



City of Birmingham Firemen's and Policemen's Supplemental Pension System

**Actuarial Valuation and Review as of
July 1, 2018**

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2727 Paces Ferry Road SE Building One, 1 Suite 1400 Atlanta, GA 30339-4053
T 678.306.3100 www.segalco.com

May 7, 2019

Board of Managers
City of Birmingham Firemen's and Policemen's Supplemental Pension System
710 North 20th Street, GA 100 City Hall
Birmingham, Alabama 35203-2216

Dear Board Members:

We are pleased to submit this Actuarial Valuation and Review as of July 1, 2018. It summarizes the actuarial data used in the valuation, analyzes the preceding year's experience, and establishes the funding requirements for fiscal 2018-2019 fiscal year.

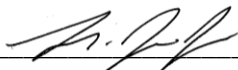
This report was prepared in accordance with generally accepted actuarial principles and practices at the request of the Board to assist in administering the Supplemental Pension System. The census information on which our calculations were based was prepared by the City and the financial information was provided by the City's Finance Department. That assistance is gratefully acknowledged.

The actuarial calculations were directed under the supervision of Deborah K. Brigham, FCA, ASA, MAAA, Enrolled Actuary. We are members of the American Academy of Actuaries and we meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the best of our knowledge, the information supplied in this actuarial valuation is complete and accurate. Further, in our opinion, the assumptions as approved by the Board of Managers are reasonably related to the experience of and the expectations for the System.

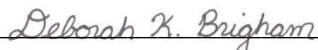
We look forward to reviewing this report at your next meeting and to answering any questions.

Sincerely,

Segal Consulting, a Member of The Segal Group, Inc.

By: 

Leon F. (Rocky) Joyner, Jr., FCA, ASA, MAAA, EA
Vice President and National Public Sector Retirement Practice Leader



Deborah K. Brigham, FCA, ASA, MAAA, EA
Senior Vice President and Consulting Actuary

Table of Contents

City of Birmingham Firemen's and Policemen's Supplemental Pension System Actuarial Valuation and Review as of July 1, 2018

Section 1: Actuarial Valuation Summary

Purpose and Basis	4
Significant Issues	5
Summary of Key Valuation Results	6
Important Information About Actuarial Valuations	8

Section 2: Actuarial Valuation Results

Participant Data.....	10
Financial Information.....	14
Actuarial Experience	17
Changes in the Actuarial Accrued Liability	22
Development of Unfunded Actuarial Accrued Liability.....	23
Actuarially Determined Contribution	24
History of Employer Contributions	26
Risk	27

Section 3: Supplemental Information

Exhibit A – Table of Plan Coverage.....	28
Exhibit B – Participants in Active Service as of June 30, 2018	29
Exhibit C – Reconciliation of Participant Data	32
Exhibit D – Summary Statement of Income and Expenses on a Market Value Basis.....	33
Exhibit E – Summary Statement of Plan Assets.....	34
Exhibit F – Development of the Fund Through June 30, 2018.....	35
Exhibit G – Definition of Pension Terms.....	36

Section 4: Actuarial Valuation Basis

Exhibit I – Actuarial Assumptions and Actuarial Cost Method.....	40
Exhibit II – Summary of Plan Provisions.....	45

Section 1: Actuarial Valuation Summary

Purpose and Basis

This report was prepared by Segal Consulting to present a valuation of the City of Birmingham Firemen's and Policemen's Supplemental Pension System as of July 1, 2018. The valuation was performed to determine whether the assets and contribution rates are sufficient to provide the prescribed benefits. The measurements shown in this actuarial valuation may not be applicable for other purposes. In particular, the measures herein are not necessarily appropriate for assessing the sufficiency of System assets to cover the estimated cost of settling the System's benefit obligations. Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as 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; and changes in plan provisions or applicable law.

Certain disclosure information required by GASB Statements No 67 and 68 as of June 30, 2018 for the Supplemental Pension System etc. has been provided in a separate report.

The contribution requirements presented in this report are based on:

- The benefit provisions of the Pension Plan, as administered by the Board of Managers;
- The characteristics of covered active participants, and retired participants and beneficiaries as of June 30, 2018, provided by the City;
- The assets of the Plan as of June 30, 2018, provided by the City's Finance Department;
- Economic assumptions regarding future salary increases and investment earnings; and
- Other actuarial assumptions regarding employee terminations, retirement, death, etc.

Significant Issues

1. This year's valuation report focuses on the City's actuarially determined contribution, net of employee contributions. Past reports have provided the total recommended contribution, for the City plus the employees.
2. Segal Consulting ("Segal") strongly recommends an actuarial funding method that targets 100% funding of the actuarial accrued liability. Generally, this implies payments that are ultimately at least enough to cover normal cost, interest on the unfunded actuarial accrued liability and the principal balance. The City increased their contribution rate to 6.05% of pay in 2018. The updated contribution levels, combined with Fire Insurance Tax income, are projected to enable the System to reach 100% funding in about 23 years, which is a reasonable period.
3. The actuarially determined employer contribution for the upcoming year is \$5,044,341, a decrease of \$232,060 from last year. The contribution as a percentage of payroll decreased from 6.19% of pay to 5.95% of pay. The amortization period used to determine the actuarially determined contribution, which was previously an open (or rolling) 30-year period, has been closed, and is 29 years in this valuation.
4. The funded ratio (the ratio of the actuarial value of assets to actuarial accrued liability) is 44.14%, compared to the prior year funded ratio of 44.92%. This ratio is one measure of funding status, and its history is a measure of funding progress. Using the market value of assets, the funded ratio is 43.65%, compared to 42.83% as of the prior valuation date. Now that the contribution levels are sufficient to amortize the unfunded liabilities, these ratios are projected to climb if all assumptions are met. Note that these measurements are not necessarily appropriate for assessing the sufficiency of System assets to cover the estimated cost of settling the System's benefit obligation or the need for or the amount of future contributions.
5. The unfunded actuarial accrued liability is \$54.6 million, which is a decrease of \$0.9 million since the prior valuation.
6. The net actuarial gain from investment and other experience is \$1,483,989, or 1.5% of actuarial accrued liability.
7. The rate of return on the market value of assets was 10.61% for the July 1, 2017 to June 30, 2018 plan year. The return on the actuarial value of assets was 6.26% for the same period, due to the recognition of prior years' investment gains and losses. This resulted in an actuarial loss when measured against the assumed rate of return of 7.50%. This actuarial investment loss increased the average employer contribution rate by 0.04% of pay. Given the low fixed income interest rate environment, target asset allocation and expectations of future investment returns for various classes, we advise the Board to continue to monitor actual and anticipated investment returns relative to the assumed long-term rate of return on investments of 7.50%.
8. The net experience gain from sources other than investment experience was 2.1% of the actuarial accrued liability. Given the temporary nature of the benefits payable from this System, liabilities can fluctuate from year to year depending on the service of individuals at retirement. The System is therefore subject to somewhat larger gains and losses than it would be if benefits were payable over participants' lifetimes.

9. The assumption for administrative expenses decreased from \$70,000 to \$65,000 for the year beginning July 1, 2018.
10. This report constitutes an actuarial valuation for the purpose of determining the actuarially determined contribution under the City's funding policy. The Net Pension Liability (NPL) and Pension Expense under Governmental Accounting Standards Board (GASB) Statements No. 67 and No. 68, for inclusion in the plan and employer's financial statements as of June 30, 2019, will be provided separately. The accounting disclosures will utilize different methodologies from those employed in the funding valuation, as required by the GASB. However, the actuarially determined recommended contribution in this valuation is expected to be used as the actuarially determined contribution (ADC) for GASB financial reporting.
11. This actuarial report as of July 1, 2018 is based on financial and demographic data as of that date. Changes subsequent to that date are not reflected and will affect future actuarial costs of the plan.
12. Since the actuarial valuation results are dependent on a given set of assumptions, there is a risk that emerging results may differ significantly as actual experience proves to be different from the assumptions. Segal has not been engaged to perform a detailed analysis of the potential range of the impact of risk relative to the System's future financial condition, but a brief discussion of some risks that may affect the System is included in Section 2. A more detailed assessment would provide the Board with a better understanding of the inherent risks. This could be important because actual contributions have been less than the ADC for several years, which may indicate additional funding challenges in the future.
13. Projections of assets and funding levels will be provided to the Board under separate cover.

Summary of Key Valuation Results

		2018	2017
Contributions for plan year beginning July 1:	• Actuarially determined employer contribution	\$5,044,341	\$5,276,401
	• Actuarially determined employer contribution as a percent of payroll	5.95%	6.19%
	• Actual contributions (employer and Fire Tax insurance)	--	\$5,237,460
Actuarial accrued liability for plan year beginning July 1:	• Retired participants and beneficiaries	\$37,933,545	\$38,909,416
	• Active participants	59,253,639	61,545,085
	• Inactive participants due a refund of employee contributions	466,937	357,587
	• Total	97,654,121	100,812,088
	• Total normal cost including administrative expenses	5,890,311	5,959,597
Assets for plan year beginning July 1:	• Market value of assets (MVA)	\$42,627,180	\$43,175,285
	• Actuarial value of assets (AVA)	43,100,200	45,287,576
	• Actuarial value of assets as a percentage of market value of assets	101.11%	104.89%
Funded status for plan year beginning July 1:	• Unfunded actuarial accrued liability on market value of assets	\$55,026,941	\$57,636,803
	• Funded percentage on MVA basis	43.65%	42.83%
	• Unfunded actuarial accrued liability on actuarial value of assets	\$54,553,921	\$55,524,512
	• Funded percentage on AVA basis	44.14%	44.92%
	• Effective amortization period on an AVA basis	23	27
Key assumptions:	• Net investment return	7.50%	7.50%
	• Inflation rate	2.50%	2.50%
	• Payroll increase	2.50%	2.50%
Demographic data for plan year beginning July 1	• Number of retired participants and beneficiaries	378	373
	• Number of active participants	1,417	1,450
	• Number of inactive participants entitled to a refund of employee contributions	46	34
	• Total payroll	\$84,820,855	\$85,269,937
	• Average payroll	59,859	58,807

Important Information About Actuarial Valuations

An actuarial valuation is a budgeting tool with respect to the financing of future projected obligations of a pension plan. It is an estimated forecast – the actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.

