



RETIREMENT FUND FOR THE CITY OF NEW HAVEN POLICEMEN & FIREMEN

ACTUARIAL VALUATION REPORT

JULY 1, 2018





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Executive Summary

	July 1, 2018	July 1, 2016
Number of members		
Active employees	719	752
Terminated vested members	5	5
Vested in employee contributions only	19	34
Retired, disabled and beneficiaries	1,345	1,290
Total	2,088	2,081
Covered employee payroll	58,881,794	61,714,054
Average plan salary	81,894	82,067
Actuarial present value of future benefits	916,911,353	879,478,079
Actuarial accrued liability	815,058,578	775,126,009
Plan assets		
Market value of assets	318,891,692	302,717,214
Actuarial value of assets	337,062,669	339,727,866
Unfunded accrued liability	477,995,909	435,398,143
Funded ratio	41.4%	43.8%
Actuarially determined employer contribution (ADEC)		
Fiscal year ending	2020	2018
ADEC	38,629,282	34,607,856
Fiscal year ending	2021	2019
ADEC	39,595,014	35,559,572



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, 2018 valuation produces the contributions for the fiscal years ending 2020 and 2021.

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 Scale MP-2016 to Scale MP-2018 and the inflation assumption was updated from 2.75% to 2.50%.

Cash Contribution for Fiscal Years Ending 2020 and 2021

The City cost is:	2020 Fiscal Year	2021 Fiscal Year
Police	\$19,526,884	\$20,015,056
Fire	<u>19,102,398</u>	<u>19,579,958</u>
Total	\$38,629,282	\$39,595,014

Liability Experience During Period Under Review

The plan experienced a net actuarial loss on liabilities of \$11,112,738 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:

	2017 Fiscal Year	2018 Fiscal Year
Market Value Basis	14.6%	2.2%
Actuarial Value Basis	5.1%	4.6%

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.

There remains 18.2 million in unrecognized losses as of July 1, 2018.



Certification

This report presents the results of the July 1, 2018 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, 2020 and June 30, 2021. This report is intended to satisfy the requirements of Connecticut General Statute 7-450a. 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.


I certify that the actuarial assumptions and methods that were selected by me and represent my best estimate of anticipated actuarial experience under the Plan.

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.


