



RETIREMENT FUND FOR THE CITY OF NEW HAVEN POLICEMEN & FIREMEN

ACTUARIAL VALUATION REPORT

JULY 1, 2020





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Executive Summary

	July 1, 2020	July 1, 2018
Number of members		
Active employees	652	719
Terminated vested members	4	5
Vested in employee contributions only	32	19
Retired, disabled and beneficiaries	1,379	1,345
Total	2,067	2,088
Covered employee payroll	59,157,790	58,881,794
Average plan salary	90,733	81,894
Actuarial present value of future benefits	1,085,973,767	916,911,353
Actuarial accrued liability	970,550,110	815,058,578
Plan assets		
Market value of assets	325,990,716	318,891,692
Actuarial value of assets	331,776,985	337,062,669
Unfunded accrued liability	638,773,125	477,995,909
Funded ratio	34.2%	41.4%
Actuarially determined employer contribution (ADEC)		
Fiscal year ending	2022	2020
ADEC	51,975,070	38,629,282
Fiscal year ending	2023	2021
ADEC	53,274,447	39,595,014



Valuation Results and Highlights

Purpose of the Valuation

The purpose of the valuation is to develop the Actuarially Determined Employer Contribution (ADEC).

The ultimate cost of a pension plan is based primarily on the level of benefits promised by the plan. The pension fund's investment earnings serve to reduce the cost of plan benefits and expenses. Thus,

$$\text{Ultimate cost} = \text{Benefits Paid} + \text{Expenses Incurred} - \text{Investment Return} - \text{Employee Contributions}$$

The actuarial cost method distributes this ultimate cost over the working lifetime of current plan participants. By means of this budgeting process, costs are allocated to both past and future years, and a cost is assigned to the current year. The current year's allocated cost, or normal cost, is the building block upon which the actuarially determined employer contribution is developed. The July 1, 2020 valuation produces the contributions for the fiscal years ending 2022 and 2023.

Information Available in the Valuation Report

The Executive Summary is intended to emphasize the notable results of the valuation from the perspective of the Plan Sponsor. Supporting technical detail is documented in Results of the Valuation, Supporting Exhibits and Description of Actuarial Methods and Assumptions. A concise summary of the principal provisions of the Plan is outlined in Summary of Plan Provisions.

Changes Reflected in the Valuation

The mortality assumption was updated from RP-2014 with Scale MP-2018 to Pub-2010 with Scale MP-2020.

The investment return assumption was decreased from 7.75% to 7.25%.

The expected COLA increase assumption was updated to be based on a participant's tier.

The COLA buyout assumption was increased from 0% to 40%.

Retirement rates for participants with under 20 years of service was increased from 3% to 7%.

The overtime pay assumption was increased to 37% of budgeted pay.

The additional credited service due to unused sick leave assumption was increased from 3.0 years to 3.5 years.

The net impact of the assumption changes was an increase in the unfunded accrued liability and ADEC of \$80.1 million and \$6.1 million, respectively.

Cash Contribution for Fiscal Years Ending 2022 and 2023

The City cost is:	2022 Fiscal Year	2023 Fiscal Year
Police	\$26,687,692	\$27,354,885
Fire	25,287,378	25,919,562
Total	\$51,975,070	\$53,274,447

Liability Experience During Period Under Review

The plan experienced a net actuarial loss on liabilities of approximately \$11,330,000 since the prior valuation.



Asset Experience During Period Under Review

The plan's assets provided the following rates of return during the past two fiscal years:

	2019 Fiscal Year	2020 Fiscal Year
Market Value Basis	7.0%	7.1%
Actuarial Value Basis	4.3%	5.5%

The Actuarial Value of assets, rather than the Market Value, is used to determine plan contributions. The Actuarial Value spreads the asset volatility by recognizing 20% of the difference each year, thereby smoothing out fluctuations that are inherent in the Market Value.

Assessment and Measurement of Risks

Financial Significance of Plan

It is important to understand the size of the pension plan compared to the size of the sponsor of that plan. Additional pension contributions may be required at inopportune times for the plan sponsor. In general, a plan sponsor with assets or revenue that are much larger than the liabilities in its pension plans will be better able to withstand increases in required pension contributions.

Plan Maturity Measurements

	July 1, 2020	July 1, 2018
Actuarial accrued liability for members currently in pay status as a percentage of the total actuarial accrued liability	77.7%	75.6%
<ul style="list-style-type: none"> • A lower percentage results in greater volatility as the investment return assumption changes. • A higher percentage results in greater demand on cash due to a proportionately higher percentage of benefits being in pay status. 		

	July 1, 2020
Duration of benefit payments using an investment rate of return of 7.25%	12.4 years
<ul style="list-style-type: none"> • A higher duration will occur if the plan's percentage of members in pay status decreases. A plan with a higher duration will have a liability that is more sensitive to changes in the investment return assumption. 	



	July 1, 2020	July 1, 2018
Ratio of market value of assets to covered payroll	5.5	5.4

- A higher ratio is more typical of relatively mature plans with a larger percentage of inactive members and may cause more potential contribution volatility as pension fund assets fluctuate.

	July 1, 2020
Ratio of market value of assets to expected benefit payments	4.9

- A plan with a high percentage of members in pay status can have a low ratio. As the ratio decreases, liquidity risk increases, and may indicate the need to review (and potentially adjust) the plan sponsor's funding policy contribution.

Risks to Assess

Overriding Minimum Contribution

	Fiscal Year Ending 2022
Actuarially determined employer contribution (ADEC)	51,975,070
Overriding minimum contribution (OMC)*	74,664,113
Surplus (deficit) - ADEC vs. OMC	(22,689,043)

- A deficit suggests that a plan's current funding policy contribution approach may result in little to no progress being made towards: (1) reducing the plan's unfunded liability; and (2) increasing the plan's funded ratio in the near-term.

* As defined in "Public Pension Plan Funding Policy" (Society of Actuaries, 2010).

Estimated Impact of a 5% Reduction in Market Value of Assets

	Fiscal Year Ending 2022	Fiscal Year Ending 2023
Increase in actuarially determined employer contribution (ADEC)	223,263	228,844

- Plans would generally be subject to a larger amortization payment if the market value of assets were 5% smaller. As a result, the ADEC would generally be higher for up to 24 years.

Due to the asset smoothing method, the ADEC will additionally increase by the same amount in each of the next few years. Each of these additional contributions will continue for up to 24 years.



Historical Results

Valuation Year Beginning	Investment Return Assumption	Annual Effective Rate of Return on Market Value of Assets	Market Value of Assets as a % of Actuarial Accrued Liability	Benefit Payments as a % of Market Value of Assets
2020	7.25%	N/A	33.6%	N/A
2019	N/A	7.1%	N/A	20.2%
2018	7.75%	7.0%	39.1%	19.2%
2017	N/A	2.2%	N/A	17.5%
2016	7.75%	14.6%	39.1%	17.9%



Certification

This report presents the results of the July 1, 2020 Actuarial Valuation for Retirement Fund for the City of New Haven Policemen & Firemen (the Plan) for the purpose of estimating the funded status of the Plan and determining the Actuarially Determined Employer Contribution (ADEC) for the fiscal years ending June 30, 2022 and June 30, 2023. This report may not be appropriate for any other purpose.

