

Fire and Police Pension Association Colorado Springs New Hire Pension Plan – Fire Component

Actuarial Valuation Report

For the Year Beginning January 1, 2020





To: Board of Directors for the Fire and Police Pension Association

CC: Administrative Heads and Finance Officers of the City of Colorado Springs

Date: June 2020

Subject: **Actuarial Valuation Results as of January 1, 2020**

This report contains the actuarial valuation results as of January 1, 2020 for the Colorado Springs New Hire Pension Plan – Fire Component (the Plan) as determined by Gabriel, Roeder, Smith & Company (GRS), actuary for the Fire and Police Pension Association (FPPA). Questions about this report should be directed to FPPA, rather than to GRS.

Financing Objectives

This valuation was prepared to determine the actuarially determined contribution (ADC) for fiscal year 2021. The ADC for FY2021 is \$6,047,482 and is shown in Table 1, Item 10.

The calculated employer contribution consists of the sum of two pieces: the normal cost and the amortization of the unfunded actuarial accrued liability (UAAL). The calculated contribution is shown in Table 1, Item 10. The normal cost (shown in Table 1, Item 2) can be viewed as the regular, ongoing cost of the Plan.

The UAAL is the amount by which the actuarial value of assets falls short of, or exceeds, the actuarial accrued liability for this Plan. Under the current statutes, the UAAL must be amortized under a level dollar method over a period of 18 years. The determined payment to amortize the UAAL is shown in Table 1, Item 9

The Actuarially Determined Contribution may be considered as a minimum contribution rate that complies with state statute. Users of this report should be aware that contributions made at that rate do not guarantee benefit security. Given the importance of benefit security to any retirement system, we suggest that contributions to the Plan in excess of those presented in this report be considered.

The contribution rate in this report is determined using the actuarial assumptions and methods disclosed in Table 13 of this report. Page 3 of this letter includes short-term projections assuming alternate investment returns. With the exception of these short term funding projections, this report does not include an 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.

For 2020, from April through June, the employer contribution rate is expected to match the employee contribution rate of 10%. It is expected that the Plan will return to contributing the actuarially determined contribution in July of 2020.

Benefit Provisions

This actuarial valuation reflects the provisions that were applicable to the Colorado Springs New Hire Pension Plan-Fire Component as of the valuation date. The details of the actuarial calculations, based on the current benefit provisions, are described in Table 14 of this report.

Stabilization Reserve Account (SRA) Contributions

As of January 1, 2020, the combined member/employer contribution rate is over 16.00% and therefore we recommend the SRA contribution rate be set to 0.00% as of January 1, 2021.

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

The assumptions and methods are detailed in Table 13 of the 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.

Because the Plan is closed to new members, the amortization period was closed at 30 years effective January 1, 2008.

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. Even seemingly minor changes in the assumptions can materially change the liabilities, calculated contribution and funding periods. The actuarial calculations are intended to provide information for rational decision making.

Assets

Table 4 shows the market value of assets for this department and Table 5 shows the development of the actuarial value. 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. This smoothed average approach is intended to ensure the smoothed value of assets will converge towards the market value in a reasonable amount of time.

Member Data

Member data as of January 1, 2020 was supplied by FPPA. GRS reviewed the data and tested it for reasonableness and consistency. The member count is shown in Table 3.

Experience

The Plan experienced an increase in its calculated contribution between the 2019 actuarial valuation and this valuation. This increase was primarily due to the higher than expected increase in salaries for the active members, and reduced anticipated contributions during 2020.

Deferred Losses and Projected Actuarial Results

To allow the City to anticipate future contribution requirements for the Plan, we have projected the actuarial status of the Plan as of January 1, 2020. The table below provides the ADC for Fiscal Years 2021 - 2025 based on the January 1, 2020 actuarial valuation.

	Actuarially Determined Contribution (ADC)		
Fiscal Year	Assuming 3.0%	Assuming 7.0%	Assuming 11.0%
(FY)	return in FY	return in FY	return in FY
2021	\$6,047,482	\$6,047,482	\$6,047,482
2022	6,580,304	5,930,439	5,280,574
2023	7,113,619	5,794,457	4,424,320
2024	7,641,880	5,623,340	3,442,413
2025	8,188,664	5,435,922	2,343,006

The projected liabilities are calculated by rolling forward the liabilities as of January 1, 2020, taking into account interest and benefit payments for the year, including mortality incidence and anticipated cost of living increases. The 7.0% scenario above coincides with the actuarial investment return assumption of 7.0%. The 3.0% and 11.0% scenarios were selected because there is statistically a high probability of the return for a two-year period being inside the expected return +/- 4%.

The scenarios above are for illustration purposes only and are in no way to be used as expected investment performance. There are no other deviations from the expected taken into consideration besides the asset performance. Careful consideration of this projected contribution should be taken into account before any benefit enhancement is adopted.

Trends

As of January 1, 2020, there remains \$3.6 million of deferred asset gains that will decrease future contribution levels, in the absence of offsetting losses. Additionally, it is anticipated that the dollar normal cost will decrease over time.

