

CITY OF EVANSTON  
FIREFIGHTERS' PENSION FUND  
ACTUARIAL VALUATION  
AS OF JANUARY 1, 2019  
CONTRIBUTIONS APPLICABLE TO THE  
PLAN/FISCAL YEAR ENDING DECEMBER 31, 2020



**FOSTER & FOSTER**  
ACTUARIES AND CONSULTANTS

August 1, 2019

Board of Trustees  
City of Evanston  
Firefighters' Pension Fund  
2100 Ridge Avenue  
Evanston, IL 60201

Re: Actuarial Valuation Report – City of Evanston Firefighters' Pension Fund

Dear Board:

We are pleased to present to the Board this report of the annual actuarial valuation of the City of Evanston Firefighters' Pension Fund. The valuation was performed to determine whether the assets and contributions are sufficient to provide the prescribed benefits and to develop the appropriate funding requirements for the applicable plan year. Please note that this valuation may not be applicable for any other purposes.

The valuation has been conducted in accordance with generally accepted actuarial principles and practices, including the applicable Actuarial Standards of Practice as issued by the Actuarial Standards Board, and reflects laws and regulations issued to date pursuant to the provisions of Article 4, Illinois Pension Code, as well as applicable federal laws and regulations. In our opinion, the assumptions used in this valuation, as adopted by the Board of Trustees, represent reasonable expectations of anticipated plan experience. Future actuarial measurements may differ significantly from the current measurements presented in this report for a variety of reasons including: changes in applicable laws, changes in plan provisions, changes in assumptions, or plan experience differing from expectations. Due to the limited scope of the valuation, we did not perform an analysis of the potential range of such future measurements.

In conducting the valuation, we have relied on personnel, plan design, and asset information supplied by the Board, financial reports prepared by the custodian bank and the actuarial assumptions and methods described in the Actuarial Assumptions section of this report. While we cannot verify the accuracy of all this information, the supplied information was reviewed for consistency and reasonableness. As a result of this review, we have no reason to doubt the substantial accuracy of the information and believe that it has produced appropriate results. This information, along with any adjustments or modifications, is summarized in various sections of this report.

The undersigned is familiar with the immediate and long-term aspects of pension valuations and meets the Qualification Standards of the American Academy of Actuaries necessary to render the actuarial opinions contained herein. All of the sections of this report are considered an integral part of the actuarial opinions.

To our knowledge, no associate of Foster & Foster, Inc. working on valuations of the program has any direct financial interest or indirect material interest in the City of Evanston, nor does anyone at Foster & Foster, Inc. act as a member of the Board of Trustees of the City of Evanston Firefighters' Pension Fund. Thus, there is no relationship existing that might affect our capacity to prepare and certify this actuarial report.

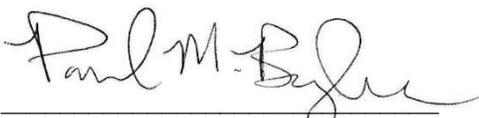
If there are any questions, concerns, or comments about any of the items contained in this report, please contact us at 630-620-0200.

Respectfully submitted,

Foster & Foster, Inc.

By:   
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Enclosures

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## SUMMARY OF REPORT

The regular annual actuarial valuation of the City of Evanston Firefighters' Pension Fund, performed as of January 1, 2019, has been completed and the results are presented in this Report. The contribution amounts set forth herein are applicable to the plan/fiscal year ended December 31, 2020.

The contribution requirements, compared with those set forth in the January 1, 2018 actuarial report, are as follows:

Valuation Date	1/1/2019	1/1/2018
Applicable to Fiscal Year Ending	<u>12/31/2020</u>	<u>12/31/2019</u>
Total Recommended Contribution	\$10,696,741	\$9,670,806
% of Projected Annual Payroll	104.4%	95.3%
Member Contributions (Est.)	968,898	959,619
% of Projected Annual Payroll	9.5%	9.5%
City Recommended Contribution	9,727,843	8,711,187
% of Projected Annual Payroll	94.9%	85.8%

As you can see, the Total Recommended Contribution shows an increase when compared to the results determined in the January 1, 2018 actuarial valuation report. The increase is attributable to the assumption change reflected in this valuation and unfavorable experience realized by the plan during the year.

Plan experience was unfavorable overall on the basis of the plan's actuarial assumptions. Sources of unfavorable experience included an investment return of 3.73% (Actuarial Asset Basis) which fell short of the 6.25% assumption, an average salary increase of 7.51% which exceeded the 4.27% assumption, and less inactive mortality than expected. There were no significant sources of favorable experience.

## CHANGES SINCE PRIOR VALUATION

### Plan Changes Since Prior Valuation

No plan changes have occurred since the prior valuation.

### Actuarial Assumption/Method Changes Since Prior Valuation

The valuation reflects the following assumption change:

- The mortality rates were updated to reflect the PubS.H-2010 tables.

There were no method changes since the prior valuation.