The valuation has been performed in accordance with generally accepted actuarial principles and practices. It is intended to comply with all applicable Actuarial Standards of Practice.

In our opinion, the actuarial assumptions used in this report are reasonably related to the experience of the Plan and to reasonable long-term expectations. These assumptions are based on an experience study covering the period 2014 through 2020.

In preparing this valuation, I have relied on employee data provided by the Plan Sponsor, and on asset and contribution information provided by the Trustee. I have audited neither the employee data nor the financial information, although I have reviewed them for reasonableness.

The results in this valuation report are based on the Plan as summarized in the *Summary of Plan Provisions* section of this report and the actuarial assumptions and methods detailed in the *Description of Actuarial Methods and Assumptions* section of this report.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to factors such as, but not limited to, the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period or additional cost or contribution requirements based on the Plan's funded status); and changes in plan provisions or applicable law. Due to the limited scope of this report, an analysis of the potential range of such future measurements has not been performed.

I have no relationship with the employer or the Plan that would impair, or appear to impair, my objectivity in performing the work presented in this report. I am a member of the American Academy of Actuaries and meet its Qualification Standards to render the actuarial opinion contained herein.

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April 2, 2021

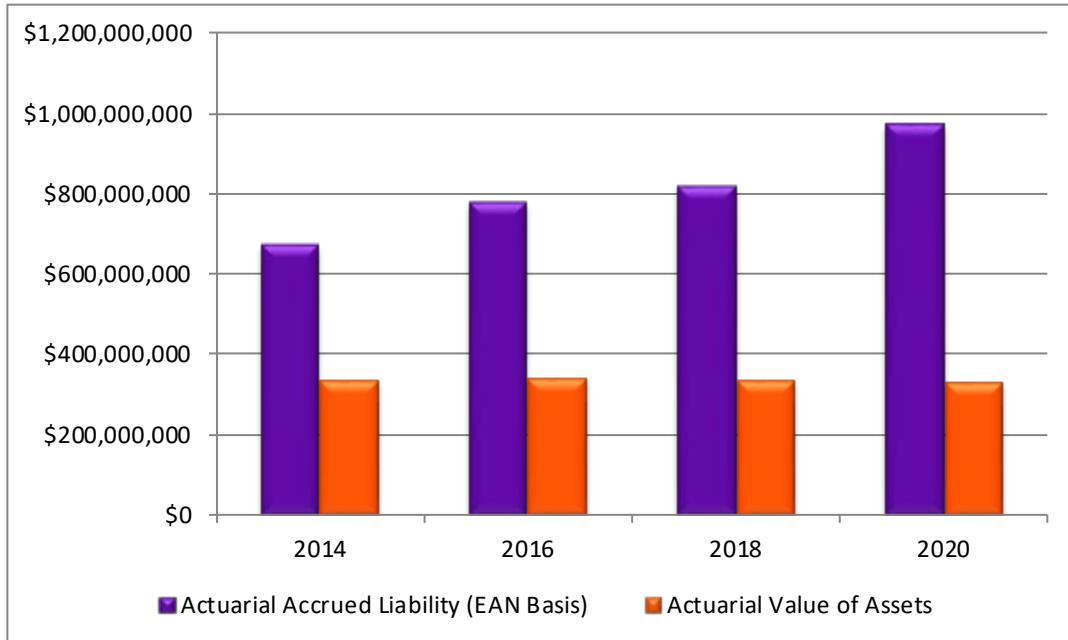


Development of Unfunded Accrued Liability and Funded Ratio

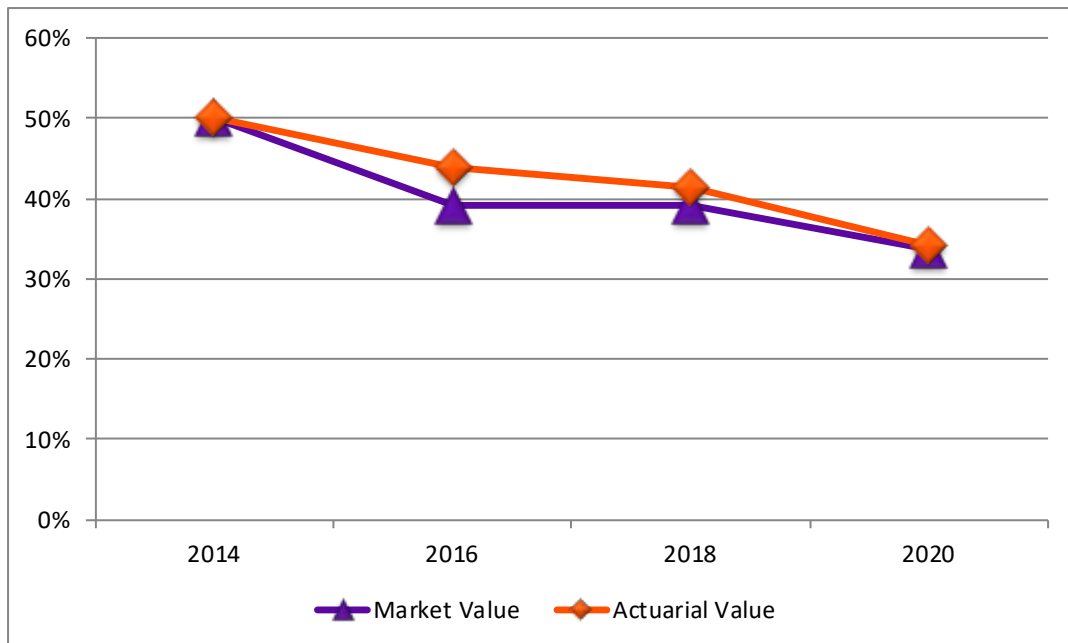
	July 1, 2020	July 1, 2018
Actuarial accrued liability for inactive members		
Retired, disabled and beneficiaries	\$754,461,853	\$616,341,655
Terminated vested members	1,710,829	2,351,710
Due refund of employee contributions only	<u>257,670</u>	<u>134,498</u>
Total	756,430,352	618,827,863
Actuarial accrued liability for active employees	<u>214,119,758</u>	<u>196,230,715</u>
Total actuarial accrued liability	970,550,110	815,058,578
Actuarial value of assets	<u>331,776,985</u>	<u>337,062,669</u>
Unfunded accrued liability	638,773,125	477,995,909
Funded ratio	34.2%	41.4%