Tables

This report includes the following sections:

- The executive summary includes a condensed summary of the demographic, financial, and actuarial data.
- Table 1 provides the details of the development of the actuarially determined contribution.
- Table 2 shows the sources of change in the calculated contribution since the prior valuation.
- Table 3 shows historical actuarial and demographic data for the department.
- Tables 4, 5, and 6 show the development of the financial information.
- Table 7 provides historical funding information.
- Table 8 provides the solvency test.
- Table 9 shows historical cash flow information.
- Tables 10, 11, and 12 show demographic data for the department.
- Table 13 shows the actuarial assumptions and methods used to calculate the liabilities.
- Table 14 is a summary of the benefit provisions for the department.
- Table 15 provides definitions of several terms used throughout the report.
- Table 16 provides Supplemental Studies
- Table 17 provides Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

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. Colorado Springs receives a separate accounting report in order to meet their financial reporting requirements under GASB 68.

Certification

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 Colorado Springs New Hire Pension Plan-Fire Component of January 1, 2020.

All calculations have been made in conformity with generally accepted actuarial principles and practices, and with the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, the results presented comply with the requirements of the State of Colorado statutes and, where applicable, the Internal Revenue Code, and ERISA.

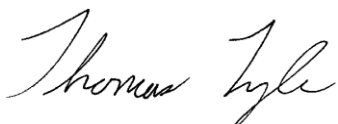
The undersigned are independent actuaries and consultants. Joseph Newton, Dana Woolfrey and Thomas Lyle are Enrolled Actuaries and all are Members of the American Academy of Actuaries, and meet the Qualification Standards of the American Academy of Actuaries. Finally, all of the undersigned are experienced in performing valuations for large public retirement systems.

Respectfully submitted,

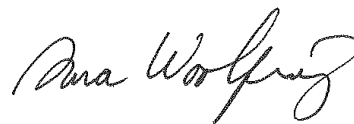
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Senior Consultant



Executive Summary

Item	January 1, 2020	January 1, 2019
Membership - Number of: - Active members 91 96 - Terminated vested members 5 3 - Inactive members 3 3 - Members in DROP 28 30 - Disabled members 0 0 - Retired members 140 135 - Beneficiaries 9 9 - Total 276 276 - Annualized payroll supplied by FPPA \$ 9,213,019 \$ 8,932,505 - Annualized monthly benefits paid \$ 8,874,823 \$ 8,502,238		
Assets - Market value \$ 154,007,661 \$ 138,638,938 - Actuarial value \$ 150,430,401 \$ 143,943,543 - Return on market value 14.4 % 0.0 % - Return on actuarial value 7.6 % 6.0 % - Contribution \$ 4,519,669 \$ 4,981,787 - Ratio of actuarial value to market value 97.7 % 103.8 %		
Actuarial Information - Actuarial accrued liability \$ 191,759,280 \$ 182,354,848 - Actuarial Value Basis - Unfunded actuarial accrued liability/(surplus) \$ 41,328,878 \$ 38,411,304 - Funded ratio 78.4 % 78.9 % - Market Value Basis - Unfunded actuarial accrued liability/(surplus) \$ 37,751,619 \$ 43,715,910 - Funded ratio 80.3 % 76.0 % - Amortization period (years) 18 19		
Annual Determined Contribution (ADC) - For year ending December 31, 2021 2020 - Estimated contribution amount \$ 6,047,482 \$ 5,560,716		



Table of Contents

Table 1: Development of Actuarially Determined Contribution	3
Table 2: Change in UAAL/Calculated Contribution	4
Table 3: Actuarial Experience	5
Table 4: Reconciliation of Net Plan Assets	6
Table 5: Development of Actuarial Value of Assets	7
Table 6: Gain/Loss on Assets	8
Table 7: Statement of Funding Progress	9
Table 8: Solvency Test	10
Table 9: Cash Flow Analysis	11
Table 10: Membership Data	12
Table 11: Summary of Retirees by Age and Type	13
Table 12: Added and Removed from Rolls	14
Table 13: Summary for Actuarial Assumptions, Methods, and Changes	15
Table 14: Summary of Benefit Provisions	20
Table 15: Definition of Terms	24
Table 16: Supplemental Studies	28
Table 17: Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution	29



Table 1 – Development of Actuarially Determined Contribution

	January 1, 2020	January 1, 2019
1. Valuation payroll	\$ 9,213,019	\$ 8,932,505
2. Normal cost	\$ 1,841,322	\$ 1,792,636
3. Administrative Expenses	\$ 74,091	\$ 74,266
4. Actuarial accrued liability for active members		
a. Present value of future benefits for active members	\$ 70,414,741	\$ 66,898,978
b. Less: present value of future normal costs	(10,861,783)	(11,356,754)
c. Actuarial accrued liability (a. + b.)	\$ 59,552,958	\$ 55,542,224
5. Total actuarial accrued liability for:		
a. Retirees and beneficiaries	\$ 102,587,113	\$ 96,480,533
b. Terminated vested members	2,154,949	1,434,688
c. Inactive members	287,729	398,276
d. Members in DROP	27,176,530	28,499,126
e. Active members (4c.)	59,552,958	55,542,224
f. Total	\$ 191,759,280	\$ 182,354,848
6. Actuarial value of assets	\$ 150,430,401	\$ 143,943,543
7. Unfunded actuarial accrued liability (UAAL)/(surplus) (5f. - 6.)	\$ 41,328,878	\$ 38,411,304
8. Funded ratio	78.45 %	78.94 %
9. Determined payment to amortize the UAAL/(surplus) over 18 years from January 1, 2020	\$ 4,132,069	\$ 3,693,814
10. Total calculated annual contribution for Fiscal Year:	<u>2021</u>	<u>2020</u>
Actuarially Determined Contribution (2. + 3. + 9.)	\$ 6,047,482	\$ 5,560,716
11. Total present value of benefits (5f. - 4b.)	\$ 202,621,063	\$ 193,711,602