Richard S. Sych, FSA, FCA, MAAA,
Enrolled Actuary 17-05065

July 26, 2019

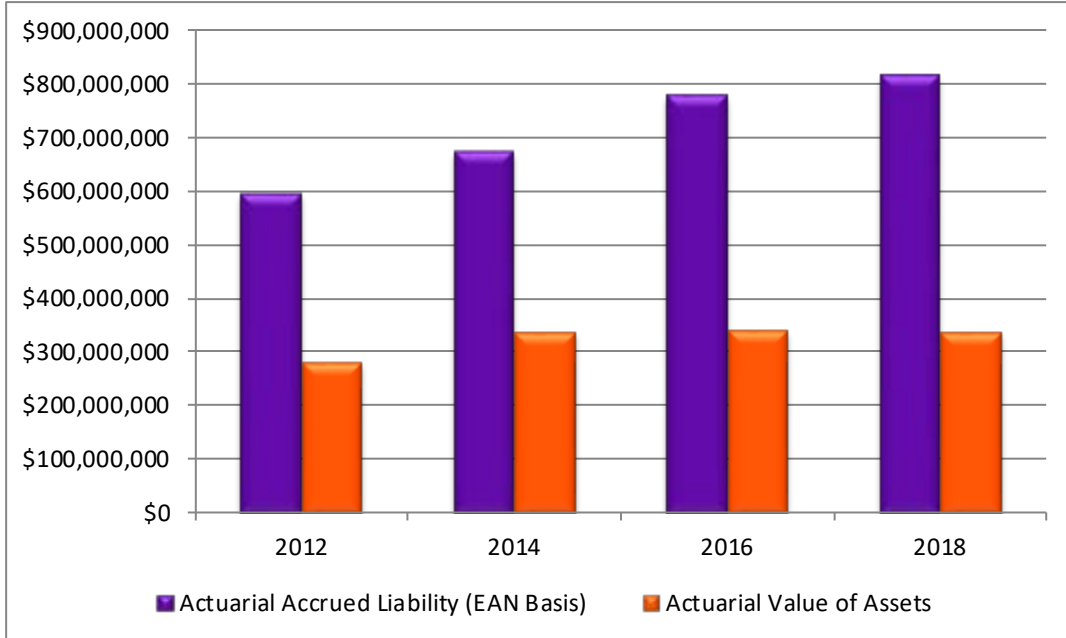


Development of Unfunded Accrued Liability and Funded Ratio

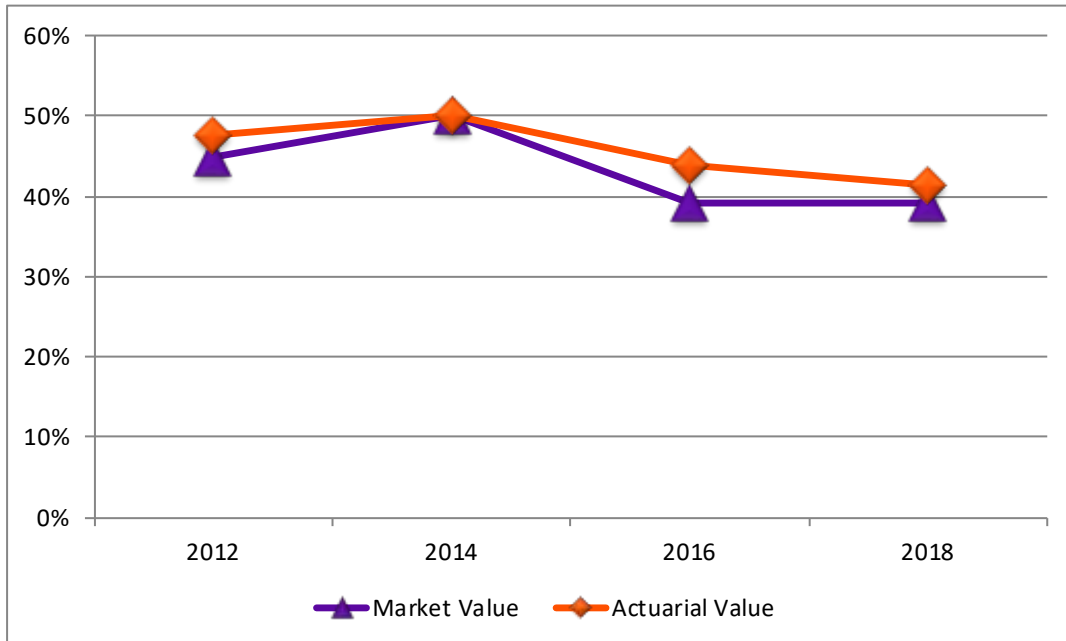
	July 1, 2018	July 1, 2016
Actuarial accrued liability for inactive members		
Retired, disabled and beneficiaries	\$616,341,655	\$553,902,550
Terminated vested members	2,351,710	2,330,873
Due refund of employee contributions only	134,498	471,919
Total	618,827,863	556,705,342
Actuarial accrued liability for active employees	196,230,715	218,420,667
Total actuarial accrued liability	815,058,578	775,126,009
Actuarial value of assets	337,062,669	339,727,866
Unfunded accrued liability	477,995,909	435,398,143
Funded ratio	41.4%	43.8%