Actuarial Accrued Liability vs. Actuarial Value of Assets



Funded Ratio



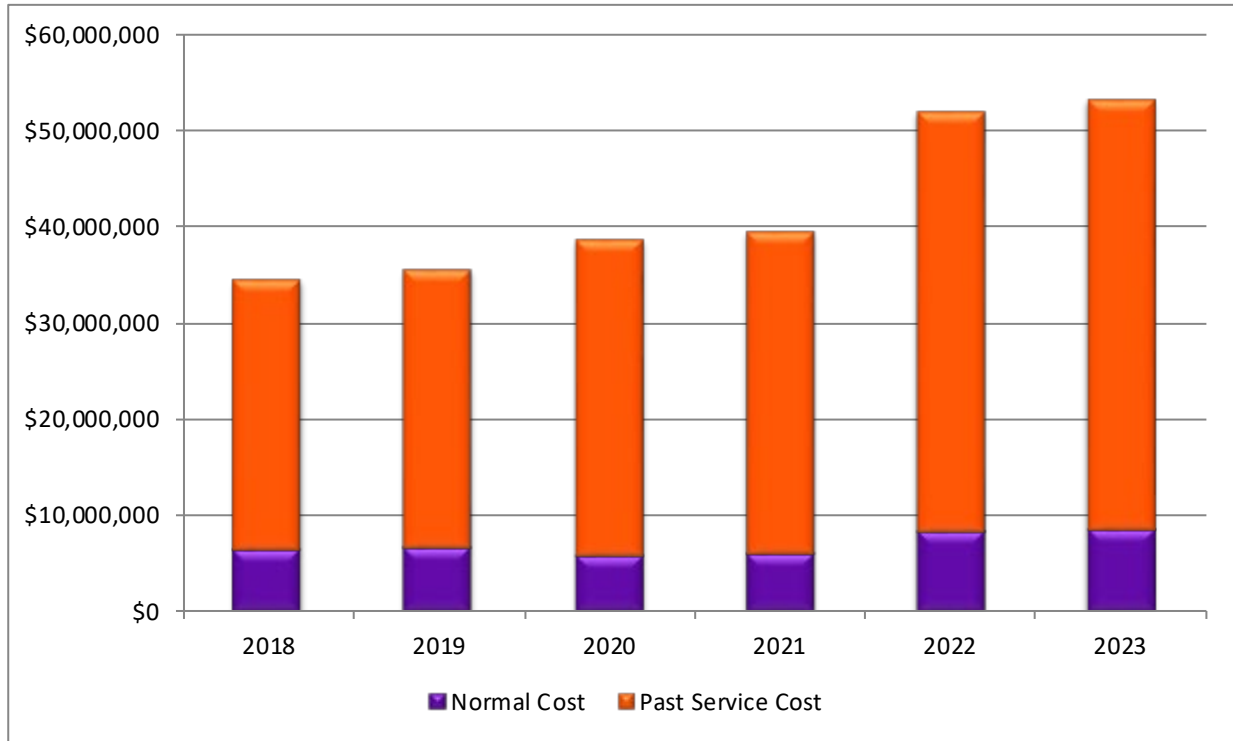


Determination of Normal Cost and Actuarially Determined Employer Contribution

	July 1, 2020		July 1, 2018	
	Cost	Percent of payroll	Cost	Percent of payroll
Gross normal cost	\$14,662,115	24.4%	\$12,521,969	20.3%
Estimated employee contributions	(6,919,971)	-11.5%	(7,120,087)	-11.5%
Estimated administrative expenses	284,200	0.5%	255,000	0.4%
City's normal cost	8,026,344	13.4%	5,656,882	9.2%
Amortization of unfunded accrued liability	42,681,041	71.0%	32,030,222	51.8%
Contribution before adjustment as of the valuation date	50,707,385	84.4%	37,687,104	61.0%
Estimated valuation year payroll for actives not yet at 100% assumed retirement age	60,113,647		61,815,310	
Fiscal year ending	2022		2020	
Adjustment for interest and inflation	1,267,685		942,178	
Actuarially determined employer contribution	51,975,070		38,629,282	
Fiscal year ending	2023		2021	
Adjustment for interest and inflation	1,299,377		965,732	
Actuarially determined employer contribution	53,274,447		39,595,014	



Actuarially Determined Employer Contribution





Actuarially Determined Employer Contribution per Group

	Police	Fire	Total
Gross normal cost	\$7,054,642	\$7,607,473	\$14,662,115
Estimated employee contributions	(3,689,640)	(3,230,331)	(6,919,971)
Estimated administrative expenses	136,742	147,458	284,200
City's normal cost	3,501,744	4,524,600	8,026,344
Actuarial accrued liability	512,437,679	458,112,431	970,550,110
Actuarial value of assets	175,173,880	156,603,105	331,776,985
Unfunded accrued liability	337,263,799	301,509,326	638,773,125
Amortization of unfunded accrued liability	22,535,028	20,146,013	42,681,041
Contribution before adjustment as of the valuation date	26,036,772	24,670,613	50,707,385
Estimated valuation year payroll for actives not yet at 100% assumed retirement age	30,746,999	29,366,648	60,113,647
City's normal cost as a percentage of payroll	11.4%	15.4%	13.4%
Contribution as a percentage of payroll	84.7%	84.0%	84.4%
Fiscal year ending June 30, 2022			
Adjustment for interest and inflation	650,920	616,765	1,267,685
Actuarially determined employer contribution	26,687,692	25,287,378	51,975,070
Fiscal year ending June 30, 2023			
Adjustment for interest and inflation	667,193	632,184	1,299,377
Actuarially determined employer contribution	27,354,885	25,919,562	53,274,447



Valuation Contribution Change

Valuation Contribution Change	
Contribution before adjustment as of July 1, 2018	\$37,687,104
Increase due to actuarial return on assets	\$1,313,074
Increase due to liability losses	790,649
Expected increase in normal cost	286,380
Expected increase in amortization of unfunded accrued liability	1,621,530
Increase due to assumption or method changes	6,080,850
Increase due to plan provision changes	2,528,967
Miscellaneous increase	<u>398,831</u>
Total increase in contribution	<u>13,020,281</u>
Contribution before adjustment as of July 1, 2020	50,707,385



Development of Asset Values

Summary of Fund Activity		
	Market Value	Actuarial Value
1. Beginning value of assets July 1, 2019		
Trust assets	\$322,421,119	\$332,722,831
2. Contributions		
City contributions during year	38,629,220	38,629,220
Employee contributions during year	7,464,385	7,464,385
Total for plan year	46,093,605	46,093,605
3. Disbursements		
Benefit payments during year	65,069,459	65,069,459
Administrative expenses during year	259,708	259,708
Total for plan year	65,329,167	65,329,167
4. Net investment return		
Interest and dividends	3,766,174	N/A
Realized and unrealized gain / (loss)	20,558,373	N/A
Expected return	N/A	24,722,003
Recognized gain / (loss)	N/A	(6,432,287)
Required adjustment due to corridor	N/A	0
Reversal of prior year required adjustment	N/A	0
Investment-related expenses	(1,519,388)	N/A
Total for plan year	22,805,159	18,289,716
5. Ending value of assets July 1, 2020		
Trust assets: (1) + (2) - (3) + (4)	325,990,716	331,776,985
6. Approximate rate of return	7.1%	5.5%



Relationship of Actuarial Value to Market Value

1. Market value 7/1/2020	\$325,990,716
2. Gain / (loss) not recognized in actuarial value 7/1/2020	<u>(5,786,269)</u>
3. Preliminary actuarial value 7/1/2020: (1) - (2)	331,776,985
4. Preliminary actuarial value as a percentage of market value: (3) ÷ (1)	101.8%
5. Gain / (loss) recognized for corridor minimum / maximum	N/A
6. Actuarial value 7/1/2020 after corridor minimum / maximum: (3) + (5)	331,776,985
7. Actuarial value as a percentage of market value: (6) ÷ (1)	101.8%

