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

Actuarial Valuation Report

For the Year Beginning January 1, 2020

P: 720.274.7270 | www.grsconsulting.com

June 30, 2020

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, 2020

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, 2020.

We certify that the information included herein and contained in the 2020 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, 2020.

This report presents the results of the January 1, 2020 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, 2020, the Plan is over-funded and the current assets exceed current liabilities by $17,412,656 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 10.30% of pay, plus 0.58% of pay to cover annual administrative expenses, is 10.88% of pay. Because there is no UAAL, contributions above this 10.88% rate are available to fund future discretionary benefit adjustments.

The contribution rate required to fund the benefits (assuming no benefit adjustments) is 5.17%. 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 10.88% of pay.

For the valuation as of January 1, 2020, the cost of benefits assuming future discretionary benefit adjustments of 3% per year is 18.13%. This rate includes the normal cost rate of 14.64% for the current active members. Until last year, the contribution rate allocated to the Defined Benefit portion of the Hybrid Plan was recommended to be the rounded value of the greater of these two rates. However, given the maximum rate of 16.00%, the plan can no longer sustain a 3.00% benefit adjustment.

The valuation results indicate that current funding levels would only support future discretionary benefit adjustments of 2.34% per year. Rather than allocate current contribution dollars toward improving the funded status of the plan beyond its current levels and increasing potential future benefit adjustments, the Board has opted to allocate to the Defined Benefit portion of the Hybrid Plan such that current funding levels are maintained going forward.

For the valuation as of January 1, 2020, the cost of benefits assuming future discretionary benefit adjustments of 2.34% per year is 13.81%. Based on the current Board objective to maintain current funding levels and 2.34% benefit adjustments, we recommend continuing the Defined Benefit allocation of 13.8%, effective July 1, 2020.

Benefit Provisions

The benefit provisions reflected in this valuation are those which were in effect on January 1, 2020. 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, 2019, based upon the actuary's analysis and recommendations from the 2018 Experience Study. For information regarding the rationale for the assumptions chosen, please see the experience study report dated September 21, 2018.

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 benefit adjustment 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 2020 are based on the same assumptions, methods and provisions used for the January 1, 2020 valuation. Consistent with the funding recommendations of the Plan, the ADC results shown assume a permanent benefit adjustment consistent with the breakeven benefit adjustment. The ADC is calculated as the higher of the Normal Cost or the Normal Cost plus Amortization of the Surplus or Unfunded Liability assuming in each future valuation year that future discretionary benefit adjustments continue at those levels. The

7.00% results show an upward trend in the projected benefit adjustments as deferred investment gains are recognized. This trend is not expected to continue beyond the projection period.

5-Year Deterministic Projection						
January 1,	Market Value Investment Return					
	3.00%		7.00%		11.00%	
	ADC	Ben Adj.	ADC	Ben Adj.	ADC	Ben. Adj.
2020	13.8%	2.34%	13.8%	2.34%	13.8%	2.34%
2021	13.8%	2.32%	13.9%	2.42%	14.0%	2.51%
2022	13.7%	2.21%	14.0%	2.50%	14.4%	2.77%
2023	13.4%	2.02%	14.1%	2.58%	14.6%	3.00%
2024	13.1%	1.75%	14.2%	2.66%	14.6%	3.00%
2025	12.6%	1.40%	14.2%	2.67%	14.7%	3.00%

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, 2020. 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, 2020.

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
Senior Consultant and Actuary

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SECTION I

EXECUTIVE SUMMARY

Executive Summary

Item	January 1, 2020	January 1, 2019
Membership		
• Number of:		
- Active members	180	174
- Retirees	47	44
- DROP Retirees	6	5
- Beneficiaries	1	1
- Inactive members	39	37
- Total	273	261
• Annualized payroll supplied by FPPA	$ 16,344	$ 15,452
Assets		
• Market value	$ 84,256	$ 72,645
• Actuarial value	$ 82,195	$ 75,269
• Return on market value	14.4%	-0.2%
• Return on actuarial value	7.7%	5.9%
• Contribution for prior year	$ 3,179	$ 5,030
• Ratio of actuarial value to market value	97.6%	103.6%
Actuarial Information		
• Total normal cost %	10.88%	10.83%
• Unfunded actuarial accrued liability/(surplus)	$ (17,413)	$ (16,427)
• Amortization rate	(5.71%)	(5.70%)
• Total required contribution %	5.17%	5.13%
• Funded ratio	126.9%	127.9%

Note: Dollar amounts in $000

Executive Summary

1. The annual required contribution rate (with no future benefit adjustments) is 5.17%.

2. Assets earned 14.36% on a market basis and 7.68% on an actuarial, smoothed, basis in 2019, producing an actuarial gain.

3. The funded ratio decreased from 127.90% as of January 1, 2019, to 126.90% as of January 1, 2020.

4. The cost of benefits assuming future permanent benefit adjustments of 3% per year is 18.13% and the funded ratio based on permanent 3% annual benefit adjustments is 95.60%. The permanent benefit adjustment which would produce a 100% funded ratio is 2.34% per year.

5. Historically, the plan has been at or very near funding levels which would support future discretionary benefit adjustments of 3% per year. Rather than allocate current contribution dollars toward improving the funded status of the plan beyond its current levels and increasing potential future benefit adjustments, the Board has opted to allocate to the Defined Benefit portion of the Hybrid Plan such that current funding levels are maintained going forward. The normal cost rate assuming future annual benefit adjustments of 2.34% is 13.81%, and there is no additional cost associated with an unfunded liability (the Plan is 100% funded at this assumed level of future benefit adjustment). Accordingly, we recommend the Defined Benefit continue at its current level of 13.80% effective July 1, 2020.

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

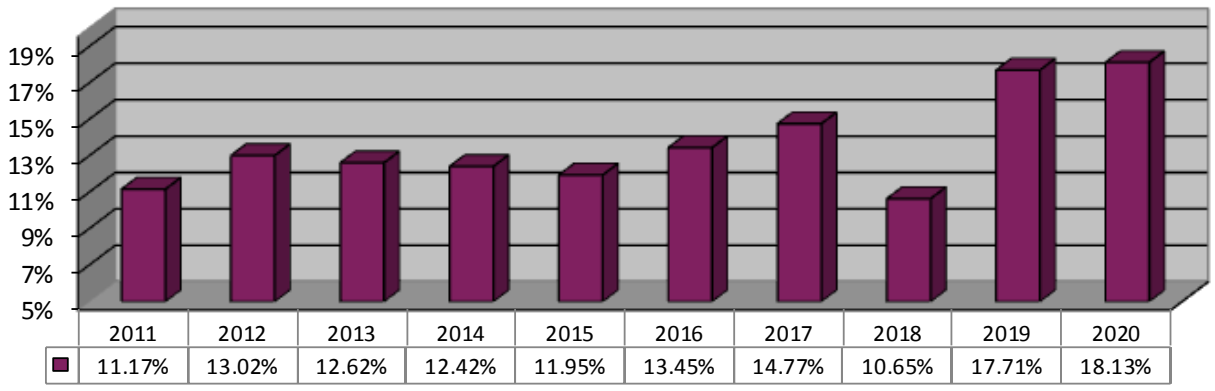
Annually, at the discretion of the Board of Directors, the amount of the combined employee and employer contribution rate to be allocated to the Defined Benefit portion of the Hybrid plan is determined.

Currently, members of the Fire and Police Pension Association Statewide Hybrid Plan contribute 13.80% to the Defined Benefit portion of the Plan. For the valuation as of January 1, 2020, the cost of the plan including permanent 3% annual benefit adjustments is 18.13%. This includes the normal cost rate 14.64% of payroll plus 3.49% of payroll to amortize the unfunded liability over the present value of future salary for the current active population. This methodology reflects the partially closed nature of the plan.

