



Fire and Police Pension Fund, San Antonio

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

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June 26, 2018

Board of Trustees
Fire and Police Pension Fund, San Antonio
11603 W. Coker Loop, Suite 201
San Antonio, Texas 78216-3099

Dear Board Members:

We are pleased to submit this Actuarial Valuation and Review as of January 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.

This report was prepared in accordance with generally accepted actuarial principles and practices at the request of the Board to assist in administering the Pension Fund. The census information and financial information on which our calculations were based was prepared by the staff of the Fund. That assistance is gratefully acknowledged.

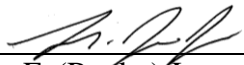
The actuarial calculations were directed under the supervision of Deborah K. Brigham FCA, ASA, MAAA, Enrolled Actuary. Ms. Brigham is a member of the American Academy of Actuaries and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion herein. To the 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 are reasonably related to the experience of and the expectations for the Fund.

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
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Table of Contents

Fire and Police Pension Fund, San Antonio Actuarial Valuation and Review as of January 1, 2018

Section 1: Actuarial Valuation Summary

Purpose and Basis	4
Significant Issues	5
Summary of Key Valuation Results	7
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
Recommended Contribution	24
Risk	26
GFOA Solvency Test	28

Section 3: Supplemental Information

Exhibit A – Table of Plan Coverage	29
Exhibit B – Participants in Active Service as of December 31, 2017 30	
Exhibit B – Participants in Active Service as of December 31, 2017 31	
Exhibit B – Participants in Active Service as of December 31, 2017 32	
Exhibit C – Reconciliation of Participant Data	33
Exhibit D – Summary Statement of Income and Expenses on a Market Value Basis	34
Exhibit E – Summary Statement of Plan Assets	35
Exhibit F – Development of the Fund Through December 31, 2017 36	
Exhibit G – Definition of Pension Terms	37

Section 4: Actuarial Valuation Basis

Exhibit I – Actuarial Assumptions and Actuarial Cost Method	41
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 San Antonio Fire and Police Pension Fund as of January 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 Fund assets to cover the estimated cost of settling the Fund'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 Statement No 67 for the Pension Fund's financial statements as of December 31, 2017 and by GASB Statement No. 68 for the City's financial statements as of September 30, 2018 is provided in a separate report.

The contribution requirements presented in this report are based on:

- The benefit provisions of the Pension Fund, as administered by the Board;
- The characteristics of covered active participants, inactive vested participants, and retired participants and beneficiaries as of December 31, 2017, provided by the Fund;
- The assets of the Plan as of December 31, 2017, provided by the Fund;
- Economic assumptions regarding future salary increases and investment earnings;
- Other actuarial assumptions regarding employee terminations, retirement, death, etc. and
- The funding policy adopted by the Board.

The assumptions and methods used to value the Plan were set by the Board of Trustees, based on recommendations made by Segal Consulting following a five-year experience study for the period ended September 30, 2014.

Significant Issues

1. 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 funding policy adopted by the Fund meets this standard.
2. The recommended contribution for the upcoming year is 29.78% of projected payroll, a decrease of 1.70% of pay from the last valuation’s calculated rate of 31.48%. As a dollar amount, the recommended contribution has decreased from \$99.1 million to \$94.9 million. This recommendation is based on a 30-year level percent-of-payroll amortization of the unfunded actuarial accrued liability.
3. The City is expected to continue to contribute 24.64% of pay, and members are expected to contribute 12.32%, for a total of 36.96% of pay. Since the actual budgeted contributions are greater than the recommended amount, the unfunded liability is effectively being amortized over a period of 9.88 years as a level percent of pay. This is a 3.19-year decrease in the effective period from 13.07 in the prior valuation. The Fund is in compliance with the provisions of its Actuarial Funding Policy. The Fund also continues to meet the requirements of the State Pension Review Board (PRB) for actuarial soundness, and no Funding Soundness Restoration Plan is required.
4. The Funding Policy adopted by the Board provides that should the effective amortization period be greater than 20 years then the Board Recommended Contribution will be based on 20 years. The annual valuation report has traditionally used 30 years to determine the recommended contribution. We recommend that for future actuarial valuations the recommended contribution reflect the 20-year amortization period as in the Funding Policy. This would make the recommended contribution \$100,367,500, or 31.49% as a percent of payroll.
5. The funded ratio (the ratio of the actuarial value of assets to actuarial accrued liability) is 90.34%, compared to the prior year funded ratio of 87.92%. 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 also 90.34%, compared to 83.72% as of the prior valuation date. These measurements are not necessarily appropriate for assessing the sufficiency of Fund assets to cover the estimated cost of settling the Fund’s benefit obligation or the need for or the amount of future contributions.
6. The actuarial experience gain for 2017 is \$32.9 million, or 0.9% of actuarial accrued liability. Of this gain, \$10.2 million is attributable to favorable investment returns, \$7.3 million is due to demographic experience, and \$15.4 million resulted from actual contributions greater than the actuarially determined amount.
7. The rate of return on the market value of assets was 14.48% for the 2017 plan year. The return on the actuarial value of assets was 7.59% for the same period due to the recognition of prior years’ investment gains and losses. This resulted in an actuarial gain when measured against the assumed rate of return of 7.25%. 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 7.25%.

8. In March 2018, Segal recommended and the Board approved a new asset valuation method for funding purposes. The prior asset method rolled forward the prior year's actuarial value with contributions, disbursements and expected return on investments, and then added 20% of the difference between that expected value and the actual market value. The new method recognizes each year's gain or loss on market value at 20% per year over a five-year period, and limits the actuarial value of assets to a 20% corridor around market value. The Trustees opted to implement this method prospectively, so the actuarial value has been set equal to market value this year. The actuarial value of assets on the prior method was equal to 98.7% of market value as of the valuation date. Therefore, resetting the value to 100% of market reduced the unfunded actuarial accrued liability by \$40.6 million, lowered the recommended contribution by 0.70% of pay, decreased the effective amortization period by 1.45 years, and improved the funded ratio from 89.19% to 90.34%.
9. This report constitutes an actuarial valuation for the purpose of determining the actuarially determined contribution under the Plan's funding policy and measuring the progress of that 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 Fund's financial statements as of December 31, 2017 and the City's financial statements as of September 30, 2018, are provided separately.
10. This actuarial report as of January 1, 2018 is based on financial and demographic data as of December 31, 2017. Changes subsequent to that date are not reflected and will affect future actuarial costs of the plan.
11. 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. We have included a discussion of various risks that may affect the plan in Section 2.

Summary of Key Valuation Results

		2018	2017
Contributions for plan year beginning January 1:	• Recommended contributions	\$94,922,777	\$99,120,618
	• Recommended contributions as a percent of projected payroll	29.78%	31.48%
	• Actual employer contributions	--	113,873,604
	• Actual contribution rate	36.96%	36.96%
	• Effective amortization period	9.88 years	13.07 years
Actuarial accrued liability for plan year beginning January 1:	• Retired participants and beneficiaries	\$1,915,171,011	\$1,784,355,704
	• Inactive vested participants ¹	2,193,836	- -
	• Active participants	1,619,292,744	1,599,916,388
	• Inactive participants due a refund of employee contributions	1,572,917	1,534,331
	• Total	3,538,230,508	3,385,806,423
	• Normal cost including administrative expenses and adjusted for timing	76,055,869	76,542,180
Assets for plan year beginning January 1:	• Market value of assets (MVA)	\$3,196,529,718	\$2,834,548,425
	• Actuarial value of assets (AVA)	3,196,529,718	2,976,885,674
	• Actuarial value of assets as a percentage of market value of assets	100.00%	105.02%
Funded status for plan year beginning January 1:	• Unfunded actuarial accrued liability on market value of assets	\$341,700,790	\$551,257,998
	• Funded percentage on MVA basis	90.34%	83.72%
	• Unfunded actuarial accrued liability on actuarial value of assets	\$341,700,790	\$408,920,749
	• Funded percentage on AVA basis	90.34%	87.92%
Key assumptions:	• Net investment return	7.25%	7.25%
	• Inflation rate	3.00%	3.00%
	• Payroll increase	3.50%	3.50%
Demographic data for plan year beginning January 1:	• Number of retired participants and beneficiaries	2,719	2,634
	• Number of inactive vested participants ¹	3	- -
	• Number of active participants	3,906	3,787
	• Number of inactive participants entitled to a refund of employee contributions	23	23
	• Total payroll	\$307,974,442	\$304,194,776
	• Average payroll	78,847	80,326
	• Projected payroll	318,753,547	314,841,593

¹Beginning with the 2018 valuation, participants with 20 or more years of service who are on indefinite suspension are included as inactive vested participants entitled to retirement benefits, rather than inactive participants due a refund of contributions.