Development of Market Value Gain / Loss for 2019-2020 Plan Year

1. Market value 7/1/2019	\$322,421,119
2. City contributions	38,629,220
3. Employee contributions	7,464,385
4. Benefit payments	65,069,459
5. Administrative expenses	259,708
6. Expected return at 7.75%	<u>24,722,003</u>
7. Expected value 7/1/2020: (1) + (2) + (3) - (4) - (5) + (6)	327,907,560
8. Market value 7/1/2020	<u>325,990,716</u>
9. Market value gain / (loss) for 2019-2020 plan year: (8) - (7)	(1,916,844)

Recognition of Gain / Loss in Actuarial Value

Year	(a) Gain / (loss)	(b) Total recognized as of 7/1/2019	(c) Recognized in current year: 20% of (a)	(d) Total recognized as of 7/1/2020: (b) + (c)	(e) Not recognized as of 7/1/2020: (a) - (d)
2015-2016	(\$31,036,097)	(\$24,828,876)	(\$6,207,221)	(\$31,036,097)	\$0
2016-2017	20,606,749	12,364,050	4,121,350	16,485,400	4,121,349
2017-2018	(17,574,995)	(7,029,998)	(3,514,999)	(10,544,997)	(7,029,998)
2018-2019	(2,240,241)	(448,048)	(448,048)	(896,096)	(1,344,145)
2019-2020	(1,916,844)	0	<u>(383,369)</u>	(383,369)	<u>(1,533,475)</u>
Total			<u>(6,432,287)</u>		<u>(5,786,269)</u>



Summary of Fund Activity		
	Market Value	Actuarial Value
1. Beginning value of assets July 1, 2018		
Trust assets	\$318,891,692	\$337,062,669
2. Contributions		
City contributions during year	35,559,572	35,559,572
Employee contributions during year	7,284,324	7,284,324
Total for plan year	42,843,896	42,843,896
3. Disbursements		
Benefit payments during year	61,381,800	61,381,800
Administrative expenses during year	330,352	330,352
Total for plan year	61,712,152	61,712,152
4. Net investment return		
Interest and dividends	4,290,548	N/A
Realized and unrealized gain / (loss)	19,749,885	N/A
Expected return	N/A	24,637,924
Recognized gain / (loss)	N/A	(10,109,506)
Required adjustment due to corridor	N/A	0
Reversal of prior year required adjustment	N/A	0
Investment-related expenses	(1,642,750)	N/A
Total for plan year	22,397,683	14,528,418
5. Ending value of assets July 1, 2019		
Trust assets: (1) + (2) - (3) + (4)	322,421,119	332,722,831
6. Approximate rate of return	7.0%	4.3%



Relationship of Actuarial Value to Market Value

1. Market value 7/1/2019	\$322,421,119
2. Gain / (loss) not recognized in actuarial value 7/1/2019	<u>(10,301,712)</u>
3. Preliminary actuarial value 7/1/2019: (1) - (2)	332,722,831
4. Preliminary actuarial value as a percentage of market value: (3) ÷ (1)	103.2%
5. Gain / (loss) recognized for corridor minimum / maximum	N/A
6. Actuarial value 7/1/2019 after corridor minimum / maximum: (3) + (5)	332,722,831
7. Actuarial value as a percentage of market value: (6) ÷ (1)	103.2%

Development of Market Value Gain / Loss for 2018-2019 Plan Year

1. Market value 7/1/2018	\$318,891,692
2. City contributions	35,559,572
3. Employee contributions	7,284,324
4. Benefit payments	61,381,800
5. Administrative expenses	330,352
6. Expected return at 7.75%	<u>24,637,924</u>
7. Expected value 7/1/2019: (1) + (2) + (3) - (4) - (5) + (6)	324,661,360
8. Market value 7/1/2019	<u>322,421,119</u>
9. Market value gain / (loss) for 2018-2019 plan year: (8) - (7)	(2,240,241)

Recognition of Gain / Loss in Actuarial Value

Year	(a) Gain / (loss)	(b) Total recognized as of 7/1/2018	(c) Recognized in current year: 20% of (a)	(d) Total recognized as of 7/1/2019: (b) + (c)	(e) Not recognized as of 7/1/2019: (a) - (d)
2014-2015	(\$20,302,958)	(\$16,242,368)	(\$4,060,590)	(\$20,302,958)	\$0
2015-2016	(31,036,097)	(18,621,657)	(6,207,219)	(24,828,876)	(6,207,221)
2016-2017	20,606,749	8,242,700	4,121,350	12,364,050	8,242,699
2017-2018	(17,574,995)	(3,514,999)	(3,514,999)	(7,029,998)	(10,544,997)
2018-2019	(2,240,241)	0	<u>(448,048)</u>	(448,048)	<u>(1,792,193)</u>
Total			<u>(10,109,506)</u>		<u>(10,301,712)</u>