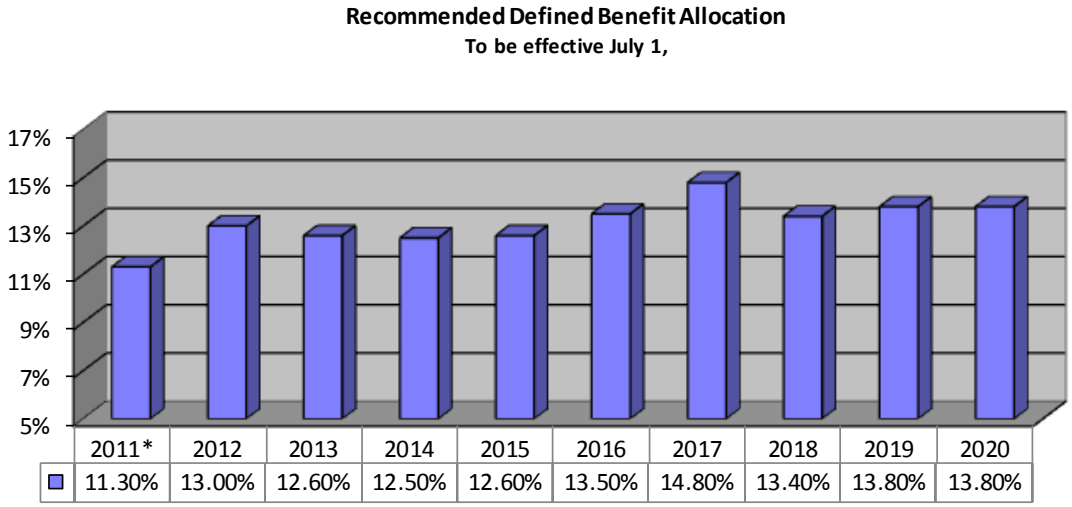
Historically, the plan has been at or very near funding levels which would support future discretionary benefit adjustments of 3% per year which would result in full allocation of the 16.00% allowed to the DB portion. Rather than allocate current contribution dollars toward improving the funded status of the plan beyond its current levels and increasing potential future benefit adjustments, the Board has opted to allocate to the Defined Benefit portion of the Hybrid Plan such that current funding levels are maintained going forward. The normal cost rate assuming future annual benefit adjustments of 2.34% is 13.81%, and there is no additional cost associated with an unfunded liability (the Plan is 100% funded at this assumed level of future benefit adjustment). Accordingly, we recommend the Defined Benefit continue at its current level of 13.80% effective July 1, 2020.

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,



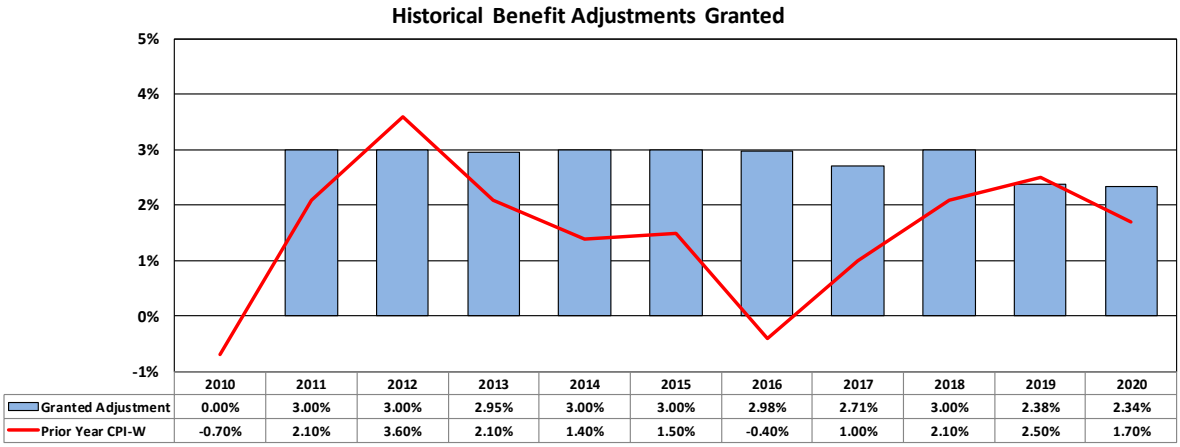
The following graph illustrates the historical Defined Benefit allocation contribution percentages and the recommended percentage for 2020.



**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 95.60%, indicating that the maximum discretionary amount cannot be actuarially supported. The permanent benefit adjustment which would produce a 100% funded ratio is 2.34% per year.



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Granted Adjustment	0.00%	3.00%	3.00%	2.95%	3.00%	3.00%	2.98%	2.71%	3.00%	2.38%	2.34%
Prior Year CPI-W	-0.70%	2.10%	3.60%	2.10%	1.40%	1.50%	-0.40%	1.00%	2.10%	2.50%	1.70%

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, 2020. The market value of assets reported was $84,256,450 as of January 1, 2020. 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.

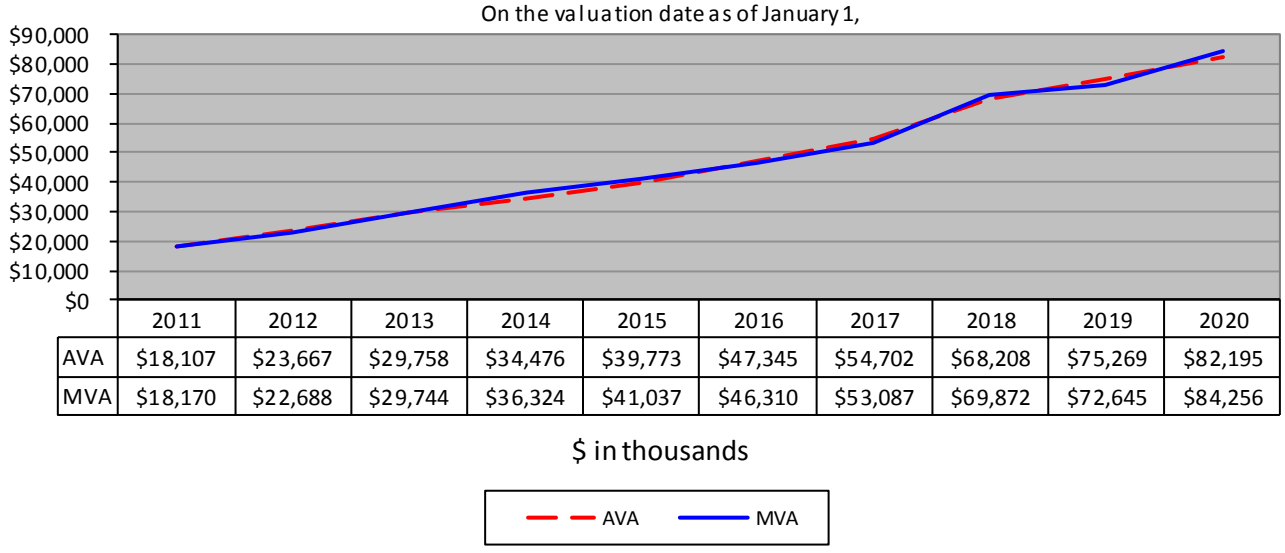
The asset valuation method uses a five-year phase-in of the excess/(shortfall) between expected investment return and actual income. Expected earnings used to project the actuarial value are determined using the assumed investment return rate and the beginning of year actuarial value of assets (adjusted 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 $75,269,291 to $82,195,088 since the prior valuation. This increase was more than expected and produced a gain of approximately $0.52 million.

