Fire and Police Pension Association Statewide Hybrid Plan – Defined Benefit Component

Actuarial Valuation Report

For the Year Beginning January 1, 2018

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June 30, 2018

Board of Directors
Fire and Police Pension Association
5290 DTC Parkway, Suite 100
Greenwood Village, Colorado 80111

Re: Actuarial Valuation of the FPPA Statewide Hybrid Plan (Defined Benefit Component) as of January 1, 2018

Dear Members of the Board:

We are pleased to present our Report on the actuarial valuation of the Fire and Police Pension Association (FPPA) Statewide Hybrid Plan - Defined Benefit Component as of January 1, 2018.

We certify that the information included herein and contained in the 2018 Actuarial Valuation Report is accurate and fairly presents the actuarial position of the Fire and Police Pension Association (FPPA) Statewide Hybrid Plan - Defined Benefit Component as of January 1, 2018.

This report presents the results of the January 1, 2018 actuarial valuation of the FPPA Statewide Hybrid Plan (SWH). The Report describes the current actuarial condition of the Statewide Hybrid Plan - Defined Benefit Component, determines actuarially appropriate contribution rates, and analyzes changes in these required rates. The results presented herein may not be applicable for other purposes. In addition, the Report provides various summaries of the data.

Valuations are prepared annually, as of January 1st, the first day of the FPPA plan year.

Financing Objectives

Contribution rates are established by the Board that, over time, are intended to remain level as a percent of payroll. The employer contributions, when combined with the contributions made by members, are intended to provide for the normal cost and to amortize the Unfunded Actuarial Accrued Liability (UAAL) over a period not to exceed 30 years.

Progress toward Realization of Financing Objectives

The UAAL/(surplus) and the funded ratio (ratio of the actuarial value of assets to the actuarial accrued liability) illustrate the progress toward the realization of certain financing objectives. Based on this actuarial valuation as of January 1, 2018, the Plan is over-funded and the current assets exceed current liabilities by $17,888,530 assuming no future discretionary benefit adjustments.

As listed in the Executive Summary under Section I of our Report, the normal cost rate of the Plan is 9.52% of pay, plus 0.52% of pay to cover annual administrative expenses, is 10.04% of pay. Because there is no UAAL, contributions above this 10.04% rate are available to fund future discretionary benefit adjustments.

The contribution rate required to fund the benefits (assuming no benefit adjustments) is 3.62%. This rate is the normal cost plus the amortization of the UAAL/(surplus) as a level percentage of payroll over a single amortization period of 30 years. This amortization is a credit when the Plan is in a surplus position, and, therefore, because of the surplus, the annual required contribution is less than the normal cost. This also means that the ultimate cost of the Plan is the normal cost (e.g. when no surplus exists) plus administrative expenses, or 10.04% of pay.

For the valuation as of January 1, 2018, the cost of benefits assuming future discretionary benefit adjustments of 3% per year is 10.65%. This rate includes the normal cost rate of 13.38% for the current active members. The contribution rate allocated to the Defined Benefit portion of the Hybrid Plan is recommended to be the rounded value of the greater of these two rates (10.65%, 13.38%). This is less than the current combined employee/employer contribution Defined Benefit allocation of 14.8%. Based on a Board objective to provide 3% benefit adjustments, we recommend reducing the Defined Benefit allocation to 13.4%, effective July 1, 2018.

Benefit Provisions

The benefit provisions reflected in this valuation are those which were in effect on January 1, 2018. There were no changes to the benefit provisions since the prior valuation. The benefit provisions are summarized in Appendix B of our Report.

Assumptions and Methods

The current actuarial methods and assumptions were adopted by the Board of Directors of FPPA for first use in the actuarial valuation as of January 1, 2016, based upon the actuary's analysis and recommendations from the 2015 Experience Study. For information regarding the rationale for the assumptions chosen, please see the experience study report dated June 1, 2015.

These assumptions and methods are detailed in Appendix A of our Report. The Board of Directors has sole authority to determine the actuarial assumptions used for the Plan. The assumptions that are based upon the actuary's recommendations are internally consistent and are reasonably based on the actual past experience of the Plan.

The actuarial assumptions represent estimates of future experience and are not market measures. The results of any actuarial valuation are dependent upon the actuarial assumptions used. Actual results (and future measures) can and almost certainly will differ, as actual experience deviates from the assumptions. Even seemingly minor changes in the assumptions can materially change the liabilities, calculated contribution rates and funding periods. The actuarial calculations presented in this Report are intended to provide information for rational decision making.

GASB Accounting

The Governmental Accounting Standards Board (GASB) Statement No. 67, Financial Reporting for Pension Plans (Issued 6/2012), has replaced the requirements under GASB Statement No. 25, Financial Reporting for Defined Benefit Pension Plans and Note Disclosures for Defined Contribution Plans (Issued 11/1994), effective for financial statements for fiscal years beginning after June 15, 2013. GASB Statement No. 68, Accounting and Financial Reporting for Pensions (Issued 6/2012), has replaced GASB Statement No. 27, Accounting for Pensions by State and Local Governmental Employers (Issued 11/1994), effective for fiscal years beginning after June 15, 2014. Plan reporting information for GASB Statement No. 67 can be found in the FPPA Comprehensive Annual Financial Report at FPPA's website - FPPAco.org. Employer reporting information for GASB Statement No. 68 is provided in a separate report to the employer.

Projected Actuarial Results

The following table shows the Funded Ratio (FR) and Actuarially Determined Contribution (ADC) projected over the next five years given alternative investment returns on the market value of assets. With the exception of the market value investment returns, the projections beyond 2018 are based on the same assumptions, methods and provisions used for the January 1, 2018 valuation. Consistent with the funding recommendations of the Plan, the results shown assume a permanent benefit adjustment of 3.0% per year. The ADC is calculated as the higher of the Normal Cost or the Normal Cost plus 30-year Amortization of the Surplus or Unfunded Liability.

5-Year Deterministic Projection

January 1,	Market Value Investment Return					
	3.50%		7.50%		11.50%	
	FR	ADC	FR	ADC	FR	ADC
2018	105.3%	13.40%	105.3%	13.40%	105.3%	13.40%
2019	105.1%	13.40%	106.0%	13.40%	106.8%	13.40%
2020	103.9%	13.40%	106.5%	13.40%	108.9%	13.40%
2021	102.0%	13.40%	107.0%	13.40%	112.0%	13.40%
2022	99.4%	13.90%	107.6%	13.40%	116.0%	13.40%
2023	96.3%	16.00%	107.7%	13.40%	120.4%	13.40%

Due to the limited scope of our assignment, we did not perform an analysis of the potential range of future actuarial measurements other than that shown above.

Data

FPPA supplied data for retired, active and inactive members as of January 1, 2018. We did not audit this data, but we did apply a number of tests to the data, and we concluded that it was reasonable and consistent. FPPA also supplied asset data as of January 1, 2018.

Certification

All of our work conforms with generally accepted actuarial principles and practices, and to the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, our calculations also comply with the requirements of Colorado state law and, where applicable, the Internal Revenue Code, ERISA, and the Statements of the Governmental Accounting Standards Board. The undersigned are independent actuaries and consultants. Joseph Newton and Dana Woolfrey are Enrolled Actuaries and are Members of the American Academy of Actuaries, and meet the Qualification Standards of the American Academy of Actuaries. Finally, all of the undersigned are experienced in performing valuations for large public retirement systems.

Respectfully submitted,
Gabriel, Roeder, Smith & Company

Joseph P. Newton, FSA, EA, MAAA
Pension Market Leader and Actuary

Dana Woolfrey, FSA, EA, MAAA
Consultant Actuary

Table of Contents

SECTION I

EXECUTIVE SUMMARY

Executive Summary

Item	January 1, 2018	January 1, 2017
Membership		
• Number of:		
- Active members	173	150
- Retirees	36	33
- DROP Retirees	6	7
- Beneficiaries	0	0
- Inactive members	35	27
- Total	250	217
• Annualized payroll supplied by FPPA	$ 15,058	$ 12,507
Assets		
• Market value	$ 69,872	$ 53,087
• Actuarial value	$ 68,208	$ 54,702
• Return on market value	14.0%	5.3%
• Return on actuarial value	8.1%	6.4%
• Contribution for prior year	$ 10,262	$ 5,417
• Ratio of actuarial value to market value	97.6%	103.0%
Actuarial Information		
• Total normal cost %	10.04%	10.16%
• Unfunded actuarial accrued liability/(surplus)	$ (17,889)	$ (12,500)
• Amortization rate	(6.42%)	(5.38%)
• Total required contribution %	3.62%	4.78%
• Funded ratio	135.5%	129.6%

Note: Dollar amounts in $000

Executive Summary

1. The annual required contribution rate (with no future benefit adjustments) is 3.62%.

2. Assets earned 14.00% on a market basis and 8.07% on an actuarial, smoothed, basis in 2017, producing an actuarial gain.

3. The funded ratio increased from 129.60% as of January 1, 2017, to 135.50% as of January 1, 2018. This was primarily due to investment gains.

4. The cost of benefits assuming future permanent benefit adjustments of 3% per year is 10.65% and the funded ratio based on permanent 3% annual benefit adjustments is 105.30%. The cost of a one-year 3.00% benefit adjustment for current retirees is 0.41% of pay, or $510,000.

5. The contribution rate allocated to the Defined Benefit portion of the Hybrid plan is recommended to be the greater of the 13.38% normal cost associated with the permanent 3% annual benefit adjustments and the total cost of the plan with permanent 3% annual benefit adjustments which is 10.65%. Therefore, we recommend the Defined Benefit contribution be reduced to 13.40% (based on a rounded value of the greater of the two calculated rates above) effective July 1, 2018.

6. Due to the small size of this group, a large influx of membership could and does quickly alter the actuarial measures of the plan. Thus, these measures should be viewed with the potential in volatility that could occur.

SECTION II

DISCUSSION

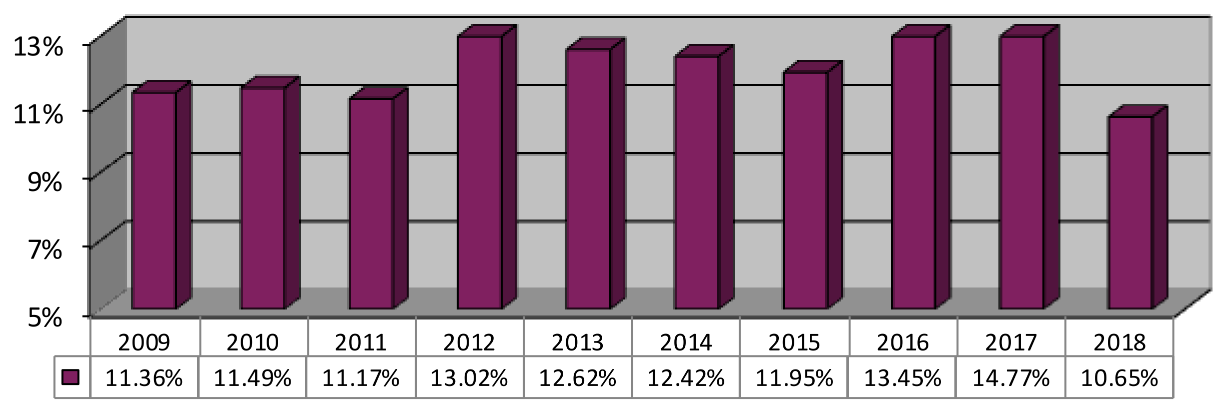
Actuarial Contribution Requirements and Contribution Allocation to the Defined Benefit Portion of the Hybrid Plan

Annually, at the discretion of the Board of Directors, the amount of the combined employee and employer contribution rate to be allocated to the Defined Benefit portion of the Hybrid plan is determined. This Actuarially Determined Contribution ("ADC") amount is recommended to be reflective of the current cost of the plan including permanent 3% annual benefit adjustments.