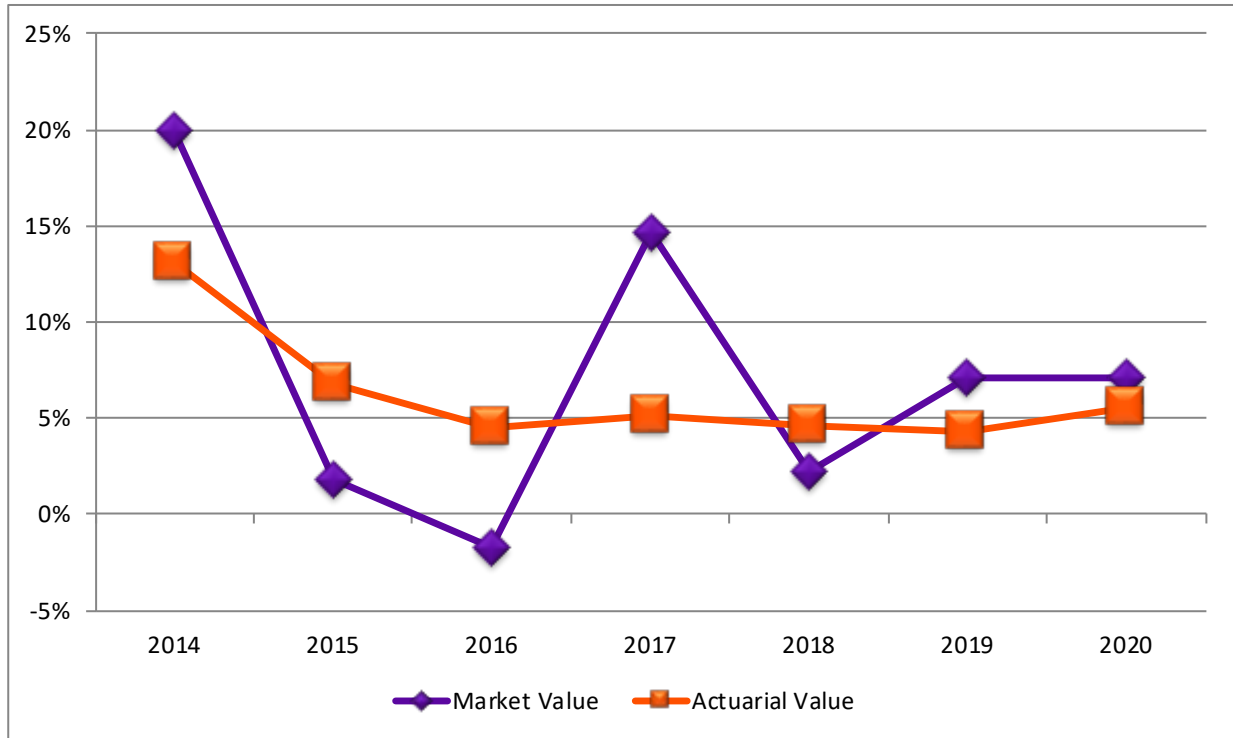


Rate of Return on Market Value of Assets				
Period Ending	Average Annual Effective Rate of Return			
	1 Year	3 Years	5 Years	10 Years
June 30				
2011	19.0%	4.0%	4.4%	4.8%
2012	-1.3%	9.8%	1.1%	5.3%
2013	15.6%	10.8%	5.1%	6.5%
2014	19.9%	11.0%	12.9%	7.1%
2015	1.8%	12.2%	10.7%	6.4%
2016	-1.8%	6.3%	6.5%	5.5%
2017	14.6%	4.7%	9.7%	5.3%
2018	2.2%	4.8%	7.0%	6.1%
2019	7.0%	7.8%	4.6%	8.7%
2020	7.1%	5.4%	5.7%	8.2%

Rate of Return on Actuarial Value of Assets				
Period Ending	Average Annual Effective Rate of Return			
	1 Year	3 Years	5 Years	10 Years
June 30				
2011	3.3%	2.0%	N/A	N/A
2012	0.9%	1.6%	N/A	N/A
2013	4.9%	3.0%	2.3%	N/A
2014	13.1%	6.2%	4.5%	N/A
2015	6.8%	8.2%	5.7%	N/A
2016	4.5%	8.1%	6.0%	N/A
2017	5.1%	5.5%	6.8%	N/A
2018	4.6%	4.7%	6.8%	4.5%
2019	4.3%	4.6%	5.0%	4.8%
2020	5.5%	4.8%	4.8%	5.3%



Actual Rate of Return on Assets





Target Allocation and Expected Rate of Return July 1, 2020

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return*	Weighting
US Large Cap Equity	20.00%	4.25%	0.85%
US Small/Mid Cap Equity	10.00%	4.51%	0.45%
Emerging Markets Equity	10.00%	5.11%	0.51%
AC World ex-US All Cap Equity Unhedged	10.00%	4.36%	0.44%
US Aggregate FI	10.00%	1.42%	0.14%
US High Yield FI	5.00%	3.12%	0.16%
Non-US Broad FI Unhedged	5.00%	1.38%	0.07%
Global Real Estate - Private	10.00%	5.47%	0.55%
Private Equity - Total	5.00%	7.28%	0.36%
Private Equity - Venture Cap	5.00%	7.39%	0.37%
MLPs	5.00%	4.65%	0.23%
Diversified Hedge Funds	5.00%	3.28%	0.16%
	100.00%		4.29%
Long-Term Inflation Expectation			2.50%
Long-Term Expected Nominal Return			6.79%

**Long-Term Real Returns are provided by Raymond James. The returns are geometric means.*

The long-term expected rate of return on pension plan investments was determined using a building block method in which best-estimate ranges of expected future real rates of return are developed. Best estimates of the real rates of return for each major asset class are included in the pension plan's target asset allocation.

The information above is based on geometric means and does not reflect additional returns through investment selection, asset allocation and rebalancing. An expected rate of return of 7.25% was used.



Amortization of Unfunded Liability

Schedule of Amortization Bases				
	Date established	Amortization installment	Years remaining	Present value of remaining installments as of July 1, 2020
2020 base	July 1, 2020	42,681,041	24	638,773,125



Member Data

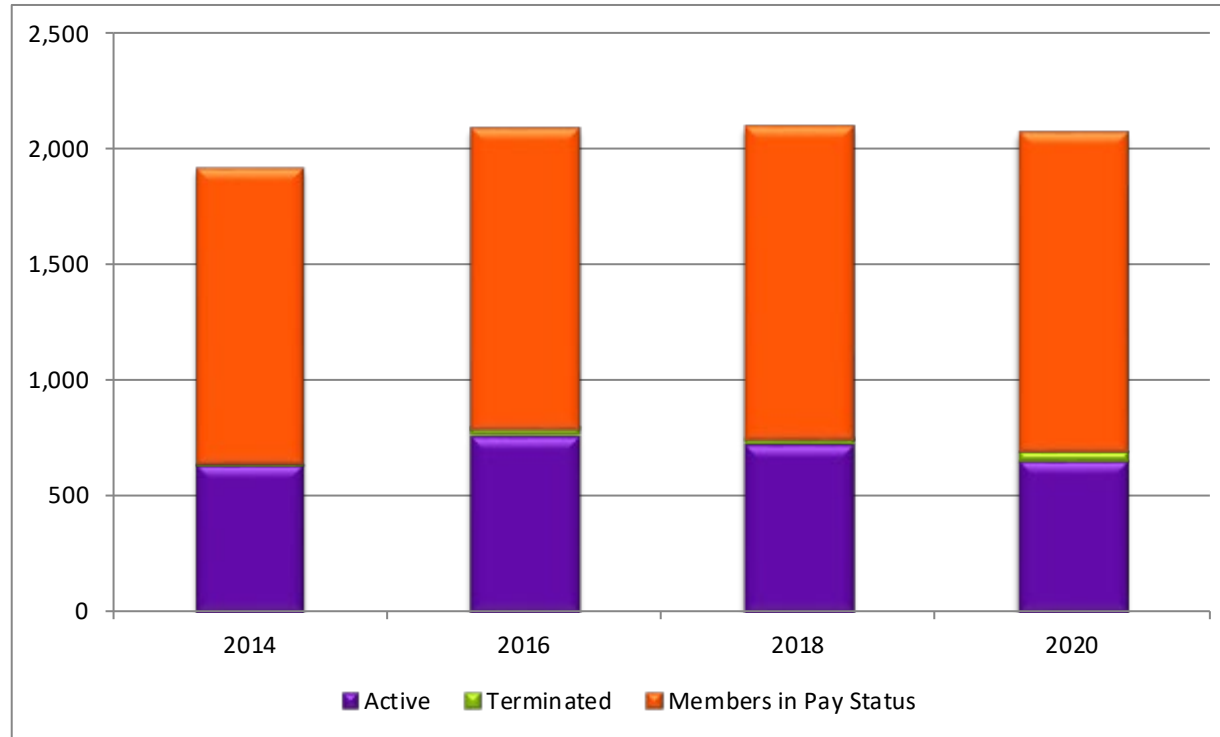
The data reported by the Plan Sponsor for this valuation includes 652 active employees who met the Plan's minimum age and service requirements as of July 1, 2020.

