48	Apr-15
Lone Star ($10 million)	11,848	0.00	0.00	8.07	0.00	94.63	79.36	42.68	30.38	-	21.71	Jun-11
Commodities	**5,869,240**	**0.77**	**0.00**	**0.00**	**0.00**	**-7.79**	**-0.09**	**-5.73**	**-**	**-**	**-5.55**	**Jan-19**
Bloomberg Commodity Index Total Return			*-1.47*	*-3.74*	*-1.08*	*-3.94*	*7.15*	*5.66*	*-1.84*	*0.35*	*6.76*	
Corrum Capital Real Assets, LP ($10 million)	5,869,240	0.77	0.00	0.00	0.00	-7.79	-0.09	-5.73	-	-	-0.10	Jun-15

Total Portfolio

	Market Value ($)	% of Portfolio	Month	Quarter	YTD	1 Yr (%)	3 Yrs (%)	5 Yrs (%)	10 Yrs (%)	15 Years	Inception (%)	Inception Date
Differentiated Return Stream	**140,261,414**	**18.42**	**0.18**	**2.47**	**1.46**	**9.55**	**5.91**	**4.58**	**-**	**-**	**4.43**	**Jan-19**
CPI+2%			-	-	-	-	-	-	-	-	-	
Kelly Park Capital	17,323,526	2.27	0.00	0.00	0.00	0.61	-3.26	-	-	-	0.45	Jan-20
Verition International Multi-Strategy Fund, Ltd.[CE]	42,660,362	5.60	0.58	3.09	2.20	9.15	6.96	-	-	-	12.84	Jan-20
OCO Opportunities Offshore Fund, Ltd.	19,652,563	2.58	0.00	7.97	5.80	15.80	12.72	16.02	8.27	-	8.33	Feb-14
Greywolf Containership Opps II, LP($6 million)	4,516,359	0.59	0.00	-6.68	0.00	1.96	-	-	-	-	4.95	Nov-22
Entrust Blue Ocean Fund, LP($17 million)	23,180,262	3.04	0.00	4.13	0.00	12.95	22.78	-	-	-	19.31	Apr-20
Entrust Blue Ocean Fund II, LP ($30 mill)	4,686,399	0.62	0.00	-1.53	0.00	-	-	-	-	-	-1.53	Dec-23
Longford Capital ($15 million)	2,800,988	0.37	0.00	0.00	0.00	4.94	18.60	18.50	7.26	-	3.72	Jul-13
Longford Capital Fund II, LP ($30 million)	15,056,093	1.98	0.00	0.00	0.00	14.11	2.03	5.93	-	-	1.29	Dec-16
Longford Capital Fund III, LP($30 million)	10,384,862	1.36	0.00	0.00	0.00	9.76	14.71	-	-	-	4.19	Apr-20
Cash	**9,604,590**	**1.26**	**0.40**	**1.26**	**0.83**	**4.99**	**2.30**	**1.74**	**-**	**-**	**1.75**	**Jan-19**
Cash Account	9,604,590	1.26	0.40	1.26	0.83	4.99	2.30	1.74	1.13	-	0.98	Jan-12
90 Day U.S. Treasury Bill			*0.41*	*1.31*	*0.84*	*5.22*	*2.43*	*1.97*	*1.33*	*0.92*	*1.11*	

Approx. 10% of portfolio is unvalued as of 2/29. Additionally, there is approx. 33% which is only valued quarterly.

Policy Index-Blended New = MSCI ACWI 55% / BBgBarc US Aggregate TR 25% / Barclay Hedge Fund Index 20%.

From 4/30/2022-1/1/2019 the Policy Index Blended New consists of MSCI ACWI 55% / BBgBarc US Aggregate TR 25% / HFRI Fund of Funds Composite Index 20%. Prior to 1/1/2019 the Policy Index Blended New consists of 15% Russell 1000 Growth, 15% Russell 1000 Value, 5% Russell MidCap, 13.6% MSCI EAFE, 7.5% MSCI Emerging Markets, 21.3% BC US Aggregate, 7.6% BofA HY BB-B Rated Constrained Index, 10% HFRX Global Hedge Fund Index, 5% Private Equity Actual.