In order to prepare a valuation, Segal Consulting (“Segal”) relies on a number of input items. These include:

Plan of benefits	Plan provisions define the rules that will be used to determine benefit payments, and those rules, or the interpretation of them, may change over time. Even where they appear precise, outside factors may change how they operate. It is important to keep Segal informed with respect to plan provisions and administrative procedures, and to review the plan summary included in our report to confirm that Segal has correctly interpreted the plan of benefits.
Participant data	An actuarial valuation for a plan is based on data provided to the actuary by the City. Segal does not audit such data for completeness or accuracy, other than reviewing it for obvious inconsistencies compared to prior data and other information that appears unreasonable. It is important for Segal to receive the best possible data and to be informed about any known incomplete or inaccurate data.
Assets	The valuation is based on the market value of assets as of the valuation date, as provided by the City’s Finance Department. The System uses an “actuarial value of assets” that differs from market value to gradually reflect year-to-year changes in the market value of assets in determining the contribution requirements.
Actuarial assumptions	In preparing an actuarial valuation, Segal projects the benefits to be paid to existing plan participants for the rest of their lives and the lives of their beneficiaries. This projection requires actuarial assumptions as to the probability of death, disability, withdrawal, and retirement of each participant for each year. In addition, the benefits projected to be paid for each of those events in each future year reflect actuarial assumptions as to salary increases and cost-of-living adjustments. The projected benefits are then discounted to a present value, based on the assumed rate of return that is expected to be achieved on the plan’s assets. There is a reasonable range for each assumption used in the projection and the results may vary materially based on which assumptions are selected. It is important for any user of an actuarial valuation to understand this concept. Actuarial assumptions are periodically reviewed to ensure that future valuations reflect emerging plan experience. While future changes in actuarial assumptions may have a significant impact on the reported results, that does not mean that the previous assumptions were unreasonable.

The user of Segal's actuarial valuation (or other actuarial calculations) should keep the following in mind:

- The actuarial valuation is prepared at the request of the City. Segal is not responsible for the use or misuse of its report, particularly by any other party.
- An actuarial valuation is a measurement of the plan's assets and liabilities at a specific date. Accordingly, except where otherwise noted, Segal did not perform an analysis of the potential range of future financial measures. The actual long-term cost of the plan will be determined by the actual benefits and expenses paid and the actual investment experience of the plan.
- Actuarial results in this report are not rounded, but that does not imply precision.
- If the City or Board is aware of any event or trend that was not considered in this valuation that may materially change the results of the valuation, Segal should be advised, so that we can evaluate it.
- Segal does not provide investment, legal, accounting, or tax advice. Segal's valuation is based on our understanding of applicable guidance in these areas and of the plan's provisions, but they may be subject to alternative interpretations. The Board of Managers should look to their other advisors for expertise in these areas.

As Segal Consulting has no discretionary authority with respect to the management or assets of the Plan, it is not a fiduciary in its capacity as actuaries and consultants with respect to the System.

Section 2: Actuarial Valuation Results

Participant Data

The Actuarial Valuation and Review considers the number and demographic characteristics of covered participants, including active participants, retired participants and beneficiaries.

This section presents a summary of significant statistical data on these participant groups.

More detailed information for this valuation year and the preceding valuation can be found in *Section 3, Exhibits A, B, and C*.

PARTICIPANT POPULATION: 2009 – 2018

Year Ended June 30	Active Participants	Retired Participants and Beneficiaries	Ratio of Non-Actives to Actives
2009	1,476	278	0.19
2010	1,520	295	0.19
2011	1,474	315	0.21
2012	1,478	323	0.22
2013	1,442	357	0.25
2014	1,467	363	0.25
2015	1,455	395	0.27
2016	1,439	388	0.27
2017	1,450	373	0.26
2018	1,417	378	0.27

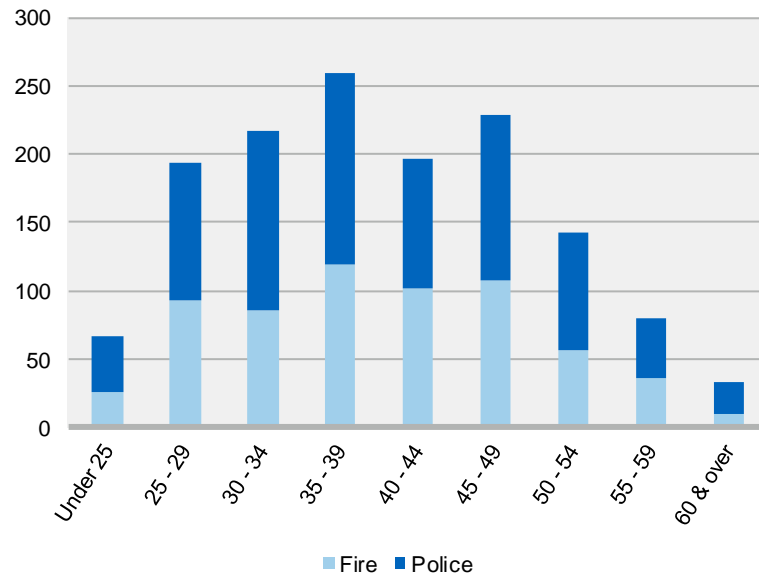
Note: Chart excludes terminated participants due a refund of employee contributions.

Active Participants

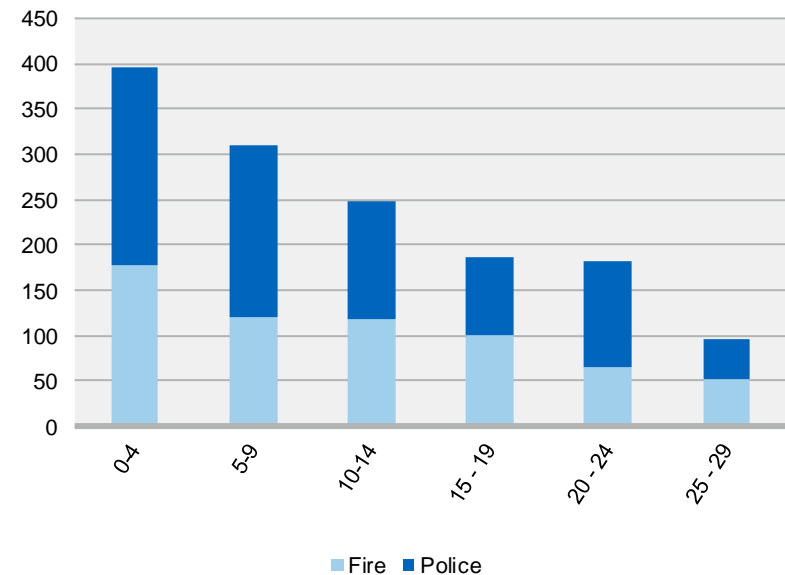
Plan costs are affected by the age, years of service and payroll of active participants. In this year's valuation, there were 1,417 active participants with an average age of 40.2, average years of service of 11.7 years and average payroll of \$59,859. The 1,450 active participants in the prior valuation had an average age of 40.1, average service of 11.8 years and average payroll of \$58,807.

Distribution of Active Participants as of June 30, 2018

ACTIVES BY AGE



ACTIVES BY YEARS OF SERVICE



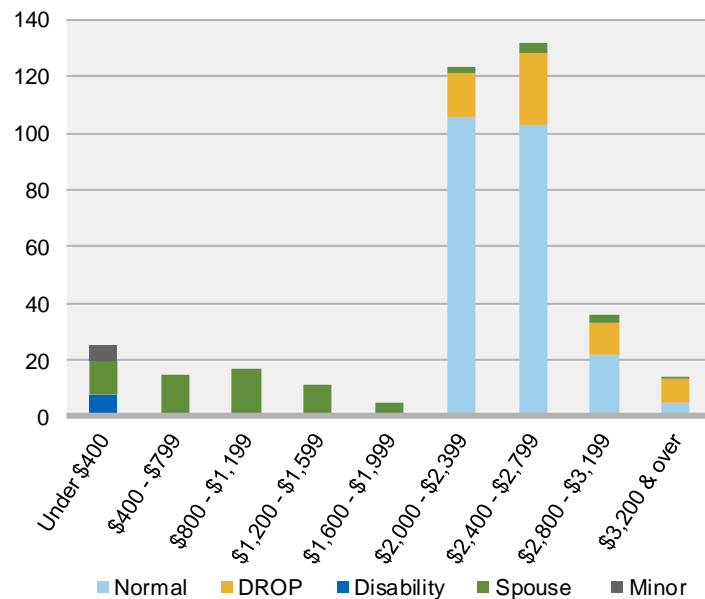
Retired Participants and Beneficiaries

As of June 30, 2018, 304 retired participants and 74 beneficiaries were receiving total monthly benefits of \$835,988. For comparison, in the previous valuation, there were 298 retired participants and 75 beneficiaries receiving monthly benefits of \$804,843.