Member Data					
	Active	Terminated vested	Due refund of contributions	Members in pay status	Total
Total members July 1, 2018	719	5	19	1,345	2,088
Adjustments	0	0	0	-1	-1
Retirements	-83	-1	N/A	+84	0
Disabilities	-5	N/A	N/A	+5	0
Terminations					
Vested	0	0	N/A	N/A	0
Lump sum payments	-34	0	-5	N/A	-39
Due contributions only	-11	N/A	+11	N/A	0
Deaths					
With death benefit	0	0	0	-22	-22
Without death benefit	-1	0	0	-57	-58
Transfers	0	0	0	N/A	0
Rehires	+2	0	0	N/A	+2
New beneficiaries	N/A	N/A	N/A	+25	+25
New entrants	+65	N/A	+7	N/A	+72
Total members July 1, 2020	652	4	32	1,379*	2,067

* Includes 60 alternate payees receiving benefits



Member Counts by Status





Member Data				
	Active	Terminated vested	Due refund of contributions	Members in pay status
Average age				
July 1, 2018	38.5	49.0	35.6	66.6
July 1, 2020	38.8	51.5	35.2	66.6
Average service				
July 1, 2018	9.7	N/A	N/A	N/A
July 1, 2020	9.8	N/A	N/A	N/A
Covered employee payroll				
July 1, 2018	\$58,881,794	N/A	N/A	N/A
July 1, 2020	59,157,790	N/A	N/A	N/A
Total annual benefits				
July 1, 2018	N/A	\$237,521	N/A	\$58,581,595
July 1, 2020	N/A	169,795	N/A	64,593,445



Member Data - Police					
	Active	Terminated vested	Due refund of contributions	Members in pay status	Total
Total members July 1, 2018	388	2	17	743	1,150
Adjustments	0	0	0	-2	-2
Retirements	-52	0	N/A	+52	0
Disabilities	-4	N/A	N/A	+4	0
Terminations					
Vested	0	0	N/A	N/A	0
Lump sum payments	-29	0	-5	N/A	-34
Due contributions only	-8	N/A	+8	N/A	0
Deaths					
With death benefit	0	0	0	-16	-16
Without death benefit	0	0	0	-29	-29
Transfers	0	0	0	N/A	0
Rehires	+1	0	0	N/A	+1
New beneficiaries	N/A	N/A	N/A	+14	+14
New entrants	+39	N/A	+5	N/A	+44
Total members July 1, 2020	335	2	25	766	1,128



Member Data - Fire					
	Active	Terminated vested	Due refund of contributions	Members in pay status	Total
Total members July 1, 2018	331	3	2	602	938
Adjustments	0	0	0	+1	+1
Retirements	-31	-1	N/A	+32	0
Disabilities	-1	N/A	N/A	+1	0
Terminations					
Vested	0	0	N/A	N/A	0
Lump sum payments	-5	0	0	N/A	-5
Due contributions only	-3	N/A	+3	N/A	0
Deaths					
With death benefit	0	0	0	-6	-6
Without death benefit	-1	0	0	-28	-29
Transfers	0	0	0	N/A	0
Rehires	+1	0	0	N/A	+1
New beneficiaries	N/A	N/A	N/A	+11	+11
New entrants	+26	N/A	+2	N/A	+28
Total members July 1, 2020	317	2	7	613	939



Active Member Count by Age and Years of Service

Attained age	Completed Years of Credited Service										
	Under 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 and over	All years
Under 25	2	8									10
25 to 29	10	59	28								97
30 to 34	6	43	83	14							146
35 to 39	8	25	47	60	9						149
40 to 44	1	12	17	21	27	7					85
45 to 49		5	12	9	14	35	2				77
50 to 54		1	3	12	5	36	2				59
55 to 59		2	1	4	7	12					26
60 to 64						1	2				3
65 to 69											
70 & over											
All ages	27	155	191	120	62	91	6				652



Expected Benefit Payments from Trust Fund

An important consideration in formulating short-term or intermediate-term investment policy is the need for liquidity to meet the payment requirements of the Plan. The Plan's investment advisors may wish to compare expected benefit payments and expenses with anticipated cash income from investments and employer contributions.

The table below presents projected annual benefit payments for the next ten plan years. The following assumptions are reflected in this table:

- Retirements among active participants will occur at the valuation's assumed retirement date.
- Benefits will continue to accrue based on the current Plan.
- Plan salaries will increase in accordance with the valuation's assumption.
- Benefits will be paid monthly.
- Participants will receive the normal form of benefit.

Differences between actual experience and that assumed will affect the pattern of benefit payments.

Participant categories reflect status as of July 1, 2020.

Year	Active as of July 1, 2020	Retired and Terminated as of July 1, 2020	Total Benefit Payments
2020	\$1,952,000	\$64,686,000	\$66,638,000
2021	4,549,000	64,274,000	68,823,000
2022	6,952,000	64,082,000	71,034,000
2023	9,126,000	63,830,000	72,956,000
2024	11,211,000	63,492,000	74,703,000
2025	13,209,000	63,100,000	76,309,000
2026	15,111,000	62,627,000	77,738,000
2027	17,034,000	62,092,000	79,126,000
2028	19,317,000	61,519,000	80,836,000
2029	21,573,000	60,874,000	82,447,000



Long Range Forecast

Projected Values as of the Valuation Date					Cash Flows Projected to the Following Fiscal Year			
Fiscal Year Ending	Market Value of Fund - Beginning of Fiscal Year	City Contribution (ADEC) *	Employee Contributions	Estimated Benefit Payments	Estimated Administrative Expenses	Expected Net Cash Flow	Estimated Investment Earnings (@ 7.25%)	Market Value of Fund - End Fiscal Year
6/30/2021	\$325,990,716	\$39,595,000	\$6,920,000	\$66,638,000	\$284,000	(\$20,407,000)	\$24,091,000	\$329,675,000
6/30/2022	329,675,000	51,975,000	7,093,000	68,823,000	291,000	(10,046,000)	25,107,000	344,736,000
6/30/2023	344,736,000	53,274,000	7,270,000	71,034,000	298,000	(10,788,000)	26,212,000	360,160,000
6/30/2024	360,160,000	54,606,000	7,452,000	72,956,000	305,000	(11,203,000)	27,355,000	376,312,000
6/30/2025	376,312,000	55,971,000	7,638,000	74,703,000	313,000	(11,407,000)	28,560,000	393,465,000
6/30/2026	393,465,000	57,370,000	7,829,000	76,309,000	321,000	(11,431,000)	29,845,000	411,879,000
6/30/2027	411,879,000	58,804,000	8,025,000	77,738,000	329,000	(11,238,000)	31,230,000	431,871,000
6/30/2028	431,871,000	60,274,000	8,226,000	79,126,000	337,000	(10,963,000)	32,734,000	453,642,000
6/30/2029	453,642,000	61,781,000	8,432,000	80,836,000	345,000	(10,968,000)	34,358,000	477,032,000
6/30/2030	477,032,000	63,326,000	8,643,000	82,447,000	354,000	(10,832,000)	36,105,000	502,305,000
6/30/2031	502,305,000	64,909,000	8,859,000	83,817,000	363,000	(10,412,000)	38,000,000	529,893,000
6/30/2032	529,893,000	66,532,000	9,080,000	84,685,000	372,000	(9,445,000)	40,085,000	560,533,000
6/30/2033	560,533,000	68,195,000	9,307,000	85,366,000	381,000	(8,245,000)	42,400,000	594,688,000
6/30/2034	594,688,000	69,900,000	9,540,000	85,845,000	391,000	(6,796,000)	44,980,000	632,872,000
6/30/2035	632,872,000	71,648,000	9,779,000	86,141,000	401,000	(5,115,000)	47,862,000	675,619,000
6/30/2036	675,619,000	73,439,000	10,023,000	86,460,000	411,000	(3,409,000)	51,077,000	723,287,000
6/30/2037	723,287,000	75,275,000	10,274,000	87,035,000	421,000	(1,907,000)	54,643,000	776,023,000
6/30/2038	776,023,000	77,157,000	10,531,000	87,891,000	432,000	(635,000)	58,569,000	833,957,000
6/30/2039	833,957,000	79,086,000	10,794,000	88,572,000	443,000	865,000	62,882,000	897,704,000
6/30/2040	897,704,000	81,063,000	11,064,000	89,322,000	454,000	2,351,000	67,618,000	967,673,000

* ADECs are projected at the 2.50% inflator rate after the last published ADEC. ADECs assume a 7.25% rate of return after 7/1/2020



Description of Actuarial Methods

Asset Valuation Method

The Actuarial Value of assets used in the development of plan contributions phases in the recognition of differences between the actual return on Market Value and expected return on Market Value over a 5-year period at 20% per year.