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 Fund. 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 Fund, which 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 Board. 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 Fund 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 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 Fund, it is not a fiduciary in its capacity as actuaries and consultants with respect to the Fund.

Section 2: Actuarial Valuation Results

Participant Data

The Actuarial Valuation and Review considers the number and demographic characteristics of covered participants, including active participants, inactive vested 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: 2008 – 2017

Year Ended December 31 ¹	Active Participants	Inactive Vested Participants ²	Retired Participants and Beneficiaries	Ratio of Non-Actives to Actives
2008	3,580	- -	1,978	0.55
2009	3,735	- -	2,074	0.56
2010	3,808	- -	2,150	0.56
2011	3,904	- -	2,182	0.56
2012	3,925	- -	2,255	0.57
2013	3,955	- -	2,317	0.59
2014	3,944	- -	2,373	0.60
2015	3,815	- -	2,478	0.65
2016	3,787	- -	2,634	0.70
2017	3,906	3	2,719	0.70

¹Prior to 2016, valuation cycles reflect 12-month periods ending September 30.

²The chart excludes terminated participants due a refund of employee contributions. Beginning with this year's valuation, participants with 20 or more years of service who are on indefinite suspension are included as inactive vested participants entitled to retirement benefits.

Active Participants

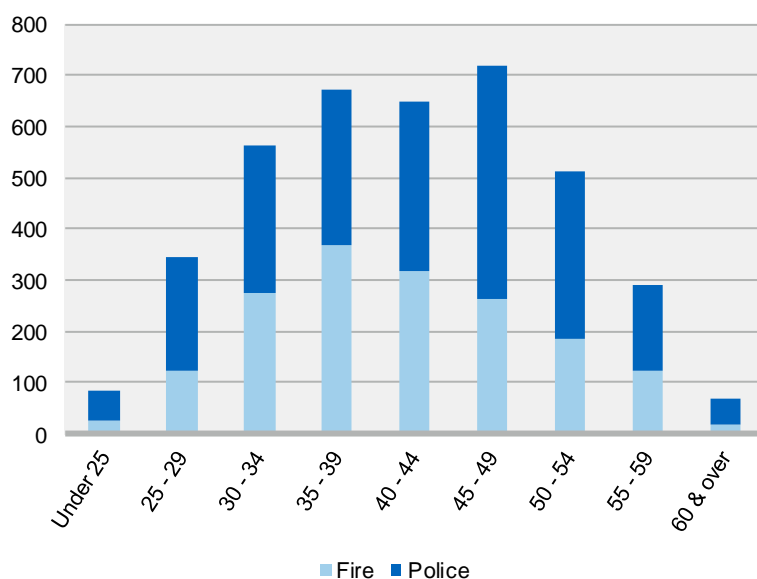
Plan costs are affected by the age, years of service and payroll of active participants. In this year's valuation, there were 3,906 active participants with an average age of 42.1, average years of service of 14.5 years and average payroll of \$78,847. The 3,787 active participants in the prior valuation had an average age of 42.4, average service of 14.8 years and average payroll of \$80,326.

The number of active Firefighters increased from 1,652 to 1,695 as of December 31, 2017. Their average age in this valuation is 41.5, their average years of service is 14.1, and their average salary is \$77,486. In the last valuation, these averages were 41.5, 14.2, and \$77,107, respectively.

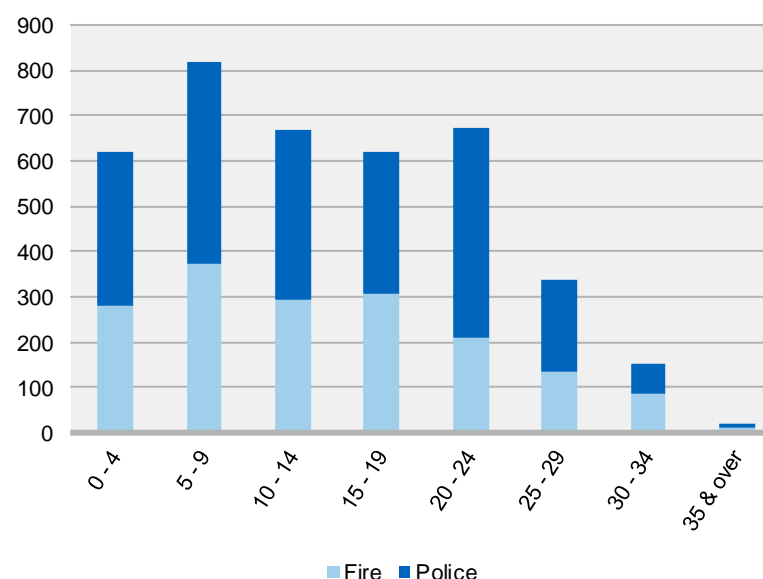
The number of active Police Officers increased from 2,135 to 2,211 as of December 31, 2017. The average age of this group decreased from 43.1 to 42.6, the average service decreased from 15.2 to 14.7, and the average salary decreased from \$82,817 to \$79,890.

Distribution of Active Participants as of December 31, 2017

ACTIVES BY AGE



ACTIVES BY YEARS OF SERVICE



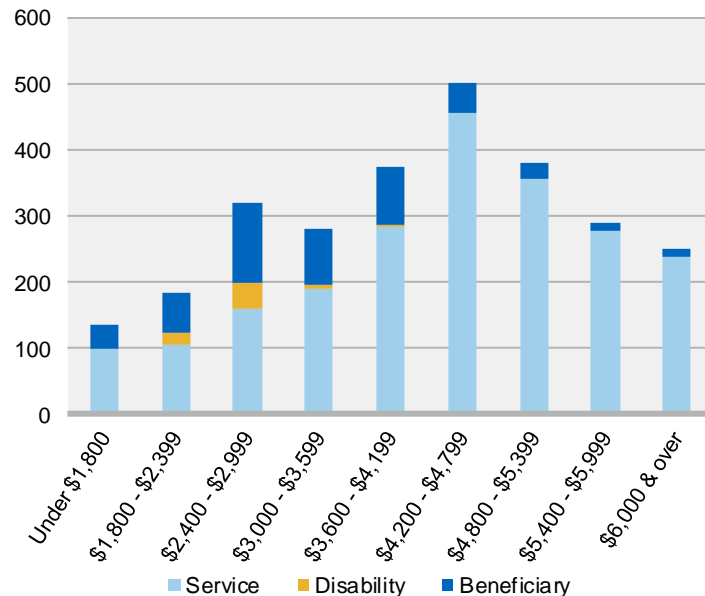
Retired Participants and Beneficiaries

As of December 31, 2017, 2,231 retired participants and 488 beneficiaries were receiving total monthly benefits of \$11,310,563. For comparison, in the previous valuation, there were 2,151 retired participants and 483 beneficiaries receiving monthly benefits of \$10,665,539. The 2017 retiree count includes 121 former spouses receiving benefits and the beneficiary count includes 39 dependent children receiving benefits. In the prior valuation there were 112 former spouses and 35 dependent children receiving benefits.

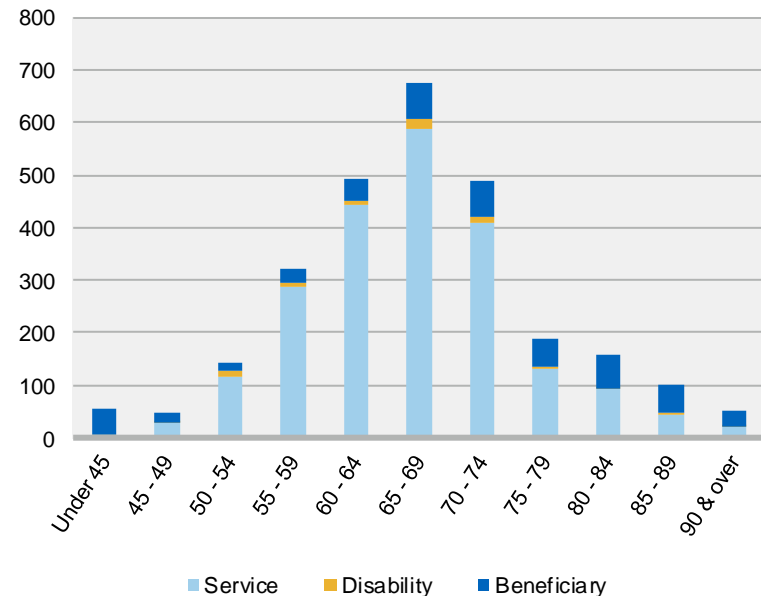
As of December 31, 2017, the average monthly benefit for retired participants and beneficiaries is \$4,160, compared to \$4,049 in the previous valuation. The average age for retired participants and beneficiaries is 67.8 in the current valuation, compared with 67.5 in the prior valuation.