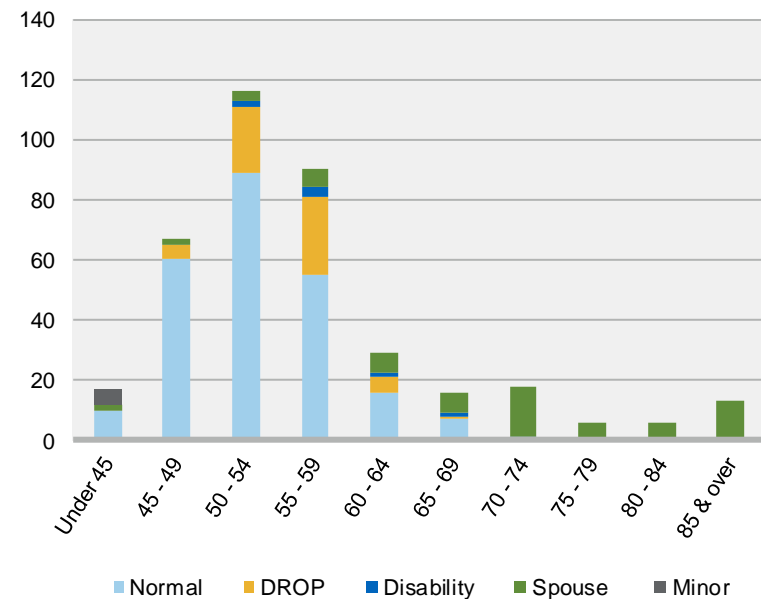
As of June 30, 2018, the average monthly benefit for retired participants and beneficiaries is \$2,212, compared to \$2,158 in the previous valuation. The average age for retired participants and beneficiaries is 57.1 in the current valuation, compared with 57.0 in the prior valuation.

Distribution of Pensioners and Beneficiaries as of June 30, 2018

PENSIONERS AND BENEFICIARIES BY TYPE AND MONTHLY AMOUNT



PENSIONERS AND BENEFICIARIES BY TYPE AND AGE



Historical Plan Population

The chart below demonstrates the progression of the active population over the last ten years. The chart also shows the changes among the retired population over the same time period.

This Supplemental System pays benefits to Police and Fire employees until they would have had 30 years of service with the City. Therefore, the active participant counts exclude those with 30 or more years of service, and the retiree counts include those who have retired but have not yet reached the 30th anniversary of their employment. The retiree counts also include disabilities and survivors, who are paid for from the System for life.

PARTICIPANT DATA STATISTICS: 2009 – 2018

Year Ended June 30	Active Participants			Retired Participants and Beneficiaries		
	Count	Average Age	Average Service	Count	Average Age	Average Monthly Amount
2009	1,476	40.2	12.0	278	54.9	\$1,640
2010	1,520	40.4	12.1	295	55.6	1,694
2011	1,474	40.6	12.2	315	56.5	1,765
2012	1,478	40.7	12.4	323	56.4	1,798
2013	1,442	40.8	12.5	357	57.0	1,913
2014	1,467	40.5	12.0	363	57.0	2,016
2015	1,455	40.5	12.3	395	57.2	2,072
2016	1,439	40.3	12.1	388	57.1	2,120
2017	1,450	40.1	11.8	373	57.0	2,158
2018	1,417	40.2	11.7	378	57.1	2,212

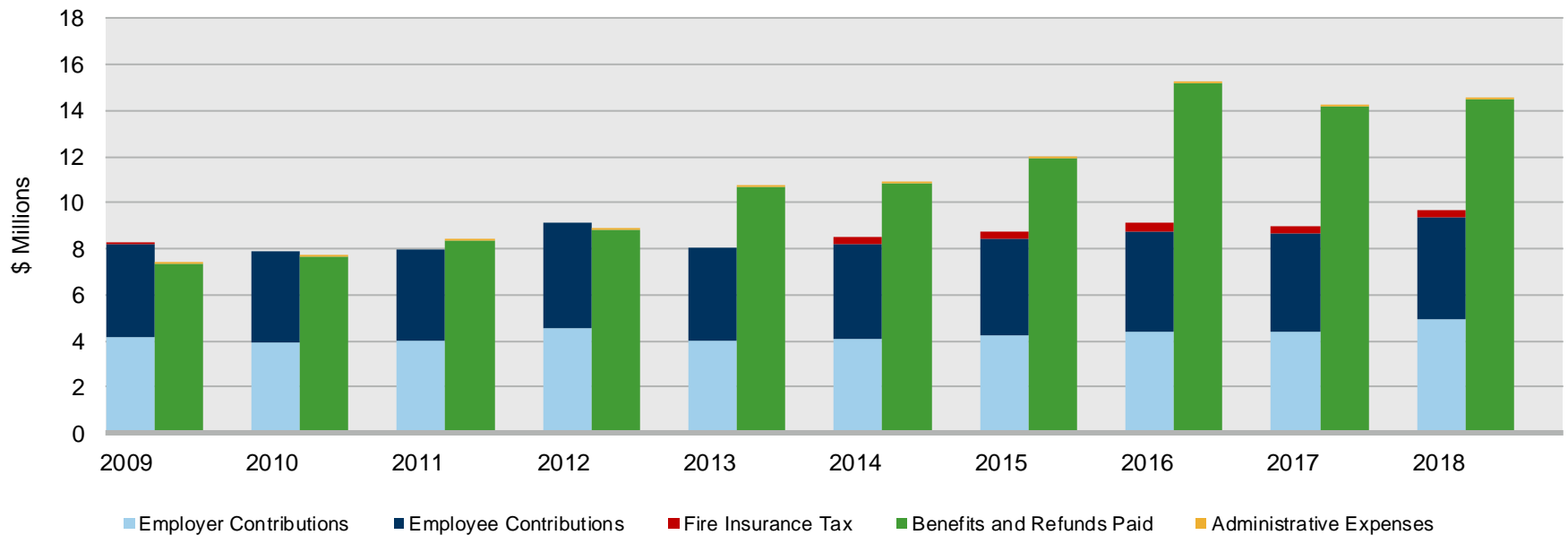
Financial Information

Retirement plan funding anticipates that, over the long term, both contributions (less administrative expenses) and investment earnings (less investment fees) will be needed to cover benefit payments. Retirement plan assets change as a result of the net impact of these income and expense components.

Total contributions, including Fire Insurance Tax income, were \$9.7 million for the year ended June 30, 2018. Benefit payments, DROP lump sums, refunds and transfers to the Retirement and Relief Plan totaled \$14.5 million. To the extent that future contributions are less than benefit payments, investment earnings or fund assets will be needed to cover the shortfall.

Additional financial information, including a summary of transactions for the valuation year, is presented in *Section 3, Exhibits D, E and F*.

**COMPARISON OF CONTRIBUTIONS MADE WITH BENEFITS AND EXPENSES PAID
FOR YEARS ENDED JUNE 30, 2009 – 2018**



It is desirable to have level and predictable plan costs from one year to the next. For this reason, the Board of Managers has approved an asset valuation method that gradually adjusts to market value. Under this valuation method, the full value of market fluctuations is not recognized in a single year and, as a result, the asset value and the plan costs are more stable. The amount of the adjustment to recognize market value is treated as income, which may be positive or negative. Realized and unrealized gains and losses are treated equally and, therefore, the sale of assets has no immediate effect on the actuarial value.

DETERMINATION OF ACTUARIAL VALUE OF ASSETS FOR YEAR ENDED JUNE 30, 2018

1. Market value of assets, June 30, 2018			\$42,627,180
2. Calculation of unrecognized return	Original Amount¹	Percent Deferred	Unrecognized Amount²
(a) Year ended June 30, 2018	\$1,266,069	80%	\$1,012,855
(b) Year ended June 30, 2017	1,051,618	60	630,972
(c) Year ended June 30, 2016	-3,978,125	40	-1,591,250
(d) Year ended June 30, 2015	-2,627,983	20	-525,597
(e) Year ended June 30, 2014	2,422,418	0	0
(f) Total unrecognized return			-473,020
3. Preliminary actuarial value: (1) - (2f)			\$43,100,200
4. Adjustment to be within 20% corridor			0
5. Final actuarial value of assets as of June 30, 2018: (3) + (4)			<u>43,100,200</u>
6. Actuarial value as a percentage of market value: (5) ÷ (1)			101.1%
7. Amount deferred for future recognition ³ : (1) - (5)			-\$473,020

¹ Total return minus expected return on a market value basis

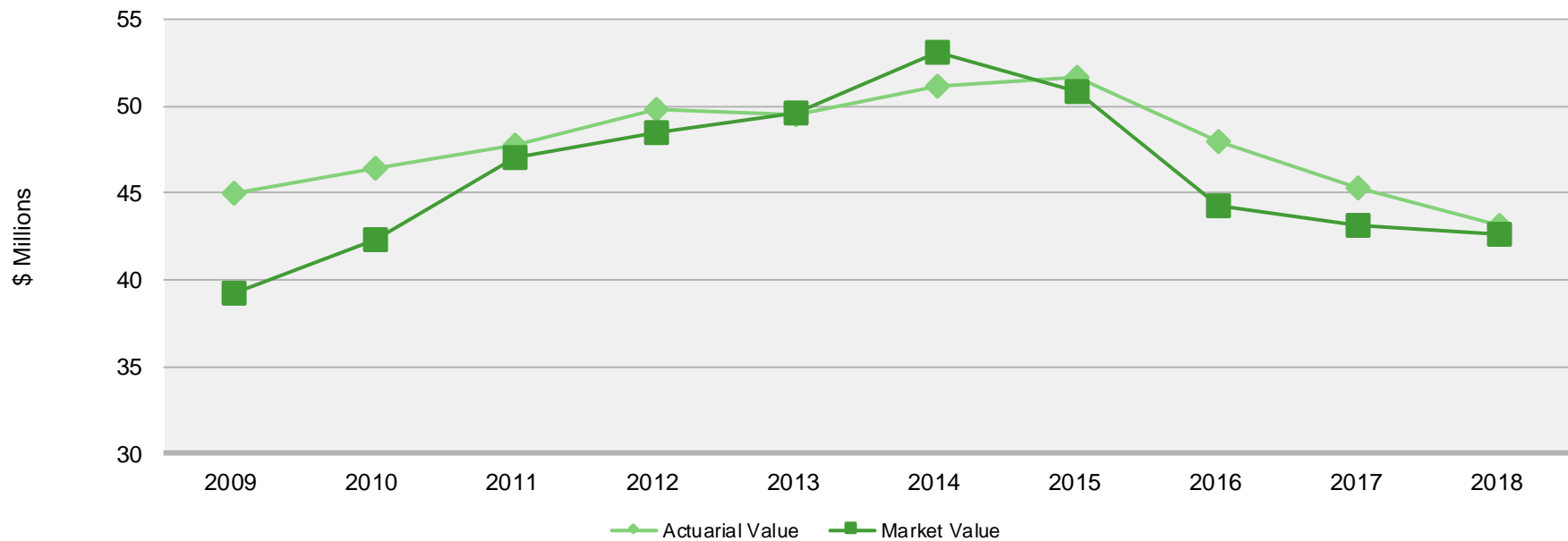
² Recognition at 20% per year over five years