Currently, members of the Fire and Police Pension Association Statewide Hybrid Plan contribute 14.80% to the Defined Benefit portion of the Plan. For the valuation as of January 1, 2018, the cost of the plan including permanent 3% annual benefit adjustments is 10.65%. This includes the normal cost rate 13.38% of payroll less 2.73% of payroll to amortize the surplus assets over the present value of future salary for the current active population. This methodology reflects the partially closed nature of the plan. Accordingly, we recommend reducing the Defined Benefit contribution rate from the current level of 14.80% of pay to 13.40% of pay as of July 1, 2018 (based on a rounded value of the greater of the normal cost and total actuarial rate).

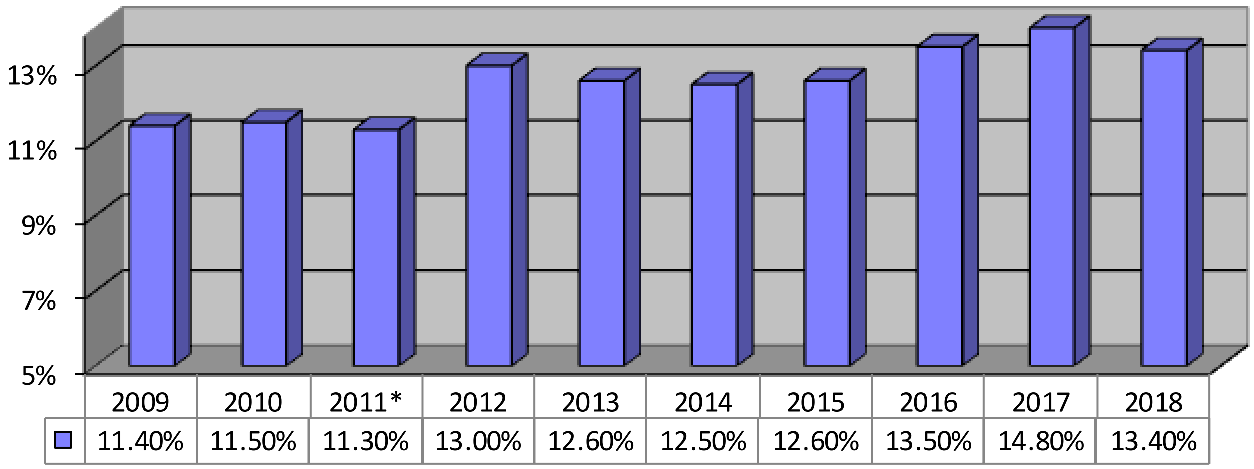
The following graph shows the historical costs of the plan including permanent 3% annual benefit adjustments as a percentage of pay.

Cost of the Plan Including Permanent 3% Benefit Adjustments
As calculated in the valuation as of January 1,



The following graph illustrates the historical Defined Benefit allocation contribution percentages and the recommended percentage for 2018.

Recommended Defined Benefit Allocation
To be effective July 1,



**Rate effective July 1, 2011 through December 31, 2011 was 11.30%.*
Rate effective January 1, 2012 through June 30, 2012 was 12.90%.

Discretionary Benefit Adjustments

On October 1st of each year, annuitants may receive a benefit increase at the discretion of the Board of Directors. The increase can range from 0% to 3%. Because the increases are purely discretionary, the valuation results in the report are shown assuming no further benefit adjustments are granted. The current funded ratio assuming a 3% permanent benefit adjustment is 105.3%, indicating that the maximum discretionary amount could be actuarially supported.

Financial Data and Experience

This section provides an analysis of the change in Plan Net Assets during the year and an estimate of the yield on mean assets of the Hybrid Plan. FPPA provided GRS with a summary of plan assets as of January 1, 2018. The market value of assets reported was $69,872,191 as of January 1, 2018. Table 7 shows data from some of the tables included in the annual financial statements of the Plan. Table 9 shows the estimated yield on a market value basis and on the actuarial asset valuation method.

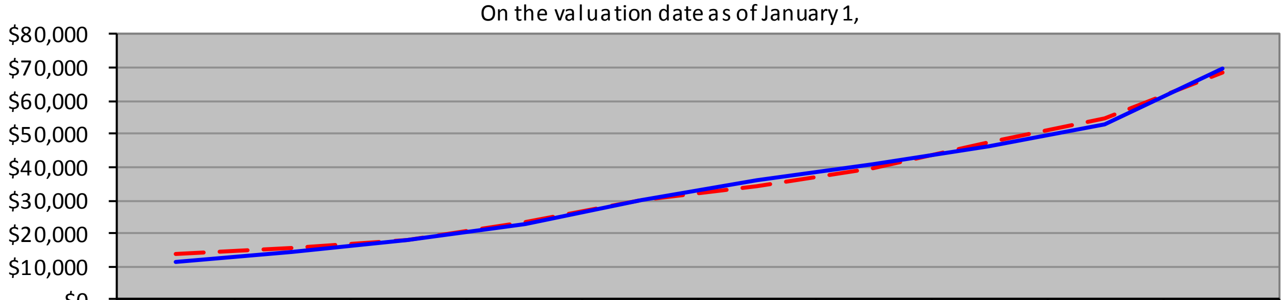
The asset valuation method uses a five-year phase-in of the excess/(shortfall) between expected investment return and actual income. Expected earnings used to project the actuarial value are determined using the assumed investment return rate and the beginning of year actuarial value of assets (adjusted for receipts and disbursements during the year). The returns are computed net of administrative and investment expenses.

Table 8 shows the development of the actuarial value of assets. The actuarial value of assets increased from $54,702,116 to $68,207,993 since the prior valuation. This increase was more than expected and produced a gain of approximately $0.42 million.

Effective January 1, 2012, the valuation assumed investment return was reduced from 8.0% to 7.5% per year. As indicated by item 8b of Table 9, the estimated return on mean market value is 14%. The actuarial asset value returned 8.07%. This difference in the estimated return on market value and actuarial value illustrates the smoothing effect of the asset valuation method.

History of AVA vs MVA

On the valuation date as of January 1,



	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
AVA	$13,643	$15,374	$18,107	$23,667	$29,758	$34,476	$39,773	$47,345	$54,702	$68,208
MVA	$11,369	$14,651	$18,170	$22,688	$29,744	$36,324	$41,037	$46,310	$53,087	$69,872

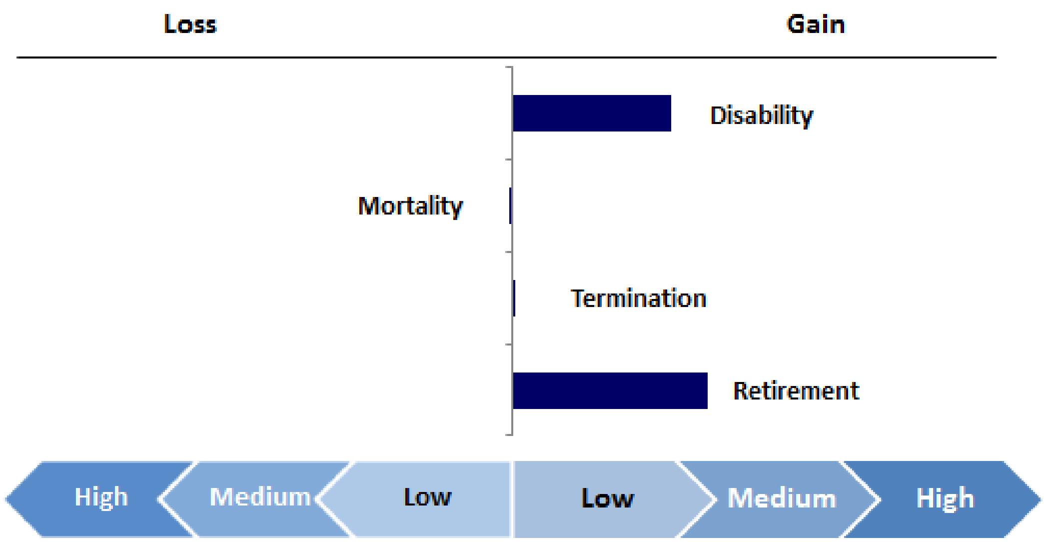
$ in thousands

AVA MVA

AVA: Actuarial (Smoothed) Value of Assets
MVA: Market Value of Assets

Demographic Experience

During the year, the plan had more disabilities than expected (gain) and less retirements than expected (gain). Although there were more terminations than expected the demographics were such that the overall impact to liabilities was minimal.



Member Data

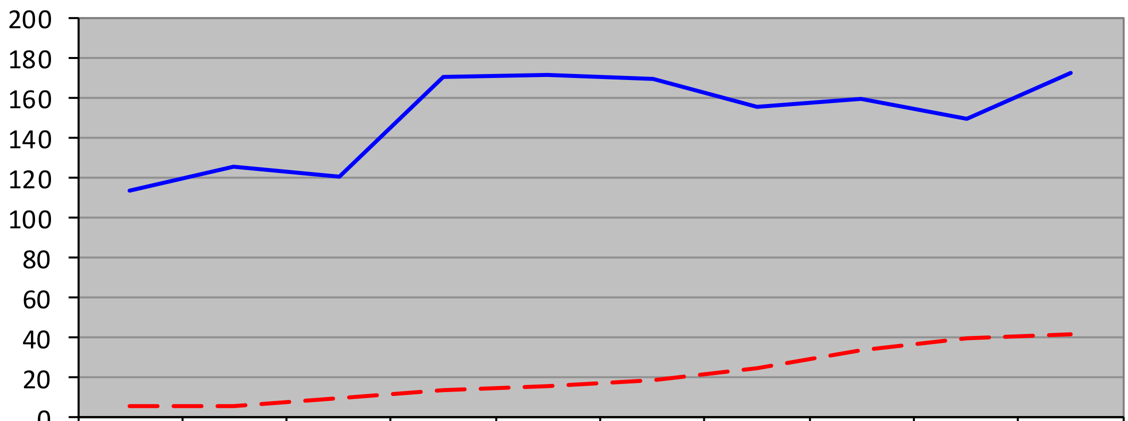
FPPA supplied member data as of January 1, 2018. While we did not audit this data, we did perform various tests to ensure that it was internally consistent, consistent with the prior year's data, and was reasonable overall. Information provided for active members includes: name, member ID, sex, a code indicating whether the member was active or inactive, date of birth, service, salary, accumulated member contributions. For retired members, data includes: name, member ID, sex, date of birth, date of retirement, amount of benefit, a code indicating the option elected and the type of retiree (normal retiree, vested retiree, beneficiary), and if applicable, the joint pensioner's date of birth and sex.