Distribution of Pensioners and Beneficiaries as of December 31, 2017

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 growth among the retired population over the same time period.

PARTICIPANT DATA STATISTICS: 2008 – 2017

Year Ended December 31 ¹	Active Participants			Retired Participants and Beneficiaries		
	Count	Average Age	Average Service	Count	Average Age	Average Monthly Amount
2008	3,580	40.7	13.5	1,978	65.3	\$3,422
2009	3,735	40.7	13.9	2,074	65.5	3,373
2010	3,808	40.7	13.4	2,150	65.9	3,491
2011	3,904	40.9	13.4	2,182	66.3	3,573
2012	3,925	41.2	13.6	2,255	66.7	3,712
2013	3,955	41.5	13.9	2,317	67.1	3,796
2014	3,944	41.9	14.3	2,373	67.4	3,879
2015	3,815	42.4	14.8	2,478	67.4	3,951
2016	3,787	42.4	14.8	2,634	67.5	4,049
2017	3,906	42.1	14.5	2,719	67.8	4,160

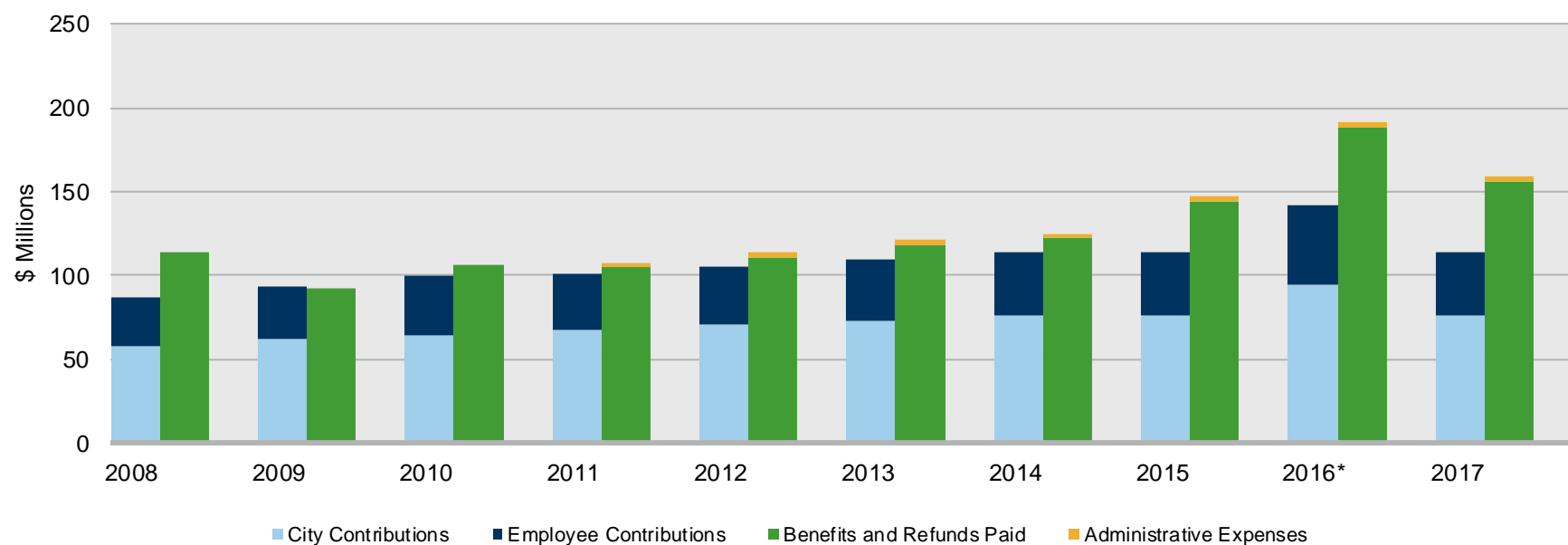
¹Prior to 2016, the valuation cycle was for the 12-month period ending September 30.

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.

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 SEPTEMBER 30, 2008 - DECEMBER 31, 2017



*The cash flows shown for 2016 reflect a 15-month period, due to the change in Plan Year from a September 30 year-end to a December 31 year-end.

It is desirable to have level and predictable plan costs from one year to the next. For this reason, the Board 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.

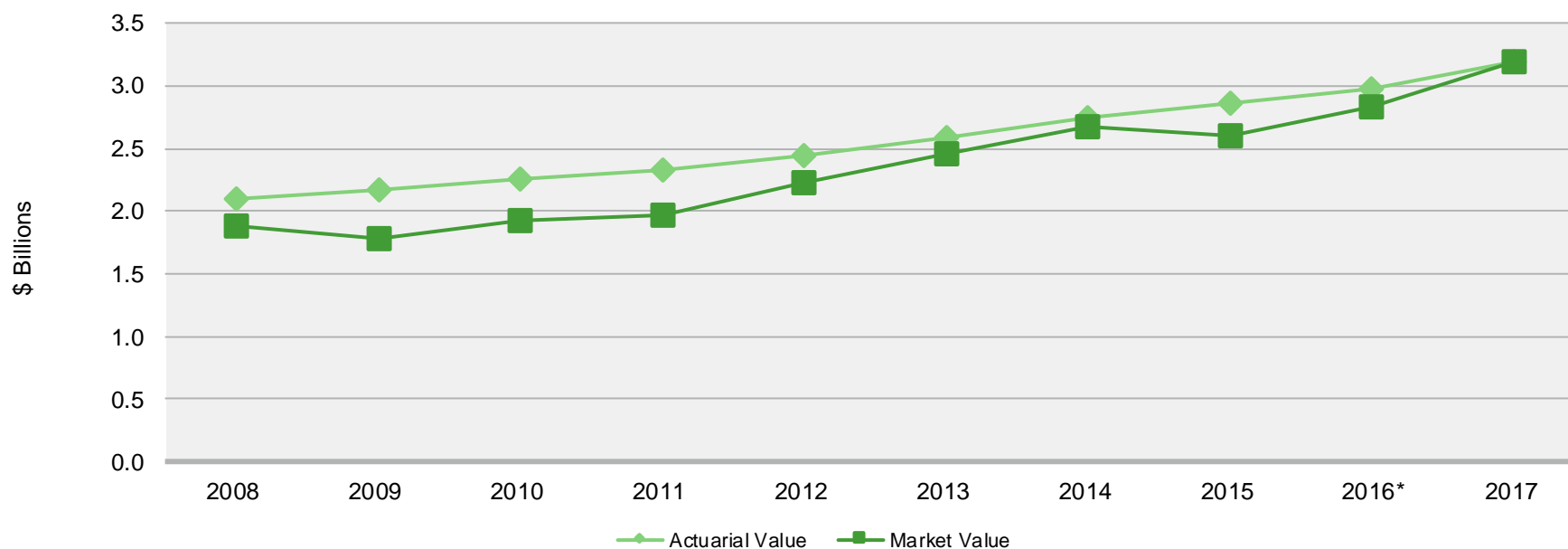
With this valuation, the asset method was revised to reflect a five-year smoothing method with a 20% corridor around the market value of assets. Market value gains and losses will be recognized over a five-year period. The new method will be implemented prospectively, and in the current valuation the actuarial value of assets is equal to the market value of assets.

DETERMINATION OF ACTUARIAL VALUE OF ASSETS FOR YEAR ENDED DECEMBER 31, 2017

1.	Actuarial value of assets as of December 31, 2016	\$2,976,885,674
2.	Contributions, less benefit payments and administrative expenses	-45,298,408
3.	Expected investment return at 7.25%	<u>214,182,144</u>
4.	Preliminary actuarial value of assets: (1) + (2) + (3)	3,145,769,410
5.	Market value of assets as of December 31, 2017	3,196,529,718
6.	Adjustment toward market value: 20% of [(5) – (4)]	10,152,062
7.	Actuarial value of assets of December 31, 2017 on prior method: [(4) + (6)]	<u>\$3,155,921,472</u>
8.	Actuarial value on prior method as a percentage of market: [(7) ÷ (5)]	98.73%
9.	Amount recognized this year as actuarial value reset to market value under new asset method	40,608,246
10.	Actuarial value of assets as of December 31, 2017, reflecting new asset method	<u>\$3,196,529,718</u>

Both the actuarial value and the market value of assets are representation's of the Fund'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 Fund'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 SEPTEMBER 30, 2008 - DECEMBER 31, 2017



*2016 reflects a 15-month period due to the change in Plan Year from a September 30 year-end to a December 31 year-end.