³ Deferred return as of June 30, 2018 recognized in each of the next four years:

(a) Amount recognized on June 30, 2019	-\$857,684
(b) Amount recognized on June 30, 2020	-332,087
(c) Amount recognized on June 30, 2021	463,538
(d) Amount recognized on June 30, 2022	253,214

Both the actuarial value and market value of assets are representations of the System’s financial status. As investment gains and losses are gradually taken into account, the actuarial value of assets tracks the market value of assets. The actuarial asset value is significant because the Plan’s liabilities are compared to these assets to determine what portion, if any, remains unfunded. Amortization of the unfunded actuarial accrued liability is an important element in determining the contribution requirement.

ACTUARIAL VALUE OF ASSETS VS. MARKET VALUE OF ASSETS AS OF JUNE 30, 2009 – 2018



Actuarial Experience

To calculate any actuarially determined contribution, assumptions are made about future events that affect the amount and timing of benefits to be paid and assets to be accumulated. Each year actual experience is measured against the assumptions. If overall experience is more favorable than anticipated (an actuarial gain), any contribution requirement will decrease from the previous year. On the other hand, any contribution requirement will increase if overall actuarial experience is less favorable than expected (an actuarial loss).

Taking account of experience gains or losses in one year without making a change in assumptions reflects the belief that the single year's experience was a short-term development and that, over the long term, experience will return to the original assumptions. For contribution requirements to remain stable, assumptions should approximate experience.

If assumptions are changed, the contribution requirement is adjusted to take into account a change in experience anticipated for all future years.

The total gain is \$1,483,989, which includes \$531,624 from investment losses and \$2,015,613 in gains from all other sources. The net experience variation from individual sources other than investments was 2.1% of the actuarial accrued liability. A discussion of the major components of the actuarial experience is on the following pages.

ACTUARIAL EXPERIENCE FOR YEAR ENDED JUNE 30, 2018

1	Net loss from investments ¹	-\$531,624
2	Net gain from administrative expenses	9,269
3	Net loss from contributions	-44,184
4	Net gain from other experience	<u>2,050,528</u>
5	Net experience gain: 1 + 2 + 3 + 4	\$1,483,989

¹ Details on next page.

Investment Experience

A major component of projected asset growth is the assumed rate of return. The assumed return should represent the expected long-term rate of return, based on the System's investment policy. The rate of return on the market value of assets was 10.61% for the year ended June 30, 2018.

For valuation purposes, the assumed rate of return on the actuarial value of assets is 7.50%. The actual rate of return on an actuarial basis for the 2017-2018 plan year was 6.26%. Since the actual return for the year was less than the assumed return, the System experienced an actuarial loss during the year ended June 30, 2018 with regard to its investments.

INVESTMENT EXPERIENCE

	Year Ended June 30, 2018		Year Ended June 30, 2017	
	Market Value	Actuarial Value	Market Value	Actuarial Value
1 Net investment income	\$4,321,601	\$2,682,330	\$4,172,814	\$2,596,310
2 Average value of assets	40,740,432	42,852,723	41,615,947	45,304,742
3 Rate of return: 1 ÷ 2	10.61%	6.26%	10.03%	5.73%
4 Assumed rate of return	7.50%	7.50%	7.50%	7.50%
5 Expected investment income: 2 x 4	3,055,532	3,213,954	3,121,196	3,397,856
6 Actuarial gain/(loss): 1 – 5	<u>\$1,266,069</u>	<u>-\$531,624</u>	<u>\$1,051,618</u>	<u>-\$801,546</u>

Because actuarial planning is long term, it is useful to see how the assumed investment rate of return has followed actual experience over time. The chart below shows the rate of return on an actuarial basis compared to the actual market value investment return for the last 20 years, including averages over select time periods.

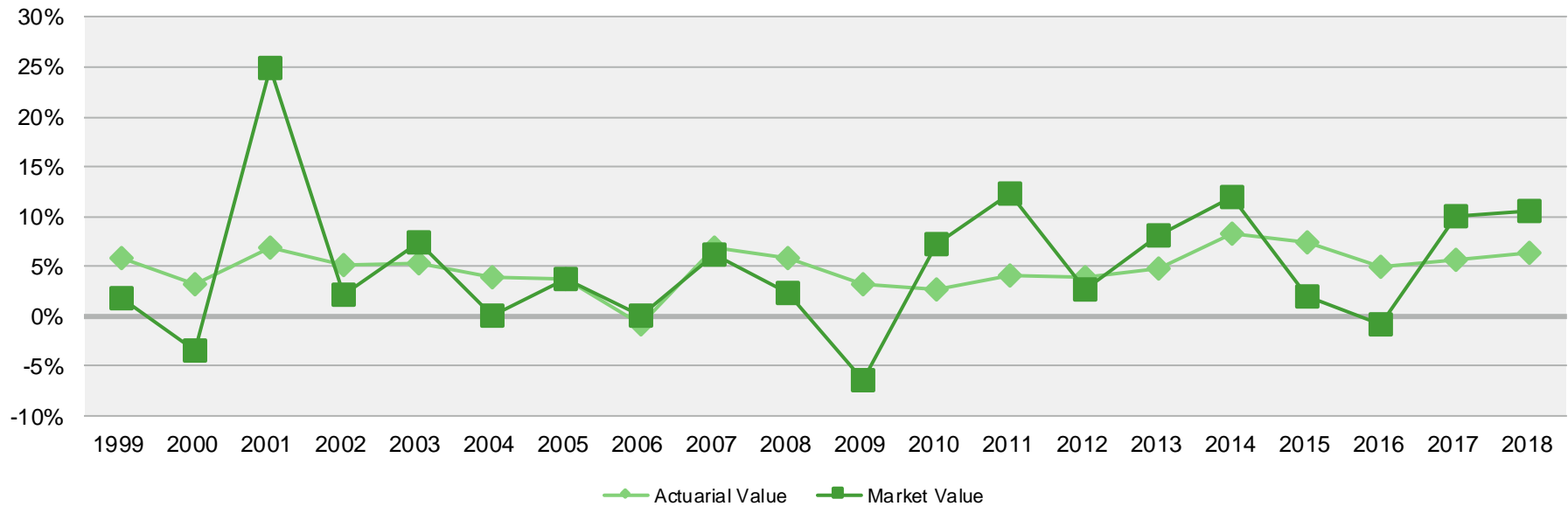
INVESTMENT RETURN – ACTUARIAL VALUE VS. MARKET VALUE: 1999 - 2018

Year Ended June 30	Actuarial Value Investment Return		Market Value Investment Return		Year Ended June 30	Actuarial Value Investment Return		Market Value Investment Return	
	Amount	Percent	Amount	Percent		Amount	Percent	Amount	Percent
1999	\$1,585,200	5.86%	\$487,600	1.81%	2009	\$1,354,538	3.14%	-\$2,666,000	-6.43%
2000	822,880	3.11	-880,800	-3.53	2010	1,218,405	2.70	2,823,000	7.18
2001	1,755,144	6.85	5,673,000	24.97	2011	1,861,519	4.03	5,208,000	12.38
2002	1,416,315	5.18	621,000	2.19	2012	1,864,222	3.89	1,256,000	2.67
2003	1,541,852	5.21	2,224,000	7.46	2013	2,353,754	4.84	3,815,769	8.07
2004	1,254,282	3.91	-8,000	-0.02	2014	4,041,418	8.34	5,819,742	11.99
2005	1,306,625	3.79	1,296,000	3.80	2015	3,714,953	7.48	982,275	1.90
2006	-331,498	-0.89	38,000	0.10	2016	2,434,896	5.01	-399,577	-0.84
2007	2,617,266	6.85	2,388,000	6.25	2017	2,596,310	5.73	4,172,814	10.03
2008	2,399,033	5.89	944,000	2.33	2018	2,682,330	6.26	4,321,601	10.61
Total						\$38,489,444		\$38,116,424	
							Most recent five-year average return	6.59%	6.47%
							Most recent ten-year average return	5.18%	5.66%
							Most recent 15-year average return	4.84%	4.76%
							Most recent 20-year average return	4.91%	5.00%

Note: Each year's yield is weighted by the average asset value in that year.
Prior to 2013, market value information provided to Segal was rounded to thousands.

Subsection B described the actuarial asset valuation method that gradually recognizes fluctuations in the market value rate of return. The goal of this is to stabilize the actuarial rate of return and to produce more level pension plan costs.

MARKET AND ACTUARIAL RATES OF RETURN FOR YEARS ENDED JUNE 30, 1999 - 2018



Administrative Expenses

Administrative expenses for the year ended June 30, 2018 totaled \$61,035 compared to the assumption of \$70,000. This resulted in a gain of \$9,269 for the year when adjust for timing. Because it is expected that these expenses will continue to decrease, we have lowered the assumption from \$70,000 to \$65,000 for the current year.