Effective January 1, 2012, the valuation assumed investment return was reduced from 8.0% to 7.5% per year. Effective January 1, 2019, the valuation assumed investment return was reduced from 7.5% to 7.0% per year. As indicated by item 8b of Table 9, the estimated return on market value is 14.36%. The actuarial asset value returned 7.68%. 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,



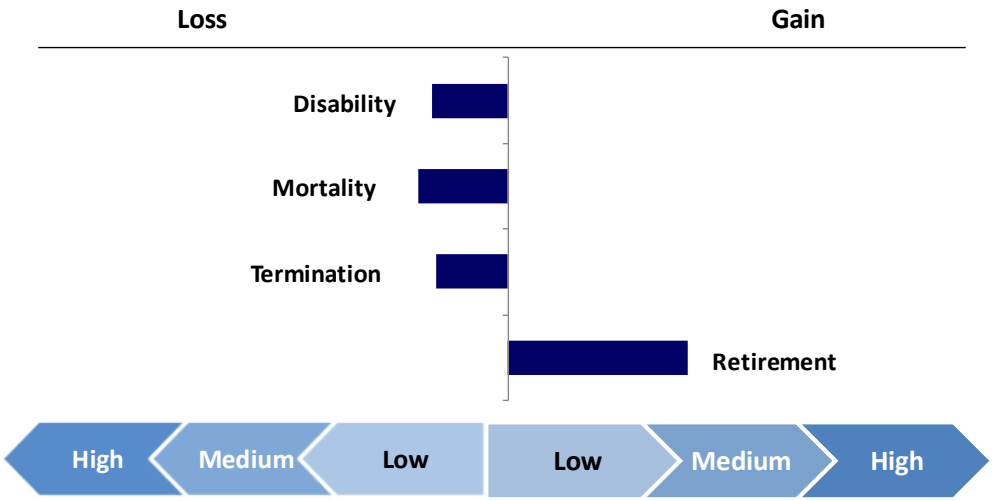
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
AVA	$18,107	$23,667	$29,758	$34,476	$39,773	$47,345	$54,702	$68,208	$75,269	$82,195
MVA	$18,170	$22,688	$29,744	$36,324	$41,037	$46,310	$53,087	$69,872	$72,645	$84,256

$ in thousands

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

Demographic Experience

During the year, the plan had less disabilities than expected (loss) and less retirements than expected (gain). There were no annuitant deaths during the year which created a liability loss for the plan. There were more terminations than expected which would typically create a gain, however the demographics of the terminations were such that the plan had a loss. The primary component of the net liability loss shown on table 4a is a conversion to normal retirement of a member previously on temporary disability.



Member Data

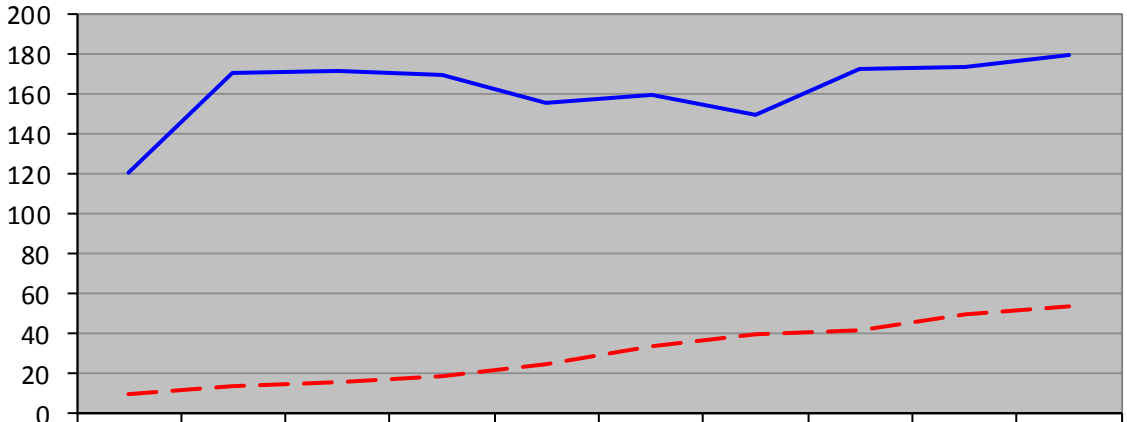
FPPA supplied member data as of January 1, 2020. While we did not audit this data, we did perform various tests to ensure that it was internally consistent, consistent with the prior year's data, and was reasonable overall. Information provided for active members includes: name, member ID, sex, a code 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,



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Active	121	171	172	170	156	160	150	173	174	180
In Payment	10	14	16	19	25	34	40	42	50	54

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 13.80%, effective July 1, 2019. The recommended amount is 13.80%, effective July 1, 2020.
- Benefit adjustments are granted periodically at the discretion of the FPPA Board.

Actuarial Methods and Assumptions

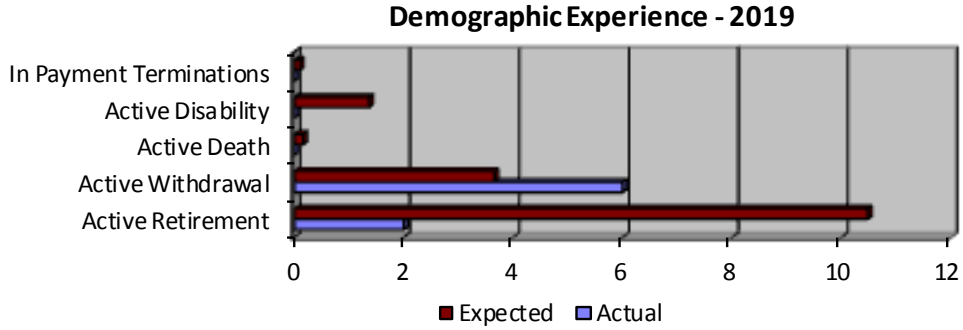
The valuation was prepared using the Entry Age Normal Method. This is the same funding method that has been used for the Statewide Defined Benefit Plan. Effective January 1, 2013, the asset valuation method is an actuarial value based on a five-year phase-in of excess investment gains and losses. See 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 FY2019, the actual salary increases were 100.5% 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

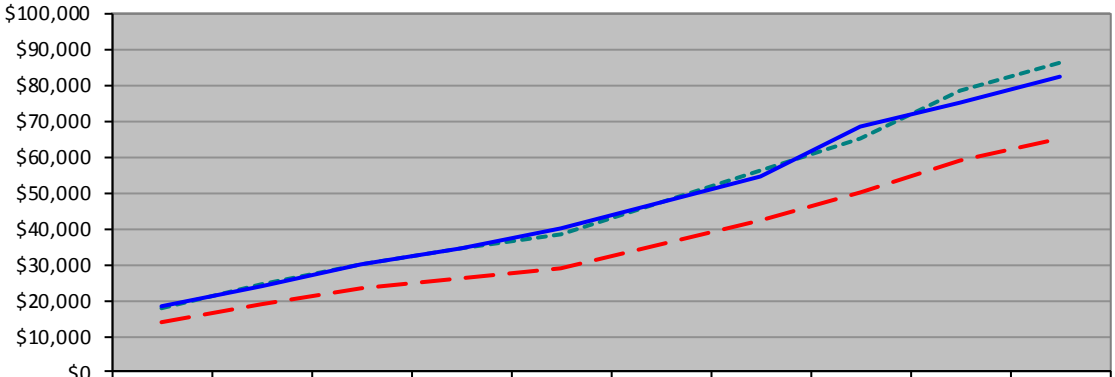
The Governmental Accounting Standards Board (GASB) Statement No. 67, Financial Reporting for Pension Plans (Issued 6/2012), has replaced the requirements under GASB Statement No. 25, Financial Reporting for Defined Benefit Pension Plans and Note Disclosures for Defined Contribution Plans (Issued 11/1994), 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.