COMPARATIVE SUMMARY OF PRINCIPAL VALUATION RESULTS

	New Assump <u>1/1/2019</u>	Old Assump <u>1/1/2019</u>	<u>1/1/2018</u>
A. Participant Data			
Number Included			
Actives	99	99	104
Service Retirees	83	83	82
Beneficiaries	39	39	32
Disability Retirees	22	22	22
Terminated Vested	<u>2</u>	<u>2</u>	<u>3</u>
Total	245	245	243
Total Annual Payroll	\$10,247,468	\$10,247,468	\$10,149,326
Payroll Under Assumed Ret. Age	10,247,468	10,247,468	10,149,326
Annual Rate of Payments to:			
Service Retirees	6,344,105	6,344,105	5,990,038
Beneficiaries	1,595,604	1,595,604	1,380,303
Disability Retirees	1,442,796	1,442,796	1,377,630
Terminated Vested	0	0	46,357
B. Assets			
Actuarial Value	81,390,583	81,390,583	78,282,857
Market Value	75,776,118	75,776,118	79,073,077
C. Liabilities			
Present Value of Benefits			
Actives			
Retirement Benefits	72,671,668	70,625,237	70,512,500
Disability Benefits	8,442,996	7,423,718	7,433,562
Death Benefits	952,215	1,939,652	1,949,168
Vested Benefits	2,897,715	2,855,241	2,788,483
Service Retirees	95,188,771	93,989,320	87,998,515
Beneficiaries	14,906,949	14,939,185	12,749,616
Disability Retirees	22,474,714	20,374,794	19,135,946
Terminated Vested	<u>66,799</u>	<u>66,799</u>	<u>1,034,943</u>
Total	217,601,827	212,213,946	203,602,733

C. Liabilities - (Continued)	New Assump <u>1/1/2019</u>	Old Assump <u>1/1/2019</u>	<u>1/1/2018</u>
Present Value of Future Salaries	115,238,425	114,538,121	114,108,025
Present Value of Future Member Contributions	10,895,793	10,829,579	10,788,914
Normal Cost (Retirement)	2,267,212	2,200,598	2,216,972
Normal Cost (Disability)	460,268	406,363	413,276
Normal Cost (Death)	65,012	112,199	113,382
Normal Cost (Vesting)	<u>165,517</u>	<u>163,381</u>	<u>160,718</u>
Total Normal Cost	2,958,009	2,882,541	2,904,348
Present Value of Future Normal Costs	29,802,091	28,866,921	29,619,165
Accrued Liability (Retirement)	49,566,538	48,328,355	47,623,975
Accrued Liability (Disability)	3,679,324	3,236,531	3,155,971
Accrued Liability (Death)	280,236	797,687	776,888
Accrued Liability (Vesting)	1,636,405	1,614,354	1,507,714
Accrued Liability (Inactives)	<u>132,637,233</u>	<u>129,370,098</u>	<u>120,919,020</u>
Total Actuarial Accrued Liability	187,799,736	183,347,025	173,983,568
Unfunded Actuarial Accrued Liability (UAAL)	106,409,153	101,956,442	95,700,711
Funded Ratio (AVA / AL)	43.3%	44.4%	45.0%

	New Assump <u>1/1/2019</u>	Old Assump <u>1/1/2019</u>	<u>1/1/2018</u>
D. Actuarial Present Value of Accrued Benefits			
Vested Accrued Benefits			
Inactives	132,637,233	129,370,098	120,919,020
Actives	18,521,475	17,914,334	18,654,666
Member Contributions	<u>9,841,269</u>	<u>9,841,269</u>	<u>9,661,291</u>
Total	160,999,977	157,125,701	149,234,977
Non-vested Accrued Benefits	<u>4,319,079</u>	<u>4,261,054</u>	<u>3,459,122</u>
Total Present Value Accrued Benefits	165,319,056	161,386,755	152,694,099
Funded Ratio (MVA / PVAB)	45.8%	47.0%	51.8%
Increase (Decrease) in Present Value of Accrued Benefits Attributable to:			
Plan Amendments	0	0	
Assumption Changes	3,932,301	0	
New Accrued Benefits	0	8,586,068	
Benefits Paid	0	(9,150,830)	
Interest	0	9,257,418	
Other	<u>0</u>	<u>0</u>	
Total	3,932,301	8,692,656	

	New Assump 1/1/2019	Old Assump 1/1/2019	1/1/2018
Valuation Date Applicable to Fiscal Year Ending	<u>12/31/2020</u>	<u>12/31/2020</u>	<u>12/31/2019</u>
<b>E. Pension Cost</b>			
Normal Cost <sup>1</sup>	\$3,142,885	\$3,062,700	\$3,085,870
% of Total Annual Payroll <sup>1</sup>	30.7	29.9	30.4
Administrative Expenses <sup>1</sup>	117,677	117,677	77,180
% of Total Annual Payroll <sup>1</sup>	1.1	1.1	0.8
Payment Required to Amortize Unfunded Actuarial Accrued Liability over 22 years (as of 1/1/2019) <sup>1</sup>	7,436,179	7,096,109	6,507,756
% of Total Annual Payroll <sup>1</sup>	72.6	69.3	64.1
Total Recommended Contribution	10,696,741	10,276,486	9,670,806
% of Total Annual Payroll <sup>1</sup>	104.4	100.3	95.3
Expected Member Contributions <sup>1</sup>	968,898	968,898	959,619
% of Total Annual Payroll <sup>1</sup>	9.5	9.5	9.5
Expected City Contribution	9,727,843	9,307,588	8,711,187
% of Total Annual Payroll <sup>1</sup>	94.9	90.8	85.8
<b>F. Past Contributions</b>			
Plan Years Ending:	<u>12/31/2018</u>		
Total Recommended Contribution City	9,870,224 8,771,718		
Actual Contributions Made:			
Members (excluding buyback)	1,098,506		
City	<u>8,344,947</u>		
Total	9,443,453		
G. Net Actuarial (Gain)/Loss	6,738,979		

<sup>1</sup> Contributions developed as of 1/1/2019 displayed above have been adjusted to account for assumed interest.

H. Schedule Illustrating the Amortization of the Total Unfunded Actuarial Accrued Liability as of:

<u>Year</u>	<u>Projected Unfunded Accrued Liability</u> <sup>1</sup>
2019	87,629,179
2020	85,669,823
2021	83,588,008
2026	71,056,772
2031	54,088,460
2036	31,111,989
2041	0

<sup>1</sup> Target funded percentage is less than 100% so not all of the Unfunded Actuarial Accrued Liability is amortized.