Beirne Wealth Consulting Services, LLC (BWC) D/B/A beirne. All rights reserved.

For more information, please visit www.beirnewealth.com or call BWC at 888-231-6372. This contains confidential and proprietary information of BWC and is intended for the exclusive use of the parties to whom it was provided by BWC. Its content may not be modified, sold or otherwise provided, in whole or in part, to any other person or entity, without BWC's prior written permission.

The findings, ratings and/or opinions expressed herein are the intellectual property of BWC and are subject to change without notice. They are not intended to convey any guarantees as to the future performance of the investment products, asset classes or capital markets discussed. Past performance does not guarantee future results. BWC's ratings do not constitute individualized investment advice.

Information contained herein has been obtained from a range of third party sources. While the information is believed to be reliable, BWC has not sought to verify it independently. As such, BWC makes no representations or warranties as to the accuracy of the information presented and takes no responsibility or liability (including for indirect, consequential or incidental damages) for any error, omission or inaccuracy in the data supplied by any third party.

This does not constitute an offer or a solicitation of an offer to buy or sell securities, commodities and/or any other financial instruments or products or constitute a solicitation on behalf of any of the investment managers, their affiliates, products or strategies that BWC may evaluate or recommend.

For the most recent approved ratings of an investment strategy, and a fuller explanation of their meanings, contact your BWCS representative.

Returns for pooled funds, e.g., mutual funds and collective investment trusts, are collected from third parties; they are not generally calculated by BWCS. Returns for separate accounts, with some exceptions, are calculated by BWC. Returns are reported net of manager fees unless otherwise noted.

A "since inception" return, if reported, begins with the first full month after funding, although actual inception dates (e.g., the middle of a month) and the timing of cash flows are taken into account in Composite return calculations.

BWC's preferred data source is the plan's custodian bank or record-keeper. If data cannot be obtained from one of the preferred data sources, data provided by investment managers may be used. Information on market indices and security characteristics is received from additional providers. While BWC has exercised reasonable professional care in preparing this report, we cannot guarantee the accuracy of all source information contained within. In addition, some index returns displayed in this report or used in calculation of a policy index, allocation index or other custom benchmark may be preliminary and subject to change.

All investments carry some level of risk. Diversification and other asset allocation techniques are not guaranteed to ensure profit or protect against losses.

This report may contain confidential or proprietary information and may not be copied or redistributed to any party not legally entitled to receive it.

This report is intended for the exclusive use of the client listed within the report. Content is privileged and confidential. Any dissemination or distribution is strictly prohibited. Information has been obtained from a variety of sources believed to be reliable though not independently verified. Any forecast represents median expectations and actual returns, volatilities and correlations will differ from forecasts. Please note each client has customized investment objectives and constraints and the investment strategy for each portfolio is based on a client-specific asset allocation model. Past performance does not indicate future performance and there is a possibility of a loss.

This report does not represent a specific investment recommendation. Please consult with your advisor, attorney, and accountant, as appropriate, regarding specific advice.

Please remember to review the periodic statements you receive from you custodian. If you do not receive periodic statements from your custodian or notice issues with the activity reported in those statements, please contact BWCS or your custodian immediately.

INDEX DEFINITIONS

- Citigroup 3 Month T-Bill measures monthly return equivalents of yield averages that are not marked to market. The Three-Month Treasury Bill Indexes consist of the last three three-month Treasury bill issues.

- Bloomberg Barclays Treasury U.S. T-Bills-1-3 Month Index includes aged U.S. Treasury bills, notes and bonds with a remaining maturity from 1 up to (but not including) 3 months. It excludes zero coupon strips.

- Bloomberg Barclays Capital US Treasury Inflation Protected Securities Index consists of Inflation-Protection securities issued by the U.S. Treasury.

- Bloomberg Barclays Muni Index is a rules-based, market-value-weighted index engineered for the long-term tax-exempt bond market. Bonds must be rated investment-grade by at least two ratings agencies.

- Bloomberg Barclays Muni 1 Year Index is the 1-year (1-2) component of the Municipal Bond index.

- Bloomberg Barclays Muni 3 Year Index is the 3-year (2-4) component of the Municipal Bond index.