Actuarial Cost Method

Changes in Actuarial Cost Method: None.

Description of Current Actuarial Cost Method: Entry Age Normal (level percentage of salary)

Normal Cost: Under this method, the total normal cost is the sum of amounts necessary to fund each active member's normal retirement benefit if paid annually from entry age to assumed retirement age. Entry age is the age at which the employee would have been first eligible for the plan, if it had always been in effect. The normal cost for each participant is expected to remain a level percentage of the employee's salary. The normal cost for the plan is the difference between the total normal cost for the year and the anticipated member contributions for that year.

Past Service Liability: The present value of future benefits that relates to service before the valuation date is the total past service liability. The unfunded past service liability is the difference between the total past service liability and any assets (including accumulated member contributions).

This amount is amortized over 24 years on a closed basis.

Experience Gains and Losses: All experience gains and losses (the financial effect of the difference between the actual experience during the prior period and the result expected by the actuarial assumptions for that prior period) appear directly in the past service liability and are amortized at the same rate the plan is amortizing the remaining unfunded past service liability.

In addition, an annual 2.50% amortization increase rate was assumed.



Description of Actuarial Assumptions

Changes in Actuarial Assumptions

The valuation reflects changes in the actuarial assumptions listed below. (The assumptions used before and after these changes are more fully described in the next section.)

- Mortality
- Retirement rate
- Overtime, longevity pay and private duty
- COLA increase
- COLA buyout
- Investment return
- Sick leave credit

The assumptions indicated were changed to represent the Enrolled Actuary's current best estimate of anticipated experience of the plan.

Investment rate of return

7.25% per year, net of investment expenses. (Prior: 7.75%)

Rate of amortization payment increase

2.50%.

Inflation

2.50%.

This assumption is based on long term historical inflation numbers. While near term averages have been lower, we do not believe this trend will continue indefinitely and expect that there will be a reversion to the long term average.

Salary increases

Age	Rate
20	9.75%
25	9.75%
30	7.50%
35	3.40%
40	3.00%
45	2.95%
50	2.75%
>=55	2.50%

Implicit inflation assumption is 2.50%.

The actuarial assumption in regards to rates of salary increases shown above are based on the results of an actuarial experience study for the period July 1, 2014 through June 30, 2020.



Overtime, longevity pay, and private duty

37% load on budgeted pay for Police and 37% load on budgeted pay for Fire.

(Prior: 32% load on budgeted pay for Police and 35% load on budgeted pay for Fire.)

The actuarial assumption shown above is based on the results of an actuarial experience study for the period July 1, 2014 through June 30, 2020.

The change in assumption for overtime, longevity pay, and private duty increased liabilities by approximately 0.4%.

Mortality

Pub-2010 Public Retirement Plans Amount-Weighted Mortality Table for Public Safety, projected to the valuation date with Scale MP-2020.

Prior: RP-2014 Adjusted to 2006 Blue Collar Mortality Table, projected to valuation date with Scale MP-2018.

Mortality improvement

Projected to date of decrement using Scale MP-2020 (generational mortality).

Prior: Projected to date of decrement using Scale MP-2018 (generational mortality).

We have selected this mortality assumption because it is based on the latest published public retirement mortality study released by the Society of Actuaries.

The mortality assumption was updated to better reflect anticipated experience.

The change in mortality and mortality improvement increased liabilities by approximately 3.4%, collectively.

Retirement age

Years of Service	Rate*
10-20	7%
20	30%
21-29	25%
30	30%
31-39	20%
40	100%

Prior:

Years of Service	Rate*
10-20	3%
20	30%
21-29	25%
30	30%
31-39	20%
40	100%

*100% are assumed to retire at age 65 or greater.

The actuarial assumption in regards to rates of retirement shown above is based on the results of an actuarial experience study for the period 2014 through 2020.

The change in the retirement rate assumption increased liabilities by approximately 0.1%.



Termination prior to retirement

Age	Years of Service			
	< 1	1	2	3+
20	5.96%	5.00%	4.20%	3.72%
25	5.56%	4.50%	3.70%	2.72%
30	5.16%	4.00%	3.20%	2.02%
35	4.76%	3.56%	2.76%	1.58%
40	4.36%	3.16%	2.36%	1.30%
45	3.96%	2.82%	2.02%	1.10%
50	3.56%	2.52%	1.72%	0.90%
>=55	3.00%	2.00%	1.00%	0.00%

The actuarial assumption in regards to rate of termination shown above is based on a standard table modified for certain plan features such as eligibility for full and early retirement where applicable and input from the plan sponsor.

The actuarial assumption in regards to rates of termination shown above is based on the results of an actuarial experience study for the period 2014 through 2020.

Disability

The 1985 Disability Pension Study, Class 4 hazardous occupations.

The actuarial assumption in regards to rates of decrement shown above are based on standard table. We reviewed the available experience and reflected it in the assumption.

Sick leave credit

Members who reach retirement or become disabled are assumed to purchase 3.5 years of additional credited service.

Prior: Members who reach retirement or become disabled are assumed to purchase 3.0 years of additional credited service (1.5 years for Police hired after July 1, 2001 and 0 years for Police hired post December 18, 2012.)

The actuarial assumption in regards to sick leave credit shown above is based on the results of an actuarial experience study for the period 2014 through 2020.

The change in assumption for sick leave credit increased liabilities by approximately 0.5%.

Administrative expenses

The estimate is based on actual expenses paid from the trust in the prior year. Estimated expenses are added to annual budget estimates at the time of their preparation.



Cost of living increases

Annual Cap	COLA	Police	Fire
4.00%	1.15%	Hired prior to March 29, 1997	Hired prior to April 23, 2004
3.00%	1.05%	Hired between April 23, 2004 and August 27, 2013	
2.00%	0.85%	Hired between March 29, 1997 and March 28, 2012	
1.50%	0.65%	Hired after March 28, 2012	Hired after August 27, 2013

Prior:

Annual Cap	COLA	Police	Fire
4.00%	1.40%	Hired prior to March 29, 1997	Hired prior to April 23, 2004
3.00%	1.20%	Hired between April 23, 2004 and August 27, 2013	
2.00%	0.90%	Hired between March 29, 1997 and March 28, 2012	
1.50%	0.70%	Hired after March 28, 2012	Hired after August 27, 2013

The actuarial assumption in regards to cost of living increases shown above is based on the results of an actuarial experience study for the period 2014 through 2020.