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 \$32,890,192, which includes \$10,152,062 from investment gains and \$22,738,130 in gains from all other sources. The net experience variation from individual sources other than investments was 0.6% 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 DECEMBER 31, 2017

1	Net gain from investments ¹	\$10,152,062
2	Net loss from administrative expenses	-240,994
3	Net gain from contributions	15,413,475
4	Net gain from other experience	7,565,649
5	Net experience gain: 1 + 2 + 3 + 4	\$32,890,192

¹Details 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 Fund's investment policy. The rate of return on the market value of assets was 14.48% for the year ended December 31, 2017.

For valuation purposes, the assumed rate of return on the actuarial value of assets is 7.25%. The actual rate of return on an actuarial basis for the 2017 plan year was 7.59%. Since the actual return for the year was greater than the assumed return, the Plan experienced an actuarial gain during the year ended December 31, 2017 with regard to its investments.

INVESTMENT EXPERIENCE

	Year Ended December 31, 2017		Year Ended December 31, 2016	
	Market Value	Actuarial Value	Market Value	Actuarial Value
1 Net investment income	\$407,279,701	\$224,334,206	\$242,006,899	\$169,446,858
2 Average value of assets	2,811,899,221	2,954,236,470	2,613,118,844	2,828,016,134
3 Rate of return: 1 ÷ 2	14.48%	7.59%	9.26%	5.99%
4 Assumed rate of return	7.25%	7.25%	7.25%	7.25%
5 Expected investment income: 2 x 4	203,862,694	214,182,144	189,451,116	205,031,170
6 Actuarial gain/(loss): 1 – 5	<u>\$203,417,007</u>	<u>\$10,152,062</u>	<u>\$52,555,783</u>	<u>-\$35,584,312</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 for the last 20 years, including averages over select time periods.

INVESTMENT RETURN – ACTUARIAL VALUE OF ASSETS MARKET VALUE OF ASSETS: FOR THE PERIODS ENDED SEPTEMBER 30, 1998 – DECEMBER 31, 2017

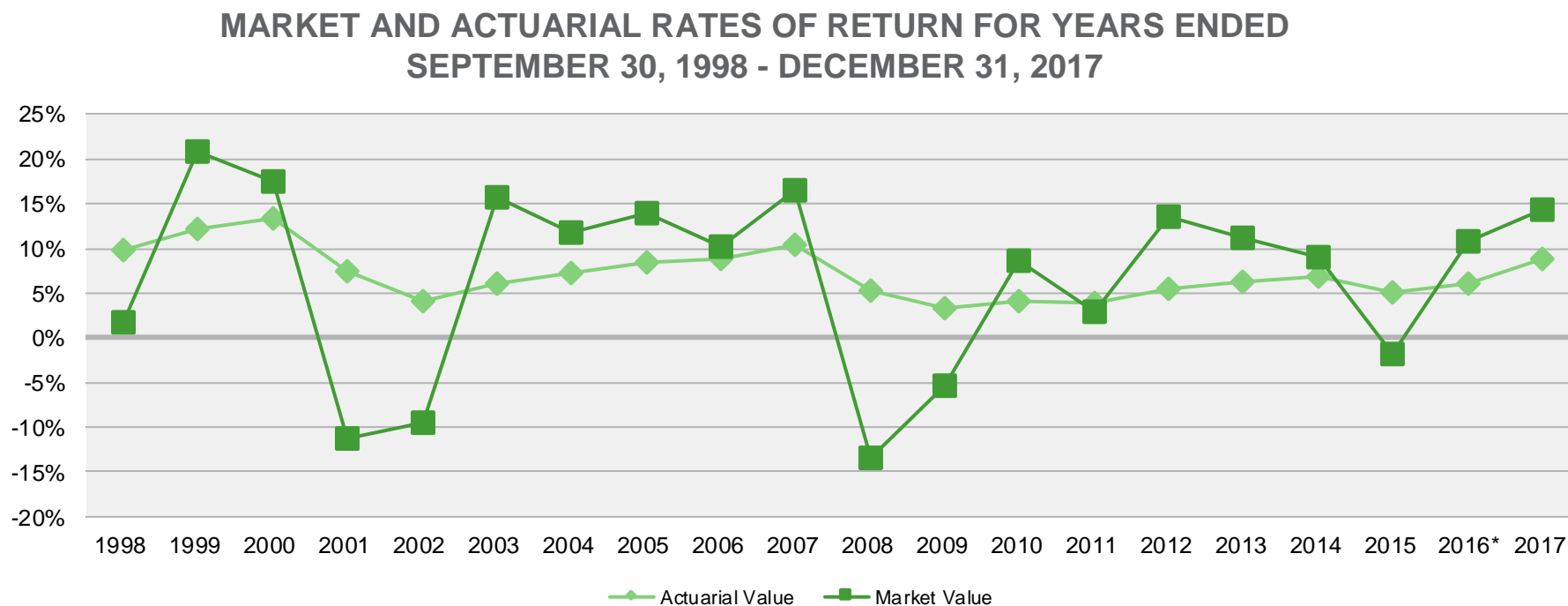
Year Ended September 30	Actuarial Value Investment Return		Market Value Investment Return		Year Ended September 30	Actuarial Value Investment Return		Market Value Investment Return	
	Amount	Percent	Amount	Percent		Amount	Percent	Amount	Percent
1998	\$80,168,021	9.83%	\$17,033,347	1.81%	2008	\$105,099,890	5.24%	-\$292,269,000	-13.40%
1999	110,999,526	12.17	203,527,404	20.94	2009	69,854,353	3.33	-100,618,000	-5.36
2000	138,497,891	13.35	208,388,392	17.52	2010	90,918,393	4.20	153,829,000	8.68
2001	88,556,000	7.44	-159,851,000	-11.32	2011	86,867,409	3.87	54,976,000	2.87
2002	53,114,613	4.13	-119,915,000	-9.51	2012	125,396,164	5.39	266,277,000	13.54
2003	82,016,767	6.10	179,311,000	15.66	2013	152,230,272	6.23	248,187,404	11.17
2004	102,912,368	7.18	158,002,000	11.87	2014	174,857,176	6.77	223,053,939	9.07
2005	130,912,911	8.49	207,914,000	13.90	2015	139,532,809	5.10	-47,586,525	-1.79
2006	147,923,772	8.82	173,218,000	10.15	2016 ¹	167,460,723	6.15	287,674,638	10.87
2007	190,171,659	10.41	311,238,000	16.54	2017 ²	224,334,206 ³	7.59	407,279,701	14.48
Total						\$2,461,824,923		\$2,379,670,300	
							Most recent 5¼-year average return	6.39%	8.74%
							Most recent 10¼-year average return	5.51%	5.33%
							Most recent 15¼-year average return	6.20%	7.42%
							Most recent 20¼-year average return	6.59%	6.64%

¹The amounts for the period ended December 31, 2016 cover the 15 months from October 1, 2015 through December 31, 2016. The actuarial and market returns for the year ended December 31, 2016 were 5.99% and 9.26%, respectively.

²Beginning in 2017, financial information is based on 12-month periods ending December 31.

³Excludes change in asset method.

Earlier in this section we described the actuarial asset valuation method that gradually takes into account fluctuations in the market value rate of return. The effect of this is to stabilize the actuarial rate of return, which contributes to leveling pension plan costs.



*2016 reflects a 15-month period due to the change in Plan Year from a September 30 year-end to a December 31 year-end.

Administrative Expenses

Administrative expenses for the year ended December 31, 2017 totaled \$3,034,563 compared to the assumption of \$2,800,000. This resulted in a loss of \$240,994 for the year. We have changed the assumption from \$2,800,000 to \$2,950,000 for the current year.

Contributions

Contributions for the year ended December 31, 2017 totaled \$113,873,604, compared to the recommended amount of \$99,120,618. This resulted in a gain of \$15,413,475 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),
- salary increases (greater or smaller than projected), and
- inflationary cost-of-living adjustments higher or lower than anticipated.