Contributions

Total contributions for the year ended June 30, 2018 totaled \$9,680,555, compared to the recommended amount of \$9,727,492. This resulted in a small loss of \$44,184 for the year, when adjusted for timing.

Other Experience

There are other differences between the expected and the actual experience that appear when the new valuation is compared with the projections from the previous valuation. These include:

- the extent of turnover among participants,
- retirement experience (earlier or later than projected),
- mortality (more or fewer deaths than projected),
- the number of disability retirements (more or fewer than projected), and
- salary increases (greater or smaller than projected).

The net gain from this other experience for the year ended June 30, 2018 amounted to \$2,050,528, which is 2.1% of the actuarial accrued liability.

Changes in the Actuarial Accrued Liability

The actuarial accrued liability as of July 1, 2018 is \$97,654,121, a decrease of \$3,157,967, or 3.1%, from the actuarial accrued liability as of the prior valuation date. The liability is expected to grow each year with normal cost and interest, and to decline due to benefit payments made. Additional fluctuations can occur due to actual experience that differs from expected (as discussed in the previous subsection).

Actuarial Assumptions

Assumed administrative expenses decreased from \$70,000 to \$65,000 for the year beginning July 1, 2018. This is the only assumption change reflected this year. Details on actuarial assumptions and methods are in *Section 4, Exhibit I*.

The System undergoes an in-depth study every five years to compare the actuarial assumptions to actual experience, and the assumptions are updated as appropriate. The last experience review was completed for the five-year period ended June 30, 2015.

Actuarial Methods

The amortization period for payment on the unfunded liability was closed, effective July 1, 2017. As of July 1, 2018, there are 29 years remaining on this schedule.

Plan Provisions

There were no changes in plan provisions since the prior valuation. A summary of plan provisions is in *Section 4, Exhibit II*.

Development of Unfunded Actuarial Accrued Liability

DEVELOPMENT FOR YEAR ENDED JUNE 30, 2018

1	Unfunded actuarial accrued liability at beginning of year	\$55,524,512
2	Normal cost at beginning of year	5,959,597
3	Total contributions	-9,680,555
4	Interest	
	• For whole year on 1 + 2	\$4,611,309
	• For half year on 3	<u>-332,769</u>
	Total interest	<u>4,278,540</u>
5	Expected unfunded actuarial accrued liability	\$56,082,094
6	Changes due to experience gains and losses	<u>-1,528,173</u>
7	Unfunded actuarial accrued liability at end of year	<u>\$54,553,921</u>

Actuarially Determined Employer Contribution

In prior valuations, the recommended contribution shown in this section included the sum of both the City and employees. The report has been adjusted to provide the City's contribution, net of expected 7.00% of payroll contributions from the employees. This actuarially determined employer contribution is equal to the employer normal cost payment and a 29-year payment on the unfunded actuarial accrued liability. As of July 1, 2018, the actuarially determined contribution is \$5,044,341, or 5.95% of payroll.

Current, the City contributes 6.05% of pay to the System. In addition, the System receives income from the Fire Insurance Tax, which is roughly 0.40% of pay. The net employer normal cost rate for the System, including administrative expenses, is 1.72% of pay. After paying the normal cost, the remaining contributions will effectively amortize the unfunded actuarial accrued liability over 23 years. This is an improvement over last year's effective period of 27 years.

The contribution requirement as of July 1, 2018 are based on the data previously described, the actuarial assumptions and Plan provisions described in *Section 4*, including all changes affecting future costs adopted at the time of the actuarial valuation, actuarial gains and losses, and changes in the actuarial assumptions.

ACTUARIALLY DETERMINED EMPLOYER CONTRIBUTION FOR YEAR BEGINNING JULY 1

	2018		2017	
	Amount	% of Payroll	Amount	% of Payroll
1. Total normal cost ¹	\$5,827,795	6.87%	\$5,892,272	6.91%
2. Administrative expenses	62,516	0.07%	67,325	0.08%
3. Expected employee contributions	<u>4,427,649</u>	<u>5.22%</u>	<u>4,451,091</u>	<u>5.22%</u>
4. Employer normal cost: (1) + (2) - (3)	\$1,462,662	1.72%	\$1,508,506	1.77%
5. Actuarial accrued liability	97,654,121		100,812,088	
6. Actuarial value of assets	43,100,200		45,287,576	
7. Unfunded actuarial accrued liability: (5) - (6)	54,553,921		55,524,512	
8. Payment on unfunded actuarial accrued liability	3,388,943	4.00%	3,396,224	3.98%
9. Adjustment for timing ²	<u>192,736</u>	<u>0.23%</u>	<u>371,671</u>	<u>0.44%</u>
10. Total actuarially determined contribution: (4) + (8) + (9)	<u>\$5,044,341</u>	<u>5.95%</u>	<u>\$5,276,401</u>	<u>6.19%</u>
11. Total payroll	\$84,820,855		\$85,269,937	

¹ Including net obligations to the Retirement and Relief System of \$1,299,326 for July 1, 2018 and \$1,309,548 for July 1, 2017 (\$1,350,943 and \$1,361,571 adjusted for timing).

² Recommended contributions are assumed to be paid at the beginning of every month.

Reconciliation of Actuarially Determined Employer Contribution

The chart below details the changes in the actuarially determined contribution from the prior valuation to the current year's valuation.

RECONCILIATION OF ACTUARIALLY DETERMINED EMPLOYER CONTRIBUTION FROM JULY 1, 2017 TO JULY 1, 2018

	Amount	% of Payroll
Actuarially Determined Employer Contribution as of July 1, 2017	\$5,276,401	6.19%
• Change due to payroll growth	-27,798	0.00%
• Effect of contributions less than actuarially determined contribution	2,854	0.00%
• Effect of investment loss	34,337	0.04%
• Effect of other gains and losses on accrued liability	-133,040	-0.16%
• Effect of change in administrative expense assumption	-5,000	-0.00%
• Net effect of other changes, including composition and number of participants	<u>-103,413</u>	<u>-0.12%</u>
Total change	-\$232,060	-0.24%
Actuarially Determined Employer Contribution as of July 1, 2018	\$5,044,341	5.95%

History of Employer Contributions

A history of the most recent years of contributions is shown below.

HISTORY OF EMPLOYER CONTRIBUTIONS: 2010 – 2019

Fiscal Year Ended June 30	Actuarially Determined Employer Contribution (ADEC) ¹	Actual Employer Contribution	Percent Contributed
2010	\$5,043,635	\$3,945,000	78.22%
2011	4,912,926	3,988,000	81.17%
2012	4,922,812	4,561,000	92.65%
2013	4,899,785	4,039,735	82.45%
2014	5,839,810	4,090,689	70.05%
2015	6,038,436	4,212,776	69.77%
2016	4,960,548	4,364,213	87.98%
2017	5,092,012	4,354,660	85.52%
2018	5,276,401	4,942,429	93.67%
2019	5,044,341	--	--

¹Prior to July 1, 2013, this amount was the Annual Required Contribution (ARC) and was calculated presuming that the employees would be responsible for an equal share of the cost of the System. However, if employee contribution rates were insufficient to cover half of the cost, the City was ultimately responsible for the funding of the Plan. Beginning July 1, 2013, the Actuarially Determined Employer Contribution (ADEC) is equal to the total calculated contribution in the most recent actuarial valuation, minus the portion expected to be covered by employee contributions.

Risk

Since the actuarial valuation results are dependent on a given set of assumptions and data as of a specific date, there is a risk that emerging results may differ significantly as actual experience differs from the assumptions.

This report does not contain a detailed analysis of the potential range of future measurements, but does include a brief discussion of some risks that may affect the Plan. Upon request, a more detailed assessment of the risks can be provided to enable a better understanding of the risks specific to your Plan.

➤ Investment Risk (the risk that returns will be different than expected)

The market value rate of return over the last 20 years has ranged from a low of -6.43% to a high of 24.97%.

The annual investment gain/loss in the last decade has ranged from a loss of \$1,934,926 to a gain of \$651,096. If all investment returns were equal to the assumed return over the last ten years, the market value of assets as of the current valuation date would be approximately \$50 million as opposed to the actual value of \$42.6 million.

➤ Longevity Risk (the risk that mortality experience will be different than expected)

The actuarial valuation includes an expectation of future improvement in life expectancy. Emerging plan experience that does not match these expectations will result in either an increase or decrease in the actuarially determined contribution.

➤ Contribution Risk (the risk that actual contributions will be different from actuarially determined contribution)

Plan contributions are set by statute. If contribution rates are insufficient to amortize the unfunded liabilities, the long-term health of the System will suffer. Periodic projections comparing expected statutory contributions with the projected actuarially determined contributions may be developed to determine if the statutory amounts are sufficient to fund the System and to ensure the payment of promised benefits.

➤ Demographic Risk (the risk that participant experience will be different than assumed)

Examples of this risk include:

- Actual retirements occurring earlier or later than assumed. The Supplemental System pays benefits to retirees for a maximum of ten years, between 20 and 30 years of service. The current assumed retirement rates project that employees will retire, on average, with about 26 years of service. If employees retire earlier, that could lead to a significant increase in the System's liabilities.
- More or less active participant turnover than assumed.