Table 15 shows the number of members by category (active, inactive, retired, etc.). Table 16 shows a historical summary of active member statistics, and Table 17 shows the distribution of active members by age and service.

The total payroll shown on the statistical tables is the amount that was supplied by FPPA. For the cost calculations, the pays were adjusted in accordance with the actuarial assumptions to reflect one year's salary increase.

History of Counts: Active vs In Payment

On the valuation date as of January 1,



	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Active	114	126	121	171	172	170	156	160	150	173
In Payment	6	6	10	14	16	19	25	34	40	42

Active — In Payment

The Plan is partially closed in nature. For many of the groups that have reentered, new entrants hired by those employers are covered under the FPPA Statewide Defined Benefit Plan. This will be a funding consideration as the Plan goes forward.

Benefit Provisions

Appendix B includes a summary of the benefit provisions for FPPA. Highlights include:

- Normal Retirement
    - Eligibility: Age 55 and 25 years of service
    - Annual Benefit: 1.5% of average of the member's highest three years base salary for each year of credit service.
    - Payment Form: Benefits are paid as a monthly life annuity. Optional forms of payment are available.
- Contributions: Members of this fund and their employers are currently each contributing at the rate determined by the individual employer. The amount allocated to the Defined Benefit portion of the Hybrid Plan is annually set by the Board of Directors. The current amount is 14.80%, effective July 1, 2017. The recommended amount is 13.40%, effective July 1, 2018.
- Benefit adjustments are granted periodically at the discretion of the FPPA Board.

Based on the results of this valuation, assuming a permanent benefit adjustment of 3.00% produces a funded ratio of 105.3%.

Actuarial Methods and Assumptions

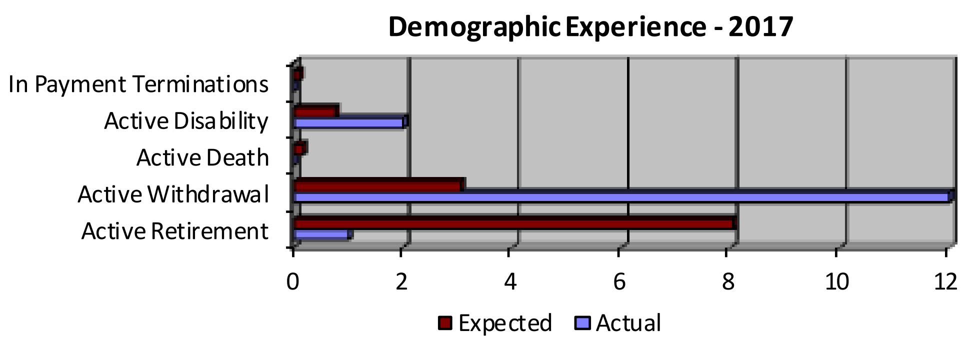
The valuation was prepared using the Entry Age Normal Method. This is the same funding method that has been used for the Statewide Defined Benefit Plan. Effective January 1, 2013, the asset valuation method is an actuarial value based on a five-year phase-in of excess investment gains and losses. See Appendix A for a complete description of this method.

The actuarial value of future benefits from the plan is based on several economic and non-economic assumptions. These are summarized in Appendix A. The economic assumptions include investment return and salary increases. Non-economic assumptions include rates of mortality, disability, and separation.

There have been no changes to the assumptions and methods since the prior valuation.

The results of the actuarial valuation are dependent on the actuarial assumptions used. Actual results can and almost certainly will differ, as actual experience deviates from the assumptions.

For FY2017, the actual salary increases were 100.0% of expected. The following charts provide a comparison of the actual experience versus the expected experience for selected demographic assumptions.



The In Payment Terminations above include deaths and benefits that were canceled for other reasons.

GASB and Funding Progress

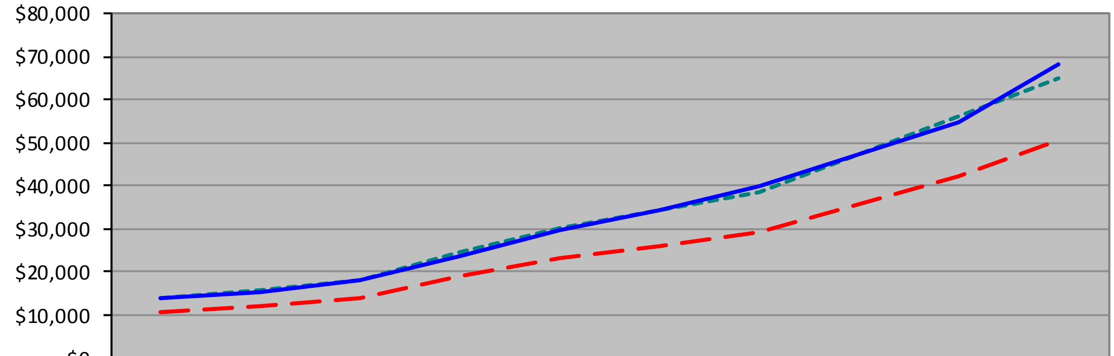
The Governmental Accounting Standards Board (GASB) Statement No. 67, Financial Reporting for Pension Plans (Issued 6/2012), has replaced the requirements under GASB Statement No. 25, Financial Reporting for Defined Benefit Pension Plans and Note Disclosures for Defined Contribution Plans (Issued 11/1994), effective for financial statements for fiscal years beginning after June 15, 2013. GASB Statement No. 68, Accounting and Financial Reporting for Pensions (Issued 6/2012), has replaced GASB Statement No. 27, Accounting for Pensions by State and Local Governmental Employers (Issued 11/1994), effective for fiscal years beginning after June 15, 2014. GASB Statement No. 67 has been implemented in FPPA's Comprehensive Annual Financial Report for fiscal year 2014.

Plan reporting information for GASB Statement No. 67 can be found in the FPPA Comprehensive Annual Financial Report at FPPAco.org. Employer reporting information for GASB Statement No. 68 is provided in a separate report to the employer.

Although it will no longer be required for financial reporting purposes, we have continued to include Table 12 (Schedule of Funding Progress) which shows a historical summary of the funded ratios and other information for FPPA. While not required, it shows insight into funding trends over time. Similarly, the following graph shows the trend of assets and liabilities over the last decade.

History of AAL vs AVA

On the valuation date as of January 1,



	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
AAL	$10,649	$12,107	$13,658	$18,833	$23,313	$26,124	$29,178	$35,777	$42,202	$50,319
3% Ben. Adj. AAL	$13,989	$15,800	$17,900	$24,319	$29,889	$34,254	$38,316	$47,425	$56,032	$64,805
AVA	$13,643	$15,374	$18,107	$23,667	$29,758	$34,476	$39,773	$47,345	$54,702	$68,208

$ in thousands

AAL 3% Ben. Adj. AAL AVA

Significant Factors Affecting Trends in Actuarial Information

Although benefits are still well funded when considering the base benefits (135.50%) as well as assuming a permanent 3.0% permanent benefit adjustment (105.3%), the closed nature of the plan and diminishing contributory payroll make it difficult to recover from any future adverse deviation on a status quo contributory basis. This can be observed in the volatility of the actuarial cost of the plan. For the valuation as of January 1, 2018, the cost of the plan including permanent 3% annual benefit adjustments is 10.65%. This same amount measured at January 1, 2017 was 14.77%. The asset gains during the year as well as liability gains produced a surplus of $3.4 million as of January 1, 2018. Although this surplus is not large in relation to the overall liabilities of the plan ($50 million), it is large in relation to the $15.8 million payroll of the plan. This relationship caused the reduction in the actuarial cost of the plan. In the absence of future actuarial losses, the defined benefit allocation is expected to remain relatively stable since it is currently based on the normal cost assuming 3.0% permanent benefits. The current recommended Defined Benefit Allocation is expected to be able to support a 3.0% permanent benefit adjustment, and is expected to continue to build a surplus when determining the actuarial results for base benefits alone. Because of the diminishing payroll and closed nature of the plan, this surplus is particularly important. It can be used to fund future benefit adjustments and to protect against adverse deviation.

Risk Metrics

The Statewide Hybrid Plan covers firefighters and police officers from departments that elect coverage under the Plan after January 1, 2004. Most departments with members covered under the Plan do not cover newly hired members under the Plan, and so, going forward, the Plan will resemble a closed plan. Over time, active member payroll will diminish and liabilities will increase as a percentage of payroll. In recent years, this increase in leverage has not been observed because reentry groups have increased the active member payroll. This trend was not observed during 2014, but reappeared in 2015. This potential pool of reentry members is diminishing, and it is unlikely that this will continue at the historical rate. Because the Plan is largely closed and the payroll contributions for this plan have a finite horizon, the Board should give added consideration to the Plan's ability to sustain adverse experience.

Valuation Year	AVA as % of Covered Payroll	AAL as % of Covered Payroll	ADC % of Covered Payroll	Increase in ADC if Assets Decrease 10%	Funded Ratio	Change in Funded Ratio if Assets Decrease 10%
2007	219%	143%	3.55%	1.22%	152.8%	-15.3%
2008	192%	133%	5.35%	1.01%	144.0%	-14.4%
2009	177%	138%	6.42%	0.93%	128.1%	-12.8%
2010	170%	134%	6.69%	0.89%	127.0%	-12.7%
2011	206%	156%	5.99%	1.09%	132.6%	-13.3%
2012	194%	154%	7.38%	1.06%	125.7%	-12.6%
2013	222%	174%	6.90%	1.20%	127.6%	-12.8%
2014	260%	197%	6.07%	1.42%	132.0%	-13.2%
2015	319%	234%	4.88%	1.75%	136.3%	-13.6%
2016	361%	273%	5.26%	1.74%	132.3%	-13.2%
2017	433%	334%	4.78%	2.05%	129.6%	-13.0%
2018	454%	335%	3.62%	2.25%	135.5%	-13.6%

Market Value

Investment gains and losses are smoothed over five years, and currently, the smoothed or actuarial value of assets is 97.6% of the market value. If the Funded Ratio and Actuarially Determined Contribution had been measured using the Market Value of Assets, they would be 138.9% and 3.02% of payroll, respectively.

The Funded Ratio and Actuarially Determined Contribution measured using the Market Value of Assets and assuming a permanent 3.0% permanent benefit adjustment would be 107.8% and 9.31% of payroll, respectively.