I. (i) 3 Year Comparison of Actual and Assumed Salary Increases

		<u>Actual</u>	<u>Assumed</u>
Year Ended	12/31/2018	7.51%	4.27%
Year Ended	12/31/2017	2.02%	4.36%
Year Ended	12/31/2016	4.47%	4.34%

(ii) 3 Year Comparison of Investment Return on Actuarial Value

		<u>Actual</u>	<u>Assumed</u>
Year Ended	12/31/2018	3.73%	6.25%
Year Ended	12/31/2017	6.36%	6.25%
Year Ended	12/31/2016	5.55%	6.50%

DEVELOPMENT OF JANUARY 1, 2019 AMORTIZATION PAYMENT

(1)	Unfunded Actuarial Accrued Liability as of January 1, 2018	\$95,700,711
(2)	Sponsor Normal Cost developed as of January 1, 2018	1,944,729
(3)	Expected administrative expenses for the year ended December 31, 2018	72,640
(4)	Expected interest on (1), (2) and (3)	6,105,110
(5)	Sponsor contributions to the System during the year ended December 31, 2018	8,344,947
(6)	Expected interest on (5)	260,780
(7)	Expected Unfunded Actuarial Accrued Liability as of December 31, 2018, (1)+(2)+(3)+(4)-(5)-(6)	95,217,463
(8)	Change to UAAL due to Assumption Change	4,452,711
(9)	Change to UAAL due to Actuarial (Gain)/Loss	6,738,979
(10)	Unfunded Accrued Liability as of January 1, 2019	106,409,153
(11)	UAAL Subject to Amortization (90% AAL less Actuarial Assets)	87,629,179

<u>Date</u> <u>Established</u>	<u>Years</u> <u>Remaining</u>	<u>1/1/2019</u> <u>Amount</u>	<u>Amortization</u> <u>Amount</u>
1/1/2019	22	87,629,179	6,998,757

## DETAILED ACTUARIAL (GAIN)/LOSS ANALYSIS

(1) Unfunded Actuarial Accrued Liability (UAAL) as of January 1, 2018	\$95,700,711
(2) Expected UAAL as of January 1, 2019	95,217,463
(3) Summary of Actuarial (Gain)/Loss, by component:	
Investment Return (Actuarial Asset Basis)	1,972,504
Salary Increases	1,278,817
Active Decrements	1,804,333
Inactive Mortality	935,086
Other	<u>748,239</u>
Change in UAAL due to (Gain)/Loss	6,738,979
Assumption Changes	<u>4,452,711</u>
(4) Actual UAAL as of January 1, 2019	\$106,409,153

## RECONCILIATION OF CHANGES IN CONTRIBUTION REQUIREMENT

(1) Contribution Determined as of January 1, 2018	\$	8,711,187
(2) Summary of Contribution Impact by component:		
Change in Normal Cost		(23,170)
Change in Assumed Administrative Expense		40,497
Investment Return (Actuarial Asset Basis)		137,844
Salary Increases		89,367
Active Decrements		126,092
Inactive Mortality		65,347
Contributions (More) or Less than Recommended		37,525
Change in Expected Member Contributions		(9,279)
Assumption Change		420,255
Other		<u>132,178</u>
Total Change in Contribution		1,016,656
(3) Contribution Determined as of January 1, 2019		\$9,727,843

## STATUTORY MINIMUM REQUIRED CONTRIBUTION

Contribution requirements shown on this page are calculated according to statutory minimum funding requirements of the Illinois Pension Code. We do not believe this method is sufficient to fund future benefits; as such, we recommend funding according to the contributions developed in Section E of this report.

	New Assump 1/1/2019	Old Assump 1/1/2019	1/1/2018
Valuation Date Applicable to Fiscal Year Ending	<u>12/31/2020</u>	<u>12/31/2020</u>	<u>12/31/2019</u>
Actuarial Accrued Liability (PUC)	184,624,372	180,170,695	170,910,408
Actuarial Value of Assets	<u>81,390,583</u>	<u>81,390,583</u>	<u>78,282,857</u>
Unfunded Actuarial Accrued Liability (UAAL)	103,233,789	98,780,112	92,627,551
UAAL Subject to Amortization	84,771,352	80,763,043	75,536,510
Normal Cost <sup>1</sup>	\$3,321,387	\$3,238,291	\$3,230,391
% of Total Annual Payroll <sup>1</sup>	32.4	31.6	31.8
Administrative Expenses <sup>1</sup>	117,677	117,677	77,180
% of Total Annual Payroll <sup>1</sup>	1.1	1.1	0.8
Payment Required to Amortize Unfunded Actuarial Accrued Liability over 22 years (as of 1/1/2019) <sup>1</sup>	5,317,922	5,066,470	4,586,508
% of Total Annual Payroll <sup>1</sup>	52.0	49.5	45.2
Total Required Contribution	8,756,986	8,422,438	7,894,079
% of Total Annual Payroll <sup>1</sup>	85.5	82.2	77.8
Expected Member Contributions <sup>1</sup>	968,898	968,898	959,619
% of Total Annual Payroll <sup>1</sup>	9.5	9.5	9.5
Expected City Contribution	7,788,088	7,453,540	6,934,460
% of Total Annual Payroll <sup>1</sup>	76.0	72.7	68.3
Assumptions and Methods:			
Actuarial Cost Method	Projected Unit Credit		
Amortization Method	90% Funding by 2040		
Payroll Growth Assumption	3.50%		

All other assumptions and methods are as described in the Actuarial Assumptions and Methods section.