Actuarial Accrued Liability vs. Actuarial Value of Assets



Funded Ratio



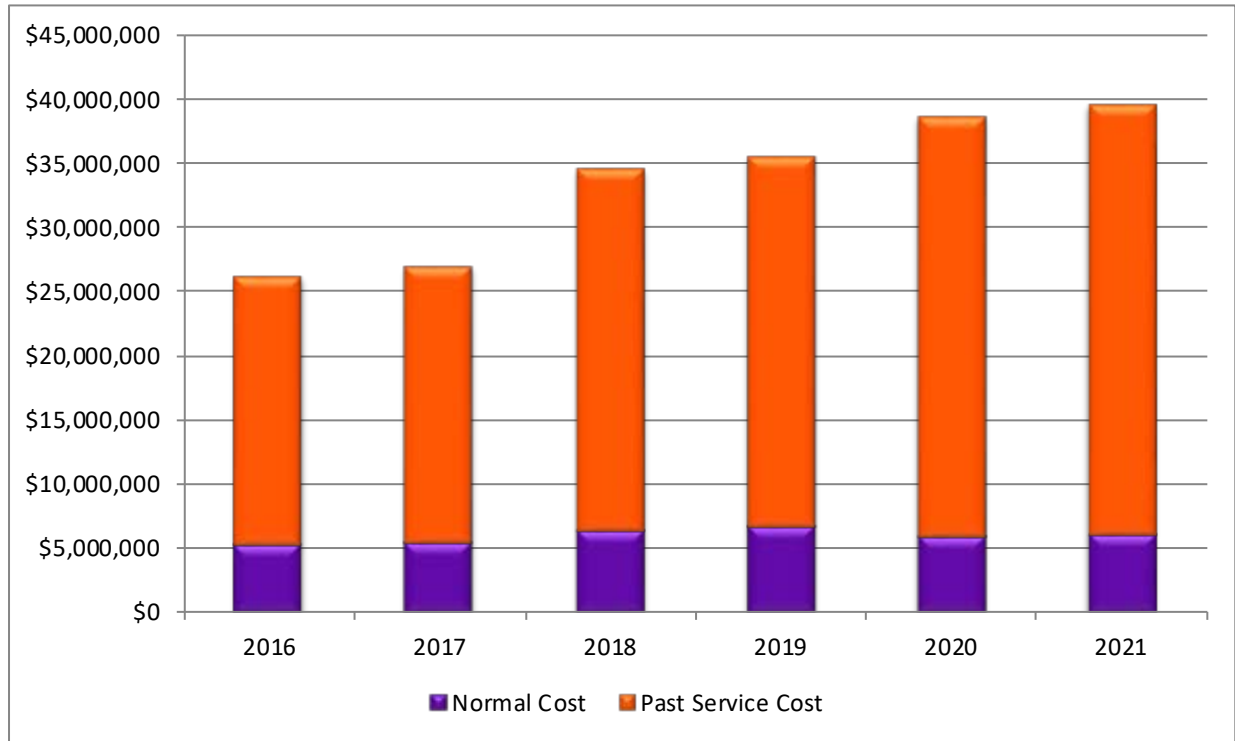


Determination of Normal Cost and Actuarially Determined Employer Contribution

	July 1, 2018		July 1, 2016	
	Cost	Percent of payroll	Cost	Percent of payroll
Gross normal cost	\$12,521,969	20.3%	\$13,176,954	21.4%
Estimated employee contributions	(7,120,087)	-11.5%	(7,125,251)	-11.5%
Estimated administrative expenses	255,000	0.4%	165,000	0.2%
City's normal cost	5,656,882	9.2%	6,216,703	10.1%
Amortization of unfunded accrued liability	32,030,222	51.8%	27,464,909	44.5%
Contribution before adjustment as of the valuation date	37,687,104	61.0%	33,681,612	54.6%
Estimated valuation year payroll for actives not yet at 100% assumed retirement age	61,815,310		61,714,054	
Fiscal year ending	2020		2018	
Adjustment for interest and inflation	942,178		926,244	
Actuarially determined employer contribution	38,629,282		34,607,856	
Fiscal year ending	2021		2019	
Adjustment for interest and inflation	965,732		951,716	
Actuarially determined employer contribution	39,595,014		35,559,572	



Actuarially Determined Employer Contribution





Actuarially Determined Employer Contribution per Group

	Police	Fire	Total
Gross normal cost	\$6,293,799	\$6,228,170	\$12,521,969
Estimated employee contributions	(3,844,831)	(3,275,256)	(7,120,087)
Estimated administrative expenses	<u>128,168</u>	<u>126,832</u>	<u>255,000</u>
City's normal cost	2,577,136	3,079,746	5,656,882
Actuarial accrued liability	428,262,780	386,795,798	815,058,578
Actuarial value of assets	<u>182,424,431</u>	<u>154,638,238</u>	<u>337,062,669</u>
Unfunded accrued liability	245,838,349	232,157,560	477,995,909
Amortization of unfunded accrued liability	16,473,482	15,556,740	32,030,222
Contribution before adjustment as of the valuation date	19,050,618	18,636,486	37,687,104
Estimated valuation year payroll for actives not yet at 100% assumed retirement age	32,040,257	29,775,053	61,815,310
City's normal cost as a percentage of payroll	8.0%	10.3%	9.2%
Contribution as a percentage of payroll	59.5%	62.6%	61.0%
Fiscal year ending June 30, 2020			
Adjustment for interest and inflation	<u>476,266</u>	<u>465,912</u>	<u>942,178</u>
Actuarially determined employer contribution	19,526,884	19,102,398	38,629,282
Fiscal year ending June 30, 2021			
Adjustment for interest and inflation	<u>488,172</u>	<u>477,560</u>	<u>965,732</u>
Actuarially determined employer contribution	20,015,056	19,579,958	39,595,014



Valuation Contribution Change

Valuation Contribution Change		
Contribution before adjustment as of July 1, 2016		\$33,681,612
Increase due to actuarial return on assets	\$1,645,413	
Increase due to liability losses	933,315	
Expected increase in normal cost	346,620	
Expected increase in amortization of unfunded accrued liability	1,531,340	
Decrease due to assumption or method changes	(699,710)	
Miscellaneous increase	248,514	
Total increase in contribution		<u>4,005,492</u>
Contribution before adjustment as of July 1, 2018		<u>37,687,104</u>



Determination of Actuarial Gain/Loss

The Actuarial Gain/Loss is the difference between the expected unfunded accrued liability and the actual unfunded accrued liability, without regard to any changes in actuarial methods, actuarial assumptions or plan provisions. This can also be referred to an Experience Gain/Loss, since it reflects the difference between what was expected and what was actually experienced.