SECTION III

TABLES

Table 1 - Development of Contribution Rate

		January 1, 2018	January 1, 2017
1.	Covered payroll for upcoming year	$ 15,818,423	$ 13,183,263
2.	Present value of future pay	$ 124,591,038	$ 104,026,122
3.	Total normal cost rate	9.52%	9.46%
4.	Actuarial accrued liability for active members		
	a. Present value of future benefits for active members	$ 41,276,540	$ 33,317,417
	b. Less: present value of future normal costs	(11,838,536)	(9,785,204)
	c. Actuarial accrued liability (a - b)	$ 29,438,004	$ 23,532,213
5.	Total actuarial accrued liability for:		
	a. Retirees and beneficiaries	$ 17,164,499	$ 15,425,878
	b. Inactive members (terminated vested and nonvested)	3,716,961	3,243,702
	c. Active members (Item 4c)	29,438,004	23,532,213
	d. Total	$ 50,319,464	$ 42,201,793
6.	Actuarial value of assets	$ 68,207,993	$ 54,702,116
7.	Unfunded actuarial accrued liability UAAL/(surplus) (Item 5d - Item 6)	$ (17,888,529)	$ (12,500,323)
8.	Contribution requirement		
	a. UAAL amortization payment as % of pay	(6.42%)	(5.38%)
	b. Normal cost	9.52%	9.46%
	c. Administrative Expense	0.52%	0.70%
	d. Contribution requirement (a + b + c)	3.62%	4.78%

Table 2 - Actuarial Present Value of Future Benefits

		January 1, 2018	January 1, 2017
1.	Active members		
	a. Retirement benefits	$ 39,898,065	$ 32,238,810
	b. Deferred termination benefits	1,142,724	966,834
	c. Refunds	161,538	48,684
	d. Death benefits	74,213	63,089
	e. Total	$ 41,276,540	$ 33,317,417
2.	Members in pay status		
	a. Service retirements	$ 17,164,499	$ 15,425,878
	b. Beneficiaries	0	0
	c. Total	$ 17,164,499	$ 15,425,878
4.	Inactive members		
	a. Vested terminations	$ 1,500,439	$ 2,122,354
	b. Nonvested terminations	2,216,522	1,121,348
	c. Total	$ 3,716,961	$ 3,243,702
5.	Total actuarial present value of future benefits	$ 62,158,000	$ 51,986,997

Table 3 - Analysis of Normal Cost by Component

		January 1, 2018	January 1, 2017
1.	Retirement benefits	8.52%	8.53%
2.	Deferred termination benefits	0.78%	0.76%
3.	Refunds	0.21%	0.16%
4.	Death benefits	0.01%	0.01%
5.	Total	9.52%	9.46%

Table 4a - Actuarial Gain/(Loss) on UAAL

		January 1, 2018	January 1, 2017
1.	Unfunded actuarial accrued liability (UAAL) as of January 1 of prior year	$ (12,500,323)	$ (11,568,049)
2.	Total normal cost for year (Normal cost % x actual payroll paid during year)	1,388,855	1,341,849
3.	Non service purchase contributions during year ending December 31	(1,908,910)	(1,739,172)
4.	Interest on UAAL for one year	(937,524)	(867,604)
5.	Interest on Item 2 and Item 3 for one-half year	(19,150)	(14,630)
6.	Expected UAAL as of January 1 (1 + 2 + 3 + 4 + 5)	$ (13,977,052)	$ (12,847,606)
7.	Actual UAAL at end of year	$ (17,888,529)	$ (12,500,323)
8.	Actuarial gain/(loss) for the period (6 - 7)	$ 3,911,477	$ (347,284)
	SOURCE OF GAINS/(LOSSES)		
9.	Asset gain/(loss) (See Table 10)	$ 416,049	$ (468,470)
10.	Salary liability gain/(loss) for the period	$ (73,993)	$ (192,855)
11.	Benefit adjustment granted as of October 1 (2.71% in 2017, 2.98% in 2016)	$ (418,041)	$ (358,082)
12.	Net liability gain/(loss) for the period (8 - 9 - 10 - 11)	$ 3,987,462	$ 672,123

Table 4b - Analysis of Change in Calculated Contribution Rate

		January 1, 2018	January 1, 2017
Results Assuming No Future Benefit Adjustments			
1.	Recommended contribution rate as of last valuation	4.78%	5.26%
2.	Change in Contribution Rate During Year		
	a. Change in normal cost	(0.12%)	0.08%
	b. Change in assumptions	0.00%	0.00%
	c. Change in benefit provisions	0.00%	0.00%
	d. Impact of contributing less/(more) than calculated rate	(0.51%)	(0.48%)
	e. Recognition of asset losses/(gains)	(0.17%)	0.19%
	f.. Effect of payroll growth	0.83%	(0.35%)
	g. Benefit adjustment granted as of October 1 (2.71% in 2017, 2.98% in 2016)	0.15%	0.16%
	h. Resetting Funding Period to 30 Years	0.12%	0.10%
	i. Actuarial (gain)/loss from other liability sources	(1.46%)	(0.18%)
	j. Total Change	(1.16%)	(0.48%)
3.	Recommended contribution rate as of this valuation	3.62%	4.78%

Table 5 - Summary of Historical Valuation Results
As of the Valuation date January 1,

	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
1. Number of Members										
a. Active	173	150	160	156	170	172	171	121	126	114
b. Retired/DROP/Beneficiaries	42	40	34	25	19	16	14	10	6	6
c. Inactive members	35	27	22	18	11	7	6	7	8	11
d. Total	250	217	216	199	200	195	191	138	140	131
2. Covered payroll (prior year)	$ 15,058,049	$ 12,506,946	$ 12,830,741	$ 12,140,184	$ 12,937,791	$ 12,958,335	$ 11,650,031	$ 8,462,937	$ 8,622,865	$ 7,338,959
3. Average compensation	$ 87,041	$ 83,380	$ 80,192	$ 77,822	$ 76,105	$ 75,339	$ 68,129	$ 69,942	$ 68,435	$ 64,377
4. Covered payroll for upcoming year	$ 15,818,423	$ 13,183,263	$ 13,622,258	$ 12,904,715	$ 13,818,988	$ 13,905,802	$ 12,637,009	$ 9,186,706	$ 9,456,360	$ 8,059,809
5. Actuarial value of assets	$ 68,207,993	$ 54,702,116	$ 47,344,971	$ 39,772,760	$ 34,476,002	$ 29,758,000	$ 23,666,933	$ 18,107,030	$ 15,373,546	$ 13,642,709
6. Market value of assets	$ 69,872,191	$ 53,087,030	$ 46,309,805	$ 41,037,152	$ 36,323,815	$ 29,743,999	$ 22,688,412	$ 18,169,731	$ 14,650,779	$ 11,368,924
7. Present value of benefits										
a. Retired/Beneficiaries	$ 17,164,499	$ 15,425,878	$ 12,016,162	$ 9,318,306	$ 6,523,497	$ 5,328,780	$ 4,796,966	$ 2,763,051	$ 1,738,422	$ 1,705,118
b. Terminations	3,716,961	3,243,702	2,334,738	1,584,754	1,188,810	524,247	483,564	383,892	265,824	244,632
c. Actives	41,276,540	33,317,417	32,069,946	28,868,639	30,202,694	29,820,602	25,611,533	17,788,639	17,826,490	15,395,251
d. Total	$ 62,158,000	$ 51,986,997	$ 46,420,846	$ 39,771,699	$ 37,915,001	$ 35,673,629	$ 30,892,063	$ 20,935,582	$ 19,830,736	$ 17,345,001
8. Total contribution										
a. Amount	$ 2,119,669	$ 1,951,123	$ 1,839,005	$ 1,619,542	$ 1,734,283	$ 1,779,943	$ 1,636,493	$ 1,047,284	$ 1,082,753	$ 902,699
b. Percent of pay	13.40%	14.80%	13.50%	12.60%	12.50%	12.60%	13.00%	11.30% *	11.50%	11.40%
c. Effective date	July 1	July 1	July 1	July 1	July 1	July 1	July 1	July 1	July 1	July 1

**11.30% rate effective July 1, 2011 through December 31, 2012. 12.90% rate effective January 1, 2012 through June 30, 2012.*

Table 6 - Allocation of Plan Assets at Fair Value

	Actual Allocation January 1, 2018	Target Allocation
1. Global Equity	38.3%	37.0%
2. Equity Long/Short	8.9%	9.0%
3. Absolute Return	9.4%	9.0%
4. Illiquid Alternatives	22.3%	24.0%
5. Managed Futures	4.0%	4.0%
6. Fixed Income	15.3%	15.0%
7. Cash	1.8%	2.0%
	100.0%	100.0%

Asset Allocation as of January 1, 2018

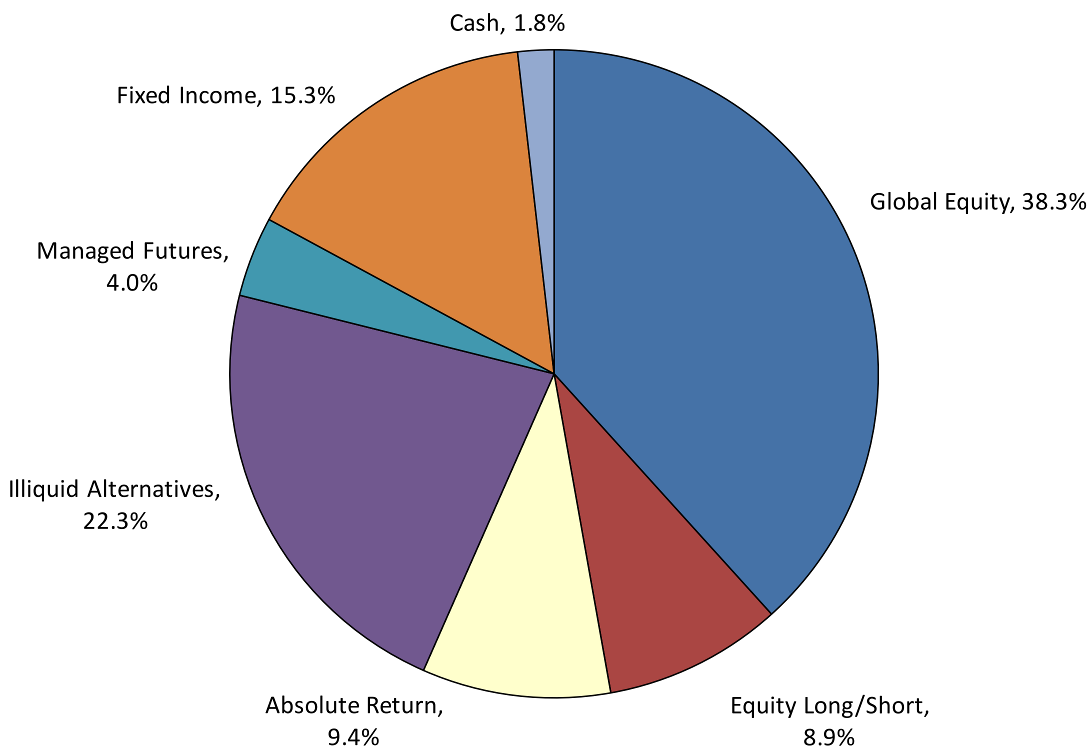


Table 7 - Reconciliation of Plan Net Assets

			Year Beginning January 1, 2017	Year Beginning January 1, 2016
1.	Market value of assets at beginning of year		$ 53,087,030	$ 46,309,805
2.	Revenue for the year			
	a.	Contributions		
		i. Member contributions	$ 8,956,842	$ 4,118,336
		ii. Employer contributions	1,304,938	1,298,683
		iii. SWDD roll to normal contributions	0	0
	b.	Net investment income		
		i. Interest	$ 158,112	$ 134,619
		ii. Dividends	422,622	378,813
		iii. Net change in accrued income	34,034	(2,718)
		iv. Unrealized gain/(loss)	4,920,847	1,245,187
		v. Realized gain/(loss)	2,652,812	1,115,590
		vi. Investment expense	(564,977)	(426,240)
		vii. Other Income	499,379	211,741
	c.	Total revenue	$ 18,384,609	$ 8,074,011
3.	Expenditures for the year			
	a.	Refunds	$ (27,870)	$ (17,151)
	b.	Benefit payments	(1,493,664)	(1,191,766)
	c.	Administrative expense	(77,914)	(87,869)
	d.	Total expenditures	$ (1,599,448)	$ (1,296,786)
4.	Increase in net assets (Item 2c + Item 3d)		$ 16,785,161	$ 6,777,225
5.	Market value of assets at end of year (Item 1 + Item 4)		$ 69,872,191	$ 53,087,030