<sup>1</sup> Contributions developed as of 1/1/2019 displayed above have been adjusted to account for assumed interest.

PROJECTION OF BENEFIT PAYMENTS

Year	Payments for Current Actives	Payments for Current Inactives	Total Payments
2019	261,840	9,349,059	9,610,899
2020	493,885	9,412,791	9,906,676
2021	727,708	9,516,407	10,244,115
2022	971,275	9,603,479	10,574,754
2023	1,240,718	9,703,191	10,943,909
2024	1,544,280	9,771,332	11,315,612
2025	1,888,542	9,828,540	11,717,082
2026	2,240,839	9,873,917	12,114,756
2027	2,618,039	9,906,446	12,524,485
2028	3,043,497	9,945,474	12,988,971
2029	3,457,121	9,950,159	13,407,280
2030	3,885,370	9,958,422	13,843,792
2031	4,331,786	9,926,146	14,257,932
2032	4,810,855	9,870,452	14,681,307
2033	5,314,453	9,789,199	15,103,652
2034	5,845,214	9,679,602	15,524,816
2035	6,400,627	9,576,988	15,977,615
2036	6,967,793	9,406,090	16,373,883
2037	7,535,142	9,200,207	16,735,349
2038	8,141,262	8,958,689	17,099,951
2039	8,745,171	8,680,909	17,426,080
2040	9,342,772	8,394,842	17,737,614
2041	9,871,947	8,048,899	17,920,846
2042	10,415,789	7,671,340	18,087,129
2043	10,924,338	7,265,680	18,190,018
2044	11,456,580	6,836,347	18,292,927
2045	11,950,859	6,388,739	18,339,598
2046	12,348,433	5,928,974	18,277,407
2047	12,687,474	5,463,491	18,150,965
2048	12,981,594	4,998,646	17,980,240
2049	13,255,355	4,540,661	17,796,016
2050	13,494,649	4,095,371	17,590,020
2051	13,676,915	3,668,014	17,344,929
2052	13,821,131	3,263,120	17,084,251
2053	13,927,572	2,884,200	16,811,772
2054	13,996,255	2,533,605	16,529,860
2055	14,026,540	2,212,684	16,239,224
2056	14,016,110	1,921,797	15,937,907
2057	13,965,397	1,660,546	15,625,943
2058	13,873,700	1,427,916	15,301,616

## ACTUARIAL ASSUMPTIONS AND METHODS

Interest Rate	6.25% per year compounded annually, net of investment related expenses. This is supported by the target asset allocation of the trust and the expected long-term return by asset class.
Mortality Rate	<p><b><i>Active Lives:</i></b> PubS.H-2010 Employee mortality, projected 5 years past the valuation date with Scale MP-2018. 20% of active deaths are assumed to be in the line of duty.</p> <p><b><i>Inactive Lives:</i></b> PubS.H-2010 Healthy Retiree mortality, projected 5 years past the valuation date with Scale MP-2018.</p> <p><b><i>Beneficiaries:</i></b> PubS.H-2010 Survivor mortality, projected 5 years past the valuation date with Scale MP-2018.</p> <p><b><i>Disabled Lives:</i></b> PubS.H-2010 Disabled mortality, projected 5 years past the valuation date with Scale MP-2018.</p> <p>The mortality assumptions sufficiently accommodate anticipated future mortality improvements.</p>
Retirement Age	See table later in this section. This is based on a 2017 experience study performed for the State of Illinois Department of Insurance.
Disability Rate	See table later in this section. 80% of the disabilities are assumed to be in the line of duty. This is based on a 2017 experience study performed for the State of Illinois Department of Insurance.
Termination Rate	See table later in this section. This is based on a 2017 experience study performed for the State of Illinois Department of Insurance.
Inflation	2.50%.
Cost-of-Living Adjustment	<p><u>Tier 1:</u> 3.00% per year after age 55. Those that retire prior to age 55 receive an increase of 1/12 of 3.00% for each full month since benefit commencement upon reaching age 55.</p> <p><u>Tier 2:</u> 1.25% per year after the later of attainment of age 60 or first anniversary of retirement.</p>

Salary Increases

See table below. This is based on an experience study performed in 2017.

Age	Increase
25	7.36%
30	5.48%
35	4.53%
40	4.02%
45	3.81%
50	3.68%
55+	3.62%

Marital Status

80% of Members are assumed to be married.

Spouse's Age

Males are assumed to be three years older than females.

Funding Method

Entry Age Normal Cost Method.

Actuarial Asset Method

Investment gains and losses are smoothed over a 5-year period.

Funding Policy Amortization Method

The UAAL is amortized according to a Level Percentage of Payroll method over a period ending in 2040. The initial amortization amount is 90% of the Accrued Liability less the Actuarial Value of Assets.

Payroll Growth

None.

Administrative Expenses

Expenses paid out of the fund other than investment-related expenses are assumed to be equal to those paid in the previous year.

Decrement Tables

% Terminating During the Year		% Becoming Disabled During the Year		% Retiring During the Year (Tier 1)		% Retiring During the Year (Tier 2)	
Age	Rate	Age	Rate	Age	Rate	Age	Rate
20	7.00%	20	0.010%	50-51	10%	50-54	3%
25	5.80%	25	0.016%	52-53	12%	55	30%
30	3.50%	30	0.068%	54-55	15%	56-59	20%
35	1.75%	35	0.220%	56-59	20%	60-62	25%
40	1.10%	40	0.420%	60-62	25%	63-64	33%
45	1.00%	45	0.650%	63-64	33%	65-69	50%
50	1.00%	50	0.900%	65-69	50%	70+	100%
55+	0.00%	55	1.240%	70+	100%		
		60	1.580%				

## GLOSSARY

Total Annual Payroll is the projected annual rate of pay for the fiscal year following the valuation date of all covered members.