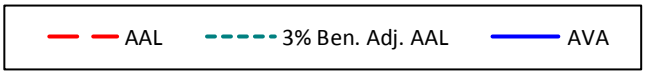
History of AAL vs AVA

On the valuation date as of January 1,



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
AAL	$13,658	$18,833	$23,313	$26,124	$29,178	$35,777	$42,202	$50,319	$58,842	$64,782
3% Ben. Adj. AAL	$17,900	$24,319	$29,889	$34,254	$38,316	$47,425	$56,032	$64,805	$78,516	$85,942
AVA	$18,107	$23,667	$29,758	$34,476	$39,773	$47,345	$54,702	$68,208	$75,269	$82,195

$ in thousands



AAL (Actuarial Accrued Liability)
AVA (Actuarial Value of Assets)

Significant Factors Affecting Trends in Actuarial Information

Investment gains during 2019, created actuarial investment gains for the Plan. Outstanding deferred investment gains would put downward pressure on the funded ratio; however, investment experience during the first half of 2020 indicates that these investment gains will be more than absorbed by 2020 losses.

Although benefits are still well funded when considering the base benefits (126.90%) as well as assuming a permanent 3.0% permanent benefit adjustment (95.60%), 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. The unfunded liability including permanent 3% annual benefit adjustments is $3.7 million as of January 1, 2020. Although this shortfall is not large in relation to the overall liabilities of the plan ($86 million), it is large in relation to the $16 million payroll of the plan. Any new unfunded liabilities created by adverse experience can quickly change the funding needs of this plan as a percentage of pay.

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 potential pool of reentry members is diminishing, and it is unlikely that this will continue at the historical rate. Effective August 2, 2019, the Sheriff departments may affiliate with the SWDB and SWH Plan under the full benefit program. This may provide an additional source of new active members, although participation levels are not known at this time. Because the Plan functions like a closed plan 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%
2019	485%	379%	5.13%	2.35%	127.9%	-12.8%
2020	501%	395%	5.17%	2.42%	126.9%	-12.7%

Data shown is for years in which GRS was the retained actuary.

Additional risk metrics are shown in Appendix C.

The contribution rate in this report is determined using the actuarial assumptions and methods disclosed in Appendix A of this report. This report includes risk metrics as shown above and some additional information in Appendix C but does not include a more robust assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment. We encourage a review and assessment of investment and other significant risks that may have a material effect on the plan's financial condition.

Market Value

Investment gains and losses are smoothed over five years, and currently, the smoothed or actuarial value of assets is 97.55% of the market value. If the Funded Ratio and Actuarially Determined Contribution had been measured using the Market Value of Assets, they would be 130.1% and 4.49% 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 98.0% and 16.57% of payroll, respectively.

SECTION III

TABLES

Table 1 - Development of Contribution Rate

		January 1, 2020	January 1, 2019
1.	Covered payroll for upcoming year	$ 16,344,137	$ 15,451,775
2.	Present value of future pay	$ 132,565,468	$ 129,325,305
3.	Total normal cost rate	10.30%	10.26%
4.	Actuarial accrued liability for active members		
	a. Present value of future benefits for active members	$ 48,198,147	$ 44,817,975
	b. Less: present value of future normal costs	(13,589,154)	(13,217,129)
	c. Actuarial accrued liability (a - b)	$ 34,608,993	$ 31,600,846
5.	Total actuarial accrued liability for:		
	a. Retirees and beneficiaries	$ 24,176,078	$ 21,585,745
	b. Inactive members (terminated vested and nonvested)	5,997,361	5,655,406
	c. Active members (Item 4c)	34,608,993	31,600,846
	d. Total	$ 64,782,432	$ 58,841,997
6.	Actuarial value of assets	$ 82,195,088	$ 75,269,291
7.	Unfunded actuarial accrued liability UAAL/(surplus) (Item 5d - Item 6)	$ (17,412,656)	$ (16,427,295)
8.	Contribution requirement		
	a. UAAL amortization payment as % of pay	(5.71%)	(5.70%)
	b. Normal cost	10.30%	10.26%
	c. Administrative Expense	0.58%	0.57%
	d. Contribution requirement (a + b + c)	5.17%	5.13%

Table 2 - Actuarial Present Value of Future Benefits

		January 1, 2020	January 1, 2019
1.	Active members		
	a. Retirement benefits	$ 46,781,075	$ 43,412,106
	b. Deferred termination benefits	1,288,294	1,231,915
	c. Refunds	51,933	100,650
	d. Death benefits	76,845	73,304
	e. Total	$ 48,198,147	$ 44,817,975
2.	Members in pay status		
	a. Service retirements	$ 23,987,955	$ 21,357,938
	b. Beneficiaries	188,123	227,807
	c. Total	$ 24,176,078	$ 21,585,745
3.	Inactive members		
	a. Vested terminations	$ 2,636,634	$ 3,694,578
	b. Nonvested terminations	3,360,727	1,960,828
	c. Total	$ 5,997,361	$ 5,655,406
4.	Total actuarial present value of future benefits	$ 78,371,586	$ 72,059,126

Table 3 - Analysis of Normal Cost by Component

		January 1, 2020	January 1, 2019
1.	Retirement benefits	9.27%	9.26%
2.	Deferred termination benefits	0.86%	0.84%
3.	Refunds	0.16%	0.15%
4.	Death benefits	0.01%	0.01%
5.	Total	10.30%	10.26%

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

		January 1, 2020	January 1, 2019
1.	Unfunded actuarial accrued liability (UAAL) as of January 1 of prior year	$ (16,427,295)	$ (17,888,529)
1.b.	Unfunded actuarial accrued liability (UAAL) as of January 1 of prior year after incorporation of the experience study recommendations	$ (16,427,295)	$ (15,929,821)
2.	Total normal cost for year (Normal cost % x actual payroll paid during year)	1,789,177	1,674,931
3.	Non service purchase contributions during year ending December 31	(2,285,010)	(2,189,145)
4.	Interest on UAAL for one year	(1,149,911)	(1,341,640)
5.	Interest on Item 2 and Item 3 for one-half year	(17,061)	(17,693)
6.	Expected UAAL as of January 1 (1 + 2 + 3 + 4 + 5)	$ (18,090,099)	$ (17,803,368)
7.	Actual UAAL at end of year	$ (17,412,656)	$ (16,427,295)
8.	Actuarial gain/(loss) for the period (6 - 7)	$ (677,443)	$ (1,376,073)
	SOURCE OF GAINS/(LOSSES)		
9.	Asset gain/(loss) (See Table 10)	$ 515,341	$ (655,963)
10.	Salary liability gain/(loss) for the period	$ (220,549)	$ 2,482
11.	Benefit adjustment granted as of October 1 (2.38% in 2019, 3.00% in 2018)	$ (508,319)	$ (514,935)
12.	Net liability gain/(loss) for the period (8 - 9 - 10 - 11)	$ (463,916)	$ (207,657)