- Bloomberg Barclays Muni 5 Year Index is the 5-year (4-6) component of the Municipal Bond index.

- Bloomberg Barclays Muni 7 Year Index is the 7-year (6-8) component of the Municipal Bond index.

- Bloomberg Barclays Intermediate U.S. Gov't/Credit is the Intermediate component of the U.S. Government/Credit index, which includes securities in the Government and Credit Indices. The Government Index includes treasuries and agencies, while the credit index includes publicly issued U.S. corporate and foreign debentures and secured notes that meet specified maturity, liquidity, and quality requirements.

- Bloomberg Barclays U.S. Aggregate Index covers the U.S. investment grade fixed rate bond market, with index components for government and corporate securities, mortgage pass-through securities, and asset backed securities.

- Bloomberg Barclays Global Aggregate ex. USD Indices represent a broad-based measure of the global investment-grade fixed income markets. The two major components of this index are the Pan-European Aggregate and the Asian-Pacific Aggregate Indices. The index also includes Eurodollar and Euro-Yen corporate bonds and Canadian government, agency and corporate securities.

- Bloomberg Barclays U.S. Corporate High Yield Index covers the universe of fixed rate, non-investment grade debt. Eurobonds and debt issues from countries designated as emerging markets (sovereign rating of Baa1/BBB+/BBB+ and below using the middle of Moody's, S&P, and Fitch) are excluded, but Canadian and global bonds (SEC registered) of issuers in non-EMG countries are included.

- JP Morgan Government Bond Index-Emerging Market (GBI-EM) Index is a comprehensive, global local emerging markets index, and consists of regularly traded, liquid fixed-rate, domestic currency government bonds to which international investors can gain exposure.

- The S&P 500 is a capitalization-weighted index of 500 stocks designed to measure performance of the broad domestic economy through changes in the aggregate market value of 500 stocks representing all major industries.

- The Dow Jones Industrial Index is a price-weighted average of 30 blue-chip stocks that are generally the leaders in their industry.

- The NASDAQ is a broad-based capitalization-weighted index of stocks in all three NASDAQ tiers: Global Select, Global Market and Capital Market.

- Russell 3000 is a market-cap-weighted index which consists of roughly 3,000 of the largest companies in the U.S. as determined by market capitalization. It represents nearly 98% of the investable U.S. equity market.

- Russell 1000 consists of the largest 1000 companies in the Russell 3000 Index.

- Russell 1000 Growth measures the performance of those Russell 1000 companies with higher P/B ratios and higher forecasted growth values.

- Russell 1000 Value measures the performance of those Russell 1000 companies with lower P/B ratios and lower forecasted growth values.

- Russell Mid Cap measures the performance of the 800 smallest companies in the Russell 1000 Index.

- Russell Mid Cap Growth measures the performance of those Russell Mid Cap companies with higher P/B ratios and higher forecasted growth values.

- Russell Mid Cap Value measures the performance of those Russell Mid Cap companies with lower P/B ratios and lower forecasted growth values.

- Russell 2000 consists of the 2,000 smallest U.S. companies in the Russell 3000 index.

- Russell 2000 Growth measures the performance of the Russell 2000 companies with higher P/B ratios and higher forecasted growth values.

- Russell 2000 Value measures the performance of those Russell 2000 companies with lower P/B ratios and lower forecasted growth values.

- Russell 2500 consists of the 2,500 smallest U.S. companies in the Russell 3000 index.

- Russell 2500 Growth measures the performance of the Russell 2500 companies with higher P/B ratios and higher forecasted growth values.

- Russell 2500 Value measures the performance of those Russell 2500 companies with lower P/B ratios and lower forecasted growth values.

- MSCI World captures large and mid-cap representation across 23 Developed Markets countries. With 1,645 constituents, the index covers approximately 85% of the free float-adjusted market capitalization in each country.

- MSCI ACWI (All Country World Index) ex. U.S. Index captures large and mid-cap representation across 22 of 23 Developed Markets countries (excluding the United States) and 23 Emerging Markets countries. With 1,859 constituents, the index covers approximately 85% of the global equity opportunity set outside the US.