Present Value of Benefits is the single sum value on the valuation date of all future benefits to be paid to current Members, Retirees, Beneficiaries, Disability Retirees and Vested Terminations.

Normal (Current Year's) Cost is the current year's cost for benefits yet to be funded.

Unfunded Accrued Liability is a liability which arises when a pension plan is initially established or improved and such establishment or improvement is applicable to all years of past service.

Total Recommended Contribution is equal to the Normal Cost plus an amount sufficient to amortize the Unfunded Accrued Liability over a period ending in 2040. The recommended amount is adjusted for interest according to the timing of contributions during the year.

Entry Age Normal Cost Method - Under this method, the normal cost is the sum of the individual normal costs for all active participants. For an active participant, the normal cost is the participant's normal cost accrual rate, multiplied by the participant's current compensation.

- (a) The normal cost accrual rate equals:
  - (i) the present value of future benefits for the participant, determined as of the participant's entry age, divided by
  - (ii) the present value of the compensation expected to be paid to the participant for each year of the participant's anticipated future service, determined as of the participant's entry age.
- (b) In calculating the present value of future compensation, the salary scale is applied both retrospectively and prospectively to estimate compensation in years prior to and subsequent to the valuation year based on the compensation used for the valuation.
- (c) The accrued liability is the sum of the individual accrued liabilities for all participants and beneficiaries. A participant's accrued liability equals the present value, at the participant's attained age, of future benefits less the present value at the participant's attained age of the individual normal costs payable in the future. A beneficiary's accrued liability equals the present value, at the beneficiary's attained age, of future benefits. The unfunded accrued liability equals the total accrued liability less the actuarial value of assets.
- (d) Under this method, the entry age used for each active participant is the participant's age at the time he or she would have commenced participation if the plan had always been in existence under current terms, or the age as of which he or she first earns service credits for purposes of benefit accrual under the current terms of the plan.

## DISCUSSION OF RISK

ASOP No. 51, Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions, states that the actuary should identify risks that, in the actuary's professional judgment, may reasonably be anticipated to significantly affect the plan's future financial condition.

Throughout this report, actuarial results are determined under various assumption scenarios. These results are based on the premise that all future plan experience will align with the plan's actuarial assumptions; however, there is no guarantee that actual plan experience will align with the plan's assumptions. Whenever possible, the recommended assumptions in this report reflect conservatism to allow for some margin of unfavorable future plan experience. However, it is still possible that actual plan experience will differ from anticipated experience in an unfavorable manner that will negatively impact the plan's funded position.

Below are examples of ways in which plan experience can deviate from assumptions and the potential impact of that deviation. Typically, this results in an actuarial gain or loss representing the current-year financial impact on the plan's unfunded liability of the experience differing from assumptions; this gain or loss is amortized over a period of time determined by the plan's amortization method. When assumptions are selected that adequately reflect plan experience, gains and losses typically offset one another in the long term, resulting in a relatively low impact on the plan's contribution requirements associated with plan experience. When assumptions are too optimistic, losses can accumulate over time and the plan's amortization payment could potentially grow to an unmanageable level.

- Investment Return: When the rate of return on the Actuarial Value of Assets falls short of the assumption, this produces a loss representing assumed investment earnings that were not realized. Further, it is unlikely that the plan will experience a scenario that matches the assumed return in each year as capital markets can be volatile from year to year. Therefore, contribution amounts can vary in the future.
- Salary Increases: When a plan participant experiences a salary increase that was greater than assumed, this produces a loss representing the cost of an increase in anticipated plan benefits for the participant as compared to the previous year. The total gain or loss associated with salary increases for the plan is the sum of salary gains and losses for all active participants.
- Payroll Growth: The plan's payroll growth assumption, if one is used, causes a predictable annual increase in the plan's amortization payment in order to produce an amortization payment that remains constant as a percentage of payroll if all assumptions are realized. If payroll does not increase according to the plan's payroll growth assumption, the plan's amortization payment can increase significantly as a percentage of payroll even if all assumptions other than the payroll growth assumption are realized.
- Demographic Assumptions: Actuarial results take into account various potential events that could happen to a plan participant, such as retirement, termination, disability, and death. Each of these potential events is assigned a liability based on the likelihood of the event and the financial consequence of the event for the plan. Accordingly, actuarial liabilities reflect a blend of financial consequences associated with various possible outcomes (such as retirement at one of various possible ages). Once the outcome is known (e.g. the participant retires) the liability is adjusted to reflect the known outcome. This adjustment produces a gain or loss depending on whether the outcome was more or less favorable than other outcomes that could have occurred.

- Contribution risk: Risks associated with the items outlined above will inherently create varying liabilities and assets resulting in volatility in contributions. Actuarial losses on assets and liabilities will lead to higher contribution amounts, while actuarial gains on assets and liabilities will lead to lower contribution amounts.

### Impact of Plan Maturity on Risk

For newer pension plans, most of the participants and associated liabilities are related to active members who have not yet reached retirement age. As pension plans continue in operation and active members reach retirement ages, liabilities begin to shift from being primarily related to active members to being shared amongst active and retired members. Plan maturity is a measure of the extent to which this shift has occurred. It is important to understand that plan maturity can have an impact on risk tolerance and the overall risk characteristics of the plan. For example, plans with a large amount of retired liability do not have as long of a time horizon to recover from losses (such as losses on investments due to lower than expected investment returns) as plans where the majority of the liability is attributable to active members. For this reason, less tolerance for investment risk may be warranted for highly mature plans with a substantial inactive liability. Similarly, mature plans paying substantial retirement benefits resulting in a small positive or net negative cash flow can be more sensitive to near term investment volatility, particularly if the size of the fund is shrinking, which can result in less assets being available for investment in the market.