Table 8 - Development of Actuarial Value of Assets

1.	Actuarial value of assets at beginning of year	$	54,702,116
2.	Net new investments		
	a. Contributions and Affiliations	$	10,261,780
	b. Benefits paid		(1,493,664)
	c. Refunds		(27,870)
	d. Administrative expense		(77,914)
	e. Subtotal	$	8,662,332
3.	Assumed investment return rate for fiscal year		7.5%
4.	Assumed investment return for fiscal year	$	4,427,496
5.	Expected Actuarial Value at end of year	$	67,791,944
6.	Market value of assets at end of year	$	69,872,191
7.	Excess return (6-5)	$	2,080,247

8. Development of amounts to be recognized as of December 31, 2017:

Fiscal Year End	Remaining Deferrals of Excess (Shortfall) of Investment Income	Offsetting of Gains/(Losses)	Net Deferrals Remaining	Years Remaining	Recognized for this valuation	Remaining after this valuation
	(1)	(2)	(3) = (1) + (2)	(4)	(5) = (3) / (4)	(6) = (3) - (5)
2013	$ 0	$ 0	$ 0	1	$ 0	$ 0
2014	0	0	0	2	0	0
2015	(776,374)	776,374	0	3	0	0
2016	(838,712)	838,712	0	4	0	0
2017	3,695,333	(1,615,086)	2,080,247	5	416,049	1,664,198
Total	$ 2,080,247	$ 0	$ 2,080,247		$ 416,049	$ 1,664,198

9.	Actuarial value of assets as of December 31, 2017 (Item 6 - Item 8)	$	68,207,993

Amounts in column (1) for fiscal years ending 2013 through 2016 are from the prior valuation. The column (1) amount for fiscal year 2017 is developed using item 7 less the total of column (1) for fiscal years ending 2013 through 2016. To the extent possible, the 2017 excess or shortfall is used to reduce prior bases. In this case, both the 2015 and 2016 bases were offset by the gains in 2017. The fiscal year 2013 and 2014 bases are $0 because they were previously offset.

Table 9 - Investment Yields

Item	Market Value	Actuarial Value
1. Assets as of January 1, 2017 (A)	$ 53,087,030	$ 54,702,116
2. Contributions during FY17	10,261,780	10,261,780
3. Benefit payments made during FY17	1,493,664	1,493,664
4. Refunds of contributions during FY17	27,870	27,870
5. Transfers to member's DROP accounts during FY17	0	0
6. Investment return during FY17	8,044,915	4,765,631
7. Assets as of January 1, 2018 (B): (1 + 2 - 3 - 4 - 5 + 6)	$ 69,872,191	$ 68,207,993
8. Approximate rate of return on average invested assets		
a. Net investment income (I)	$ 8,044,915	$ 4,765,631
b. Estimated return based on (2I / (A + B - I))	14.00%	8.07%

Table 10 - Gain/(Loss) on Actuarial Value of Assets

Item	Valuation as of January 1, 2018	Valuation as of January 1, 2017
1. Actuarial assets, prior valuation	$ 54,702,116	$ 47,344,971
2. Total contributions since prior valuation	$ 10,261,780	$ 5,417,020
3. Benefits, refunds and administrative expense since prior valuation	$ (1,599,448)	$ (1,296,786)
4. Assumed net investment income at actuarial rate %*		
a. Beginning assets	$ 4,102,659	$ 3,550,873
b. Contributions	384,817	203,138
c. Benefits, refunds paid and administrative expense	(59,980)	(48,630)
d. Total	$ 4,427,496	$ 3,705,381
5. Expected actuarial assets (1 + 2 + 3 + 4)	$ 67,791,944	$ 55,170,586
6. Actual actuarial assets, this valuation	$ 68,207,993	$ 54,702,116
7. Asset gain/(loss) since prior valuation (6 - 5)	$ 416,049	$ (468,470)
	Gain	Loss

**7.5% beginning at January 1, 2012.*

Table 11 - History of Investment Return Rates

For Fiscal Year Ending	Market Value	Actuarial Value
December 31, 2007	7.70%	10.36%
December 31, 2008	(30.00%)	(13.96%)
December 31, 2009	19.62%	5.48%
December 31, 2010	13.69%	8.19%
December 31, 2011	0.50%	5.63%
December 31, 2012	11.67%	7.48%
December 31, 2013	15.07%	9.00%
December 31, 2014	6.70%	8.68%
December 31, 2015	1.38%	6.89%
December 31, 2016	5.31%	6.37%
December 31, 2017	14.00%	8.07%
Average Returns:		
Last 5 Years	8.37%	7.80%
Last 10 Years	4.79%	4.96%

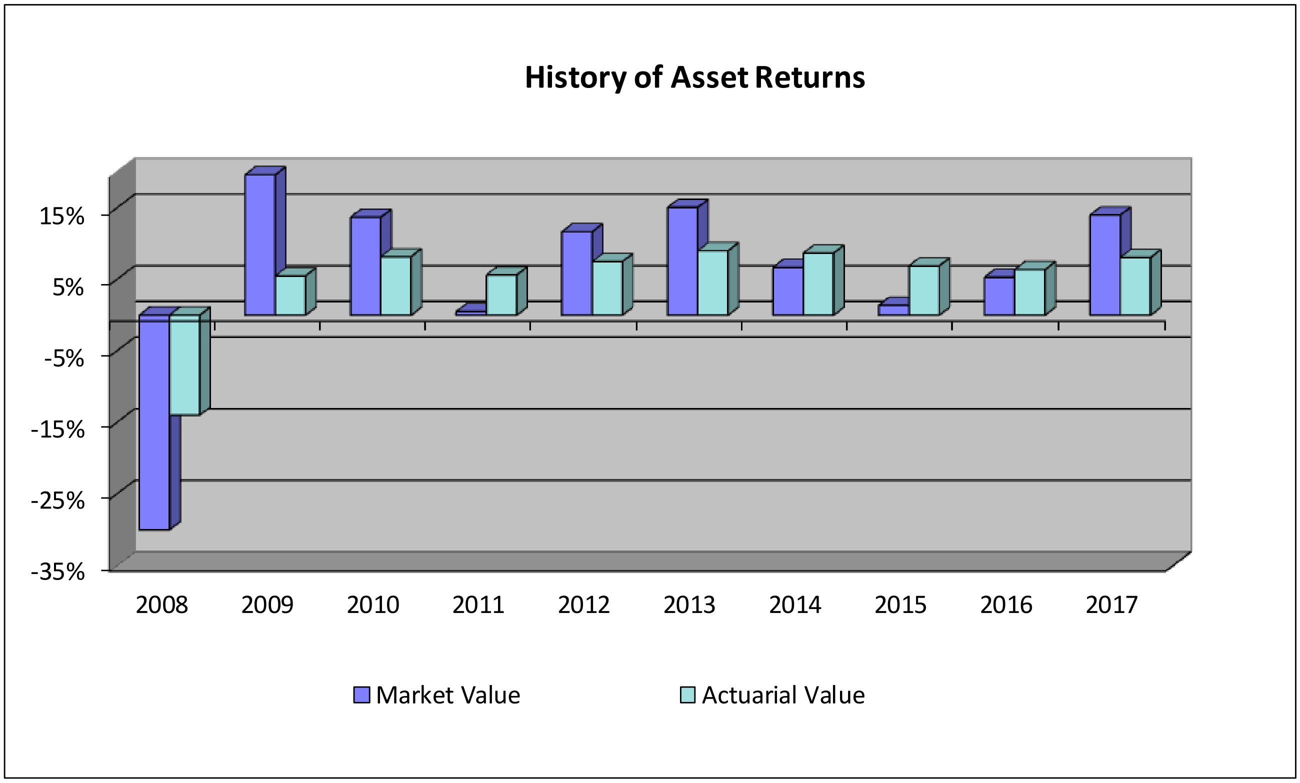


Table 12 - Schedule of Funding Progress

Date	Actuarial Value of Assets (AVA)	Actuarial Accrued Liability (AAL)	Unfunded Actuarial Accrued Liability (UAAL) (3) - (2)	Funded Ratio (2)/(3)	Annual Payroll	UAAL as % of Payroll (4)/(6)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
January 1, 2007	$ 9,624,239	$ 6,299,422	$ (3,324,817)	152.8%	$ 4,391,954	(75.7%)
January 1, 2008	14,075,984	9,774,906	(4,301,078)	144.0%	7,342,967	(58.6%)
January 1, 2009	13,642,709	10,648,712	(2,993,997)	128.1%	7,726,670	(38.7%)
January 1, 2010	15,373,546	12,107,329	(3,266,217)	127.0%	9,026,182	(36.2%)
January 1, 2011	18,107,030	13,658,025	(4,449,005)	132.6%	8,770,187	(50.7%)
January 1, 2012	23,666,933	18,832,849	(4,834,084)	125.7%	12,195,940	(39.6%)
January 1, 2013	29,758,000	23,313,204	(6,444,795)	127.6%	13,384,707	(48.2%)
January 1, 2014	34,476,002	26,123,656	(8,352,346)	132.0%	13,246,537	(63.1%)
January 1, 2015	39,772,760	29,177,530	(10,595,230)	136.3%	12,462,773	(85.0%)
January 1, 2016	47,344,971	35,776,922	(11,568,049)	132.3%	13,118,579	(88.2%)
January 1, 2017	54,702,116	42,201,793	(12,500,323)	129.6%	12,631,900	(99.0%)
January 1, 2018	68,207,993	50,319,464	(17,888,529)	135.5%	15,021,985	(119.1%)

Limitations of Funded Status Measurements

Unless otherwise indicated, a funded status measurement presented in this report is based upon the actuarial accrued liability and the actuarial value of assets. With regard to any funded status measurements presented in this report:

(1) The measurement is inappropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations.