Section 3: Supplemental Information

EXHIBIT A – TABLE OF PLAN COVERAGE

Category	Year Ended June 30		Change From Prior Year
	2018	2017	
Active participants in valuation:			
• Number	1,417	1,450	-2.3%
• Average age	40.2	40.1	0.1
• Average years of service	11.7	11.8	-0.1
• Total payroll	\$84,820,855	\$85,269,937	-0.5%
• Average payroll	59,859	58,807	1.8%
• Account balances	41,374,220	41,035,722	0.8%
• Total active vested participants	286	322	-11.2%
Terminated participants due a refund of employee contributions	46	34	35.3%
Retired participants:			
• Number in pay status	296	289	2.4%
• Average age	53.6	53.6	0.0
• Average monthly benefit	\$2,551	\$2,503	1.9%
Disabled participants:			
• Number in pay status	8	9	-11.1%
• Average age	59.9	59.2	0.7
• Average monthly benefit	\$158	\$152	3.9%
Beneficiaries:			
• Number in pay status	74	75	-1.3%
• Average age (excluding minors)	71.8	70.8	1.0
• Average monthly benefit	\$1,076	\$1,068	0.7%
• Number in suspended status	0	0	N/A

**EXHIBIT B – PARTICIPANTS IN ACTIVE SERVICE AS OF JUNE 30, 2018
BY AGE, YEARS OF SERVICE, AND AVERAGE PAYROLL**

B-1 Fire and Police

Age	Total	Years of Service					
		0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29
Under 25	67	67	--	--	--	--	--
	\$42,460	\$42,460	--	--	--	--	--
25 - 29	194	145	49	--	--	--	--
	48,439	46,366	\$54,570	--	--	--	--
30 - 34	217	87	98	32	--	--	--
	53,143	46,003	56,920	\$60,990	--	--	--
35 - 39	259	53	89	99	18	--	--
	58,767	47,677	57,950	63,257	\$70,767	--	--
40 - 44	197	16	34	60	71	16	--
	63,967	48,060	58,536	63,134	68,080	\$76,292	--
45 - 49	229	20	21	36	61	81	10
	67,722	59,472	57,547	64,025	65,945	73,347	\$84,171
50 - 54	142	7	12	12	23	46	42
	69,509	54,621	57,410	61,436	65,346	68,048	81,633
55 - 59	79	2	5	4	10	27	31
	70,799	44,290	58,467	57,983	61,452	67,969	81,632
60 - 64	32	--	1	5	3	11	12
	67,786	--	65,603	67,337	63,328	68,601	68,521
65 - 69	1	--	--	--	--	--	1
	83,741	--	--	--	--	--	83,741
Total	1,417	397	309	248	186	181	96
	\$59,859	\$46,666	\$57,137	\$62,955	\$66,869	\$71,170	\$80,280

**EXHIBIT B –PARTICIPANTS IN ACTIVE SERVICE AS OF JUNE 30, 2017
BY AGE, YEARS OF SERVICE, AND AVERAGE PAYROLL**

B-2 Fire

Age	Total	Years of Service					
		0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29
Under 25	26	26	--	--	--	--	--
	\$43,181	\$43,181	--	--	--	--	--
25 - 29	93	62	31	--	--	--	--
	48,806	46,144	\$54,129	--	--	--	--
30 - 34	86	36	29	21	--	--	--
	53,730	46,952	56,552	\$61,452	--	--	--
35 - 39	119	27	36	43	13	--	--
	59,239	47,669	57,409	63,736	\$73,464	--	--
40 - 44	102	10	12	31	41	8	--
	65,445	47,664	57,149	64,605	69,262	\$83,809	--
45 - 49	107	12	10	17	31	29	8
	68,995	63,462	56,796	64,171	67,838	75,759	\$82,758
50 - 54	56	5	2	5	10	14	20
	75,241	54,072	60,893	63,678	68,009	70,213	91,996
55 - 59	36	--	1	2	5	10	18
	79,874	--	65,352	58,095	63,624	74,316	90,703
60 & over	10	--	--	--	1	4	5
	71,913	--	--	--	59,281	70,491	75,577
Total	635	178	121	119	101	65	51
	\$61,729	\$47,582	\$56,410	\$63,524	\$68,864	\$75,009	\$88,481

**EXHIBIT B –PARTICIPANTS IN ACTIVE SERVICE AS OF JUNE 30, 2017
BY AGE, YEARS OF SERVICE, AND AVERAGE PAYROLL**

B–3 Police

Age	Total	Years of Service					
		0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29
Under 25	41	41	--	--	--	--	--
	\$42,003	\$42,003	--	--	--	--	--
25 - 29	101	83	18	--	--	--	--
	48,100	46,532	\$55,330	--	--	--	--
30 - 34	131	51	69	11	--	--	--
	52,759	45,333	57,075	\$60,108	--	--	--
35 - 39	140	26	53	56	5	--	--
	58,365	47,685	58,317	62,889	\$63,752	--	--
40 - 44	95	6	22	29	30	8	--
	62,381	48,719	59,292	61,562	66,465	\$68,775	--
45 - 49	122	8	11	19	30	52	2
	66,605	53,487	58,230	63,893	63,989	72,002	\$89,823
50 - 54	86	2	10	7	13	32	22
	65,776	55,993	56,714	59,834	63,298	67,101	72,213
55 - 59	43	2	4	2	5	17	13
	63,202	44,290	56,746	57,872	59,281	64,236	69,072
60 - 64	22	--	1	5	2	7	7
	65,910	--	65,603	67,337	65,352	67,522	63,481
65 & over	1	--	--	--	--	--	1
	83,741	--	--	--	--	--	83,741
Total	782	219	188	129	85	116	45
	\$58,341	\$45,922	\$57,604	\$62,430	\$64,498	\$69,019	\$70,986

EXHIBIT C – RECONCILIATION OF PARTICIPANT DATA

	Active Participants	Disableds	Retired Participants	Beneficiaries	Total
Number as of July 1, 2017	1,450	9	289	75	1,823
• New participants	76	N/A	N/A	N/A	76
• Terminations – with vested rights	0	0	0	0	0
• Terminations – without vested rights*	-24	N/A	N/A	N/A	-24
• Retirements	-43	N/A	43	N/A	0
• New disabilities	0	0	N/A	N/A	0
• Return to work	3	0	0	N/A	3
• Deceased	0	-1	-1	-1	-3
• New beneficiaries	0	0	0	1	1
• Lump sum cash-outs	-34	0	0	0	-34
• Rehire	0	N/A	0	N/A	0
• Certain period expired	N/A	0	0	-1	-1
• Data adjustments	-1	0	1	0	0
• Transfer of actives with more than 30 years of service to Retirement and Relief System	-10	N/A	N/A	N/A	-10
• Retired in Retirement and Relief System	<u>0</u>	<u>0</u>	<u>-36</u>	<u>0</u>	<u>-36</u>
Number as of July 1, 2018	1,417	8	296	74	1,795

*The data reflects terminated participants due a refund of employee contributions.

EXHIBIT D – SUMMARY STATEMENT OF INCOME AND EXPENSES ON A MARKET VALUE BASIS

	Year Ended June 30, 2018	Year Ended June 30, 2017
Net assets at market value at the beginning of the year	\$43,175,285	\$44,229,422
Contribution income:		
• Employer contributions	\$4,942,429	\$4,354,660
• Employer contributions	4,443,095	4,336,141
• Fire Insurance Tax income	295,031	323,369
• Less administrative expenses	<u>-61,035</u>	<u>-55,250</u>
<i>Net contribution income</i>	\$9,619,520	\$8,958,920
Investment income:		
• Interest and dividends	\$1,359,177	\$850,556
• Asset appreciation	3,243,977	3,547,827
• Less investment fees	<u>-281,553</u>	<u>-225,569</u>
<i>Net investment income</i>	<u>\$4,321,601</u>	<u>\$4,172,814</u>
Total income available for benefits	\$13,941,121	\$13,131,734
Less benefit payments:		
• Benefits	-\$9,902,705	-\$9,679,837
• DROP payments	-2,386,702	-2,318,035
• Refunds	-923,829	-930,677
• R&R contribution for Supplemental retirees	<u>-1,275,990</u>	<u>-1,257,322</u>
<i>Net benefit payments</i>	-\$14,489,226	-\$14,185,871
Change in market value of assets	-\$548,105	-\$1,054,137
Net assets at market value at the end of the year	\$42,627,180	\$43,175,285

EXHIBIT E – SUMMARY STATEMENT OF PLAN ASSETS

	June 30, 2018	June 30, 2017
Cash equivalents	\$3,326,890	\$986,981
Total accounts receivable	\$417,050	\$101,583
Investments:		
• Domestic stocks	\$29,810,267	\$26,523,231
• Domestic corporate bonds	4,801,688	7,806,629
• Alternative investments	2,911,858	5,734,839
• U.S. Government obligations	<u>1,420,843</u>	<u>2,051,018</u>
Total investments at market value	\$38,944,656	\$42,115,717
Total assets	\$42,688,596	\$43,204,281
Total accounts payable	-61,416	-28,996
Net assets at market value	\$42,627,180	\$43,175,285
Net assets at actuarial value	\$43,100,200	\$45,287,576