Actuarial Gain / Loss	
Expected unfunded accrued liability July 1, 2018	
Expected unfunded accrued liability July 1, 2017	
Unfunded accrued liability July 1, 2016	\$435,398,143
Gross normal cost July 1, 2016	13,341,954
City and employee contributions for 2016-2017	(35,110,045)
Interest at 7.75% to July 1, 2017	33,122,105
Expected unfunded accrued liability July 1, 2017	446,752,157
Expected unfunded accrued liability July 1, 2018	
Expected unfunded accrued liability July 1, 2017	446,752,157
Expected gross normal cost July 1, 2017	13,704,320
City and employee contributions for 2017-2018	(42,165,245)
Interest at 7.75% to July 1, 2018	34,493,985
Expected unfunded accrued liability July 1, 2018	452,785,217
Actuarial (gain) / loss July 1, 2018	30,704,239
Actual unfunded accrued liability July 1, 2018, prior to plan provision, assumption and method changes	483,489,456
Sources of (gain) / loss	
Assets	19,591,501
Liabilities	11,112,738
Total (gain) / loss	30,704,239
Assumption and method changes since prior valuation	(5,493,547)
Actual unfunded accrued liability July 1, 2018, after plan provision, assumption and method changes	477,995,909



Development of Asset Values

Summary of Fund Activity		
	Market Value	Actuarial Value
1. Beginning value of assets July 1, 2017		
Trust assets	\$327,394,235	\$337,651,677
2. Contributions		
City contributions during year	34,607,857	34,607,857
Employee contributions during year	7,557,388	7,557,388
Total for plan year	42,165,245	42,165,245
3. Disbursements		
Benefit payments during year	57,416,436	57,416,436
Administrative expenses during year	252,477	252,477
Total for plan year	57,668,913	57,668,913
4. Net investment return		
Interest and dividends	3,959,111	N/A
Realized and unrealized gain / (loss)	4,607,850	N/A
Expected return	N/A	24,576,120
Recognized gain / (loss)	N/A	(9,661,460)
Required adjustment due to corridor	N/A	0
Reversal of prior year required adjustment	N/A	0
Investment-related expenses	(1,565,836)	N/A
Total for plan year	7,001,125	14,914,660
5. Ending value of assets July 1, 2018		
Trust assets: (1) + (2) - (3) + (4)	318,891,692	337,062,669
6. Approximate rate of return	2.2%	4.6%



Relationship of Actuarial Value to Market Value

1. Market value 7/1/2018	\$318,891,692
2. Gain / (loss) not recognized in actuarial value 7/1/2018	<u>(18,170,977)</u>
3. Preliminary actuarial value 7/1/2018: (1) - (2)	337,062,669
4. Preliminary actuarial value as a percentage of market value: (3) ÷ (1)	105.7%
5. Gain / (loss) recognized for corridor minimum / maximum	N/A
6. Actuarial value 7/1/2018 after corridor minimum / maximum: (3) + (5)	337,062,669
7. Actuarial value as a percentage of market value: (6) ÷ (1)	105.7%

Development of Market Value Gain / Loss for 2017-2018 Plan Year

1. Market value 7/1/2017	\$327,394,235
2. City contributions	34,607,857
3. Employee contributions	7,557,388
4. Benefit payments	57,416,436
5. Administrative expenses	252,477
6. Expected return at 7.75%	<u>24,576,120</u>
7. Expected value 7/1/2018: (1) + (2) + (3) - (4) - (5) + (6)	336,466,687
8. Market value 7/1/2018	<u>318,891,692</u>
9. Market value gain / (loss) for 2017-2018 plan year: (8) - (7)	(17,574,995)

Recognition of Gain / Loss in Actuarial Value

Year	(a) Gain / (loss)	(b) Total recognized as of 7/1/2017	(c) Recognized in current year: 20% of (a)	(d) Total recognized as of 7/1/2018: (b) + (c)	(e) Not recognized as of 7/1/2018: (a) - (d)
2013-2014	\$0	\$0	\$0	\$0	\$0
2014-2015	(20,302,958)	(12,181,776)	(4,060,592)	(16,242,368)	(4,060,590)
2015-2016	(31,036,097)	(12,414,438)	(6,207,219)	(18,621,657)	(12,414,440)
2016-2017	20,606,749	4,121,350	4,121,350	8,242,700	12,364,049
2017-2018	(17,574,995)	0	<u>(3,514,999)</u>	(3,514,999)	<u>(14,059,996)</u>
Total			(9,661,460)		(18,170,977)



Summary of Fund Activity		
	Market Value	Actuarial Value
1. Beginning value of assets July 1, 2016		
Trust assets	\$302,717,214	\$339,727,866
2. Contributions		
City contributions during year	27,536,158	27,536,158
Employee contributions during year	7,573,887	7,573,887
Total for plan year	35,110,045	35,110,045
3. Disbursements		
Benefit payments during year	54,073,974	54,073,974
Administrative expenses during year	197,429	197,429
Total for plan year	54,271,403	54,271,403
4. Net investment return		
Interest and dividends	4,188,816	N/A
Realized and unrealized gain / (loss)	40,159,970	N/A
Expected return	N/A	23,231,630
Recognized gain / (loss)	N/A	(6,146,461)
Required adjustment due to corridor	N/A	0
Reversal of prior year required adjustment	N/A	0
Investment-related expenses	(510,407)	N/A
Total for plan year	43,838,379	17,085,169
5. Ending value of assets July 1, 2017		
Trust assets: (1) + (2) - (3) + (4)	327,394,235	337,651,677
6. Approximate rate of return	14.6%	5.1%