- MSCI ACWI (All Country World Index) ex. U.S. Small Cap Index captures small cap representation across 22 of 23 Developed Markets countries (excluding the US) and 23 Emerging Markets countries. With 4,368 constituents, the index covers approximately 14% of the global equity opportunity set outside the US.

- MSCI EAFE is an equity index which captures large and mid-cap representation across Developed Markets countries around the world, excluding the US and Canada. With 930 constituents, the index covers approximately 85% of the free float-adjusted market capitalization in each country.

- MSCI EAFE Value captures large and mid-cap securities exhibiting overall value style characteristics across Developed Markets countries around the world, excluding the US and Canada. The value investment style characteristics for index construction are defined using three variables: book value to price, 12-month forward earnings to price and dividend yield. With 507 constituents, the index targets 50% coverage of the free float- adjusted market capitalization of the MSCI EAFE Index.

- MSCI EAFE Growth captures large and mid-cap securities exhibiting overall growth style characteristics across Developed Markets countries around the world, excluding the US and Canada. The growth investment style characteristics for index construction are defined using five variables: long-term forward EPS growth rate, short-term forward EPS growth rate, current internal growth rate and long-term historical EPS growth trend and long term historical sales per share growth trend. With 542 constituents, the index targets 50% coverage of the free float-adjusted market capitalization of the MSCI EAFE Index.

- MSCI Emerging Markets captures large and mid-cap representation across 23 Emerging Markets countries. With 836 constituents, the index covers approximately 85% of the free-float adjusted market capitalization in each country.

- Consumer Price Index is a measure of prices paid by consumers for a market basket of consumer goods and services. The yearly (or monthly) growth rates represent the inflation rate.

- FTSE NAREIT Equity REITs Index contains all Equity REITs not designed as Timber REITs or Infrastructure REITs.

- S&P Developed World Property defines and measures the investable universe of publicly traded property companies domiciled in developed markets. The companies in the index are engaged in real estate related activities, such as property ownership, management, development, rental and investment.

- S&P Developed World Property x U.S. defines and measures the investable universe of publicly traded property companies domiciled in developed countries outside of the U.S. The companies included are engaged in real estate related activities, such as property ownership, management, development, rental and investment.

- Bloomberg Commodity Index is calculated on an excess return basis and reflects commodity futures price movements. The index rebalances annually weighted 2/3 by trading volume and 1/3 by world production and weight-caps are applied at the commodity, sector and group level for diversification.

- HFRI Fund Weighted Composite Index is a global, equal-weighted index of over 2,000 single-manager funds that report to HFR Database. Constituent funds report monthly net of all fees performance in US Dollar and have a minimum of $50 Million under management or a twelve (12) month track record of active performance. The HFRI Fund Weighted Composite Index does not include Funds of Hedge Funds.

- The Alerian MLP Index is the leading gauge of energy Master Limited Partnerships (MLPs). The float adjusted, capitalization-weighted index, whose constituents represent approximately 85% of total float-adjusted market capitalization, is disseminated real-time on a price-return basis (AMZ) and on a total-return basis.

- The Adjusted Alerian MLP Index is commensurate with 65% of the monthly returns of the Alerian MLP Index to incorporate the effect of deferred tax liabilities incurred by MLP entities.

DEFINITION OF KEY STATISTICS AND TERMS

- Returns: A percentage figure used when reporting historical average compounded rate of investment return. All returns are annualized if the period for which they are calculated exceeds one year.

- Universe Comparison: The universe compares the fund's returns to a group of other investment portfolios with similar investment strategies. The returns for the fund, the index and the universe percentiles are displayed. A percentile ranking of 1 is the best, while a percentile ranking of 100 is the worst. For example, a ranking of 50 indicates the fund outperformed half of the universe. A ranking of 25 indicates the fund was in the top 25% of the universe, outperforming75%.