The net gain from this other experience for the year ended December 31, 2017 amounted to \$7,565,649, which is 0.2% of the actuarial accrued liability.

Changes in the Actuarial Accrued Liability

The actuarial accrued liability as of January 1, 2018 is \$3,538,230,508, an increase of \$152,424,085, or 4.5%, 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 and Methods

The assumption and method changes reflected in this report are:

- Administrative expenses increased from \$2,800,000 to \$2,950,000 for the year beginning January 1, 2018.
- The asset method was changed with this valuation to reflect a five-year smoothing method with a 20% corridor around the market value of assets. This year, the actuarial value of assets equals market value. Smoothing will occur prospectively.
- These changes decreased the unfunded actuarial accrued liability by \$40,608,246, decreased the recommended contribution by \$2,092,080, and lowered the effective amortization period by 1.40 years.
- Details on actuarial assumptions and methods are in *Section 4, Exhibit I*.

The Fund 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 September 30, 2014.

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 DECEMBER 31, 2017

1	Unfunded actuarial accrued liability at beginning of year	\$408,920,749
2	Normal cost at beginning of year	73,864,589
3	Total contributions	-113,873,604
4	Interest	
	• For whole year on 1 + 2	\$35,001,937
	• For half year on 3	<u>-4,127,918</u>
	Total interest	<u>30,874,019</u>
5	Expected unfunded actuarial accrued liability	\$399,785,753
6	Changes due to:	
	• Experience gains and losses	-17,476,717
	• Asset method	<u>-40,608,246</u>
	Total changes	<u>-\$58,084,963</u>
7	Unfunded actuarial accrued liability at end of year	<u>\$341,700,790</u>

Recommended Contribution

The recommended contribution is equal to the normal cost payment and a 30-year level percentage-of-pay payment on the unfunded actuarial accrued liability. As of January 1, 2018, the recommended contribution is \$94,922,777, or 29.78% of projected payroll.

As set by State legislature, the total amount of annual contributions is comprised of a 12.32% of pay member contribution and a 24.64% of pay City contribution for a total contribution of 36.96% of pay. Since the actuarially calculated contribution is 29.78% of payroll, there is a margin of 7.18% of projected pay.

The calculated normal cost (including expenses) is 23.86% of projected payroll after adjustment for timing. The remaining 13.10% of projected payroll will amortize the unfunded actuarial accrued liability over a period of 9.88 years if all assumptions are met. This is a reasonable amortization period, and complies with the Texas State Pension Review Board's Guidelines for Actuarial Soundness.

The contribution requirement as of January 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.

RECOMMENDED CONTRIBUTION FOR YEAR BEGINNING JANUARY 1

	2018		2017	
	Amount	% of Projected Payroll	Amount	% of Projected Payroll
1. Normal cost	\$70,546,743		\$71,160,884	
2. Administrative expenses	<u>2,848,547</u>		<u>2,703,705</u>	
3. Total normal cost: (1) + (2), adjusted for timing	\$76,055,869	23.86%	\$76,542,180	24.31%
4. Actuarial accrued liability	\$3,538,230,508		\$3,385,806,423	
5. Actuarial value of assets	<u>3,196,529,718</u>		<u>2,976,885,674</u>	
6. Unfunded actuarial accrued liability: (4) - (5)	\$341,700,790		\$408,920,749	
7. Payment on unfunded actuarial accrued liability, adjusted for timing	18,866,908	5.92%	22,578,438	7.17%
8. Total recommended contribution: (3) + (7)	<u>\$94,922,777</u>	<u>29.78%</u>	<u>\$99,120,618</u>	<u>31.48%</u>
9. Projected payroll	\$318,753,547		\$314,841,593	

*Recommended contributions are assumed to be paid at the middle of every year.

Reconciliation of Recommended Contribution

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

RECONCILIATION OF RECOMMENDED CONTRIBUTION FROM JANUARY 1, 2017 TO JANUARY 1, 2018

	Amount	% of Payroll
Recommended Contribution as of January 1, 2017	\$99,120,618	31.48%
• Effect of increase in projected payroll	1,231,483	0.00%
• Effect of contributions more than recommended contribution	-867,518	-0.27%
• Effect of investment gain	-571,389	-0.18%
• Effect of other gains and losses on accrued liability	-412,254	-0.13%
• Effect of maintaining 30-year amortization period	-408,442	-0.13%
• Effect of change in administrative expense assumption	150,000	0.04%
• Effect of change in asset method	-2,242,172	-0.70%
• Net effect of other changes, including composition and number of participants	-1,077,549	-0.33%
Total change	-\$4,197,841	-1.70%
Recommended Contribution as of January 1, 2018	\$94,922,777	29.78%

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 Fund. 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 -13.40% to a high of 20.94%.

Over the last decade, the annual investment experience has ranged from a loss of \$97,871,439 to a gain of \$10,152,062. 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 \$3.6 billion as opposed to the actual value of \$3.2 billion.

➤ 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 recommended contribution.

➤ 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 value of retirement plan benefits is sensitive to the rate of benefit accruals and any early retirement subsidies that apply.
- More or less active participant turnover than assumed.

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

Plan contributions are set by statute. Periodic projections comparing expected statutory contributions with the projected recommended contributions are developed to determine if the statutory amounts are sufficient to fund the Plan and to ensure the payment of promised benefits.

If contributions remain at current level and future experience matches the current assumptions, we project the unfunded actuarial accrued liability will be paid off in 9.88 years, in compliance with the Board's funding policy. Currently, contribution risk for the Fund is negligible.

➤ Maturity Measures

As pension plans mature, the cash need to fulfill benefit obligations will increase over time. Therefore, cash flow projections and analysis should be performed to assure that the Plan's asset allocation is aligned to meet emerging pension liabilities.

Currently the Plan has a non-active to active participant ratio of 0.70. For the prior year benefits paid were \$42.3 million more than contributions received. As the Fund matures, more cash will be needed from the investment portfolio to meet benefit payments.

While it is difficult to quantify the impact of potential experience, for the Pension Fund, each 1% change in the actuarial cost factors would result in a change in the recommended contribution of \$2.7 million.

GFOA Solvency Test

The Actuarial Accrued Liability represents the present value of benefits earned, calculated using the plan's actuarial cost method. The Actuarial Value of Assets reflects the financial resources available to liquidate the liability. The portion of the liability covered by assets reflects the extent to which accumulated plan assets are sufficient to pay future benefits, and is shown for liabilities associated with employee contributions, pensioner liabilities, and other liabilities. The Government Finance Officers Association (GFOA) recommends that the funding policy aim to achieve a funded ratio of 100 percent.

GFOA SOLVENCY TEST AS OF DECEMBER 31

	2018	2017
Actuarial accrued liability (AAL)		
• Active member contributions	\$436,169,664	\$421,438,079
• Retirees and beneficiaries	1,915,171,011	1,784,355,704
• Active and inactive members (employer-financed)	1,186,889,833	1,180,012,640
Total	\$3,538,230,508	\$3,385,806,423
Actuarial value of assets	\$3,196,529,718	\$2,976,885,674
Cumulative portion of AAL covered		
• Active member contributions	100.00%	100.00%
• Retirees and beneficiaries	100.00%	100.00%
• Active and inactive members (employer-financed)	71.21%	65.35%

Section 3: Supplemental Information

EXHIBIT A – TABLE OF PLAN COVERAGE

Category	Year Ended December 31		Change From Prior Year
	2017	2016	
Active participants in valuation:			
• Number	3,906	3,787	3.1%
• Average age	42.1	42.4	-0.3
• Average years of service	14.5	14.8	-0.3
• Total payroll	\$307,974,442	\$304,194,776	1.2%
• Average payroll	78,847	80,326	-1.8%
• Account balances	436,169,664	421,438,079	3.5%
• Total active vested participants	1,181	1,162	1.6%
Inactive vested participants¹	3	- -	N/A
Inactive nonvested participants due a refund	23	23	0.0%
Retired participants:			
• Number in pay status	2,167	2,086	3.9%
• Average age	66.8	66.5	0.3
• Average monthly benefit	\$4,412	\$4,301	2.6%
Disabled participants:			
• Number in pay status	64	65	-1.5%
• Average age	65.8	65.0	0.8
• Average monthly benefit	\$2,677	\$2,638	1.5%
Beneficiaries:			
• Number in pay status	488	483	1.0%
• Average age	72.5	72.4	0.1
• Average monthly benefit	\$3,235	\$3,153	2.6%

¹Beginning with the 2018 valuation, participants with 20 or more years of service who are on indefinite suspension are included as inactive vested participants entitled to retirement benefits, rather than inactive participants due a refund of contributions.