To assist with determining the maturity of the plan, we have provided some relevant metrics in table following titled “Plan Maturity Measures and Other Risk Metrics”. Highlights of this information are discussed below:

- The Support Ratio, determined as the ratio of active to inactive members has decreased from 71.9% to 67.8% over the last four years, meaning the plan’s maturity has remained fairly steady.
- The Accrued Liability Ratio, determined as the ratio of the Inactive Accrued Liability, which is the accrued liability associated with those receiving payments to the Total Accrued Liability, is 70.6%. With a plan of this maturity, losses due to lower than expected investment returns or demographic factors will need to be made up for over a shorter time horizon than would be needed for a less mature plan.
- The Funded Ratio, determined as the ratio of the Actuarial Value of Assets to the Total Accrued Liability has decreased from 43.6% on January 1, 2016 to 43.3% on January 1, 2019 due mainly changes in assumptions.

It is important to note that the actuary has identified the risks above as the most significant risks based on the characteristics of the plan and the nature of the project, however, it is not an exhaustive list of potential risks that could be considered. Additional advanced modelling, as well as the identification of additional risks, can be provided at the request of the reader.

PLAN MATURITY MEASURES AND OTHER RISK METRICS

	<u>1/1/2016</u>	<u>1/1/2017</u>	<u>1/1/2018</u>	<u>1/1/2019</u>
<u>Support Ratio</u>				
Total Actives	105	103	104	99
Total Inactives	146	140	139	146
Actives / Inactives	71.9%	73.6%	74.8%	67.8%
 <u>Asset Volatility Ratio</u>				
Market Value of Assets (MVA)	66,741,089	70,599,997	79,073,077	75,776,118
Total Annual Payroll	9,901,165	10,035,610	10,149,326	10,247,468
MVA / Total Annual Payroll	674.1%	703.5%	779.1%	739.5%
 <u>Accrued Liability (AL) Ratio</u>				
Inactive Accrued Liability	110,591,682	117,262,739	120,919,020	132,637,233
Total Accrued Liability	159,121,485	169,320,673	173,983,568	187,799,736
Inactive AL / Total AL	69.5%	69.3%	69.5%	70.6%
 <u>Funded Ratio</u>				
Actuarial Value of Assets (AVA)	69,312,907	73,120,605	78,282,857	81,390,583
Total Accrued Liability	159,121,485	169,320,673	173,983,568	187,799,736
AVA / Total Accrued Liability	43.6%	43.2%	45.0%	43.3%

STATEMENT OF FIDUCIARY NET POSITION  
December 31, 2018

<u>ASSETS</u>	MARKET VALUE
Cash and Cash Equivalents:	
Money Market	1,225,663
Total Cash and Equivalents	1,225,663
Receivables:	
From City	23,348
Accrued Past Due Interest	145,542
Total Receivable	168,890
Investments:	
Municipal Obligations	764,190
Corporate Bonds	13,554,406
U.S. Gov't and Agency Obligations	5,506,499
Stocks	2,094,014
Mutual Funds	52,467,456
Total Investments	74,386,565
Other Assets	0
Total Assets	75,781,118
<u>LIABILITIES</u>	
Total Liabilities	5,000
Net Assets:	
Active and Retired Members' Equity	75,776,118
NET POSITION RESTRICTED FOR PENSIONS	75,776,118
TOTAL LIABILITIES AND NET ASSETS	75,781,118

STATEMENT OF CHANGES IN FIDUCIARY NET POSITION  
FOR THE YEAR ENDED December 31, 2018  
Market Value Basis

ADDITIONS

Contributions:		
Member	1,098,506	
City	8,344,947	
Total Contributions		9,443,453
Investment Income:		
Net Realized Gain (Loss)	354,172	
Unrealized Gain (Loss)	(5,956,875)	
Net Increase in Fair Value of Investments		(5,602,703)
Interest & Dividends		2,215,613
Less Investment Expense <sup>1</sup>		(91,737)
Net Investment Income		(3,478,827)
Total Additions		5,964,626
<u>DEDUCTIONS</u>		
Distributions to Members:		
Benefit Payments	9,150,830	
Total Distributions		9,150,830
Administrative Expenses		110,755
Total Deductions		9,261,585
Net Increase in Net Position		(3,296,959)
NET POSITION RESTRICTED FOR PENSIONS		
Beginning of the Year		79,073,077
End of the Year		75,776,118

<sup>1</sup> Investment Related expenses include investment advisory, custodial and performance monitoring fees.

ACTUARIAL ASSET VALUATION

December 31, 2018

Actuarial Assets for funding purposes are developed by recognizing the total actuarial investment gain or loss for each Plan Year over a five year period. In the first year, 20% of the gain or loss is recognized. In the second year 40%, in the third year 60%, in the fourth year 80%, and in the fifth year 100% of the gain or loss is recognized. The actuarial investment gain or loss is defined as the actual return on investments minus the actuarial assumed investment return. Actuarial Assets shall not be less than 80% nor greater than 120% of the Market Value of Assets.