Table 4b - Analysis of Change in Calculated Contribution Rate

		January 1, 2020	January 1, 2019
A.	Results Assuming No Future Benefit Adjustments		
1.	Recommended contribution rate as of last valuation	5.13%	3.62%
2.	Change in Contribution Rate During Year		
a.	Change in normal cost	0.05%	(0.01%)
b.	Change in assumptions	0.00%	1.55%
c.	Change in benefit provisions	0.00%	0.00%
d.	Impact of contributing less/(more) than calculated rate	(0.46%)	(0.46%)
e.	Recognition of asset losses/(gains)	(0.17%)	0.23%
f..	Effect of payroll growth	0.13%	(0.05%)
g.	Benefit adjustment granted as of October 1 (2.38% in 2019, 3.00% in 2018)	0.17%	0.19%
h.	Resetting Funding Period to 30 Years	0.11%	0.11%
i.	Actuarial (gain)/loss from other liability sources	0.21%	(0.05%)
j.	Total Change	0.04%	1.51%
3.	Recommended contribution rate as of this valuation	5.17%	5.13%

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

		2020	2019	2018	2017	2016	2015	2014	2013	2012	2011
1.	Number of Members										
	a. Active	180	174	173	150	160	156	170	172	171	121
	b. Retired/DROP/Beneficiaries	54	50	42	40	34	25	19	16	14	10
	c. Inactive members	39	37	35	27	22	18	11	7	6	7
	d. Total	273	261	250	217	216	199	200	195	191	138
2.	Covered payroll (prior year)	$ 16,344,137	$ 15,451,775	$ 15,058,049	$ 12,506,946	$ 12,830,741	$ 12,140,184	$ 12,937,791	$ 12,958,335	$ 11,650,031	$ 8,462,937
3.	Average compensation	$ 90,801	$ 88,803	$ 87,041	$ 83,380	$ 80,192	$ 77,822	$ 76,105	$ 75,339	$ 68,129	$ 69,942
4.	Covered payroll for upcoming year	$ 16,344,137	$ 15,451,775	$ 15,818,423	$ 13,183,263	$ 13,622,258	$ 12,904,715	$ 13,818,988	$ 13,905,802	$ 12,637,009	$ 9,186,706
5.	Actuarial value of assets	$ 82,195,088	$ 75,269,291	$ 68,207,993	$ 54,702,116	$ 47,344,971	$ 39,772,760	$ 34,476,002	$ 29,758,000	$ 23,666,933	$ 18,107,030
6.	Market value of assets	$ 84,256,450	$ 72,645,438	$ 69,872,191	$ 53,087,030	$ 46,309,805	$ 41,037,152	$ 36,323,815	$ 29,743,999	$ 22,688,412	$ 18,169,731
7.	Present value of benefits										
	a. Retired/Beneficiaries	$ 24,176,078	$ 21,585,745	$ 17,164,499	$ 15,425,878	$ 12,016,162	$ 9,318,306	$ 6,523,497	$ 5,328,780	$ 4,796,966	$ 2,763,051
	b. Terminations	5,997,361	5,655,406	3,716,961	3,243,702	2,334,738	1,584,754	1,188,810	524,247	483,564	383,892
	c. Actives	48,198,147	44,817,975	41,276,540	33,317,417	32,069,946	28,868,639	30,202,694	29,820,602	25,611,533	17,788,639
	d. Total	$ 78,371,586	$ 72,059,126	$ 62,158,000	$ 51,986,997	$ 46,420,846	$ 39,771,699	$ 37,915,001	$ 35,673,629	$ 30,892,063	$ 20,935,582
8.	Total contribution										
	a. Amount	$ 2,255,491	$ 2,132,345	$ 2,119,669	$ 1,951,123	$ 1,839,005	$ 1,619,542	$ 1,734,283	$ 1,779,943	$ 1,636,493	$ 1,047,284
	b. Percent of pay	13.80%	13.80%	13.40%	14.80%	13.50%	12.60%	12.50%	12.60%	13.00%	11.30% *
	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, 2020	Target Allocation
1. Global Equity	39.9%	38.0%
2. Equity Long/Short	8.1%	8.0%
3. Absolute Return	7.9%	8.0%
4. Illiquid Alternatives	24.7%	25.0%
5. Managed Futures	3.7%	4.0%
6. Fixed Income	14.9%	15.0%
7. Cash	0.8%	2.0%
	100.0%	100.0%

Asset Allocation as of January 1, 2020

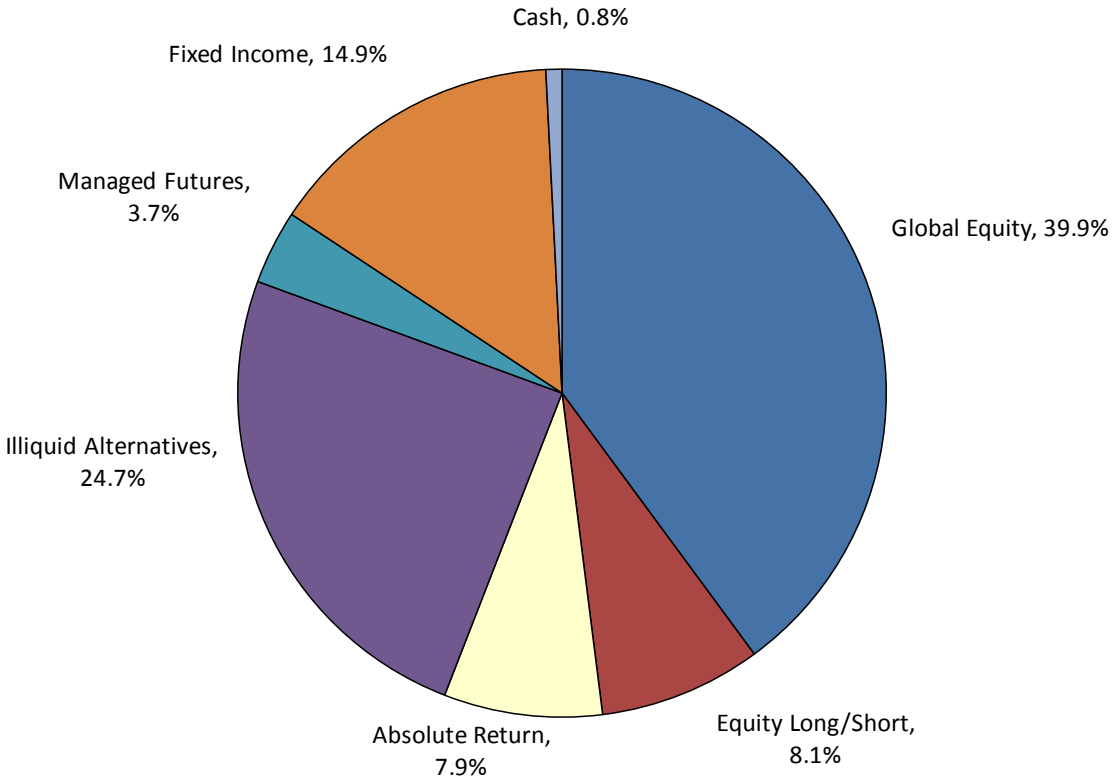


Table 7 - Reconciliation of Plan Net Assets

		Year Beginning January 1, 2019	Year Beginning January 1, 2018
1.	Market value of assets at beginning of year	$ 72,645,438	$ 69,872,191
2.	Revenue for the year		
	a. Contributions		
	i. Member contributions	$ 1,544,018	$ 3,536,361
	ii. Employer contributions	1,583,066	1,494,055
	iii. SWDD roll to normal contributions	51,933	0
	b. Net investment income		
	i. Interest	$ 373,606	$ 296,761
	ii. Dividends	490,161	548,503
	iii. Net change in accrued income	16,609	34,143
	iv. Unrealized gain/(loss)	3,348,900	(4,170,820)
	v. Realized gain/(loss)	6,630,328	3,454,155
	vi. Investment expense	(657,239)	(631,601)
	vii. Other Income	305,646	398,916
	c. Total revenue	$ 13,687,028	$ 4,960,473
3.	Expenditures for the year		
	a. Refunds	$ (19,271)	$ (326,973)
	b. Benefit payments	(1,961,328)	(1,771,264)
	c. Administrative expense	(95,417)	(88,989)
	d. Total expenditures	$ (2,076,016)	$ (2,187,226)
4.	Increase in net assets (Item 2c + Item 3d)	$ 11,611,012	$ 2,773,247
5.	Market value of assets at end of year (Item 1 + Item 4)	$ 84,256,450	$ 72,645,438