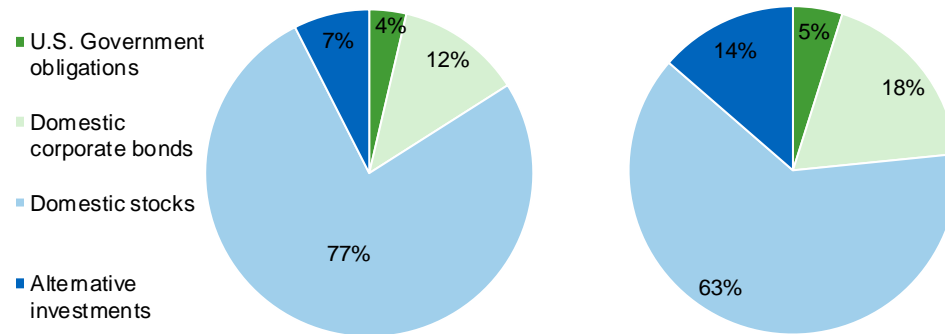


EXHIBIT F – DEVELOPMENT OF THE FUND THROUGH JUNE 30, 2018

Year Ended June 30	Employer Contributions	Employee Contributions	Other Contributions ¹	Net Investment Return ²	Admin. Expenses	Benefit Payments	Market Value of Assets at Year-End	Actuarial Value of Assets at Year-End	Actuarial Value as a Percent of Market Value
2009	\$4,127,000	\$4,075,000	\$1,000	-\$2,666,000	\$73,000	\$7,330,000	\$39,252,000	\$44,956,837	114.5%
2010	3,945,000	3,933,000	0	2,823,000	58,000	7,622,000	42,273,000	46,373,242	109.7%
2011	3,988,000	3,974,000	0	5,208,000	71,000	8,350,000	47,022,000	47,775,761	101.6%
2012	4,561,000	4,543,000	0	1,256,000	74,000	8,822,000	48,486,000	49,847,983	102.8%
2013	4,039,735	4,024,743	0	3,815,769	60,299	10,681,296	49,624,652	49,524,620	99.8%
2014	4,090,689	4,074,251	313,899	5,819,742	36,850	10,823,354	53,063,029	51,184,673	96.5%
2015	4,212,776	4,197,254	362,196	982,275	75,251	11,943,335	50,798,944	51,653,266	101.7%
2016	4,364,213	4,348,710	404,462	-399,577	72,692	15,214,638	44,229,422	47,918,217	108.3%
2017	4,354,660	4,336,141	323,369	4,172,814	55,250	14,185,871	43,175,285	45,287,576	104.9%
2018	4,942,429	4,443,095	295,031	4,321,601	61,035	14,489,226	42,627,180	43,100,200	101.1%

¹Other contributions include the Fire Insurance Tax beginning in the year ended June 30, 2014

²On a market basis, net of investment fees

EXHIBIT G – DEFINITION OF PENSION TERMS

The following list defines certain technical terms for the convenience of the reader:

Actuarial Accrued Liability for Actives:	The equivalent of the accumulated normal costs allocated to the years before the valuation date.
Actuarial Accrued Liability for Pensioners and Beneficiaries:	The single-sum value of lifetime benefits to existing pensioners and beneficiaries. This sum takes account of life expectancies appropriate to the ages of the annuitants and the interest that the sum is expected to earn before it is entirely paid out in benefits.
Actuarial Cost Method:	A procedure allocating the Actuarial Present Value of Future Benefits to various time periods; a method used to determine the Normal Cost and the Actuarial Accrued Liability that are used to determine the actuarially determined contribution.
Actuarial Gain or Loss:	A measure of the difference between actual experience and that expected based upon a set of Actuarial Assumptions, during the period between two Actuarial Valuation dates. Through the actuarial assumptions, rates of decrements, rates of salary increases, and rates of fund earnings have been forecasted. To the extent that actual experience differs from that assumed, Actuarial Accrued Liabilities emerge which may be the same as forecasted, or may be larger or smaller than projected. Actuarial gains are due to favorable experience, e.g., assets earn more than projected, salary increases are less than assumed, members retire later than assumed, etc. Favorable experience means actual results produce actuarial liabilities not as large as projected by the actuarial assumptions. On the other hand, actuarial losses are the result of unfavorable experience, i.e., actual results yield in actuarial liabilities that are larger than projected. Actuarial gains will shorten the time required for funding of the actuarial balance sheet deficiency while actuarial losses will lengthen the funding period.
Actuarially Equivalent:	Of equal actuarial present value, determined as of a given date and based on a given set of Actuarial Assumptions.
Actuarial Present Value (APV):	<p>The value of an amount or series of amounts payable or receivable at various times, determined as of a given date by the application of a particular set of Actuarial Assumptions. Each such amount or series of amounts is:</p> <ul style="list-style-type: none"> Adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.) Multiplied by the probability of the occurrence of an event (such as survival, death, disability, withdrawal, etc.) on which the payment is conditioned, and Discounted according to an assumed rate (or rates) of return to reflect the time value of money.

Actuarial Present Value of Future Plan Benefits:	The Actuarial Present Value of benefit amounts expected to be paid at various future times under a particular set of Actuarial Assumptions, taking into account such items as the effect of advancement in age, anticipated future compensation, and future service credits. The Actuarial Present Value of Future Plan Benefits includes the liabilities for active members, retired members, beneficiaries receiving benefits, and inactive members entitled to either a refund or a future retirement benefit. Expressed another way, it is the value that would have to be invested on the valuation date so that the amount invested plus investment earnings would provide sufficient assets to pay all projected benefits and expenses when due.
Actuarial Valuation:	The determination, as of a valuation date, of the Normal Cost, Actuarial Accrued Liability, Actuarial Value of Assets, and related Actuarial Present Values for a plan. An Actuarial Valuation for a governmental retirement system typically also includes calculations of items needed for compliance with GASB, such as the Actuarially Determined Contribution (ADC) and the Net Pension Liability (NPL).
Actuarial Value of Assets (AVA):	The value of the Fund's assets as of a given date, used by the actuary for valuation purposes. This may be the market or fair value of plan assets, but commonly plans use a smoothed value in order to reduce the year-to-year volatility of calculated results, such as the funded ratio and the ADC.
Actuarially Determined:	Values that have been determined utilizing the principles of actuarial science. An actuarially determined value is derived by application of the appropriate actuarial assumptions to specified values determined by provisions of the law.
Actuarially Determined Contribution (ADC):	The employer's periodic required contributions, expressed as a dollar amount or a percentage of covered plan compensation, determined under the Plan's funding policy. The ADC consists of the Employer Normal Cost and the Amortization Payment.
Amortization Method:	A method for determining the Amortization Payment. The most common methods used are level dollar and level percentage of payroll. Under the Level Dollar method, the Amortization Payment is one of a stream of payments, all equal, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the Amortization Payment is one of a stream of increasing payments, whose Actuarial Present Value is equal to the UAAL. Under the Level Percentage of Pay method, the stream of payments increases at the assumed rate at which total covered payroll of all active members will increase.
Amortization Payment:	The portion of the pension plan contribution, or ADC, that is designed to pay interest on and to amortize the Unfunded Actuarial Accrued Liability.

Assumptions or Actuarial Assumptions:	The estimates upon which the cost of the Fund is calculated, including: <u>Investment return</u> - the rate of investment yield that the Fund will earn over the long-term future; <u>Mortality rates</u> - the death rates of employees and pensioners; life expectancy is based on these rates; <u>Retirement rates</u> - the rate or probability of retirement at a given age or service; <u>Disability rates</u> – the probability of disability retirement at a given age; <u>Withdrawal rates</u> - the rates at which employees of various ages are expected to leave employment for reasons other than death, disability, or retirement; <u>Salary increase rates</u> - the rates of salary increase due to inflation and productivity growth.
Closed Amortization Period:	A specific number of years that is counted down by one each year, and therefore declines to zero with the passage of time. For example, if the amortization period is initially set at 30 years, it is 29 years at the end of one year, 28 years at the end of two years, etc. See Open Amortization Period.
Decrements:	Those causes/events due to which a member's status (active-inactive-retiree-beneficiary) changes, that is: death, retirement, disability, or withdrawal.
Defined Benefit Plan:	A retirement plan in which benefits are defined by a formula applied to the member's compensation and/or years of service.
Defined Contribution Plan:	A retirement plan, such as a 401(k) plan, a 403(b) plan, or a 457 plan, in which the contributions to the plan are assigned to an account for each member, the plan's earnings are allocated to each account, and each member's benefits are a direct function of the account balance.
Employer Normal Cost:	The portion of the Normal Cost to be paid by the employer. This is equal to the Normal Cost less expected member contributions.
Experience Study:	A periodic review and analysis of the actual experience of the Fund that may lead to a revision of one or more actuarial assumptions. Actual rates of decrement and salary increases are compared to the actuarially assumed values and modified as deemed appropriate by the Actuary.
Funded Ratio:	The ratio of the actuarial value of assets (AVA) to the actuarial accrued liability (AAL). Plans sometimes calculate a market funded ratio, using the market value of assets (MVA), rather than the AVA.

GASB 67 and GASB 68:	Governmental Accounting Standards Board (GASB) Statements No. 67 and No. 68. These are the governmental accounting standards that set the accounting rules for public retirement systems and the employers that sponsor or contribute to them. Statement No. 68 sets the accounting rules for the employers that sponsor or contribute to public retirement systems, while Statement No. 67 sets the rules for the systems themselves.
Investment Return:	The rate of earnings of the Fund from its investments, including interest, dividends and capital gain and loss adjustments, computed as a percentage of the average value of the fund. For actuarial purposes, the investment return often reflects a smoothing of the capital gains and losses to avoid significant swings in the value of assets from one year to the next.
Net Pension Liability (NPL):	The Net Pension Liability is equal to the Total Pension Liability minus the Plan Fiduciary Net Position.
Normal Cost:	That portion of the Actuarial Present Value of pension plan benefits and expenses allocated to a valuation year by the Actuarial Cost Method. Any payment in respect of an Unfunded Actuarial Accrued Liability is not part of Normal Cost (see Amortization Payment). For pension plan benefits that are provided in part by employee contributions, Normal Cost refers to the total of employee contributions and employer Normal Cost unless otherwise specifically stated.
Open Amortization Period:	An open amortization period is one which is used to determine the Amortization Payment but which does not change over time. If the initial period is set as 30 years, the same 30-year period is used in determining the Amortization Period each year. In theory, if an Open Amortization Period with level percentage of payroll is used to amortize the Unfunded Actuarial Accrued Liability, the UAAL will never decrease, but will become smaller each year, in relation to covered payroll, if the actuarial assumptions are realized.
Plan Fiduciary Net Position:	Market value of assets.
Total Pension Liability (TPL):	The actuarial accrued liability under the entry age normal cost method and based on the blended discount rate as described in GASB 67 and 68.
Unfunded Actuarial Accrued Liability:	The excess of the Actuarial Accrued Liability over the Actuarial Value of Assets. This value may be negative, in which case it may be expressed as a negative Unfunded Actuarial Accrued Liability, also called the Funding Surplus.
Valuation Date or Actuarial Valuation Date:	The date as of which the value of assets is determined and as of which the Actuarial Present Value of Future Plan Benefits is determined. The expected benefits to be paid in the future are discounted to this date.