- Returns In Up/Down Markets: This measures how the fund performed in both up and down markets. The methodology is to segregate the performance for each time period into the quarters in which the market, as defined by the index, was positive and negative. Quarters with negative index returns are treated as down markets, and quarters with positive index returns are treated as up markets. Thus, in a 3 year or 12 quarter period, there might be 4 down quarters and 8 up quarters. A simple arithmetic average of returns is calculated for the fund and the index based on the up quarters. A simple arithmetic average of returns is calculated for the fund and the index based on the down quarters. The up-market capture ratio is the ratio of the fund's return in up markets to the index. The down-market capture ratio is the ratio of the fund's return in down markets to the index. Ideally, the fund would have a greater up market capture ratio than down market capture ratio.

- Standard Deviation: Standard deviation is a statistical measure of the range of performance within which the total returns of a fund fall. When a fund has a high standard deviation, the range of performance is very wide, meaning there is a greater volatility. Approximately 68% of the time, the total return of any given fund will differ from the average total return by no more than plus or minus the standard deviation figure. Ninety-five percent of the time, a fund’s total return will be within a range of plus or minus two times the standard deviation from the average total return. If the quarterly or monthly returns are all the same the standard deviation will be zero. The more they vary from one another, the higher the standard deviation. Standard deviation can be misleading as a risk indicator for funds with high total returns because large positive deviations will increase the standard deviation without a corresponding increase in the risk of the fund. While positive volatility is welcome, negative is not.

- R-Squared: This reflects the percentage of a fund’s movements that are explained by movements in its benchmark index. An R-squared of 100 means that all movements of a fund are completely explained by movements in the index. Conversely, a low R-squared indicates very few of the fund’s movements are explained by movements in the benchmark index. R-squared can also be used to ascertain the significance of a particular beta. Generally, a higher R-squared will indicate a more reliable beta figure. If the R-squared is lower, then the beta is less relevant to the fund’s performance. A measure of diversification, R-squared indicates the extent to which fluctuations in portfolio returns are explained by market. An R-squared = 0.70 implies that 70% of the fluctuation in a portfolio's return is explained by the fluctuation in the market. In this instance, overweighting or underweighting of industry groups or individual securities is responsible for 30% of the fund's movement.

- Beta: This is a measure of a fund’s market risk. The beta of the market is 1.00. Accordingly, a fund with a 1.10 beta is expected to perform 10% better than the market in up markets and 10% worse that the market in down markets. It is important to note, however, a low fund beta does not imply the fund has a low level of volatility; rather, a low beta means only that the fund’s market-related risk is low. Because beta analyzes the market risk of a fund by showing how responsive the fund is to the market, its usefulness depends on the degree to which the markets determine the fund's total risk (indicated by R-squared).

- Alpha: The Alpha is the nonsystematic return, or the return that cannot be attributed to the market. It can be thought of as how the manager performed if the market’s return was zero. A positive alpha implies the manager added value to the return of the portfolio over that of the market. A negative alpha implies the manager did not contribute any value over the performance of the market.

- Sharpe Ratio: The Sharpe ratio is the excess return per unit of total risk as measured by standard deviation. Higher numbers are better, indicating more return for the level of risk experienced. The ratio is a fund's return minus the risk-free rate of return (30-day T-Bill rate) divided by the fund’s standard deviation. The higher the Sharpe ratio, the more reward you are receiving per unit of total risk. This measure can be used to rank the performance of mutual funds or other portfolios.

- Treynor Ratio: The Treynor ratio measures returns earned in excess of that which could have been earned on a riskless investment per each unit of market risk. The ratio relates excess return over the risk-free rate to the additional risk taken; however, systematic risk is used instead of total risk. The Treynor ratio is similar to the Sharpe ratio, except in the fact that it uses the beta to evaluate the returns

- Tracking Error: Tracking error measures the volatility of the difference in annual returns between the manager and the index. This value is calculated by measuring the standard deviation of the difference between the manager and index returns. For example, a tracking error of +/- 5 would mean there is about a 68% chance (1 standard deviation event) that the manager's returns will fall within +/- 5% of the benchmark's annual return.

- Information Ratio: The information ratio is a measure of the consistency of excess return. This value is determined by taking the annualized excess return over a benchmark (style benchmark by default) and dividing it by the standard deviation of excess return.

- Downside Risk: Downside risk is a measure similar to standard deviation but focuses only on the negative movements of the return series. It is calculated by taking the standard deviation of the negative quarterly set of returns. The higher the factor, the riskier the product.