**EXHIBIT B – PARTICIPANTS IN ACTIVE SERVICE AS OF DECEMBER 31, 2017
BY AGE, YEARS OF SERVICE, AND AVERAGE PAYROLL**

B-1 Total

Age	Total	Years of Service								
		0 - 4	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 & over
Under 25	83	83	--	--	--	--	--	--	--	--
	\$60,061	\$60,061	--	--	--	--	--	--	--	--
25 - 29	344	283	61	--	--	--	--	--	--	--
	63,722	62,090	\$71,294	--	--	--	--	--	--	--
30 - 34	562	188	322	52	--	--	--	--	--	--
	69,637	63,573	71,944	\$77,272	--	--	--	--	--	--
35 - 39	674	54	282	279	59	--	--	--	--	--
	74,087	64,668	71,132	76,689	\$84,529	--	--	--	--	--
40 - 44	650	7	111	202	276	54	--	--	--	--
	80,207	63,500	70,631	77,352	84,159	\$92,533	--	--	--	--
45 - 49	720	4	30	104	230	327	25	--	--	--
	84,809	55,401	72,971	77,434	81,540	90,338	\$92,146	--	--	--
50 - 54	514	--	11	24	45	207	174	53	--	--
	89,617	--	73,716	78,202	80,940	87,688	94,640	\$96,493	--	--
55 - 59	292	--	--	6	6	69	121	85	5	--
	91,478	--	--	74,202	79,860	87,762	91,678	96,129	\$93,527	--
60 - 64	59	--	--	--	5	13	17	13	5	6
	90,530	--	--	--	78,810	89,836	91,673	90,137	102,244	\$89,650
65 - 69	8	--	--	--	1	2	--	3	1	1
	85,748	--	--	--	82,411	83,481	--	89,606	89,924	77,866
Total	3,906	619	817	667	622	672	337	154	11	7
	\$78,847	\$62,466	\$71,498	\$77,083	\$82,905	\$89,404	\$93,242	\$95,621	\$97,162	\$87,967

**EXHIBIT B – PARTICIPANTS IN ACTIVE SERVICE AS OF DECEMBER 31, 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	30 - 34	35 - 39	40 & over
Under 25	25	25	--	--	--	--	--	--	--	--
	\$61,331	\$61,331	--	--	--	--	--	--	--	--
25 - 29	124	111	13	--	--	--	--	--	--	--
	63,993	63,302	\$69,893	--	--	--	--	--	--	--
30 - 34	274	112	141	21	--	--	--	--	--	--
	67,659	63,457	69,890	\$75,084	--	--	--	--	--	--
35 - 39	369	30	171	129	39	--	--	--	--	--
	72,864	63,998	69,781	75,319	\$85,084	--	--	--	--	--
40 - 44	318	--	45	108	132	33	--	--	--	--
	80,856	--	69,808	76,128	85,510	\$92,776	--	--	--	--
45 - 49	262	--	3	37	118	95	9	--	--	--
	83,183	--	72,527	75,599	81,750	87,834	\$87,612	--	--	--
50 - 54	184	--	--	--	19	68	65	32	--	--
	88,562	--	--	--	76,476	87,928	90,792	\$92,555	--	--
55 - 59	123	--	--	--	--	13	61	47	2	--
	91,594	--	--	--	--	92,984	89,533	93,791	\$93,774	--
60 - 64	15	--	--	--	--	--	--	7	3	5
	86,586	--	--	--	--	--	--	85,143	90,633	\$86,178
65 - 69	1	--	--	--	--	--	--	--	--	1
	77,866	--	--	--	--	--	--	--	--	77,866
Total	1,695	278	373	295	308	209	135	86	5	6
	\$77,486	\$63,262	\$69,851	\$75,634	\$83,458	\$88,965	\$90,011	\$92,627	\$91,889	\$84,792

**EXHIBIT B – PARTICIPANTS IN ACTIVE SERVICE AS OF DECEMBER 31, 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	30 - 34	35 - 39	40 & over
Under 25	58	58	--	--	--	--	--	--	--	--
	\$59,514	\$59,514	--	--	--	--	--	--	--	--
25 - 29	220	172	48	--	--	--	--	--	--	--
	63,569	61,308	\$71,673	--	--	--	--	--	--	--
30 - 34	288	76	181	31	--	--	--	--	--	--
	71,519	63,745	73,544	\$78,754	--	--	--	--	--	--
35 - 39	305	24	111	150	20	--	--	--	--	--
	75,567	65,506	73,214	77,866	\$83,446	--	--	--	--	--
40 - 44	332	7	66	94	144	21	--	--	--	--
	79,585	63,500	71,192	78,758	82,920	\$92,152	--	--	--	--
45 - 49	458	4	27	67	112	232	16	--	--	--
	85,739	55,401	73,020	78,446	81,320	91,364	\$94,696	--	--	--
50 - 54	330	--	11	24	26	139	109	21	--	--
	90,205	--	73,716	78,202	84,202	87,570	96,935	\$102,495	--	--
55 - 59	169	--	--	6	6	56	60	38	3	--
	91,393	--	--	74,202	79,860	86,549	93,858	99,020	\$93,362	--
60 - 64	44	--	--	--	5	13	17	6	2	1
	91,874	--	--	--	78,810	89,836	91,673	95,963	119,661	\$107,012
65 - 69	7	--	--	--	1	2	--	3	1	--
	86,873	--	--	--	82,411	83,481	--	89,606	89,924	--
Total	2,211	341	444	372	314	463	202	68	6	1
	\$79,890	\$61,817	\$72,882	\$78,233	\$82,363	\$89,601	\$95,401	\$99,408	\$101,555	\$107,012

EXHIBIT C – RECONCILIATION OF PARTICIPANT DATA

	Active Participants	Inactive Vested Participants ¹	Disableds	Retired Participants	Beneficiaries	Total
Number as of January 1, 2017	3,787	0	65	2,086	483	6,421
• New participants	247	N/A	N/A	N/A	N/A	247
• Terminations – with vested accruals	-2	2	0	0	0	0
• Terminations – without vested rights	-9	N/A	N/A	N/A	N/A	-9
• Retirements	-100	0	N/A	100	N/A	0
• New disabilities	0	0	0	N/A	N/A	0
• Return to work	0	0	0	0	N/A	0
• Deceased	-6	0	-1	-29	-23	-59
• New beneficiaries	0	0	0	0	32	32
• Lump sum cash-outs	-11	0	0	0	0	-11
• Rehire	0	0	N/A	0	N/A	0
• Payment period for dependent children expired	N/A	0	0	0	-4	-4
• Data adjustments	0	1	0	0	0	1
• QDRO adjustments ²	<u>0</u>	<u>0</u>	<u>0</u>	<u>10</u>	<u>0</u>	<u>10</u>
Number as of January 1, 2018	3,906	3	64	2,167	488	6,628

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

¹Prior to January 1, 2018, terminated participants with 20 or more years of service were excluded from this chart.

²The data includes 10 new former spouses receiving benefit under qualified domestic relations orders (QDROs) and excludes one former spouse whose benefit terminated during the year.

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

	Year Ended December 31, 2017	Year Ended December 31, 2016 ¹
Net assets at market value at the beginning of the year	\$2,834,548,425	\$2,595,910,683
Contribution income:		
• Employer contributions	\$75,915,522	\$94,972,075
• Employee contributions	37,958,082	47,485,016
• Less administrative expenses	<u>-3,034,563</u>	<u>-3,568,003</u>
<i>Net contribution income</i>	<i>\$110,839,041</i>	<i>\$138,889,088</i>
Investment income:		
• Interest, dividends and other income	\$58,859,990	\$79,470,483
• Asset appreciation	363,837,203	224,538,480
• Less investment fees	<u>-15,417,492</u>	<u>-16,334,325</u>
<i>Net investment income</i>	<i><u>\$407,279,701</u></i>	<i><u>\$287,674,638</u></i>
Total income available for benefits	\$518,118,742	\$426,563,726
Less benefit payments:		
• Benefits	-\$133,932,070	-\$154,735,069
• BackDROP payments	-21,188,375	-31,580,245
• Refunds	<u>-1,017,004</u>	<u>-1,610,670</u>
<i>Net benefit payments</i>	<i>-\$156,137,449</i>	<i>-\$187,925,984</i>
Change in market value of assets	\$361,981,293	\$238,637,742
Net assets at market value at the end of the year	\$3,196,529,718	\$2,834,548,425

¹Represents the 15-month period October 1, 2015 – December 31, 2016.