Table 2 – Actuarial Gain/(Loss) on UAAL

1. Unfunded actuarial accrued liability (UAAL)	\$ 38,411,304
2. Total normal cost for 2019	1,902,086
3. Non Service Purchase Contributions during 2019	(4,519,669)
4. Administrative Expenses 2019	74,091
5. a) Interest on Item 1 for one year	2,688,791
b) Interest on Item 2, 3, and Item 4 for one-half year *	(89,022)
6. Change in UAAL due to:	
a. Benefit Improvements	0
b. Assumption Changes	0
7. Expected UAAL as of this valuation (1.+2.+3.+4.+5.)	38,467,581
8. Actual UAAL at end of period	41,328,879
9. Actuarial gain/(loss) for the period (8. – 7.)	(2,861,298)
SOURCE OF GAINS/(LOSSES)	
10. Asset gain/(loss) (See Table 6)	\$ 894,315
11. Salary/rank liability gain/(loss) for the period	(2,823,174)
12. Net liability gain/(loss) for the period (9. - 10. - 11.)	(932,440)

Change in Calculated Contribution

1. Calculated contribution in 2019 valuation	\$ 5,560,716
2. Benefit changes	0
3. Assumption/method changes	0
4. Change in Normal Cost**	48,686
5. Investment experience	(94,673)
6. Salary/rank experience	298,865
7. Contribution Shortfall	135,162
8. Other liability experience ***	98,727
9. Total change	486,766
10. Calculated contribution in 2020 valuation	\$ 6,047,482

* Assume Normal Cost, contributions and administrative expense occurred in the mid-year.

** The normal cost is a measure of the rate at which active member benefits are accruing and directly relates to the active member payroll. The increase in normal cost is due to the increase in active member payroll due to pay increases outpacing pay reduction through terminations.

*** includes losses from fewer disabilities than expected



Table 3 – Actuarial Experience

	<u>2020</u>	<u>2019</u>	<u>2018</u>	<u>2017</u>	<u>2016</u>	<u>2015</u>	<u>2014</u>	<u>2013</u>	<u>2012</u>	<u>2011</u>
1. Number of members										
a. Active	91	96	103	110	130	149	155	161	165	264
b. Retired	140	135	122	118	108	101	86	80	71	58
c. DROP	28	30	38	37	27	18	27	29	36	36
d. Beneficiaries	9	9	7	6	4	2	2	1	1	1
e. Terminated vested	5	3	6	7	9	9	9	10	10	10
f. Inactive	3	3	3	3	2	1	2	1	3	3
g. Total	276	276	279	281	280	280	281	282	286	372
2. Covered payroll	\$ 9,213,019	\$ 8,932,505	\$ 9,310,153	\$ 9,619,561	\$ 11,167,162	\$ 12,537,370	\$ 12,468,196	\$ 12,349,627	\$ 12,497,987	\$ 19,664,027
3. Average compensation	\$ 101,242	\$ 93,047	\$ 90,390	\$ 87,451	\$ 85,901	\$ 84,143	\$ 80,440	\$ 76,706	\$ 75,745	\$ 74,485
4. Valuation results										
a. Normal cost	\$ 1,841,322	\$ 1,792,636	\$ 1,706,597	\$ 1,818,795	\$ 2,050,714	\$ 2,256,072	\$ 2,310,185	\$ 2,308,265	\$ 2,361,981	\$ 3,516,328
b. Accrued liability	191,759,280	182,354,848	168,492,702	163,542,442	157,971,179	145,875,351	138,255,953	129,466,329	124,211,363	127,909,057
c. Actuarial value of assets	150,430,401	143,943,543	139,084,637	131,529,543	126,813,938	120,350,555	111,882,235	103,516,709	98,326,872	108,848,941
d. Unfunded liability	41,328,878	38,411,304	29,408,065	32,012,899	31,157,241	25,524,796	26,373,718	25,949,620	25,884,491	19,060,116
e. Remaining amortization	18	19	20	21	22	23	24	25	26	27
f. Funded ratio	78.4%	78.9%	82.5%	80.4%	80.3%	82.5%	80.9%	80.0%	79.2%	85.1%
5. Actuarially Determined										
Estimated dollar contribution	\$ 6,047,482	\$ 5,560,716	\$ 4,519,669	\$ 4,981,787	\$ 5,132,890	\$ 4,522,810	\$ 4,628,508	\$ 4,546,999	\$ 4,685,823	\$ 5,199,980

Item 5 above is the calculated contribution as it is described throughout the report: normal cost plus the amortization of the UAAL under the policy as described in the current statutes. There is a one-year lag. As an example, the contribution shown in valuation year 2020 is payable in fiscal year 2021.