Section 4: Actuarial Valuation Basis

EXHIBIT I – ACTUARIAL ASSUMPTIONS AND ACTUARIAL COST METHOD

Rationale for Assumptions:	The information and analysis used in selecting each demographic assumption that has a significant effect on this actuarial valuation is shown in the Experience Study Report for the five-year period ended June 30, 2015. Based on the results of that study as well as professional judgment, no additional demographic assumption changes are warranted at this time and will be assessed again in the next five-year review.																																			
Net Investment Return:	7.50%. The net investment return assumption was chosen by the Pension System's Board of Trustees, with input from the actuary. The net investment return assumption is a long-term estimate derived from historical data, current and recent market expectations, and professional judgment. As part of the analysis, a building block approach was used that reflects inflation expectations and anticipated risk premiums for each of the portfolio's asset classes as well as the System's target asset allocation.																																			
Salary Increases:	<table border="1"> <thead> <tr> <th>Years of Service</th> <th>Rate (%)</th> <th>Years of Service</th> <th>Rate (%)</th> </tr> </thead> <tbody> <tr> <td>Less than 1</td> <td>6.75</td> <td>7-8</td> <td>5.00</td> </tr> <tr> <td>1-2</td> <td>6.50</td> <td>8-9</td> <td>4.75</td> </tr> <tr> <td>2-3</td> <td>6.25</td> <td>9-10</td> <td>4.50</td> </tr> <tr> <td>3-4</td> <td>6.00</td> <td>10-14</td> <td>4.00</td> </tr> <tr> <td>4-5</td> <td>5.75</td> <td>15-19</td> <td>3.50</td> </tr> <tr> <td>5-6</td> <td>5.50</td> <td>20-24</td> <td>3.00</td> </tr> <tr> <td>6-7</td> <td>5.25</td> <td>25-29</td> <td>2.75</td> </tr> </tbody> </table> <p><i>Note: the salary increase rates include 2.50% inflation.</i></p>				Years of Service	Rate (%)	Years of Service	Rate (%)	Less than 1	6.75	7-8	5.00	1-2	6.50	8-9	4.75	2-3	6.25	9-10	4.50	3-4	6.00	10-14	4.00	4-5	5.75	15-19	3.50	5-6	5.50	20-24	3.00	6-7	5.25	25-29	2.75
Years of Service	Rate (%)	Years of Service	Rate (%)																																	
Less than 1	6.75	7-8	5.00																																	
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3-4	6.00	10-14	4.00																																	
4-5	5.75	15-19	3.50																																	
5-6	5.50	20-24	3.00																																	
6-7	5.25	25-29	2.75																																	
Payroll Growth:	2.50%, used to amortize the unfunded actuarial accrued liability as a level percentage of payroll.																																			
Administrative Expenses:	\$65,000 per year, payable monthly, equivalent to \$62,516 at the beginning of the year. The annual administrative expenses were based on historical and current data and adjusted to reflect estimated future experience and professional judgment.																																			

Mortality Rates:

Pre-retirement: RP-2014 Blue Collar Employee Mortality Table, set forward two years for males and four years for females, projected generationally using Scale MP-2015

Healthy annuitants: RP-2014 Blue Collar Employee Healthy Annuitant Mortality Table, set forward two years for males and four years for females, projected generationally using Scale MP-2015

Disabled annuitants: RP-2014 Disabled Retiree Mortality Table, projected generationally using Scale MP-2015

The tables above, with adjustments as shown, reasonably reflect the mortality experience of the System as of the measurement date. The mortality tables were then generationally projected using Scale MP-2015 to reflect future mortality improvement.

Annuitant Mortality Rates:

Age	Rate (%)			
	Healthy*		Disabled*	
	Male	Female	Male	Female
55	0.69	0.53	2.34	1.45
60	0.98	0.80	2.66	1.70
65	1.50	1.27	3.17	2.09
70	2.37	2.08	4.03	2.82
75	3.83	3.44	5.43	4.10
80	6.36	5.83	7.66	6.10
85	10.70	10.04	11.33	9.04
90	17.77	16.63	17.30	13.27

**Rates shown do not include generational projection.*

Mortality and Disability Rates Before Retirement:	Age	Rate (%)			
		Mortality*		Disability	
		Male	Female	Fire	Police
	20	0.06	0.02	0.15	0.15
	25	0.06	0.02	0.15	0.15
	30	0.06	0.03	0.15	0.15
	35	0.07	0.04	0.95	0.15
	40	0.09	0.07	0.95	0.50
	45	0.16	0.11	0.95	0.50
	50	0.27	0.17	0.95	0.50
	55	0.44	0.25	0.95	0.50
	60	0.76	0.38	0.95	0.50

**Rates shown do not include generational projection*

On the Job Disability:	
<i>Fire:</i>	80%
<i>Police:</i>	100%
On the Job Death:	
<i>Fire and Police:</i>	15%

Termination Rates Before Retirement:

Withdrawal			
Years of Service	Rate%	Years of Service	Rate%
1	5.00	9	2.50
2	4.50	10	2.00
3	4.25	11	1.75
4	4.00	12	1.50
5	3.75	13	1.25
6	3.50	14-16	1.00
7	3.25	17-20	0.50
8	3.00	20+	0.00

Retirement Rates:

Fire		Police	
Years of Service*	Rate%	Years of Service*	Rate%
20	15.0	20	30.0
21	10.0	21	15.0
22-25	5.0	22	7.5
26-27	20.0	23-25	2.5
28	10.0	26	20.0
29	50.0	27-28	10.0
30-32	0.0**	29	40.0
33	50.0**	30-32	0.0**
34	20.0**	33	100.0**
35	100.0**		

**Retirement is assumed to occur no later than age Normal Retirement Age in the Retirement and Relief System*

***Assumed to retire in Retirement and Relief System*

Description of Weighted Retirement Age	Age 54.9, determined as follows: The weighted average retirement age for each participant is calculated as the sum of the product of each potential current or future retirement age times the probability of surviving from current age to that age and then retiring at that age, assuming no other decrements. The overall weighted retirement age is the average of the individual retirement ages based on all the active participants included in the July 1, 2018 actuarial valuation.
Interest on DROP Accounts:	5.00%
Utilization of BackDROP:	90% of retiring Firefighters are assumed to elect a three-year BackDROP. Firefighters who retire prior to 23 years of service are not assumed to utilize the BackDROP provisions of the plan. 70% of retiring Police Officers are assumed to elect a three-year BackDROP. Police Officers who retire prior to 23 years of service are not assumed to utilize the BackDROP provisions of the plan.
Unknown Data for Participants:	Same as those exhibited by Participants with similar known characteristics. If not specified, Participants are assumed to be male.
Percent Married:	75%
Age of Spouse:	Females three years younger than males
Actuarial Value of Assets:	Market value of assets less unrecognized returns in each of the last five years. Unrecognized return is equal to the difference between the actual market return and the expected return on the market value, and is recognized over a five-year period, further adjusted, if necessary, to be within 20% of the market value.
Actuarial Cost Method:	Entry Age Actuarial Cost Method. Entry Age is the age at the time the participant commenced employment. Normal Cost and Actuarial Accrued Liability are calculated on an individual basis, with Normal Cost determined as if the current benefit accrual rate had always been in effect. Actuarial Liability is allocated by salary.
Justification for Change in Actuarial Assumptions and Methods:	The only change in assumptions was a decrease in the administrative expense assumption from \$70,000 to \$65,000. The amortization method was closed, effective July 1, 2017. As of July 1, 2018, there are 20 years remaining on this schedule.

EXHIBIT II – SUMMARY OF PLAN PROVISIONS

This exhibit summarizes the major provisions of the Plan included in the valuation. It is not intended to be, nor should it be interpreted as, a complete statement of all plan provisions.

Plan Year:	July 1 through June 30
Plan Status:	Ongoing
Normal Retirement:	
<i>Service Requirement</i>	20 years of credited service
<i>Amount</i>	50% of final average salary plus 0.5% of final average salary for each year over 20 years is paid for the period prior to eligibility for 30-year retirement under the General Fund. Final average salary is defined as the highest average of basic salary earned during any 42 consecutive month period in the last 10 years prior to termination.
Disability:	
<i>Service Requirement</i>	5 years of credited service
<i>Amount</i>	A supplement sufficient when added to the General disability allowance to total not less than 25% nor more than 50% of final average salary, payable for life.
Termination:	If a participant terminates prior to eligibility for a pension from the Supplemental Pension System, a lump sum of his/her own contributions without interest is payable.
Death Benefits:	
<i>Pre-Retirement</i>	For an active participant who has at least 5 years of credited service, the survivor's benefit is equal to 60% of final average salary, plus 5% for each child up to two children. No death benefit is payable if a death benefit is payable from the General Fund.
<i>Post-Retirement</i>	For a retired participant, the survivor's benefit is 60% of the monthly benefit plus 5% per dependent child to a maximum of 70% of the participant's monthly benefit.
Back DROP:	Participants with at least 26 years of credited service may elect a 36-month Back-DROP. They will receive a monthly benefit based on service and final average salary as of the date of the Back-DROP and a 36-month lump-sum benefit.
Participation:	All qualified full-time policemen and firemen must participate.
Contribution Rates:	
<i>Employees</i>	5.22% of compensation
<i>City</i>	6.05% of compensation effective July 1, 2018
Changes in Plan Provisions:	There have been no changes in plan provisions since the last valuation.