Plan Year Ending	Gain/(Loss)	Gains/(Losses) Not Yet Recognized				
		Amounts Not Yet Recognized by Valuation Year				
		2019	2020	2021	2022	2023
12/31/2015	(4,120,159)	(824,032)	0	0	0	0
12/31/2016	(442,241)	(176,896)	(88,448)	0	0	0
12/31/2017	3,546,209	2,127,725	1,418,484	709,242	0	0
12/31/2018	(8,426,578)	(6,741,262)	(5,055,947)	(3,370,631)	(1,685,316)	0
Total		(5,614,465)	(3,725,911)	(2,661,389)	(1,685,316)	0

Development of Investment Gain/Loss

Market Value of Assets, 12/31/2017	79,073,077
Contributions Less Benefit Payments & Administrative Expenses	181,868
Expected Investment Earnings <sup>1</sup>	4,947,751
Actual Net Investment Earnings	<u>(3,478,827)</u>
2018 Actuarial Investment Gain/(Loss)	<u>(8,426,578)</u>

<sup>1</sup> Expected Investment Earnings = 6.25% x (79,073,077 + 0.5 x 181,868)

Development of Actuarial Value of Assets

Market Value of Assets, 12/31/2018	75,776,118
(Gains)/Losses Not Yet Recognized	<u>5,614,465</u>
Actuarial Value of Assets, 12/31/2018	81,390,583
(A) 12/31/2017 Actuarial Assets:	78,282,857
(I) Net Investment Income:	
1. Interest and Dividends	2,215,613
2. Realized Gains (Losses)	354,172
3. Change in Actuarial Value	447,810
4. Investment Expenses	<u>(91,737)</u>
Total	2,925,858
(B) 12/31/2018 Actuarial Assets:	81,390,583
Actuarial Asset Rate of Return = (2 x I) / (A + B - I):	3.73%
Market Value of Assets Rate of Return:	-4.39%
12/31/2018 Limited Actuarial Assets:	81,390,583
Actuarial Gain/(Loss) due to Investment Return (Actuarial Asset Basis)	(1,972,504)

CHANGES IN NET ASSETS AVAILABLE FOR BENEFITS  
December 31, 2018  
Actuarial Asset Basis

INCOME		
Contributions:		
Member	1,098,506	
City	8,344,947	
Total Contributions		9,443,453
Earnings from Investments		
Interest & Dividends	2,215,613	
Net Realized Gain (Loss)	354,172	
Change in Actuarial Value	447,810	
Total Earnings and Investment Gains		3,017,595
EXPENSES		
Administrative Expenses:		
Investment Related <sup>1</sup>	91,737	
Other	110,755	
Total Administrative Expenses		202,492
Distributions to Members:		
Benefit Payments	9,150,830	
Total Distributions		9,150,830
Change in Net Assets for the Year		3,107,726
Net Assets Beginning of the Year		78,282,857
Net Assets End of the Year <sup>2</sup>		81,390,583

<sup>1</sup> Investment Related expenses include investment advisory, custodial and performance monitoring fees.

<sup>2</sup> Net Assets may be limited for actuarial consideration.

STATISTICAL DATA

	<u>1/1/2016</u>	<u>1/1/2017</u>	<u>1/1/2018</u>	<u>1/1/2019</u>
<u>Actives - Tier 1</u>				
Number	79	76	73	68
Average Current Age	43.4	44.0	44.5	45.1
Average Age at Employment	28.1	28.2	28.1	28.2
Average Past Service	15.3	15.8	16.4	16.9
Average Annual Salary	\$100,461	\$103,029	\$104,249	\$109,606
<u>Actives - Tier 2</u>				
Number	26	27	31	31
Average Current Age	30.8	31.8	32.2	33.2
Average Age at Employment	28.0	28.1	27.6	27.6
Average Past Service	2.8	3.7	4.6	5.6
Average Annual Salary	\$75,567	\$81,683	\$81,909	\$90,138
<u>Service Retirees</u>				
Number	86	86	82	83
Average Current Age	69.1	69.4	69.4	69.2
Average Annual Benefit	\$66,938	\$70,671	\$73,049	\$76,435
<u>Beneficiaries</u>				
Number	34	30	32	39
Average Current Age	70.7	68.3	70.6	62.3
Average Annual Benefit	\$33,533	\$34,748	\$43,134	\$40,913
<u>Disability Retirees</u>				
Number	22	21	22	22
Average Current Age	61.9	62.8	63.1	61.3
Average Annual Benefit	\$57,557	\$60,835	\$62,620	\$65,582
<u>Terminated Vested</u>				
Number	4	3	3	2
Average Current Age	33.1	39.4	40.4	36.8
Average Annual Benefit <sup>1</sup>	N/A	\$46,357	\$46,357	N/A

<sup>1</sup> Average Annual Benefit for Terminated Vested members reflects the benefit for members entitled to a future annual benefit from the plan.

## AGE AND SERVICE DISTRIBUTION

### PAST SERVICE

AGE	0	1	2	3	4	5-9	10-14	15-19	20-24	25-29	30+	Total
15 - 19	0	0	0	0	0	0	0	0	0	0	0	0
20 - 24	0	1	0	0	0	0	0	0	0	0	0	1
25 - 29	0	2	0	0	2	2	0	0	0	0	0	6
30 - 34	0	0	1	1	3	8	0	0	0	0	0	13
35 - 39	0	1	0	0	1	10	16	1	0	0	0	29
40 - 44	0	0	0	0	0	1	6	7	0	0	0	14
45 - 49	0	0	0	0	0	2	2	11	2	0	0	17
50 - 54	0	0	0	0	0	0	2	4	3	1	0	10
55 - 59	0	0	0	0	0	0	0	0	1	2	4	7
60 - 64	0	0	0	0	0	0	0	1	0	0	1	2
65+	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	4	1	1	6	23	26	24	6	3	5	99