EXHIBIT E – SUMMARY STATEMENT OF PLAN ASSETS

	December 31, 2017	December 31, 2016
Cash equivalents	\$120,324,738	\$121,827,171
Total accounts receivable	\$21,259,395	\$14,163,268
Investments:		
• Equities	\$1,946,469,658	\$1,623,308,390
• Fixed income	816,117,253	775,132,642
• Real estate and real assets	382,089,409	385,604,570
• Property, plant and equipment ¹	<u>535,027</u>	<u>554,996</u>
Total investments at market value	\$3,145,211,347	\$2,784,600,598
Total assets	\$3,286,795,480	\$2,920,591,037
Total accounts payable	-90,265,762	-86,042,612
Net assets at market value	\$3,196,529,718	\$2,834,548,425
Net assets at actuarial value	\$3,196,529,718	\$2,976,885,674

¹Represents less than 0.1% of the total investments

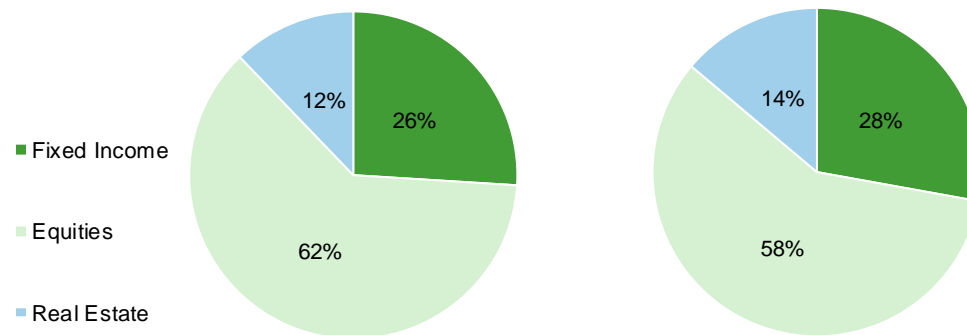


EXHIBIT F – DEVELOPMENT OF THE FUND THROUGH DECEMBER 31, 2017

Year Ended December 31 ¹	Employer Contributions	Employee Contributions	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
2008	\$58,101,000	\$29,050,000	-\$292,269,000	\$0	\$114,031,000	\$1,875,062,000	\$2,096,075,406	111.8%
2009	62,344,000	31,172,000	-100,618,000	0	92,522,000	1,775,438,000	2,166,923,759	122.1%
2010	64,498,000	34,849,000	153,829,000	0	106,640,000	1,921,974,000	2,250,549,152	117.1%
2011	67,328,000	33,663,000	54,976,000	2,728,000	105,159,000	1,970,054,000	2,330,520,561	118.3%
2012	70,389,000	35,193,000	266,277,000	2,747,000	111,164,000	2,228,002,000	2,447,587,725	109.9%
2013	73,255,620	36,629,009	248,187,404	2,714,633	118,680,884	2,464,678,516	2,588,307,109	105.0%
2014	76,145,635	38,072,618	223,053,939	2,789,578	122,305,997	2,676,855,133	2,752,286,963	102.8%
2015	75,801,715	37,901,064	-47,586,525	2,903,392	144,157,312	2,595,910,683	2,858,461,847	110.1%
2016 ³	94,972,075	47,485,016	287,674,638	3,568,003	187,925,984	2,834,548,425	2,976,885,674	105.0%
2017	75,915,522	37,958,082	407,279,701	3,034,563	156,137,449	3,196,529,718	3,196,529,718	100.0%

¹Prior to 2016, financial information was based on 12-month periods ending September 30.

²On a market basis, net of investment fees.

³Reflects the 15-month period from October 1, 2015 through December 31, 2016.

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 recommended 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> <p>Adjusted for the probable financial effect of certain intervening events (such as changes in compensation levels, marital status, etc.)</p> <p>Multiplied by the probability of the occurrence of an event (such as survival, death, disability, withdrawal, etc.) on which the payment is conditioned, and</p> <p>Discounted according to an assumed rate (or rates) of return to reflect the time value of money.</p>

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:	<p>The estimates upon which the cost of the Fund is calculated, including:</p> <p><u>Investment return</u> - the rate of investment yield that the Fund will earn over the long-term future;</p> <p><u>Mortality rates</u> - the death rates of employees and pensioners; life expectancy is based on these rates;</p> <p><u>Retirement rates</u> - the rate or probability of retirement at a given age or service;</p> <p><u>Disability rates</u> - the probability of disability retirement at a given age;</p> <p><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;</p> <p><u>Salary increase rates</u> - the rates of salary increase due to inflation and productivity growth.</p>
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 assumptions and methods upon which this valuation is based were set by the Board of Trustees, based on recommendations by Segal Consulting following a five-year experience study for the period ended September 30, 2014. The information and analysis used in selecting each assumption are shown in that experience study report. Assumptions are generally reviewed and updated on a five-year cycle. Based on professional judgment, no changes are required at this time.	
Net Investment Return:	7.25%. The net investment return assumption was chosen by the Pension Fund's Board of Trustees, with input from the actuary. The 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 Plan's target asset allocation.	
Administrative Expenses:	\$2,950,000 payable mid-year for the year beginning January 1, 2018 (equivalent to \$2,848,547 payable at the beginning of the year)	
Salary Increases:	Years of Service	Rate (%)
	1	14.25%
	2	11.25
	3	6.25
	4	5.75
	5	5.25
	6	4.75
	7-9	4.25
	10 or more	3.75
	<i>Includes an underlying 3.00% inflation component</i>	
Payroll Growth:	3.50% (used to amortize the unfunded actuarial accrued liability as a level percentage of payroll)	

Cost-of-Living Adjustments*:																																																						
Retirement before October 1, 1999:	3.00%																																																					
Retirement on or after October 1, 1999:	2.25%																																																					
*Valuation liabilities reflect the actual COLA granted for 2018. The stated assumptions apply to 2019 forward.																																																						
Mortality Rates:																																																						
Pre-retirement:	RP-2014 Employee Mortality Table, with rates loaded by 7% for females, projected generationally using 50% of Scale MP-2014																																																					
Healthy annuitants:	RP-2014 Healthy Annuitant Mortality Table, with rates loaded by 7% for females, projected generationally using 50% of Scale MP-2014																																																					
Disabled annuitants:	RP-2014 Healthy Annuitant Mortality Table, set forward six years, with rates loaded by 7% for females, projected generationally using 50% of Scale MP-2014																																																					
The tables above, with adjustments as shown, reasonably reflect the mortality experience of the Fire and Police Pension Fund as of the measurement date. The mortality tables were then generationally projected using 50% of Scale MP-2014 to reflect future mortality improvement.																																																						
Duty Death Percentages:	10% of deaths are assumed to be in the line of duty																																																					
Annuitant Mortality Rates:	<table><tr><th rowspan="3">Age</th><th colspan="4">Rate (%)</th></tr><tr><th colspan="2">Healthy*</th><th colspan="2">Disabled*</th></tr><tr><th>Male</th><th>Female</th><th>Male</th><th>Female</th></tr><tr><td>55</td><td>0.57</td><td>0.39</td><td>0.83</td><td>0.60</td></tr><tr><td>60</td><td>0.78</td><td>0.56</td><td>1.19</td><td>0.94</td></tr><tr><td>65</td><td>1.10</td><td>0.86</td><td>1.84</td><td>1.52</td></tr><tr><td>70</td><td>1.68</td><td>1.38</td><td>2.96</td><td>2.47</td></tr><tr><td>75</td><td>2.68</td><td>2.24</td><td>4.98</td><td>4.15</td></tr><tr><td>80</td><td>4.47</td><td>3.73</td><td>8.67</td><td>7.25</td></tr><tr><td>85</td><td>7.75</td><td>6.47</td><td>15.13</td><td>12.81</td></tr><tr><td>90</td><td>13.59</td><td>11.46</td><td>23.65</td><td>20.96</td></tr></table> <p>*Rates shown do not include generational projection.</p>	Age	Rate (%)				Healthy*		Disabled*		Male	Female	Male	Female	55	0.57	0.39	0.83	0.60	60	0.78	0.56	1.19	0.94	65	1.10	0.86	1.84	1.52	70	1.68	1.38	2.96	2.47	75	2.68	2.24	4.98	4.15	80	4.47	3.73	8.67	7.25	85	7.75	6.47	15.13	12.81	90	13.59	11.46	23.65	20.96
Age	Rate (%)																																																					
	Healthy*		Disabled*																																																			
	Male	Female	Male	Female																																																		
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90	13.59	11.46	23.65	20.96																																																		