Percent of active employees married

80% of male employees and 70% of female employees assumed married.

Spouse's age

Husbands are assumed to be 2 years older than wives.

COLA buyout assumption

40% of retiring employees are assumed to elect the COLA buyout upon retirement.

Prior: 0% of retiring employees are assumed to elect the COLA buyout upon retirement.

The change in the COLA buyout assumption decreased liabilities by 0.3%.



Summary of Plan Provisions

This exhibit summarizes the major provisions of the Plan. It is not intended to be, nor should it be interpreted as a complete statement of all plan provisions. To the extent that this summary does not accurately reflect the plan provisions, then the results of this valuation may not be accurate.

Effective Date

January 1, 1958 and dates of subsequent amendments.

Plan Year

July 1 through June 30.

Eligibility

Automatic for policemen and firemen hired after December 31, 1957.

Employee Contributions

11.5% for Fire after July 1, 2014.

12% for Police effective after December 18, 2012.

10.0% for Police effective July 1, 2010.

9.75% for Police effective July 1, 2006.

9.25% for Police effective November 8, 2004.

8.75% of regular and premium pay plus:

for Police - 4.8% of private duty pay effective July 1, 2006.

3.8% of private duty pay after January 1, 1995.

for Fire - 4.375% of private duty pay after April 1, 1995.

6¼% of all earnings after June 30, 1985.

6½% of all earnings between July 1, 1984 and June 30, 1985.

6% of all earnings prior to July 1, 1984.

Continuous Service

Uninterrupted employment with the Police or Fire Departments. Also, members may purchase up to 5 years sick leave credit at retirement.

Service Retirement Date

20 years of continuous service. 25 years for Police hired after May 28, 2012 and Fire hired after August 27, 2013.

Mandatory Retirement Date

Police: Age 67 with no service requirement.

Fire: Age 65 with no service requirement.



Final Average Pay

Average total annual earnings for the 4 highest plan years of earnings (was 5 years for Police prior to July 1, 2004 and for Fire prior to July 1, 2006), or budgeted annual salary at time of retirement, whichever is greater. Total annual earnings includes 50% of extra duty compensation earned on and after July 1, 1994. For Police hired after November 1, 2009, and for Fire hired after August 27, 2013, earnings include only base wages for pension purposes.

For Police (effective July 1, 2004): In consideration for those employees who at the time of retirement have a four (4) year average that is not more than the employee's base salary, said employee's total annual earnings shall be the equivalent of the annual salary of an employee's holding the next higher rank to that held by the retiring employee prior to retirement. This provision shall automatically sunset (no longer exist) at 11:59 p.m. on July 15, 2007. For purposes of calculating the four (4) year average, only plainclothes differential pay, overtime and extra duty pay will be added to the regular pay.

Service Retirement Benefits

For members actively employed after June 30, 1994: 2½% (2% for Police hired after March 28, 2012 and for Fire hired after August 27, 2013) of final average pay for each year of service and fraction thereof up to 20 years plus 3% (2.5% for Police hired after March 28, 2012 and for Fire hired after August 27, 2013) of final average pay for each year of service and fraction thereof in excess of 20 years all subject to a maximum of 80% (effective July 1, 2004: 83% for Police retiring with at least 30 years of actual service, if cash in 30 sick days from the sick leave payout maximum at retirement of final average pay), and 70% for Police hired after May 28, 2012).

January 1, 1993 (June 30, 1993 for Fire) through June 30, 1994: 2½% times final average pay times years of service, up to a maximum of 75% of final average pay.

July 1, 1987 through January 1, 1993 (June 30, 1993 for Fire): 2% of final average pay for each year of service and fraction thereof up to 20 years plus 3% of final average pay for each year of service and fraction thereof in excess of 20 all subject to a maximum of 70% of final average pay.

Prior to July 1, 1987: 2% times final average pay times years of service subject to a maximum of 70% of final average pay.

Disability

For a non-service connected disability 5 years of continuous service is required in order to receive a disability benefit of 50% of final average pay. For service connected disability there is no service requirement and there is a minimum disability benefit of 50% of the employee's rate of pay at time of disability.

After August 31, 1984 policemen and firemen who retire on disability with less than 13 years of service will have their disability benefits reduced if their earnings while on disability exceed a certain level. No reductions will apply after the attainment of age 65.

Death Benefits

The monthly benefits payable to the widow and/or children are summarized as follows:

Pre-retirement Death Benefit:

1. Widow only - 50% (25% prior to July 1, 1987) of rate of pay being received at date of death;
2. Widow and one child - 60% (35% prior to July 1, 1987) of rate of pay being received at date of death; or
3. Widow and two or more children - 70% (45% prior to July 1, 1987) of rate of pay being received at date of death.

Special benefits for service connected deaths (equal to 100% of final salary less Worker's Compensation payments) are payable out of the City's General Fund.



Death Benefits (cont.)

Post-retirement Death benefit:

1. Widow only - for members actively employed after June 30, 1994: 65% of pension being paid at date of death - for other members: 50% of pension being paid at date of death;
2. Widow and one child - for members actively employed after June 30, 1994: 75% of pension being paid at date of death - for other members: 70% of pension being paid at date of death; or
3. Widow and two or more children - for members actively employed after June 30, 1994: 85% of pension being paid at date of death for other members: 90% of pension being paid at date of death.

In any event, the total cumulative benefit payments paid out of the Pension fund will amount to no less than the total contributions made by the employee to the plan.

Termination Benefits

Subject to the following requirements, a benefit equal to 2% times average total earnings for the 10 highest plan years of earnings times years of actual service will be payable starting on the date the terminated member would have become eligible for a normal service pension:

1. Completed 10 years of continuous service.
2. Elected to leave his accumulated contributions in the plan.

All other members will receive their accumulated employee contributions at their date of termination.

Cost of Living Adjustment

Policemen and Firemen, who retire after June 30, 1984 with a service retirement benefit which requires at least 20 years (25 years for members who retire before July 1, 1994) of service or who retire after June 30, 1984 as a result of a service connected disability with 20 years of service, and their eligible survivors will have their benefits increased or decreased every other January 1st starting on January 1, 1987 according to the U.S. Consumer Price Index subject to the following restrictions:

1. each increase or decrease will be limited to 4% (2% for Police hires after March 28, 1997 and 1.5% for Police hires after March 28, 2012), (3% for Fire hired after April 23, 2004 and 1.5% for Fire hired after August 27, 2013);
2. the overall increase in benefits will be limited to 25% (20% for members who retired before July 1, 1994); and
3. the cost of living adjustments will never reduce the benefit below its original level.
4. Accumulated maximum of 25% for Police retirees hired prior to March 29, 1997, and a maximum of 10% applies for such Police retirees hired after March 29, 1997. Accumulated maximum of 15% for Fire retirees hired after April 23, 2004 and 10% for Fire hired after August 27, 2013.
5. The retiree has the option to receive 40% of the actuarial value of the Cost of Living feature in exchange for forgoing the COLA.

Sick Leave

Policemen and Firemen may exchange up to 150 days of sick leave for pension credit. (30 days equal one year of pension service.)