## VALUATION PARTICIPANT RECONCILIATION

### 1. Active lives

a. Number in prior valuation 1/1/2018	104
b. Terminations	
i. Vested (partial or full) with deferred benefits	0
ii. Non-vested or full lump sum distribution received	0
iii. Transferred service to other fund	0
c. Deaths	
i. Beneficiary receiving benefits	0
ii. No future benefits payable	0
d. Disabled	(2)
e. Retired	(3)
f. Continuing participants	99
g. New entrants	0
h. Total active life participants in valuation	99

### 2. Non-Active lives (including beneficiaries receiving benefits)

	Service Retirees, Vested Receiving <u>Benefits</u>	Receiving Death <u>Benefits</u>	Receiving Disability <u>Benefits</u>	Vested <u>Deferred</u>	<u>Total</u>
a. Number prior valuation	82	32	22	3	139
Retired	4	0	0	(1)	3
Vested Deferred	0	0	0	0	0
Death, With Survivor	(3)	10	(1)	0	6
Death, No Survivor	0	(3)	(1)	0	(4)
Disabled	0	0	2	0	2
Refund of Contributions	0	0	0	0	0
Rehires	0	0	0	0	0
Expired Annuities	0	0	0	0	0
Data Corrections	0	0	0	0	0
Hired/Termed in Same Year	0	0	0	0	0
b. Number current valuation	83	39	22	2	146

SUMMARY OF CURRENT PLAN

Article 4 Pension Fund

The Plan is established and administered as prescribed by “Article 4. Firefighters’ Pension Fund – Municipalities 500,000 and Under” of the Illinois Pension Code.

Plan Administration

The Plan is a single employer defined benefit pension plan administered by a Board of Trustees comprised of:

- a) Two members appointed by the Municipality,
- b) Two active Members of the Fire Department elected by the Membership, and
- c) One retired Member of the Fire Department elected by the Membership.

Credited Service

Years and fractional parts of years of service (except as noted below) as a sworn Firefighter employed by the Municipality.

Salary

Annual salary, including longevity, attached to firefighter’s rank, as established by the municipality appropriation ordinance, excluding overtime pay, bonus pay and holiday pay except for the base 8 hours of the 10 pensionable holidays which is included.

Normal Retirement

Date

**Tier 1:** Age 50 and 20 years of Credited Service.

**Tier 2:** Age 55 and 10 years of Credited Service.

Benefit

**Tier 1:** 50% of annual salary attached to rank on last day of service plus 2.50% of annual salary for each year of service over 20 years, up to a maximum of 75% of salary. The minimum monthly benefit is \$1,159.27 per month.

**Tier 2:** 2.50% per year of service times the average salary for the eight consecutive years prior to retirement times the number of years of service, up to a maximum of 75% of average salary. The minimum monthly benefit is \$1,159.27 per month.

Form of Benefit

**Tier 1:** For married retirees, an annuity payable for the life of the Member; upon the death of the member, 100% of the Member’s benefit payable to the spouse until death. For unmarried retirees, the normal form is a Single Life Annuity.

**Tier 2:** Same as above, but with 66 2/3% of benefit continued to spouse.

Early Retirement

Date	<b>Tier 1:</b> Age 60 and 10 years of Credited Service. <b>Tier 2:</b> Age 50 and 10 years of Credited Service.
Benefit	<b>Tier 1:</b> 1.5% plus 0.1% for each year of service in excess of 10 years, times salary x service (complete years). <b>Tier 2:</b> Normal Retirement Benefit, reduced 6% for each year before age 55, with no minimum benefit.
Form of Benefit	Same as Normal Retirement

Disability Benefit

Eligibility	Total and permanent as determined by the Board of Trustees. Seven years of service required for non-service connected disability.
Benefit Amount	A maximum of: <ul style="list-style-type: none"><li>a.) 65% of salary attached to the rank held by Member on last day of service, and;</li><li>b.) The monthly retirement pension that the Member is entitled to receive if he or she retired immediately.</li></ul>

For non-service connected disabilities, a benefit of 50% of salary attached to rank held by Member on last day of service.

Cost-of-Living Adjustment

**Tier 1:**

*Retirees:* An annual increase equal to 3.00% per year after age 55. Those that retire prior to age 55 receive an increase of 1/12 of 3.00% for each full month since benefit commencement upon reaching age 55.

*Disabled Retirees:* An annual increase equal to 3.00% per year of the original benefit amount beginning at age 60. Those that become disabled prior to age 60 receive an increase of 3.00% of the original benefit amount for each year since benefit commencement upon reaching age 60.

**Tier 2:** An annual increase each January 1 equal to 3.00% per year or one-half of the annual unadjusted percentage increase in the consumer price index-u for the 12 months ending with the September preceding each November 1, whichever is less, of the original pension after the attainment of age 60 or first anniversary of pension start date whichever is later.

Pre-Retirement Death Benefit

Service Incurred	100% of salary attached to rank held by Member on last day of service.
Non-Service Incurred	A maximum of: a.) 54% of salary attached to the rank held by Member on last day of service, and; b.) The monthly retirement pension earned by the deceased Member at the time of death, regardless of whether death occurs before or after age 50.

Vesting (Termination)

Vesting Service Requirement	10 years.
Non-Vested Benefit	Refund of Member Contributions.
Vested Benefit	Either the termination benefit, payable upon reaching age 60 (55 for Tier 2), provided contributions are not withdrawn, or a refund of member contributions.
Termination Benefit	Based on the monthly salary attached to the Member's rank at separation from service and equals:  <b>Tier 1:</b> 1.5% plus 0.1% for each year of service in excess of 10 years, times salary x service (based on complete years).  <b>Tier 2:</b> 2.50% of 8-year final average salary times creditable service.

Contributions

Employee	9.455% of Salary.
Municipality	Remaining amount necessary for payment of Normal (current year's) Cost and amortization of the accrued past service liability.