Table 8 - Development of Actuarial Value of Assets

1.	Actuarial value of assets at beginning of year	$	75,269,291
2.	Net new investments		
	a. Contributions and Affiliations	$	3,179,017
	b. Benefits paid		(1,961,328)
	c. Refunds		(19,271)
	d. Administrative expense		(95,417)
	e. Subtotal	$	1,103,001
3.	Assumed investment return rate for fiscal year		7.0%
4.	Assumed investment return for fiscal year	$	5,307,455
5.	Expected Actuarial Value at end of year	$	81,679,747
6.	Market value of assets at end of year	$	84,256,450
7.	Excess return (6-5)	$	2,576,703

8. Development of amounts to be recognized as of December 31, 2019:

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)
2015	$ 0	$ 0	$ 0	1	$ 0	$ 0
2016	0	0	0	2	0	0
2017	0	0	0	3	0	0
2018	(2,623,853)	2,623,853	0	4	0	0
2019	5,200,556	(2,623,853)	2,576,703	5	515,341	2,061,362
Total	$ 2,576,703	$ 0	$ 2,576,703		$ 515,341	$ 2,061,362

9.	Actuarial value of assets as of December 31, 2019 (Item 6 - Item 8)	$	82,195,088

Amounts in column (1) for fiscal years ending 2015 through 2018 are from the prior valuation. The column (1) amount for fiscal year 2019 is developed using item 7 less the total of column (1) for fiscal years ending 2015 through 2018. To the extent possible, the 2019 excess or shortfall is used to reduce prior bases. In this case, the 2018 base was offset by the gains in 2019. The fiscal year 2015, 2016 and 2017 bases are $0 because they were previously offset.

Table 9 - Investment Yields

Item	Market Value	Actuarial Value
1. Assets as of January 1, 2019 (A)	$ 72,645,438	$ 75,269,291
2. Contributions during FY19	3,179,017	3,179,017
3. Benefit payments made during FY19	1,961,328	1,961,328
4. Refunds of contributions during FY19	19,271	19,271
5. Administrative expenses during FY19	95,417	95,417
6. Investment return during FY19	10,508,011	5,822,796
7. Assets as of January 1, 2020 (B): (1 + 2 - 3 - 4 - 5 + 6)	$ 84,256,450	$ 82,195,088
8. Approximate rate of return on average invested assets		
a. Net investment income (I)	$ 10,508,011	$ 5,822,796
b. Estimated return based on (2I / (A + B - I))	14.36%	7.68%

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

Item	Valuation as of January 1, 2020	Valuation as of January 1, 2019
1. Actuarial assets, prior valuation	$ 75,269,291	$ 68,207,993
2. Total contributions since prior valuation	$ 3,179,017	$ 5,030,416
3. Benefits, refunds and administrative expense since prior valuation	$ (2,076,016)	$ (2,187,226)
4. Assumed net investment income at actuarial rate %*		
a. Beginning assets	$ 5,268,850	$ 4,774,559
b. Contributions	111,266	176,065
c. Benefits, refunds paid and administrative expense	(72,661)	(76,553)
d. Total	$ 5,307,455	$ 4,874,071
5. Expected actuarial assets (1 + 2 + 3 + 4)	$ 81,679,747	$ 75,925,254
6. Actual actuarial assets, this valuation	$ 82,195,088	$ 75,269,291
7. Asset gain/(loss) since prior valuation (6 - 5)	$ 515,341	$ (655,963)
	Gain	Loss

**7.5% beginning at January 1, 2012.*
7.0% beginning at January 1, 2019.

Table 11 - History of Investment Return Rates

For Fiscal Year Ending	Market Value	Actuarial Value
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%
December 31, 2018	-0.22%	5.93%
December 31, 2019	14.36%	7.68%
Average Returns:		
Last 5 Years	6.79%	6.98%
Last 10 Years	8.08%	7.39%

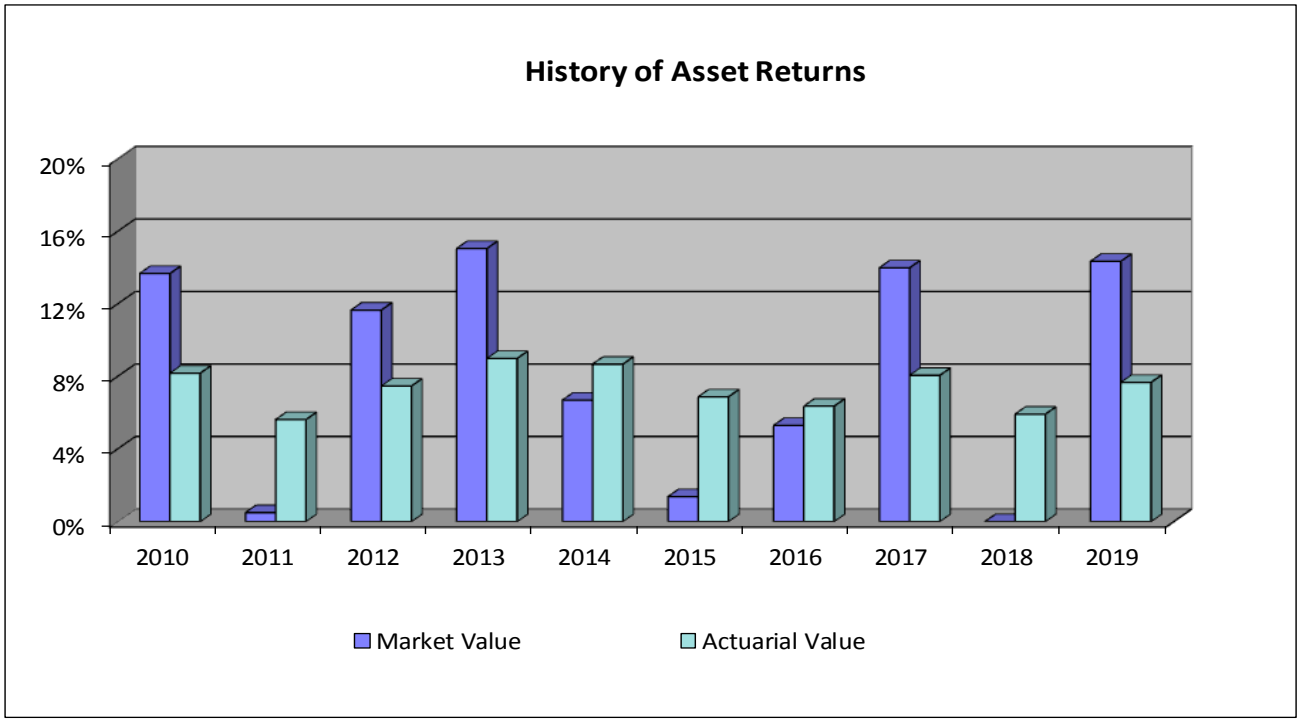


Table 12 - Schedule of Funding Progress

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, 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%)
January 1, 2019	75,269,291	58,841,997	(16,427,295)	127.9%	15,528,275	(105.8%)
January 1, 2020	82,195,088	64,782,432	(17,412,656)	126.9%	16,413,020	(106.1%)