Table 4 – Reconciliation of Net Plan Assets

	Year Ending	
	December 31, 2019	December 31, 2018
1. Market value of assets at beginning of year	\$ 138,638,938	\$ 142,035,779
2. Revenue for the year		
a. Contributions		
i. Member contributions	\$ 936,275	\$ 923,455
ii. Employer contributions	3,583,394	4,058,332
iii. State contributions	0	0
iv. Contributions from the SWDD Plan	0	0
v. Total	\$ 4,519,669	\$ 4,981,787
b. Net investment income		
i. Interest	\$ 701,070	\$ 590,046
ii. Dividends	916,981	1,085,613
iii. Net change in accrued income	32,018	69,526
iv. Unrealized gain/(loss)	6,230,640	(8,105,084)
v. Realized gain/(loss)	12,484,777	6,853,943
vi. Defined contribution earnings (net)	(5,621)	(6,625)
vii. Investment expense	(1,229,764)	(1,248,136)
viii. Direct allocated plan expense/(income)	(16,552)	(14,256)
ix. Allocated fees and expenses	(57,538)	(60,009)
x. Other Income	570,510	794,666
c. Total revenue	\$ 24,146,190	\$ 4,941,471
3. Expenditures for the year		
a. Benefit payments	\$ (8,777,467)	\$ (8,338,312)
b. Refunds	0	0
c. Plan directed expenses	0	0
d. Total expenditures	(8,777,467)	(8,338,312)
4. Increase in net assets (2c. + 3d.)	\$ 15,368,723	\$ (3,396,841)
5. Market value of assets at end of year (1. + 4.)	\$ 154,007,661	\$ 138,638,938

Table 5 – Development of Actuarial Value of Assets

1. Actuarial value of assets at beginning of year	\$ 143,943,543
2. Net new investments	
a. Contributions	4,519,669
b. Benefits paid	(8,777,467)
c. Refunds	0
d. Administrative Expenses	(74,091)
e. Subtotal	(4,331,889)
3. Assumed investment return rate for fiscal year	7.0%
4. Assumed investment return for fiscal year	\$ 9,924,432
5. Expected Actuarial Value at end of year	\$ 149,536,086
6. Market value of assets at end of year	\$ 154,007,661
7. Excess return (6-5)	\$ 4,471,575
8. Development of amounts to be recognized as of January 1, 2020:	

		Remaining Deferrals of Excess					Remaining
Fiscal Year End	(Shortfall) of Investment Income	Offsetting of Gains/(Losses)	Net Deferrals Remaining	Years Remaining	Recognized for this valuation		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	(5,304,605)	5,304,605	0	4	0		0
2019	9,776,180	(5,304,605)	4,471,575	5	894,315		3,577,260
Total	\$ 4,471,575	\$ 0	\$ 4,471,575		\$ 894,315		\$ 3,577,260

9. Actuarial value of assets as of January 1, 2020 (Item 6 - Item 8)	\$ 150,430,401
10. Ratio of actuarial value to market value	97.7%

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 is offset by the 2019 excess. The fiscal year 2015 through 2017 bases are \$0 because they were previously offset.



Table 6 – Gain/(Loss) on Actuarial Value of Assets

	Year Ending	
	December 31, 2019	December 31, 2018
1. Actuarial assets as of January 1	\$ 143,943,543	\$ 139,084,637
2. Total contributions since prior valuation	\$ 4,519,669	\$ 4,981,787
3. Benefits, refunds, and administrative expense since prior valuation	\$ (8,851,558)	\$ (8,412,578)
4. Assumed net investment income		
a. Beginning assets	\$ 10,076,048	\$ 9,735,925
b. Contributions	158,188	174,363
c. Benefits, refunds, and administrative expense	<u>(309,805)</u>	<u>(294,440)</u>
d. Total	\$ 9,924,432	\$ 9,615,847
5. Expected actuarial assets (1. + 2. + 3. + 4.)	\$ 149,536,086	\$ 145,269,693
6. Actual actuarial assets as of December 31	\$ 150,430,401	\$ 143,943,543
7. Net asset gain/(loss) since prior valuation (6. - 5.)	\$ 894,315	\$ (1,326,150)
	Gain	Loss