(2) The measurement alone is inappropriate for assessing the need for or the amount of future employer contributions.

(3) The measurement would produce a different result if the market value of assets were used instead of the actuarial value of assets, unless the market value of assets is used in the measurement.

Table 13 - Solvency Test

Valuation Date	Aggregated Accrued Liabilities for: Active Members Contributions	Retirees Beneficiaries and Vested Terminations	Members (Employer Financed Portion)	Actuarial Value of Assets	Portion of Accrued Liabilities Covered by Reported Assets: (5)/(2)	[(5)-(2)]/(3)	[(5)-(2)-(3)]/(4)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
January 1, 2005	$ 4,796,229	$ 0	$ (760,335)	$ 5,040,067	100.0%	100.0%	100.0%
January 1, 2006	6,565,089	0	(1,198,177)	7,998,356	100.0%	100.0%	100.0%
January 1, 2007	6,372,113	869,103	(941,794)	9,624,239	100.0%	100.0%	100.0%
January 1, 2008	9,263,435	1,249,679	(738,208)	14,075,984	100.0%	100.0%	100.0%
January 1, 2009	7,488,207	2,201,593	958,912	13,642,709	100.0%	100.0%	100.0%
January 1, 2010	7,717,567	2,233,942	2,155,820	15,373,546	100.0%	100.0%	100.0%
January 1, 2011	7,303,256	3,146,943	3,207,826	18,107,030	100.0%	100.0%	100.0%
January 1, 2012	9,883,610	5,280,530	3,668,709	23,666,933	100.0%	100.0%	100.0%
January 1, 2013	12,049,328	5,853,027	5,410,849	29,758,000	100.0%	100.0%	100.0%
January 1, 2014	11,990,004	7,712,307	6,421,345	34,476,002	100.0%	100.0%	100.0%
January 1, 2015	10,736,366	10,903,060	7,538,104	39,772,760	100.0%	100.0%	100.0%
January 1, 2016	12,829,719	14,350,900	8,596,303	47,344,971	100.0%	100.0%	100.0%
January 1, 2017	12,984,652	18,669,580	10,547,561	54,702,116	100.0%	100.0%	100.0%
January 1, 2018	19,210,449	20,881,460	10,227,555	68,207,993	100.0%	100.0%	100.0%

Table 14 - Cash Flow Analysis

Year Ending December 31,	Contributions for the Year	Expenditures During the Year: Benefit Payments	Refund of Contributions	Identified Receipts	Expenses	Total	External Cash Flow for the Year	Market Value of Assets	External Cash Flow as Percent of Market Value
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2004	$ 4,796,245	$ 0	$ 0	$ 0	$ (6,300)	$ (6,300)	$ 4,789,945	$ 5,144,011	93.1%
2005	2,384,615	0	(36,779)	0	(46,372)	(83,151)	2,301,465	8,156,421	28.2%
2006	697,112	(42,481)	(2,108)	0	(60,873)	(105,462)	591,650	10,056,739	5.9%
2007	3,502,835	(95,405)	(122,503)	0	(82,933)	(300,841)	3,201,994	14,241,929	22.5%
2008	1,880,763	(155,143)	(78,716)	0	(108,949)	(342,808)	1,537,955	11,368,924	13.5%
2009	1,384,791	(195,627)	(232,027)	(12)	(97,983)	(525,649)	859,142	14,650,779	5.9%
2010	1,253,552	(89,965)	252,487	0	(126,643)	35,879	1,289,431	18,169,731	7.1%
2011	4,749,092	(317,469)	(14,990)	0	(154,432)	(486,891)	4,262,201	22,688,412	18.8%
2012	4,617,459	(449,818)	(3,097)	0	(154,432)	(607,347)	4,010,112	29,743,999	13.5%
2013	2,513,695	(525,814)	(36,845)	0	(314,953)	(877,613)	1,636,082	36,323,815	4.5%
2014	3,003,129	(752,330)	(43,962)	0	(356,794)	(1,153,086)	1,850,043	41,037,152	4.5%
2015	5,644,278	(953,099)	(18,365)	0	(442,660)	(1,414,123)	4,230,154	46,309,805	9.1%
2016	5,417,020	(1,191,766)	(17,151)	0	(87,869)	(1,296,786)	4,120,234	53,087,030	7.8%
2017	10,261,780	(1,493,664)	(27,870)	0	(77,914)	(1,599,448)	8,662,332	69,872,191	12.4%
2018*	2,230,398	(1,881,505)	(63,027)	0	(80,641)	(2,025,173)	205,225	75,325,526	0.3%
2019*	2,193,857	(2,244,081)	(65,233)	0	(83,463)	(2,392,777)	(198,920)	80,768,560	-0.2%
2020*	2,270,642	(2,365,569)	(67,516)	0	(86,385)	(2,519,470)	(248,828)	86,568,044	-0.3%

* Results for 2018, 2019, & 2020 are based on expected contributions, expected benefit payments, and assumed investment return of 7.5%
Expected contributions are based on combined employee and employer rate of 14.8% and 3.5% annual payroll growth
Expected benefit payments are based on 3% benefit adjustment and expected retirements, terminations, and mortality
Assets are assumed to increase at the annual return of 7.5% with all cash flow occurring in the middle of the year

Table 15 - Membership Data

	January 1, 2018	January 1, 2017	January 1, 2016
1. Active members			
a. Number	173	150	160
b. Total payroll	$ 15,058,049	$ 12,506,946	$ 12,830,741
c. Average annual salary	$ 87,041	$ 83,380	$ 80,192
d. Average age	46.5	46.3	46.1
e. Average service	13.6	13.4	12.2
2. Inactive members			
a. Vested	3	4	4
b. NonVested	32	23	18
3. Service retirees			
a. Number	42	40	34
b. Total annual benefits	$ 1,584,650	$ 1,419,211	$ 1,089,295
c. Average annual benefit	$ 37,730	$ 35,480	$ 32,038
d. Average age	63.7	62.8	62.4
4. Beneficiaries and spouses			
a. Number	0	0	0
b. Total annual benefits	$ 0	$ 0	$ 0
c. Average annual benefit	$ 0	$ 0	$ 0
d. Average age	0.0	0.0	0.0

Table 16 - Historical Summary of Active Member Data

Valuation Date	Active Count	Average Age	Average Service	Covered Payroll	Average Annual Salary	Percent Change in Average Salary
2006	67	42.4	9.8	3,967,889	59,222	(16.76%)
2007	63	41.7	10.3	4,257,723	67,583	14.12%
2008	115	40.9	8.5	6,988,987	60,774	(10.08%)
2009	114	41.2	8.8	7,338,959	64,377	5.93%
2010	126	42.7	8.9	8,622,865	68,435	6.30%
2011	121	43.4	9.7	8,462,937	69,942	2.20%
2012	171	44.5	8.9	11,650,031	68,129	(2.59%)
2013	172	45.3	10.3	12,958,335	75,339	10.58%
2014	170	45.6	10.8	12,937,791	76,105	1.02%
2015	156	46.1	11.5	12,140,184	77,822	2.26%
2016	160	46.1	12.2	12,830,741	80,192	3.05%
2017	150	46.3	13.4	12,506,946	83,380	3.97%
2018	173	46.5	13.6	15,058,049	87,041	4.39%

Table 17 - Distribution of Active Members by Age and by Years of Service
As of December 31, 2017

	Years of Credited Service												
Attained Age	Less than 1 Count & Avg. Comp.	1-2 Count & Avg. Comp.	2-3 Count & Avg. Comp.	3-4 Count & Avg. Comp.	4-5 Count & Avg. Comp.	5-9 Count & Avg. Comp.	10-14 Count & Avg. Comp.	15-19 Count & Avg. Comp.	20-24 Count & Avg. Comp.	25-29 Count & Avg. Comp.	30-34 Count & Avg. Comp.	35 & Over Count & Avg. Comp.	Total Count & Avg. Comp.
Under 25													0 $0
25-29	3 $57,258	1 $56,000	3 $59,070		1 $62,843								8 $58,478
30-34	2 $61,401		1 $60,038		1 $83,767	3 $66,531	1 $77,818						8 $68,002
35-39			1 $85,221	1 $59,544	2 $74,937	3 $71,604	7 $82,131	1 $98,512					15 $78,858
40-44	3 $86,385	1 $59,465	2 $95,048			11 $88,210	11 $84,555	11 $89,250	1 $120,487	1 $84,080			41 $87,694
45-49	1 $81,812		1 $110,339	1 $75,012		5 $84,288	15 $87,832	7 $91,839	6 $97,830	2 $106,423	1 $81,812		39 $90,528
50-54	1 $107,993		1 $85,638			5 $92,559	3 $83,532	11 $88,044	2 $97,580	4 $106,186	3 $96,945		30 $92,875
55-59			1 $115,771			3 $110,259	5 $79,915	4 $86,350	1 $91,747	2 $87,469	2 $95,003	3 $104,031	21 $93,348
60-64						5 $75,680	1 $121,436			1 $132,844		3 $90,511	10 $90,421
65 & Over						1 $86,524							1 $86,524
Total	10 $74,354	2 $57,733	10 $82,431	2 $67,278	4 $74,121	36 $85,129	43 $85,394	34 $89,324	10 $99,437	10 $102,945	6 $93,775	6 $97,271	173 $87,041

Average:	Age:	46.5	Number of participants:	Fully vested:	145	Males:	166
	Service:	13.6		Not Vested:	28	Females:	7

Table 18 - Schedule of Retirants & Annuitants Added to & Removed from Rolls

	Added to Rolls*		Removed from Rolls		Rolls-End of Year			
Year Ended	Number	Annual Benefits	Number	Annual Benefits	Number	Annual Benefits	% Increase in Annual Benefits	Average Annual Benefits
December 31, 2004	0	$ 0	0	$ 0	0	$ 0	N/A	$ 0
December 31, 2005	0	0	0	0	0	0	N/A	0
December 31, 2006	3	83,287	0	0	3	83,287	N/A	27,762
December 31, 2007	1	13,802	0	0	4	97,089	16.57%	24,272
December 31, 2008	2	59,330	0	0	6	161,905	66.76%	26,984
December 31, 2009	0	4,858	0	0	6	166,763	3.00%	27,794
December 31, 2010	4	90,509	0	0	10	257,272	54.27%	25,727
December 31, 2011	4	174,855	0	0	14	432,126	67.96%	30,866
December 31, 2012	2	54,220	0	0	16	486,346	12.55%	30,397
December 31, 2013	3	111,306	0	0	19	597,652	22.89%	31,455
December 31, 2014	6	266,259	0	0	25	863,911	44.55%	34,556
December 31, 2015	9	225,384	0	0	34	1,089,295	26.09%	32,038
December 31, 2016	6	329,916	0	0	40	1,419,211	30.29%	35,480
December 31, 2017	3	180,005	1	14,566	42	1,584,650	11.66%	37,730