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	Aggregated Accrued Liabilities for: Retirees Beneficiaries and Vested Terminations	Aggregated Accrued Liabilities for: Members (Employer Financed Portion)	Actuarial Value of Assets	Portion of Accrued Liabilities Covered by Reported Assets: (5)/(2)	Portion of Accrued Liabilities Covered by Reported Assets: [(5)-(2)]/(3)	Portion of Accrued Liabilities Covered by Reported Assets: [(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%
January 1, 2019	18,316,715	27,241,151	13,284,131	75,269,291	100.0%	100.0%	100.0%
January 1, 2020	18,758,565	30,173,439	15,850,428	82,195,088	100.0%	100.0%	100.0%

Table 14 - Cash Flow Analysis

Year Ending December 31,	Contributions for the Year	Expenditures During the Year					External Cash Flow for the Year	Market Value of Assets	External Cash Flow as Percent of Market Value
		Benefit Payments	Refund of Contributions	Identified Receipts	Expenses	Total			
(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	5,030,416	(1,771,264)	(326,973)	0	(88,989)	(2,187,226)	2,843,190	72,645,438	3.9%
2019	3,179,017	(1,961,328)	(19,271)	0	(95,417)	(2,076,016)	1,103,001	84,256,450	1.3%
2020*	2,255,491	(2,392,215)	(24,534)	0	(98,757)	(2,515,506)	(260,015)	90,305,919	-0.3%
2021*	2,334,433	(2,756,305)	(25,393)	0	(102,213)	(2,883,911)	(549,478)	96,508,779	-0.6%
2022*	2,416,138	(3,010,818)	(26,281)	0	(105,791)	(3,142,890)	(726,752)	102,992,933	-0.7%

* Results for 2020, 2021, & 2022 are based on expected contributions, expected benefit payments, and assumed investment return of 7.0%
Expected contributions are based on combined employee and employer rate of 13.8% 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 7.0% with all cash flow occurring in the middle of the year

Table 15 - Membership Data

	January 1, 2020	January 1, 2019	January 1, 2018
1. Active members			
a. Number	180	174	173
b. Total payroll	$ 16,344,137	$ 15,451,775	$ 15,058,049
c. Average annual salary	$ 90,801	$ 88,803	$ 87,041
d. Average age	47.0	46.5	46.5
e. Average service	14.0	13.8	13.6
2. Inactive members			
a. Vested	6	5	3
b. NonVested	33	32	32
3. Service retirees			
a. Number	53	49	42
b. Total annual benefits	$ 2,147,453	$ 1,906,784	$ 1,584,650
c. Average annual benefit	$ 40,518	$ 38,914	$ 37,730
d. Average age	65.0	64.1	63.7
4. Beneficiaries and spouses			
a. Number	1	1	0
b. Total annual benefits	$ 19,919	$ 19,919	$ 0
c. Average annual benefit	$ 19,919	$ 19,919	$ 0
d. Average age	63.0	62.0	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%
2019	174	46.5	13.8	15,451,775	88,803	2.02%
2020	180	47.0	14.0	16,344,137	90,801	2.25%

Table 17 - Distribution of Active Members by Age and by Years of Service
As of December 31, 2019

Attained Age	Years of Credited Service												
	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	1												1
	$51,929												$51,929
25-29	4		1	2	2	2							11
	$38,054		$62,146	$64,258	$67,820	$62,460							$54,858
30-34	2	2	3		1	1							9
	$56,934	$62,881	$70,389		$69,777	$73,871							$66,049
35-39	2		1			3	6	2					14
	$37,310		$76,997			$85,163	$94,348	$75,224					$80,260
40-44	2	1	3	2	3	6	6	4	3				30
	$57,376	$62,353	$91,539	$60,565	$100,442	$79,422	$94,738	$101,910	$96,374				$87,197
45-49	1	1	1			7	16	15	6	3			50
	$65,650	$92,398	$87,102			$94,553	$95,172	$98,720	$101,790	$95,305			$96,144
50-54		2				2	4	6	9	4	4		31
		$71,575				$89,760	$86,043	$98,099	$101,491	$124,442	$107,121		$99,842
55-59					1	3	6	2	5		1	2	20
					$128,043	$104,018	$89,319	$99,198	$101,493		$104,310	$125,206	$101,830
60-64							4	1	2	2	1	1	11
							$95,426	$135,817	$85,920	$126,342	$103,217	$99,869	$104,103
65 & Over						2						1	3
						$101,041						$63,137	$88,406
Total	12	6	9	4	7	26	42	30	25	9	6	4	180
	$47,753	$70,610	$79,114	$62,411	$90,684	$87,936	$93,311	$98,723	$99,703	$115,152	$106,002	$103,355	$90,770

Average:	Age:	47.0	Number of participants:		Fully vested:	142	Males:	169
	Service:	14.0			Not Vested:	38	Females:	11

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
December 31, 2018	8	342,053	0	0	50	1,926,703	21.59%	38,534
December 31, 2019	4	240,669	0	0	54	2,167,372	12.49%	40,137

* 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	31	$ 3,005,348	31	$ 3,005,348
27	BROOMFIELD POLICE	1	92,398	0	0	1	92,398
29	BUENA VISTA POLICE	2	166,579	0	0	2	166,579
740	CARBONDALE & RURAL FPD	0	0	1	96,491	1	96,491
33	CANON CITY POLICE	1	69,307	0	0	1	69,307
63	DILLON POLICE	5	305,621	0	0	5	305,621
73	EDGEWATER POLICE	1	68,058	0	0	1	68,058
76	ENGLEWOOD POLICE	2	180,170	0	0	2	180,170
79	EVANS	30	2,241,175	0	0	30	2,241,175
89	FOUNTAIN FIRE	1	60,206	1	96,096	2	156,302
102	GRANADA POLICE	1	32,868	0	0	1	32,868
104	GRAND JUNCTION FIRE	0	0	3	203,017	3	203,017
137	LAFAYETTE POLICE	4	402,547	0	0	4	402,547
149	LITTLETON FIRE	3	302,474	0	0	3	302,474
163	MILLIKEN POLICE	1	75,000	0	0	1	75,000
166	MONTE VISTA	4	167,466	0	0	4	167,466
532	NORTH METRO FIRE RESCUE	0	0	1	151,000	1	151,000
518	POUDRE FIRE AUTHORITY	0	0	1	72,886	1	72,886
551	ROARING FORK FRA	0	0	2	191,687	2	191,687
542	SABLE ALTURA FPD	0	0	1	67,200	1	67,200
219	SEVERANCE	1	101,067	0	0	1	101,067
220	SHERIDAN POLICE	1	97,169	0	0	1	97,169
540	SOUTH METRO FIRE RESCUE FPD	0	0	7	775,846	7	775,846
549	SUMMIT FIRE & EMS AUTHORITY	0	0	4	402,827	4	402,827
238	THORNTON FIRE	0	0	5	525,221	5	525,221
338	THORNTON POLICE	9	887,825	0	0	9	887,825
240	TRINIDAD FIRE	0	0	3	190,918	3	190,918
595	UPPER PINE RIVER FPD	0	0	1	99,000	1	99,000
534	WEST METRO FPD	0	0	32	3,368,502	32	3,368,502
252	WESTMINSTER FIRE	15	1,307,508	5	540,661	20	1,848,169
	Totals	82	$ 6,557,438	98	$ 9,786,699	180	$ 16,344,137

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 (7.0%). 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 2018 for first use in the actuarial valuation as of January 1, 2019, following a regularly scheduled experience study. The rationale for all of the current assumptions is included in that report, dated September 21, 2018.