Table 7 – Statement of Funding Progress

Date	Actuarial Value of Assets (AVA)	Actuarial Accrued Liability (AAL)	Unfunded (Surplus) Actuarial Accrued Liability (UAAL) (3) - (2)	Funded Ratio (2)/(3)	Annual Covered Payroll	UAAL as a % of payroll (4)/(6)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
January 1, 1998	\$ 36,847,022	\$ 30,351,861	\$ (6,495,161)	121.4 %	\$ 11,972,174	(54.3) %
January 1, 2000	50,722,513	40,520,761	(10,201,752)	125.2	14,279,040	(71.4)
January 1, 2002	57,728,219	52,687,510	(5,040,709)	109.6	18,282,885	(27.6)
January 1, 2004	62,859,916	66,756,828	3,896,912	94.2	21,214,606	18.0
January 1, 2005	71,474,295	81,608,422	10,134,127	87.6	23,344,108	43.0
January 1, 2006	84,519,478	86,903,116	2,383,638	97.3	26,640,305	9.0
January 1, 2007	98,290,761	99,137,903	847,142	99.1	26,867,827	3.0
January 1, 2008	104,946,386	107,389,381	2,442,995	97.7	23,827,770	10.3
January 1, 2009	92,515,096	113,068,434	20,553,338	81.8	22,483,956	91.4
January 1, 2010	100,709,022	121,361,624	20,652,602	83.0	21,535,495	95.9
January 1, 2011	108,848,941	127,909,057	19,060,116	85.1	19,664,027	96.9
January 1, 2012	98,326,872	124,211,363	25,884,491	79.2	12,497,987	207.1
January 1, 2013	103,516,709	129,466,329	25,949,620	80.0	12,349,627	210.1
January 1, 2014	111,882,235	138,255,953	26,373,718	80.9	12,468,196	211.5
January 1, 2015	120,350,555	145,875,351	25,524,796	82.5	12,537,370	203.6
January 1, 2016	126,813,938	157,971,179	31,157,241	80.3	11,167,162	279.0
January 1, 2017	131,529,543	163,542,442	32,012,899	80.4	9,619,561	332.8
January 1, 2018	139,084,637	168,492,702	29,408,065	82.5	9,310,153	315.9
January 1, 2019	143,943,543	182,354,848	38,411,304	78.9	8,932,505	430.0
January 1, 2020	150,430,401	191,759,280	41,328,878	78.4	9,213,019	448.6

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 8 – Solvency Test

Valuation Date	Aggregated Accrued Liabilities for				Actuarial Value of Assets	Portion of Accrued Liabilities Covered by Reported Assets		
	Active Members Contribution	Retirees		Members (Employer Financed Portion)		(5)/(2)	[(5)-(2)-(3)]/(4)	
		Beneficiaries and Vested Terminations					[(5)-(2)]/(3)	(4)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
January 1, 2007	\$ 17,106	\$ 21,479	\$ 60,554	\$ 98,291	100.0%	100.0%	98.6%	
January 1, 2008	16,186	29,492	61,711	104,946	100.0%	100.0%	96.0%	
January 1, 2009	17,117	36,551	59,400	92,515	100.0%	100.0%	65.4%	
January 1, 2010	17,531	46,439	57,391	100,709	100.0%	100.0%	64.0%	
January 1, 2011	17,297	59,509	51,103	108,849	100.0%	100.0%	62.7%	
January 1, 2012	12,800	70,830	40,581	98,327	100.0%	100.0%	36.2%	
January 1, 2013	13,989	72,425	43,053	103,517	100.0%	100.0%	39.7%	
January 1, 2014	14,705	75,027	48,525	111,882	100.0%	100.0%	45.6%	
January 1, 2015	15,131	78,621	52,124	120,351	100.0%	100.0%	51.0%	
January 1, 2016	13,776	97,364	46,831	126,814	100.0%	100.0%	33.5%	
January 1, 2017	11,906	112,324	39,312	131,530	100.0%	100.0%	18.6%	
January 1, 2018	12,055	116,601	39,837	139,085	100.0%	100.0%	26.2%	
January 1, 2019	12,038	126,813	43,505	143,944	100.0%	100.0%	11.7%	
January 1, 2020	12,113	132,206	47,440	150,430	100.0%	100.0%	12.9%	

\$ amounts in 000s



Table 9 – Cash Flow Analysis

Year Ending December 31,	Contributions for the Year	Expenditures During the Year			Transfer to FPPA Statewide DB	External Cash	Market Value of Assets	External Cash
		Benefit		Total		Flow for the		Flow as Percent
		Payments **	Expenses***			Year		of Market Value
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2005	\$ 4,246,521	\$ (433,572)	\$ (609,593)	\$ (1,043,165)	\$ 0	\$ 3,203,356	\$ 86,245,371	3.7 %
2006	4,635,325	(1,194,578)	(668,843)	(1,863,421)	0	2,771,904	102,563,833	2.7
2007	4,853,098	(1,904,689)	(776,908)	(2,681,598)	(7,126,881)	(4,955,381)	107,836,784	(4.6)
2008	3,823,945	(2,493,071)	(779,983)	(3,273,054)	0	550,891	77,095,913	0.7
2009	4,025,461	(3,075,980)	(654,327)	(3,730,307)	(174,888)	120,267	93,245,608	0.1
2010	5,123,834	(4,102,856)	(742,245)	(4,845,101)	0	278,733	106,862,046	0.3
2011	4,604,275	(5,047,853)	(818,801)	(5,866,654)	(14,827,301)	(16,089,679)	91,528,868	(17.6)
2012	4,017,079	(5,260,141)	(873,250)	(6,133,391)	0	(2,116,312)	100,831,706	(2.1)
2013	4,879,867	(5,230,250)	(973,410)	(6,203,660)	0	(1,323,793)	115,691,126	(1.1)
2014	4,627,045	(5,317,236)	(1,026,942)	(6,344,178)	0	(1,717,133)	122,730,229	(1.4)
2015	4,640,109	(6,228,574)	(194,094)	(6,422,668)	0	(1,782,559)	123,154,436	(1.4)
2016	4,569,688	(7,389,735)	(209,340)	(7,599,075)	0	(3,029,387)	126,527,898	(2.4)
2017	5,264,542	(7,983,856)	(58,095)	(8,041,951)	0	(2,777,408)	142,035,779	(2.0)
2018	4,981,787	(8,338,312)	(74,266)	(8,412,578)	0	(3,430,791)	138,638,938	(2.5)
2019	4,519,669	(8,777,467)	(74,091)	(8,851,558)	0	(4,331,889)	154,007,661	(2.8)
2020*	4,414,870	(9,167,962)	(75,943)	(9,243,905)	0	(4,829,035)	159,790,146	(3.0)
2021*	6,047,482	(9,744,844)	(77,841)	(9,822,685)	0	(3,775,203)	167,068,120	(2.3)