Relationship of Actuarial Value to Market Value

1. Market value 7/1/2017	\$327,394,235
2. Gain / (loss) not recognized in actuarial value 7/1/2017	(10,257,442)
3. Preliminary actuarial value 7/1/2017: (1) - (2)	337,651,677
4. Preliminary actuarial value as a percentage of market value: (3) ÷ (1)	103.1%
5. Gain / (loss) recognized for corridor minimum / maximum	N/A
6. Actuarial value 7/1/2017 after corridor minimum / maximum: (3) + (5)	337,651,677
7. Actuarial value as a percentage of market value: (6) ÷ (1)	103.1%

Development of Market Value Gain / Loss for 2016-2017 Plan Year

1. Market value 7/1/2016	\$302,717,214
2. City contributions	27,536,158
3. Employee contributions	7,573,887
4. Benefit payments	54,073,974
5. Administrative expenses	197,429
6. Expected return at 7.75%	23,231,630
7. Expected value 7/1/2017: (1) + (2) + (3) - (4) - (5) + (6)	306,787,486
8. Market value 7/1/2017	327,394,235
9. Market value gain / (loss) for 2016-2017 plan year: (8) - (7)	20,606,749

Recognition of Gain / Loss in Actuarial Value

Year	(a) Gain / (loss)	(b) Total recognized as of 7/1/2016	(c) Recognized in current year: 20% of (a)	(d) Total recognized as of 7/1/2017: (b) + (c)	(e) Not recognized as of 7/1/2017: (a) - (d)
2012-2013	\$0	\$0	\$0	\$0	\$0
2013-2014	0	0	0	0	0
2014-2015	(20,302,958)	(8,121,184)	(4,060,592)	(12,181,776)	(8,121,182)
2015-2016	(31,036,097)	(6,207,219)	(6,207,219)	(12,414,438)	(18,621,659)
2016-2017	20,606,749	0	4,121,350	4,121,350	16,485,399
Total			(6,146,461)		(10,257,442)



Rate of Return on Market Value of Assets				
Period Ending June 30	Average Annual Effective Rate of Return			
	1 Year	3 Years	5 Years	10 Years
2009	-16.1%	-2.5%	1.7%	2.1%
2010	12.6%	-3.5%	2.3%	2.6%
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%

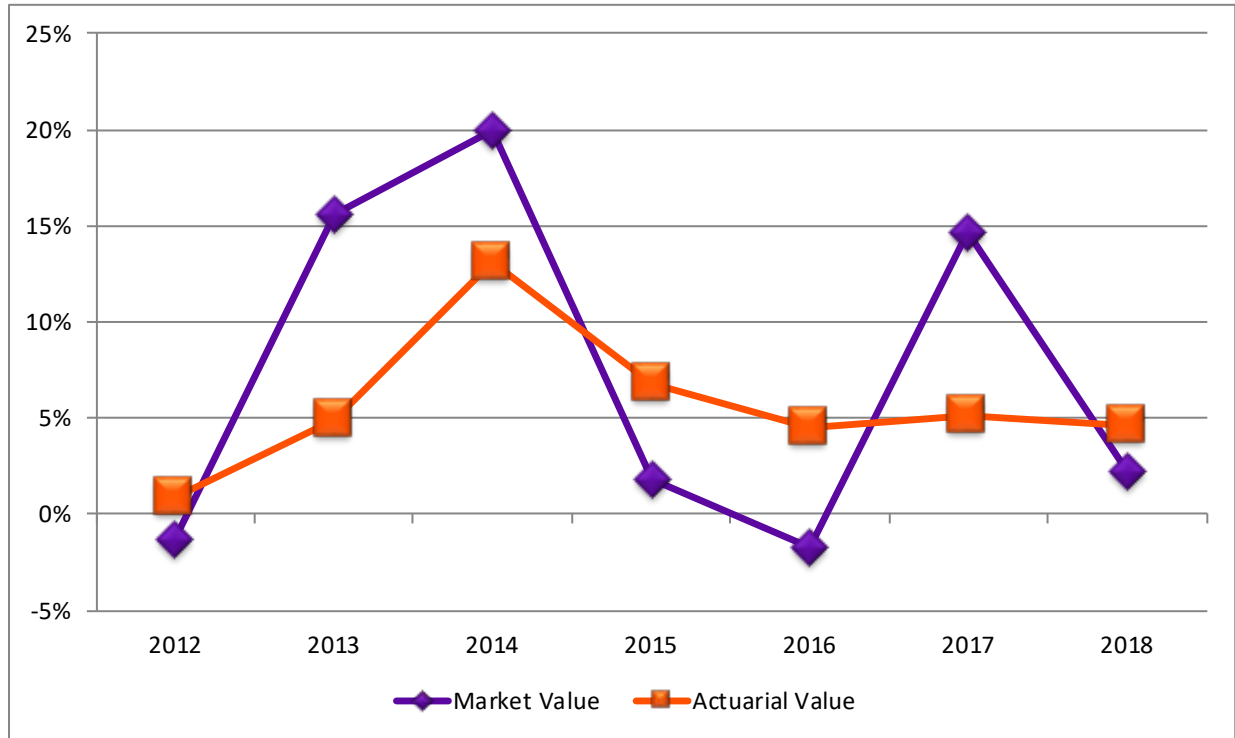
Rate of Return on Actuarial Value of Assets				
Period Ending June 30	Average Annual Effective Rate of Return			
	1 Year	3 Years	5 Years	10 Years
2009	1.9%	N/A	N/A	N/A
2010	0.7%	N/A	N/A	N/A
2011	3.3%	2.0%	N/A	N/A
2012	0.9%	1.6%	N/A	N/A
2013	4.9%	3.0%	2.3%	N/A
2014	13.1%	6.2%	4.5%	N/A
2015	6.8%	8.2%	5.7%	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%