Termination Rates before Retirement:			Rate (%)				
		Mortality*		Disability		Withdrawal	
	Age	Male	Female	Fire	Police	Fire	Police
	20	0.04	0.02	0.01	0.02	0.25	1.00
	25	0.05	0.02	0.01	0.03	0.25	1.00
	30	0.05	0.02	0.01	0.03	0.25	0.80
	35	0.05	0.03	0.01	0.04	0.25	0.80
	40	0.06	0.04	0.02	0.07	0.25	0.60
	45	0.10	0.07	0.04	0.11	0.25	0.60
	50	0.17	0.12	0.00	0.00	0.00	0.00
	55	0.28	0.18	0.00	0.00	0.00	0.00
	60	0.47	0.26	0.00	0.00	0.00	0.00
	*Rates shown do not include generational projection.						
Catastrophic Disability:	0% of disabilities are assumed to be catastrophic						
Retirement Rates:		Fire		Police			
		Years of Service	Rate %	Years of Service	Rate %		
		20 - 24	1.5%	20 - 21	1.5%		
		25 - 28	2.5	22 - 24	2.0		
		29	5.0	25	3.0		
		30	10.0	26	5.0		
		31	20.0	27	7.0		
		32	25.0	28	9.0		
		33 - 37	35.0	29	14.0		
		38 - 39	25.0	30	20.0		
		40	100.0	31 - 32	25.0		
				33	40.0		
				34 - 39	50.0		
				40	100.0		
		Retirement is assumed to occur no later than age 65 if participant has at least 20 years of service.					

Retirement Rates for Inactive Vested Participants:	Former participants with rights to deferred benefits are assumed to retire at earliest eligibility.
Description of Weighted Average Retirement Age:	Age 59.3 for Firefighters and 58.1 for Police Officers, 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 January 1, 2018 actuarial valuation.
Percent Married:	90%
Age of Spouse:	Females three years younger than males
Marriage after Retirement:	The retiree liability includes a 0.35% load and the disability liability includes a 0.80% load to account for unmarried retirees marrying after retirement.
Beneficiary Liability:	The spousal beneficiary liability includes a 2% load to account for future increased spousal benefits when dependent children receiving benefits reach the age of majority and are no longer eligible to receive benefits.
Utilization of BackDROP:	95% of retiring Firefighters and new beneficiaries are assumed to elect a four-year BackDROP. Firefighters who retire prior to 24 years of service are not assumed to utilize the BackDROP provisions of the plan. 75% of retiring Police Officers and new beneficiaries 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.
13th and 14th Checks:	No future Board actions assumed. This is an asymmetric benefit, payable only if the Fund's investment experience is favorable. Currently the amount of one additional check is approximately 0.3% of the total liability of the Fund. Therefore, it is assumed that the active liabilities should be loaded by 0.03% and the non-active liabilities by 0.1% as an estimate for future payment.
Sick Leave:	For purposes of calculating Fund benefits, total service at decrement is increased by 1.0% for Firefighters and 0.2% for Police Officers to recognize inclusion of sick leave.
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 age at the member's hire date. Normal Cost and Actuarial Accrued Liability are calculated on an individual basis and are based on costs allocated as a level percentage of compensation.
Justification for Change in Actuarial Assumptions and methods:	Based on past experience and future expectations, the administrative expense assumption was increased from \$2,800,000 to \$2,950,000. The asset method was changed to reflect a five-year smoothing method with a 20% corridor around the market value of assets. Market value gains/losses will be recognized prospectively over a five-year period. The actuarial value of assets was set equal to market value for the current valuation.

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:	January 1 through December 31
Plan Status:	Ongoing
Normal Retirement:	
<i>Service Requirement</i>	20 years of service and contributions, regardless of age
<i>Amount</i>	2.25% of Average Salary for each of the first 20 years of service, plus 5.00% of Average Salary for each of the next 7 years of service, plus 2.00% of Average Salary for each of the next 3 years of service, plus 0.50% of Average Salary for each year of service thereafter, with a maximum benefit percentage of 87.50%.
<i>Average Salary</i>	The average of the highest three years of annual salary during the five-year period ending on the date of retirement.
Disability:	
<i>Eligibility</i>	Immediately eligible upon membership, payable after 30 days of continuous disability
<i>Amount</i>	50% of Average Salary
Catastrophic Injury Disability:	
<i>Eligibility</i>	Be unable to secure any type of third-party employment, or engage in any self-employment, and as a result make an annual income below the poverty level.
<i>Amount</i>	87.50% of Average Salary
Termination Benefits:	No benefits are vested prior to eligibility for disability or normal retirement benefits, or at death. However, a participant may receive a refund of member contributions without interest.

Survivor's Pre-Retirement Death Benefit (death not in line of duty):	<p><i>Eligibility</i></p> <p>Immediately upon membership</p> <p><i>Amount</i></p> <p><i>Spouse</i> - Participant's accrued benefit, with a minimum of 50% of average salary and a maximum based on 27 years of service. 25% of the benefit is paid to the children who are under age 18 or disabled, if any, divided equally among them.</p> <p><i>Children only (under age 18, or disabled)</i> -Participant's accrued benefit, with a minimum of 50% of average salary and a maximum based on 27 years of service. Benefits are divided equally among the children.</p> <p><i>Dependent parents, no wife or children</i> - 33% of Average Salary, if two; 25% if one.</p> <p><i>No dependents</i> - Lump sum equal to ten times the accrued retirement benefit based on service and salary at time of death, or a refund of member contributions, if greater.</p> <p><i>Wholly-dependent orphaned children</i> - 100% of the surviving spouse's benefit for life.</p>
Survivor's Pre-Retirement Death Benefit (death in line of duty):	<p><i>Eligibility</i></p> <p>Immediately upon membership</p> <p><i>Amount</i></p> <p>Surviving spouse and dependent children will receive a total pension equal to the salary, including longevity pay, of the member at the time of death.</p>
Post-Retirement Death Benefit:	<p><i>Amount</i></p> <p>Percentage of Average Salary available for retirement benefit, with a maximum benefit based on 27 years of service, with the percentage based on the formula in effect on the date of the retiree's death minus BackDROP period; maximum benefit equal to benefit being received by retiree at death.</p> <p>For marriages after retirement if the widow was married less than five years a lump sum of \$15,000 is payable and if the widow was married at least five years than the widow is eligible for the entire death benefit of a surviving spouse starting at age 55.</p>
Cost-of-Living Adjustments:	<p>If retirement was before October 1, 1999, the benefits are adjusted annually by 100% of the CPI, provided the index shows an increase, if the percentage increase is 8% or less. If the increase is more than 8%, the benefits shall be increased by 8% plus a percentage equal to 75% of the percentage increase that is more than 8%. If retirement is on or after October 1, 1999, benefits are adjusted by 75% of the CPI.</p>
13th and 14th Pension Checks:	<p>The Board may authorize the disbursement of a 13th pension check in a year in which the arithmetic average of the annual rates of return for the most recent five years exceeds the assumed rate by at least 100 basis points. A 14th check may be authorized if the five-year average return exceeds the assumed rate by at least 300 basis points.</p>

BackDROP:	
<i>Eligibility</i>	Participants who are eligible to retire may elect a BackDROP. (Not applicable to line-of-duty or disability). The surviving spouse of an active member may elect a BackDROP, but the service upon which the spousal BackDROP benefit is based may not exceed 27 years of service.
<i>Amount</i>	The backward deferred retirement option plan (BackDROP) benefit provides a lump sum payment based on pay and service as of the BackDROP retirement date times the number of months elected in exchange for a reduced monthly benefit. The monthly benefit is based on pay and all service as of the BackDROP retirement date plus sick leave credit.
<i>BackDROP Retirement Date</i>	Actual retirement date minus number of months elected. The number of months cannot exceed the lesser of 60 months or the number of months of service in excess of 20 years.
Contributions:	
<i>Member contributions</i>	Members pay 12.32% of total salary, excluding overtime pay
<i>City contributions</i>	The City pays 24.64% of total salary, excluding overtime pay
Changes in Plan Provisions:	There have been no changes in plan provisions since the last valuation.

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