* Cash flow estimated based on expected contributions and expected benefit payments. Assets are assumed to increase at the annual return of 7.0% with all cash flow occurring in the middle of the year.

** Expected Benefit Payments for 2020 and beyond include expected retirements, expected mortality and if applicable, future cost of living increases.

*** Beginning in fiscal year ending December 31, 2015, expenses reflect administrative expense only. Prior years include investment expenses.



Table 10 – Membership Data

	<u>January 1, 2020</u>	<u>January 1, 2019</u>	<u>January 1, 2018</u>
1. Active members			
a. Number	91	96	103
b. Total payroll	\$ 9,213,019	\$ 8,932,505	\$ 9,310,153
c. Average annual salary	\$ 101,242	\$ 93,047	\$ 90,390
d. Average age	49.2	48.4	47.8
e. Average service	20.3	19.7	18.9
2. Terminated vested			
a. Number	5	3	6
b. Total annual benefits	\$ 195,153	\$ 125,217	\$ 186,947
c. Average annual benefit	\$ 39,031	\$ 41,739	\$ 31,158
d. Average age	50.7	51.2	52.3
3. Members In DROP			
a. Number	28	30	38
b. Total annual benefits	\$ 1,806,749	\$ 1,903,965	\$ 2,249,418
c. Average annual benefit	\$ 64,527	\$ 63,466	\$ 59,195
d. Average age	58.4	58.4	57.8
4. Service retirees			
a. Number	140	135	122
b. Total annual benefits	\$ 6,846,628	\$ 6,415,976	\$ 5,763,800
c. Average annual benefit	\$ 48,904	\$ 47,526	\$ 47,244
d. Average age	65.0	64.2	63.7
5. Beneficiaries			
a. Number	9	9	7
b. Total annual benefits	\$ 221,446	\$ 182,297	\$ 124,498
c. Average annual benefit	\$ 24,605	\$ 20,255	\$ 17,785
d. Average age	53.0	48.3	50.1
6. Inactive members			
a. Number	3	3	3

Table 11 – Summary of Retirees by Age and Type

Age	Retirees		Disabled Members		Beneficiaries		Members in DROP		All	
	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Less than 50	0	\$ 0	0	\$ 0	2	\$ 2,655	0	\$ 0	2	\$ 2,655
50-54	3	3,586	0	0	0	0	0	0	3	3,586
55-59	22	3,938	0	0	4	2,148	21	5,243	47	4,368
60-64	48	4,399	0	0	1	1,804	7	5,781	56	4,525
65-69	45	4,103	0	0	1	1,808	0	0	46	4,053
70-74	21	3,609	0	0	0	0	0	0	21	3,609
75-79	1	1,578	0	0	1	940	0	0	2	1,259
Greater than 80	0	0	0	0	0	0	0	0	0	0
All	140	4,075	0	0	9	2,050	28	5,377	177	4,178



Table 12 – Schedule of Retirants & Annuitants Added to and Removed from Rolls

Valuation Year	Added to Rolls		Removed from Rolls		Rolls-End of Year		% Increase in Annual Benefits	Average Annual Benefits	Average Age
	Numbe	Annual Benefits*	Number	Annual Benefits	Number	Annual Benefits			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2006	3	\$ 106,428	0	\$ 0	16	\$ 379,356	39.0 %	\$ 23,710	57.7
2007	26	1,160,157	0	0	42	1,539,513	305.8	36,655	57.6
2008	12	592,154	0	0	54	2,131,667	38.5	39,475	56.8
2009	11	536,669	0	0	65	2,668,336	25.2	41,051	57.2
2010	14	725,800	0	0	79	3,394,136	27.2	42,964	57.6
2011	16	901,143	0	0	95	4,295,279	26.5	45,213	58.7
2012	14	711,103	1	18,613	108	4,987,769	16.1	46,183	59.2
2013	2	96,704	0	0	110	5,084,473	1.9	46,222	60.1
2014	7	275,015	2	71,310	115	5,288,178	4.0	45,984	60.7
2015	6	257,233	0	0	121	5,545,411	4.9	45,830	61.4
2016	19	1,149,542	1	37,545	139	6,657,408	20.1	47,895	61.0
2017	23	1,149,453	1	30,677	161	7,776,184	16.8	48,299	61.1
2018	7	390,886	1	29,354	167	8,137,716	4.6	48,729	61.8
2019	9	456,116	2	91,594	174	8,502,238	4.5	48,863	62.3
2020	6	816,514	3	79,407	177	8,874,823	4.4	50,140	63.4

* Includes cost-of-living adjustments granted since the prior valuation.