Asset Split Development			
	Total	Police	Fire
1. Beginning value of assets July 1, 2016			
Market Value	\$302,717,214	\$157,450,016	\$145,267,198
2. Contributions 2016-2017			
City contributions during year	27,536,158	14,407,688	13,128,470
Employee contributions during year	7,573,887	4,501,884	3,072,003
Total for plan year	35,110,045	18,909,572	16,200,473
3. Disbursements 2016-2017			
Benefit payments during year	(54,073,974)	(25,182,620)	(28,891,354)
Administrative expenses during year	(197,429)	(98,715)	(98,714)
Total for plan year	(54,271,403)	(25,281,335)	(28,990,068)
4. Net investment return 2016-2017			
	41,118,378	21,915,249	19,203,129
5. Ending value of assets July 1, 2017			
Market Value: (1) + (2) + (3) + (4)	324,674,234	172,993,502	151,680,732
6. Contributions 2017-2018			
City contributions during year	34,607,857	18,640,481	15,967,376
Employee contributions during year	7,557,388	4,267,118	3,290,270
Total for plan year	42,165,245	22,907,599	19,257,646
7. Disbursements 2017-2018			
Benefit payments during year	(57,416,436)	(28,459,291)	(28,957,145)
Administrative expenses during year	(252,477)	(126,239)	(126,238)
Total for plan year	(57,668,913)	(28,585,530)	(29,083,383)
8. Net investment return 2017-2018			
	9,721,126	5,274,397	4,446,729
9. Ending value of assets July 1, 2018			
Market Value: (5) + (6) + (7) + (8)	318,891,692	172,589,968	146,301,724
Actuarial Value of Assets - Allocated	337,062,669	182,424,431	154,638,238



Actual Rate of Return on Assets





Target Allocation and Expected Rate of Return July 1, 2018

Asset Class	Target Allocation	Long-Term Expected Real Rate of Return*	Weighting
US Large Cap	24.00%	4.65%	1.12%
US Mid Cap / Small Cap	8.00%	5.50%	0.44%
Developed International Equity	21.00%	5.50%	1.16%
Emerging Markets Equity	6.00%	6.50%	0.39%
Intermediate Corporate Fixed	5.00%	2.25%	0.11%
Intermediate Government Fixed	5.00%	1.65%	0.08%
High Yield Income	2.00%	3.25%	0.07%
International Bonds	1.00%	2.00%	0.02%
Emerging Market Debt	0.00%	3.75%	0.00%
Money Market / Short Term Bonds	5.00%	0.00%	0.00%
Real Estate (Core)	4.00%	5.00%	0.20%
Commodities	0.00%	5.25%	0.00%
Alternative	19.00%	5.00%	0.95%
	100.00%		4.54%
Long-Term Inflation Expectation			2.50%
Long-Term Expected Nominal Return			7.04%

**Long-Term Real Returns are provided by HHIA. 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 7.75% 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, 2018
2018 base	July 1, 2018	32,030,222	26	477,995,909



Member Data

The data reported by the Plan Sponsor for this valuation includes 719 active employees who met the Plan's minimum age and service requirements as of July 1, 2018.