* Includes benefit adjustments

Table 19 - Summary of Members and Adjusted Payroll by Employer

City		Police			Fire			Total		
Code	City Name	No.		Earnings	No.		Earnings	No.		Earnings
10	AURORA FIRE	0	$	0	33	$	2,978,193	33	$	2,978,193
29	BUENA VISTA POLICE	2		148,592	0		0	2		148,592
33	CANON CITY POLICE	1		65,504	0		0	1		65,504
740	CARBONDALE AND RURAL FPD ADMIN	0		0	1		89,378	1		89,378
73	EDGEWATER POLICE	1		58,331	0		0	1		58,331
76	ENGLEWOOD POLICE	2		167,534	0		0	2		167,534
79	EVANS	28		2,025,499	0		0	28		2,025,499
89	FOUNTAIN FIRE	0		0	1		76,282	1		76,282
102	GRANADA POLICE	1		29,664	0		0	1		29,664
137	LAFAYETTE POLICE	4		357,584	0		0	4		357,584
149	LITTLETON FIRE	0		0	12		1,218,470	12		1,218,470
163	MILLIKEN POLICE	1		62,119	0		0	1		62,119
532	NORTH METRO FIRE RESCUE	0		0	1		140,965	1		140,965
524	SNOWMASS WILDCAT FPD	0		0	2		182,111	2		182,111
542	SABLE-ALTURA FPD	0		0	1		61,098	1		61,098
220	SHERIDAN POLICE	1		91,233	0		0	1		91,233
549	SUMMIT FIRE & EMS AUTHORITY	0		0	4		367,232	4		367,232
238	THORNTON FIRE	0		0	6		611,312	6		611,312
338	THORNTON POLICE	10		859,916	0		0	10		859,916
240	TRINIDAD FIRE	0		0	3		178,467	3		178,467
595	UPPER PINE RIVER FPD	0		0	1		93,462	1		93,462
534	WEST METRO FPD	0		0	33		3,107,485	33		3,107,485
252	WESTMINSTER FIRE	17		1,414,358	7		673,262	24		2,087,620
	Totals	68	$	5,280,333	105	$	9,777,716	173	$	15,058,049

SECTION IV

APPENDICES

SUMMARY OF ACTUARIAL METHODS AND ASSUMPTIONS

I. Valuation Date

The valuation date is January 1st of each plan year. This is the date as of which the actuarial present value of future benefits and the actuarial value of assets are determined.

II. Actuarial Cost Method

The actuarial valuation uses the Entry Age Normal actuarial cost method. Under this method, the employer contribution rate is the sum of (i) the employer normal cost rate, and (ii) a rate that will amortize the unfunded actuarial liability.

1. The valuation is prepared on the projected benefit basis. The present value of each participant's expected benefit payable at retirement or termination is determined, based on age, service, sex, compensation, and the interest rate assumed to be earned in the future (7.5%). The calculations take into account the probability of a participant's death or termination of employment prior to becoming eligible for a benefit, as well as the possibility of his terminating with a service benefit. Future salary increases are also anticipated. The present value of the expected benefits payable on account of the active participants is added to the present value of the expected future payments to retired participants and beneficiaries to obtain the present value of all expected benefits payable from the Plan on account of the present group of participants and beneficiaries.

2. The employer contributions required to support the benefits of the Plan are determined following a level funding approach, and consist of a normal cost contribution and an accrued liability contribution.

3. The normal cost contribution is determined using the Entry Age Normal method. Under this method, a calculation is made to determine the average uniform and constant percentage rate of employer contribution which, if applied to the compensation of each new participant during the entire period of his anticipated covered service, would be required in addition to the contributions of the participant to meet the cost of all benefits payable on their behalf.

4. The unfunded accrued liability contributions are determined by subtracting the actuarial value of assets from the actuarial accrued liability and amortizing the result over 30 years from the valuation date. It is assumed that payments are made monthly throughout the year.

III. Actuarial Value of Assets

Effective January 1, 2013, the actuarial value of assets is equal to the market value of assets less a five-year phase in of the excess/(shortfall) between expected investment return and actual income. The actual calculation is based on the difference between actual earnings and expected earnings each year, and recognizes the cumulative excess return (or shortfall) over at a minimum rate of 20% per year. The speed of the recognition will increase if the Plan continues to be in the same net deferred position (net gain or net loss) from one year to the next. This is intended to ensure the smoothed value of assets will converge towards the market value in a reasonable amount of time. In addition, a gain or loss that is in the opposite direction of the current net position will be immediately recognized.

Expected earnings are determined using the assumed investment return rate and the beginning of year actuarial value of assets (adjusted for receipts and disbursements during the year). The returns are computed net of administrative and investment expenses.

IV. Actuarial Assumptions

The current assumptions were adopted by the Board in 2015 for first use in this valuation following a regularly scheduled experience study. The rationale for all of the current assumptions is included in that report, dated June 1, 2015.

A. Economic Assumptions

1. Investment return: 7.50% per annum, compounded annually, composed of an assumed 2.50% inflation rate and a 5.00% real rate of return. This rate represents the assumed return, net of all investment expenses.

2. Salary increase rate: Inflation rate of 2.50%, plus productivity component of 1.50%, plus step-rate/ promotional component as shown on the following page:

Years of Service	Annual Step-rate/ Promotional Rate	Total Annual Rate of Increase Including 2.50% Inflation Component and 1.50% Productivity Component
(1)	(2)	(4)
1	10.00%	14.00%
2	8.50%	12.50%
3	8.00%	12.00%
4	7.50%	11.50%
5	2.50%	6.50%
6	1.50%	5.50%
7	1.50%	5.50%
8	1.00%	5.00%
9	0.75%	4.75%
10	0.50%	4.50%
11	0.50%	4.50%
12	0.50%	4.50%
13	0.25%	4.25%
14	0.25%	4.25%
15	0.00%	4.00%

Salary increases are assumed to occur once a year, on January 1. Therefore the pay used for the period between the valuation date and the first anniversary of the valuation date is equal to the reported pay for the prior year, annualized if necessary, and then increased by the salary increase assumption.

3. Payroll growth rate: In the amortization of the unfunded actuarial accrued liability, payroll is assumed to increase 3.50% per year. This increase rate is primarily due to the effect of inflation on salaries, with no allowance for future membership growth.

B. Demographic Assumptions

1. Healthy retirees and beneficiaries: For ages less than 55, RP-2014 Mortality Tables for Blue Collar Employees. For ages 65 and older, RP-2014 Mortality Tables for Blue Collar Healthy Annuitants. For ages 55 through 64, a blend of the previous tables. All tables are projected with Scale BB.

	Annual Rate per 1,000 Members				
Attained Age in 2018	Males	Females	Attained Age in 2018 (cont.)	Males	Females
(1)	(2)	(3)	(4)	(5)	(6)
50	2.16	1.22	70	18.53	13.31
55	3.65	1.95	75	29.66	21.89
60	7.13	4.53	80	48.82	36.36
65	12.02	8.31	85	81.74	61.95

The following table provides the life expectancy for an individual age 55 at retirement in a given year based on the assumption with full generational projection:

	Year of Retirement			
Gender	2016	2021	2026	2031
Male	30.2	30.7	31.3	31.9
Female	32.8	33.3	33.7	34.2

2. Mortality rates (active members) – RP-2014 Mortality Tables for Blue Collar Employees, projected with Scale BB, 55% multiplier for off-duty mortality. Increased by 0.00020 for on-duty related Fire and Police experience. Sample rates are shown below:

	Annual Rate per 1,000 Members				
Attained Age in 2018	Males	Females	Attained Age in 2018 (cont.)	Males	Females
(1)	(2)	(3)	(4)	(5)	(6)
20	0.49	0.30	40	0.64	0.44
25	0.54	0.31	45	0.88	0.60
30	0.52	0.33	50	1.39	0.87
35	0.57	0.37	55	2.16	1.21

3. Disability rates: Sample rates are shown below by age and disability type.

	Annual Rate per 1,000 Members	
Age	Occupational Disability Rates	Total Disability Rates
(1)	(2)	(3)
25	0.29	0.02
30	1.35	0.17
35	1.82	0.34
40	2.67	0.52
45	3.29	0.72
50	4.89	0.94
55	6.88	1.17

Disability rates are turned off at eligibility for normal retirement.

4. Termination rates (for causes other than death, disability or retirement): Termination rates are based on service. Termination rates are not applied after a member becomes eligible for a retirement benefit. Rates at selected ages are shown:

	Annual Rate per 1,000 Members				
Service	Rates	Service (cont.)	Rates	Service (cont.)	Rates
0	98.5	8	25.5	16	9.4
1	84.6	9	21.3	17	9.1
2	72.3	10	17.9	18	8.8
3	61.4	11	15.3	19	8.5
4	51.9	12	13.3	20	8.1
5	43.6	13	11.7	21	7.5
6	36.5	14	10.7	22	6.5
7	30.5	15	9.9	23	5.2

5. Retirement rates:

Age-Based Retirement rates

Age	Annual Rate per 100 Members
55	60
56-59	50
60	100

Service-Based Retirement rates*

Service	Annual Rate per 100 Members
5-10	4
11	5
12	6
13	7
14	8
15	9
16	10
17	11
18	12
19	13
20	15
21	20
22-24	25

*Rates first applied at age 55; 100 percent retirement assumed at age 70.

C. Other Assumptions

1. Administrative expenses: An explicit administrative expense equal to the prior year actual expenses.
2. Percent married: 85% of employees are assumed to be married or in a civil union.
3. Age difference: Male members are assumed to be two years older than their spouses, and female members are assumed to be two years younger than their spouses.
4. Post-retirement benefit adjustments: 0%.
5. Percent electing annuity on death (when eligible): All of the spouses of vested, married participants are assumed to elect an annuity.
6. Percent electing deferred termination benefit: Vested terminating members are assumed to elect a refund or a deferred benefit, whichever is more valuable at the time of termination.
7. There will be no recoveries once disabled.
8. No surviving spouse will remarry and there will be no children’s benefit.
9. Assumed age for commencement of deferred benefits: Members electing to receive a deferred benefit are assumed to commence receipt at the first age at which unreduced benefits are available.

10. Pay increase timing: Beginning of (fiscal) year. This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date.
11. Decrement timing: Decrements of all types are assumed to occur mid-year.
12. Eligibility testing: Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
13. Decrement relativity: Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
14. Incidence of Contributions: Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made.
15. Benefit Service: All members are assumed to accrue 1 year of service each year. Exact fractional service is used to determine the amount of benefit payable.
16. Inactive Population: All members included in the inactive non-vested population with at least 10 years of service are valued using two times member contributions.

D. Participant Data

Participant data was supplied on electronic files in the form of spreadsheets. There were separate tabs for (i) active and non-vested inactive members, and (ii) members and beneficiaries receiving benefits or vested inactives.

The data for an active members included birthdate, sex, service, salary and employee contribution account balance. For retired members and beneficiaries, the data included date of birth, sex, spouse's date of birth (where applicable), amount of monthly benefit, date of retirement, and a form of payment code.

Salary supplied for the current year was based on the earnings for the year preceding the valuation date adjusted for service accrued during the year. In cases where the earnings for the year two years prior to the valuation date was higher, this higher amount was used. This salary was adjusted by the salary increase rate for one year.