Table 13 – Summary for Actuarial Assumptions, Methods, and Changes

The calculations set forth in this report are based on the following assumptions:

1. Investment Return Rate 7.00% per annum (net of investment expenses), compounded annually

2. Rates of Decrement due to:

a) Retirement As eligible for retirement under Rule of 75 with minimum age 50 or Normal Retirement:

50-54: 5%

55: 60%

56-59: 45%

60+: 100%

b) Disability Graduated rates, sample rates shown below:

Age	<u>Annual Rate Per 1,000</u>	
	Occupational Disability	Total Disability Rate
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

c) Pre-Retirement Mortality

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 experience.

<u>Annual Rate per 1,000 Members</u>		
Attained		
Age in 2020	Males	Females
20	0.34	0.23
25	0.39	0.24
30	0.40	0.26
35	0.45	0.31
40	0.49	0.37
45	0.64	0.48
50	0.98	0.68
55	1.54	1.02

d) Withdrawal (any reason other than retirement, death, or disability) rates at selected ages are shown:

<u>Annual Rate per 1,000 Members</u>			
Years of <u>Service</u>	Termination <u>Rates</u>	Years of <u>Service</u>	Termination <u>Rates</u>
0	108.4	12	14.6
1	93.1	13	12.9
2	79.5	14	11.8
3	67.5	15	10.9
4	57.1	16	10.3
5	48.0	17	10.0
6	40.2	18	9.7
7	33.6	19	9.4
8	28.1	20	8.9
9	23.4	21	8.3
10	19.7	22	7.2
11	16.8	23	5.7

3. Post-Retirement Mortality

Healthy Retirees, 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.

<u>Annual Rate per 1,000 Members</u>		
Attained		
Age in 2020	Males	Females
50	3.98	2.68
55	5.71	3.77
60	8.01	5.64
65	11.47	8.32
70	17.00	12.87
75	27.15	21.14
80	45.85	36.18
85	80.33	64.64

4. Salary Increase Rate

A service-related component shown below, plus a 2.5% inflation component and 1.75% productivity component, as follows:

<u>Years of Service</u>	<u>Service-Related Component</u>	<u>Total Annual Rate of Increase Including 2.5% Inflation and 1.75% Productivity Component</u>
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	0.75%	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 1st. 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.

5. Marital Status

- a) Percent married 85% male and female
- b) Age difference Males are assumed to be two years older than females.

6. Benefit Escalation 2.4%

7. Payroll Growth 0.00% - The Plan is closed to New Entrants. Therefore, no payroll growth was assumed in the amortization calculation.

8. Third Week Pay Impact To account for third week pay, an additional salary increase of 2% is included after 10 years of service. Also, the final average pay is increased by 0.50% at the time of retirement. This is representative of a member beginning to receive third-week checks in their 11th year of service, continuing to receive them until retirement, and receiving two third-week checks in the final 18 months of employment (the period used in the final average compensation calculation).

9. Administrative Expense An explicit administrative expense equal to the prior year actual expenses.

10. Changes in Actuarial Assumptions There were no changes in the actuarial assumptions since the prior valuation.

11. Actuarial Cost Method

Under the entry age actuarial cost method, the normal cost is computed as the level percent of pay, which, if paid from the earliest time each member would have been eligible to join the Plan if it then existed (thus, entry age) until his retirement or termination, would accumulate with interest at the rate assumed in the valuation to a fund sufficient to pay all benefits under the Plan. The normal cost for the Plan is determined by summing the normal cost of all members.

The actuarial accrued liability under this method at any point in time is the theoretical amount of the fund that should have been accumulated had annual contributions been made in prior years equaling to the normal cost. The unfunded actuarial accrued liability/(surplus) is the excess of the actuarial accrued liability over the actuarial value of the Plan assets as of the valuation date.

The contribution requirements determined by this valuation will not be effective until one year later, and the determination of the requirement reflects this deferral. It is assumed that there will be no change in the normal cost due to the deferral, and it is assumed that payments are made in the middle of the year. The reflection of the one year lag is a change from the methodology of prior valuations.

Under this method, experience gains and losses (i.e. decreases or increases in accrued liabilities), attributable to deviations in experience from the actuarial assumptions, adjust the unfunded actuarial accrued liability.

12. Asset Valuation Method

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.



Table 14 – Summary of Benefit Provisions

Plan Description

Two plans from the City of Colorado Springs joined the Fire & Police Pension Association Defined Benefit System as of October 1, 2006. They are now one single-employer defined benefit pension plan, Colorado Springs New Hire Pension Plan (“Plan”), but with a fire component and a police component for fire and police employees hired by the City of Colorado Springs on or after April 8, 1978 but prior to October 1, 2006. The Plans are closed to new members as of October 1, 2006.

Employers may not withdraw from the Fire & Police Pension Association Defined Benefit System once elected. The Plan members had opportunities to transfer to the Fire & Police Pension Association Defined Benefit System - Statewide Defined Benefit Plan in conjunction with the administrative change. The Plan assets are included in the Fire & Police Members’ Benefit Investment Fund and the Fire & Police Members’ Self-Directed Investment Fund (for Deferred Retirement Option Plan “DROP” assets and Separate Retirement Account assets from eligible retired members).