Member Data					
	Active	Terminated vested	Due refund of contributions	Members in pay status	Total
Total members July 1, 2016	752	5	34	1,290	2,081
Adjustments	0	0	+2	+3	+5
Retirements	-88	0	N/A	+88	+42
Disabilities	-4	N/A	N/A	+4	+3
Terminations					
Vested	-1	+1	N/A	N/A	0
Lump sum payments	-17	0	-20	N/A	-37
Due contributions only	-3	N/A	+3	N/A	0
Deaths					
With death benefit	0	0	0	-38	-38
Without death benefit	-3	0	0	-39	-42
Transfers	0	0	0	N/A	0
Rehires	+2	-1	0	1	0
New beneficiaries	N/A	N/A	N/A	+38	+38
New entrants	+81	N/A	0	N/A	+81
Total members July 1, 2018	719	5	19	1,345	2,133



Member Counts by Status





Member Data				
	Active	Terminated vested	Due refund of contributions	Members in pay status
Average age				
July 1, 2016	38.5	51.7	33.3	66.7
July 1, 2018	38.5	49.0	35.6	66.6
Average service				
July 1, 2016	10.0	N/A	N/A	N/A
July 1, 2018	9.7	N/A	N/A	N/A
Covered employee payroll				
July 1, 2016	\$61,714,054	N/A	N/A	N/A
July 1, 2018	58,881,794	N/A	N/A	N/A
Total annual benefits				
July 1, 2016	N/A	\$225,692	N/A	\$52,258,765
July 1, 2018	N/A	237,521	N/A	58,581,595



Member Data - Police					
	Active	Terminated vested	Due refund of contributions	Members in pay status	Total
Total members July 1, 2016	427	1	30	717	1,175
Adjustments	0	0	+1	+1	+2
Retirements	-42	0	N/A	+42	+42
Disabilities	-3	N/A	N/A	+3	+3
Terminations					
Vested	-1	+1	N/A	N/A	0
Lump sum payments	-17	0	-17	N/A	-34
Due contributions only	-3	N/A	+3	N/A	0
Deaths					
With death benefit	0	0	0	-17	-17
Without death benefit	-2	0	0	-19	-21
Transfers	0	0	0	N/A	0
Rehires	+1	0	0	-1	0
New beneficiaries	N/A	N/A	N/A	+17	+17
New entrants	+28	N/A	0	N/A	+28
Total members July 1, 2018	388	2	17	743	1,195



Member Data - Fire					
	Active	Terminated vested	Due refund of contributions	Members in pay status	Total
Total members July 1, 2016	325	4	4	573	906
Adjustments	0	0	+1	+2	+3
Retirements	-46	0	N/A	+46	0
Disabilities	-1	N/A	N/A	+1	0
Terminations					
Vested	0	0	N/A	N/A	0
Lump sum payments	0	0	-3	N/A	-3
Due contributions only	0	N/A	0	N/A	0
Deaths					
With death benefit	0	0	0	-21	-21
Without death benefit	-1	0	0	-20	-21
Transfers	0	0	0	N/A	0
Rehires	+1	-1	0	N/A	0
New beneficiaries	N/A	N/A	N/A	+21	+21
New entrants	+53	N/A	0	N/A	+53
Total members July 1, 2018	331	3	2	602	938



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	10	5									15
25 to 29	13	107	20								140
30 to 34	9	69	37	27							142
35 to 39	5	40	16	52	11						124
40 to 44		16	9	26	33	16					100
45 to 49	2	10	6	6	56	27					107
50 to 54		4	4	9	25	28					70
55 to 59		1	2	2	9	6					20
60 to 64						1					1
65 to 69											
70 & over											
All ages	39	252	94	122	134	78					719



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, 2018.

Year	Active as of July 1, 2018	Retired and Terminated as of July 1, 2018	Total Benefit Payments
2018	\$1,225,000	\$58,506,000	\$59,731,000
2019	3,847,000	57,827,000	61,674,000
2020	6,469,000	57,235,000	63,704,000
2021	8,764,000	56,604,000	65,368,000
2022	10,939,000	55,938,000	66,877,000
2023	12,989,000	55,213,000	68,202,000
2024	14,747,000	54,445,000	69,192,000
2025	16,497,000	53,632,000	70,129,000
2026	18,127,000	52,768,000	70,895,000
2027	19,803,000	51,842,000	71,645,000