A. Economic Assumptions

1. Investment return: 7.00% per annum, compounded annually, composed of an assumed 2.50% inflation rate and a 4.50% 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 1.75%, 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 1.75% Productivity Component
(1)	(2)	(4)
1	7.00%	11.25%
2	7.00%	11.25%
3	6.50%	10.75%
4	6.00%	10.25%
5	3.50%	7.75%
6	1.50%	5.75%
7	1.50%	5.75%
8	1.00%	5.25%
9	1.00%	5.25%
10	0.75%	5.00%
11	0.75%	5.00%
12	0.50%	4.75%
13	0.50%	4.75%
14	0.25%	4.50%
15	0.00%	4.25%

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: 2006 central rates from the RP-2014 Annuitant Mortality Tables for males and females projected to 2018 using the MP-2017 projection scales, and then projected prospectively using the ultimate rates of the scale for all years.

	Annual Rate per 1,000 Members				
Attained Age in 2020	Males	Females	Attained Age in 2020 (cont.)	Males	Females
(1)	(2)	(3)	(4)	(5)	(6)
50	3.98	2.68	70	17.00	12.87
55	5.71	3.77	75	27.15	21.14
60	8.01	5.64	80	45.85	36.18
65	11.47	8.32	85	80.33	64.64

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

	Year of Retirement			
Gender	2020	2025	2030	2035
Male	29.9	30.4	30.9	31.4
Female	32.4	32.8	33.3	33.7

2. Mortality rates (active members) – 2006 central rates from the RP-2014 Employee Mortality Tables for males and females projected to 2018 using the MP-2017 projection scales, and then projected prospectively using the ultimate rates of the scale for all years, 50% multiplier for off-duty mortality. Increased by 0.00015 for on-duty related Fire and Police experience. Sample rates are shown below:

	Annual Rate per 1,000 Members				
Attained Age in 2020	Males	Females	Attained Age in 2020 (cont.)	Males	Females
(1)	(2)	(3)	(4)	(5)	(6)
20	0.34	0.23	40	0.49	0.37
25	0.39	0.24	45	0.64	0.48
30	0.40	0.26	50	0.98	0.68
35	0.45	0.31	55	1.54	1.02

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	0.48	0.02
30	2.26	0.17
35	3.05	0.34
40	4.48	0.52
45	5.53	0.72
50	8.22	0.94
55	11.56	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	45
60	100

Service-Based Retirement rates*

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

*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 were no assumption or method changes 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.

Employers may not withdraw from the Plan once affiliated. In 2003, legislation was enacted to allow departments who cover their firefighters and police officers in money purchase plans to elect coverage under the FPPA Defined Benefit System. A reentry moratorium was in place from late 2012 through 2014 as the Statewide Defined Benefit Plan Member Contribution Election was completed. The board of directors lifted the moratorium for partial reentry in 2017 to align with their strategic plan objective to expand membership into FPPA's retirement plans. As of January 1, 2020, Colorado police and sheriff departments who participate in Social Security have the option of affiliating for coverage under the Defined Benefit System and the Statewide Death and Disability 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. The Plan assets for the Defined Benefit Component are included in the Fire & Police Members' Benefit Investment Fund Long-Term Pool 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, also known as Pensionable Earnings, 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).

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 shown on the following page:

Effective Date	Defined Benefit Component of the Total Contribution
7/1/2019 - 6/30/2020	13.80%
7/1/2018 - 6/30/2019	13.40%
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 percent 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 effective with the first day of the month following the date of the death of the beneficiary.

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.

Withdrawals from the Money Purchase Component of the Plan are allowed under the following conditions: the member separates from service with the fire or police department; the member becomes disabled; the member attains their required minimum distribution date; or payment is made to the member's beneficiary upon death.

The member may choose one, or a combination, of the following distribution methods for their Money Purchase Component of the Plan: lump sum, monthly periodic payment (monthly benefits payable over a certain time frame or a certain dollar amount per month until the account is exhausted), conversion of balance to a monthly lifetime benefit, or the purchase of an annuity.

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.

Investment Pool

The Statewide Hybrid Plan - Defined Benefit Component is invested in the Long-Term Pool. The Long-Term Pool is designed primarily for open plans with a longer time horizon, higher risk tolerance, and lower liquidity needs. The investment return assumption is 7.0%.

RISKS ASSOCIATED WITH MEASURING THE ACCRUED LIABILITY AND ACTUARIALLY DETERMINED CONTRIBUTION

The determination of the accrued liability and the actuarially determined contribution requires the use of assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability and the actuarially determined contribution that results from the differences between actual experience and the actuarial assumptions.

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 due to changing conditions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period, or additional cost or contribution requirements based on the Plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the plan's future financial condition include:

1. Investment risk – actual investment returns may differ from the expected returns;
2. Asset/Liability mismatch – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
3. Contribution risk – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. Salary and Payroll risk – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. Longevity risk – members may live longer or shorter than expected and receive pensions for a period of time other than assumed;
6. Other demographic risks – members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

The effects of certain trends in experience can generally be anticipated. For example, if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

The computed contribution rates shown in this report may be considered as a minimum contribution rate that complies with the Board's funding policy and state statute. The timely receipt of the actuarially determined contributions is critical to support the financial health of the plan. Users of this report should be aware that contributions made at the actuarially determined rate do not necessarily guarantee benefit security.

With each valuation there is a presentation of the summary of findings to the Board. Included are various discussions and scenarios of potential risks.

Plan Maturity Measures

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Generally accepted plan maturity measures include the following:

	2020	2019	2018
Ratio of the market value of assets to total payroll	5.2	4.7	4.6
Ratio of actuarial accrued liability to payroll	4.0	3.8	3.2
Ratio of actives to retirees and beneficiaries	3.3	3.5	4.1
Net cash flow as a percentage of market value of assets	1.3%	3.9%	12.4%
Duration of the actuarial accrued liability	11.8	12.0	11.4

RATIO OF MARKET VALUE OF ASSETS TO PAYROLL:

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 4.0 times the payroll, a return on assets 5% different than assumed would equal 20% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.

RATIO OF ACTUARIAL ACCRUED LIABILITY TO PAYROLL:

The ratio of liability to payroll may also be used as a measure of sensitivity of the liability itself. For example, if the actuarial accrued liability is 5.0 times the payroll, a change in liability 2% other than assumed would equal 10% of payroll. A higher (lower) or increasing (decreasing) level of this maturity

measure generally indicates a higher (lower) or increasing (decreasing) volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

The relationship between the actuarial accrued liability and payroll is a useful indicator of the potential longer term asset-related volatility once the current UAAL is fully amortized. A funding policy that targets a funded ratio of 100% is expected to result in the ratio of assets to payroll and the ratio of liability to payroll converging over time.

RATIO OF ACTIVES TO RETIREES AND BENEFICIARIES:

A young plan with many active members and few retirees will have a high ratio of active to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

NET CASH FLOW AS A PERCENTAGE OF MARKET VALUE OF ASSETS:

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means existing funds are being used to make payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

DURATION OF LIABILITIES:

The duration of the present value of future benefits may be used to approximate the sensitivity to a 1% change in the assumed rate of return. For example, duration of 10 indicates that the present value of future benefits would increase approximately 10% if the assumed rate of return were lowered 1%. This also is an approximation of the discount-weighted average time horizon of the liability.