Assumptions were made to correct for missing, bad, or inconsistent data. These had no material impact on the results presented.

E. Changes to the assumptions and methods

There have been no changes to the assumptions or methods since the prior valuation.

SUMMARY OF BENEFIT PROVISIONS

Plan Description

The Fire & Police Pension Association Defined Benefit System – Statewide Hybrid Plan ("Plan") was established January 1, 2004 as a cost-sharing multiple-employer pension plan covering full-time firefighters and police officers from departments that elect coverage. The Plan may also cover clerical staff, other fire district personnel whose services are auxiliary to fire protection, or Chiefs who have opted out of the Statewide Defined Benefit Plan. The Plan is comprised of two components: Defined Benefit and Money Purchase. With the latter component, members have the option of choosing among various investment options offered by an outside investment manager.

Employers may not withdraw from the Plan once affiliated. The Plan assets for the Defined Benefit Component are included in the Fire & Police Members' Benefit Investment Fund and Plan assets associated with the Money Purchase Component and the Deferred Retirement Option Plan "DROP" are included in the Fire & Police Members' Self-Directed Investment Fund.

Plan Year

A twelve-month period ending December 31.

Members Included

Members included are active employees who are full-time salaried employees of a participating municipality, fire protection district, fire authority, or county improvement district normally serving at least 1,600 hours in a calendar year and whose duties are directly involved with the provision of police or fire protection. The Plan may include clerical and other personnel from fire districts whose service are auxiliary to fire protection or sheriff departments, as certified by the county.

Compensation Considered (Base Salary)

Base salary means the total base rate of pay including Member Contributions to the Defined Benefit System which are "picked up" by the employer. The definition of Base Salary is subject to the following conditions:

1) The definition of Base Salary shall also include longevity pay, sick leave pay taken in the normal course of employment, vacation leave pay taken in the normal course of employment, shift differential, and mandatory overtime that is part of the Member's fixed, periodic compensation.

2) Accumulated vacation leave pay shall also be included if a Member completes their service requirement for purposes of normal retirement while exhausting accumulated vacation leave.

3) In the event an employer has established or does establish a Deferred Compensation Plan, the amount of the Member's salary that is deferred shall be included in the Member's base salary.

4) Any amounts voluntarily contributed to an Internal Revenue Code Section 125 "Cafeteria Plan" shall be included in the Member's base salary.

5) Base salary shall not include overtime pay (except as noted in (1) above), step-up pay or other pay for temporarily acting in a higher rank (a member is deemed to be temporarily acting in a higher rank if the appointment to the rank is anticipated to last less than six months), uniform allowances, accumulated sick leave pay, accumulated vacation leave pay (except as noted in (2) above), and other forms of extra pay (including Member Contributions which are paid by the employer and not deducted from the Member's salary). A member is deemed to be temporarily acting in a higher rank if the appointment to the rank is anticipated to last less than six months.

Contribution Rates

The Plan sets contribution rates at a level that enables all benefits to be fully funded at the retirement date of all members. The members of this Plan and their employers are currently each contributing at the rate determined by the individual employer, however, the rate for both employer and members must be at least 8 percent of the member's base salary for a total of 16 percent. The amount allocated to the Defined Benefit Component is set annually by the Fire & Police Pension Association Board of Directors. Excess contributions fund the Money Purchase Component of the Plan. The Defined Benefit Component of the total contribution rate for this Plan was as follows:

Effective Date	Defined Benefit Component of the Total Contribution
7/1/2017 - 6/30/2018	14.80%
7/1/2016 - 6/30/2017	13.50%
7/1/2015 - 6/30/2016	12.60%
7/1/2014 - 6/30/2015	12.50%
7/1/2013 - 6/30/2014	12.60%
7/1/2012 - 6/30/2013	13.00%
1/1/2012 - 6/30/2012	12.90%
7/1/2011 - 12/31/2012	11.30%
7/1/2010 - 6/30/2011	11.50%
7/1/2009 - 6/30/2010	11.40%
8/1/2008 - 6/30/2009	11.00%
8/1/2007 - 7/31/2008	10.25%
8/1/2006 - 7/31/2007	11.00%

Within the Money Purchase Component, members are always fully vested in their own contributions, as well as the earnings on those contributions. Vesting in the employer's contributions within the Money Purchase Component, and earnings on those contributions occurs according to the vesting schedule set by the Plan document at 20 percent per year after the first year of service and to be 100 percent vested after five years of service or the attainment of age 55. Employer and member contributions are invested in funds at the discretion of members.

A member may elect to make voluntary after-tax contributions to the Money Purchase Component of the Plan. Additional voluntary contributions from the employer are made on a pre-tax basis.

Highest Average Salaries (HAS)

HAS is the average of the member's highest three annual base salaries.

Normal Retirement Date

A member's Normal Retirement Date shall be the date on which the member has completed at least 25 years of credited service and has attained the age of 55.

Normal Retirement Benefit

The annual Normal Retirement Benefit of the Defined Benefit Component is 1.5 percent of the average of the member's highest three years base salary for each year of credited service.

Benefits of the Defined Benefit Component are paid as a monthly life annuity. Other forms of payment are available.

Early Retirement Benefit

A member shall be eligible for an Early Retirement Benefit within the Defined Benefit Component after completion of 30 years of service or attainment of age 50 with at least five years of credited service. The Early Retirement Benefit shall be the reduction of the Normal Retirement Benefit on an actuarially equivalent basis.

Benefits of the Defined Benefit Component are paid as a monthly life annuity. Other forms of payment are available.

Terminated Vested Benefit

A member who terminates with at least five years of active service credit is vested. A vested member who does not withdraw their contributions from the Plan is eligible for a vested benefit within the

Defined Benefit Component, payable at age 55. The annual vested benefit is equal to 1.5 percent of the average of the member's highest three years base salary for each year of credited service. Both the highest average salary and service credits are determined at the time the member leaves active employment or enters the Deferred Retirement Option Plan (DROP). Benefits may commence at age 55.

Benefits of the Defined Benefit Component are paid as a monthly life annuity. Other forms of payment are available.

Deferred Retirement Benefit
Members who qualify for a Normal or Vested Retirement within the Defined Benefit Component may defer the receipt of their defined benefit pension to as late as age 65 and receive the actuarial equivalent of the benefit.

Benefits of the Defined Benefit Component are paid as a monthly life annuity. Other forms of payment are available.

Severance Benefit
All members with contributions in the Defined Benefit Component and leaving covered employment with less than five years of service credit are eligible. Optionally, vested members (those with five or more years of service credit) may withdraw their accumulated contributions from the Defined Benefit Component in lieu of the benefits otherwise due.

The member receives a lump-sum payment equal to the sum of their member contributions. 5 percent as interest is credited on these contributions. In addition, upon termination, the vested account balance within the Money Purchase Component is available to the member.

Death Benefit of Active Members
Death must have occurred while an active or an inactive, non-retired member.

Upon the death of an active, unmarried member with no spouse, no dependent children, and no beneficiary, a refund of the member's contributions is paid to the member's estate. If the member was eligible for retirement, a joint and survivor annuity may be paid to the beneficiary when the member would have been age 55.

Survivors (spouse or dependent children) of active members who die prior to retirement eligibility are covered by the benefits provided by the Statewide Death & Disability Plan. For purposes of the Statewide Death & Disability Plan, a spouse includes a partner in a civil union.

Forms of Payment

The Plan provides six choices for receipt of the retirement benefit.

Normal Option – The retiree receives a monthly pension benefit for their life. No monthly benefits are paid to a beneficiary following the retiree's death. However, if at the time of the member's death, they have not recouped in pension payments the amount of the member contributions (including all funds paid in to purchase service credit), the remaining funds plus 5% as interest would be paid to the member's beneficiary or estate as a lump sum.

Option 1 (Joint and 100% Survivor) - Under Option 1, an actuarially equivalent normal, deferred, early or vested retirement pension will be paid from the effective date of the retiree's retirement or later in the case of a deferred retirement. The actuarially equivalent monthly pension will continue for the life of the retiree. Upon the death of the retiree, the same monthly pension will be paid to the retiree's designated beneficiary for life.

Option 2 (Joint and 50% Survivor) - Under Option 2, an actuarially equivalent normal, deferred, early or vested retirement pension will be paid from the effective date of the retiree's retirement or later Appendix B Summary of Benefit Provisions Statewide Defined Benefit Plan 58 in the case of a deferred retirement. The actuarially equivalent monthly pension will continue for the life of the retiree. Upon the death of the retiree, 50 percent of the same monthly pension will be paid to the retiree's designated beneficiary for life.

Option 3 (Joint and 50% Last Survivor) - Under Option 3, an actuarially equivalent normal, deferred, early or vested retirement monthly pension will be shared by the retiree and their named beneficiary. Upon the death of either the retiree or the designated beneficiary, 50 percent of the same monthly pension will be paid to the survivor for life.

Option 4 (Joint and 100% Survivor with "Pop Up") – Under Option 4, an actuarially equivalent normal, deferred, early or vested retirement pension will be paid from the effective date of the retiree's retirement or later in the case of a deferred retirement. The actuarially equivalent monthly pension will continue for the life of the retiree. Upon the death of the retiree, the same monthly pension will be paid to the retiree's designated beneficiary for life. However, if the designated beneficiary dies before the retiree, the monthly pension benefit "pops-up" or reverts to the Normal Option effective with the first day of the month following the date of the death of the beneficiary.

Option 5 (Joint and 50% Survivor with "Pop Up") – Under Option 5, an actuarially equivalent normal, deferred, early or vested retirement pension will be paid from the effective date of the retiree's retirement or later in the case of a deferred retirement. The actuarially equivalent monthly pension will continue for the life of the retiree. Upon the death of the retiree, 50 percent of the same monthly pension benefit will be paid to the retiree's beneficiary for life. However, if the beneficiary dies before the retiree, the monthly pension benefit "pops-up" or reverts to the Normal Option.

Survivor benefits are paid according to the payment option elected by the member at the time of retirement or entry into DROP.

Actuarial equivalence is based on tables adopted by the Fire & Police Pension Association Board of Directors.

Benefit Adjustments for Benefits in Pay Status

Benefits to members and beneficiaries may be increased annually on October 1. The amount is based on the Fire & Police Pension Association Board of Directors discretion and can range from 0 percent to 3 percent. Benefit adjustment may begin once the retired member has been receiving retirement benefits for at least 12 calendar months prior to October 1.

Deferred Retirement Option Plan (DROP)

A member may elect to participate in the DROP after reaching eligibility for normal retirement, early retirement or vested retirement and age 55. A member continues to work while participating in the DROP, but must terminate employment within five years of entry into the DROP. The member's percentage of retirement benefit is frozen at the time of entry into the DROP. The monthly payments that begin at entry into the DROP are accumulated until the member terminates service, at which time the DROP accumulated benefits can be paid as periodic installments, a lump sum, or if desired a member may elect to convert the DROP to a lifetime monthly benefit with survivor benefits. The member continues to make contributions, which are credited to the DROP. The member shall self-direct the investments of their DROP funds.