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 + Expense	Expected Net Cash Flow	Estimated Investment Earnings (@ 7.75%)	Market Value of Fund - End Fiscal Year
6/30/2019	318,891,692	\$35,560,000	\$7,120,000	\$59,731,000	(\$17,051,000)	\$25,202,000	\$327,042,692
6/30/2020	327,042,692	38,629,000	7,262,000	61,674,000	(15,783,000)	25,982,000	337,241,692
6/30/2021	337,241,692	39,595,000	7,407,000	63,704,000	(16,702,000)	26,768,000	347,307,692
6/30/2022	347,307,692	40,387,000	7,555,000	65,368,000	(17,426,000)	27,545,000	357,426,692
6/30/2023	357,426,692	41,195,000	7,706,000	66,877,000	(17,976,000)	28,334,000	367,784,692
6/30/2024	367,784,692	42,019,000	7,860,000	68,202,000	(18,323,000)	29,150,000	378,611,692
6/30/2025	378,611,692	42,859,000	8,017,000	69,192,000	(18,316,000)	30,017,000	390,312,692
6/30/2026	390,312,692	43,716,000	8,177,000	70,129,000	(18,236,000)	30,954,000	403,030,692
6/30/2027	403,030,692	44,590,000	8,341,000	70,895,000	(17,964,000)	31,979,000	417,045,692
6/30/2028	417,045,692	45,482,000	8,508,000	71,645,000	(17,655,000)	33,106,000	432,496,692
6/30/2029	432,496,692	46,392,000	8,678,000	72,721,000	(17,651,000)	34,333,000	449,178,692
6/30/2030	449,178,692	47,320,000	8,852,000	74,029,000	(17,857,000)	35,647,000	466,968,692
6/30/2031	466,968,692	48,266,000	9,029,000	74,969,000	(17,674,000)	37,064,000	486,358,692
6/30/2032	486,358,692	49,231,000	9,210,000	75,598,000	(17,157,000)	38,618,000	507,819,692
6/30/2033	507,819,692	50,216,000	9,394,000	76,107,000	(16,497,000)	40,338,000	531,660,692
6/30/2034	531,660,692	51,220,000	9,582,000	76,461,000	(15,659,000)	42,251,000	558,252,692
6/30/2035	558,252,692	52,244,000	9,774,000	76,444,000	(14,426,000)	44,393,000	588,219,692
6/30/2036	588,219,692	53,289,000	9,969,000	76,229,000	(12,971,000)	46,805,000	622,053,692
6/30/2037	622,053,692	54,355,000	10,168,000	76,229,000	(11,706,000)	49,511,000	659,858,692
6/30/2038	659,858,692	55,442,000	10,371,000	77,004,000	(11,191,000)	52,496,000	701,163,692

** ADECs are projected at the 2% payroll increase assumption after last published ADEC. ADECs assume a 7.75% rate of return after 7/1/2018 to reflect the future impact of the current unrecognized losses being recognized.*



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).

The amortization period was closed at 30 years as of July 1, 2014 (26 years remaining).

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.)

- Inflation

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

Investment rate of return

7.75% per year, net of investment expenses.

Rate of Amortization Payment Increase

2.50%. (Prior: 2.75%)

Inflation

2.50%. (Prior: 2.75%)

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.

The assumption was changed to better reflect expected experience.

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, 2008 through June 30, 2014.

Overtime, Longevity Pay, and Private Duty

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, 2008 through June 30, 2014.



Mortality

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

Prior: RP-2014 Adjusted to 2006 Blue Collar Mortality Table, projected to valuation date with Scale MP-2016.

Mortality Improvement

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

Prior: Projected to date of decrement using Scale MP-2016 (generational mortality).

We have selected this mortality assumption and mortality improvement scale because it is based on the latest published pension mortality study released by the Society of Actuaries.

Retirement age

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 2008 through 2014.

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.

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 3.0 years of sick leave credit (1.5 years for Police hired after 7/1/2001 and 0 for Police hired post 12/18/2012.)

Administrative expenses

Estimated expenses are added to annual budget estimates at the time of their preparation.

The estimate is based on actual expenses paid from the trust in the prior year.

Cost of living increases

Benefits eligible for cost-of-living increases are assumed to increase 1.4% per year until the maximum is reached, 0.9% for Police hired after 3/28/1997 and 0.7% for Police hired after 10/20/2012, 1.2% for Fire hired after 4/23/2004 and 0.7% for Fire hired after 8/28/2013.

Percent of active employees married

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

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

Spouse's age

Husbands are assumed to be 2 years older than wives.

COLA Buy-out Assumption

0% of the eligible employees are assumed to buy out the Cost of Living provision upon retirement.

As of the valuation date there was not enough data to support a change in this assumption.



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% for Fire after July 1, 2014.

12% for Police effective after 12/18/2012.

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 12/18/2012.

Mandatory Retirement Date

Age 67 with no service requirement (was 65).



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 28, 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 12/18/2012 and for Fire hired after 4/23/2014) of final average pay for each year of service and fraction thereof up to 20 years plus 3% (2.5% for Police hired after 12/18/2012 and for Fire hired after 4/23/2014) 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, 70% for Police hired after 12/18/2012 and for Fire hired after 4/23/2014).

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 3/28/1997 and 1.5% for Police hires after 10/20/2012), (3% for Fire hired after 4/23/2004 and 1.5% for Fire hired after 8/28/2013);
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 after July 1, 2011 and were hired prior to 3/28/1997 applies, and a maximum of 10% applies for such Police retirees hired after 10/20/2012. Accumulated maximum of 15% for Fire retirees hired after 4/23/2004 and 10% for Fire hired after 8/28/2013.
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.) For Police hired after 7/1/2001, 50 days equal one year of pension service. Police hired after 10/20/2012 are not eligible for sick leave buyback.