Plan Year

A twelve-month period ending December 31.

Members Included

Members included are active employees hired on or after April 8, 1978 but prior to October 1, 2006. As of October 1, 2006, administration of the Plan has been transferred to the Fire & Police Pension Association and the Plan has been closed. All members hired on or after October 1, 2006 will become members of the Fire & Police Pension Association Defined Benefit System - Statewide Defined Benefit Plan.

Compensation Considered

Basic salary, including longevity pay, sick pay taken in the normal course of employment, vacation leave pay taken in the normal course of employment, third week pay, and mandatory overtime (including Annual Pay in lieu of leave) that is part of the members annual fixed periodic compensation. Also, all salary amounts deferred for 457 or Section 125 “cafeteria plan” are included.

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 within each component as determined by the actuarial study. Effective January 1, 2019, the Fire Component’s actuarially determined contribution is



\$4,519,669. Of this amount the members of the Plan contribute 10 percent of basic salary and the employer remitted the remainder. Effective January 1, 2020, the actuarially determined contribution is \$5,560,716.

Final Average Salary

Final Average Salary is the average of monthly basic salary compensation awarded to the member during the 18 months immediately preceding termination or retirement.

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 age 55.

Normal Retirement Benefit

Any member who elects to retire on or after his Normal Retirement Date shall be eligible for a monthly pension equal to 2 percent of Final Average Salary for each year of service for the first 10 years, plus 2.85 percent of Final Average Salary for each year of service in excess of 10 years. The maximum monthly pension is 77 percent of Final Average Salary. The maximum pension is earned upon completing 30 years of service.

Early Retirement Benefit

A member shall be eligible for an Early Retirement Benefit payable on or after the attainment of age 50 and completion of 20 years of service. The Early Retirement Benefit is 2 percent of Final Average Salary for each year of service for the first 10 years, plus 2.85 percent of Final Average Salary for each year of service in excess of 10 years. The maximum monthly pension is 77 percent of Final Average Salary. The Early Retirement Benefit shall be reduced 4.615 percent for each year that the benefit commences before age 55.

Deferred Retirement Benefit

Any member retiring and eligible for a Normal Retirement Benefit may elect to defer receipt of such pension until attaining the age of 65 years. In the case of such an election, the annual deferred retirement pension shall be actuarially equivalent to the normal retirement pension.

Terminated Vested Benefit

A member who terminates with at least 10 years of active service may leave the contributions in the Plan and when the member attains age 55 be eligible to receive a monthly vested benefit equal to 2 percent of Final Average Salary for each year of credited service for the first 10 years, plus 2.85 percent of Final Average Salary for each year of credited service in excess of 10 years. The maximum benefit is 77 percent of Final Average Salary.



Severance Benefit

In lieu of a future pension, a member may upon termination elect to have the accumulated member contributions refunded in a lump sum. Interest is credited at 5 percent per annum.

Death & Disability Benefit of Active Members

Disabled members and survivors (spouse or dependent children) of active members who die prior to retirement eligibility are covered by the benefits provided by the Fire & Police Pension Association Statewide Death & Disability Plan.

Post-Retirement Death Benefit

If a retired member dies, the “qualified surviving spouse” shall receive, until death, a monthly pension equal to 70 percent of the monthly benefit the member was receiving prior to death, including cost-of-living increases. If there is no “qualified surviving spouse” or if the qualified surviving spouse dies, each qualified surviving child should receive equal shares of the qualified surviving spouses benefit, as long as the child remains a “qualified child.” For purposes of this Plan, a spouse includes a partner in a civil union.

Cost-of-Living Adjustment (COLA)

Benefits are increased to reflect increases in the consumer price index but in no case may benefits be increased by more than 3 percent for any one year. Cost-of-living adjustments begin on October 1 immediately prior to the earlier of attainment of age 65 or 10 years after benefit payments commenced.

Deferred Retirement Option Plan (DROP)

A member may elect to participate in the DROP after reaching eligibility for Normal Retirement or the “Rule of 75” with a minimum age of 50 years. This means that a member must attain age 50 and the sum of his or her credited service and age must total 75 or greater at date of severance in order to qualify for the DROP program. 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 a lump sum, if desired. The member continues contributing the member contribution rate which is credited to the DROP. The member shall self-direct the investments of their DROP funds.



Purchase of Service Credit

Active members of this Plan may purchase service credit for other employment completed within the United States not covered by this Plan. The cost of such service credit purchase shall be determined by the Fire & Police Pension Association Board of Directors and shall be on an actuarially equivalent basis. A member shall not be allowed to purchase service credit to the extent that the additional accrued benefits derived from the purchased service credit would result in the annual amount of the member's benefit exceeding the annual benefit limitation for defined benefit plans as determined under section 415 of the Internal Revenue Code (Ord. 04-107).

Stabilization Reserve Account (SRA)

Annually, at the discretion of the Fire & Police Pension Association Board of Directors, a contribution may be allocated to the SRA based on the actuarial study for the previous year. Amounts set aside in the SRA are allocated to individual accounts for each member. A member may receive the amounts in this individual account upon election of normal, vested, early, disability, deferred retirement, or in the event of the active member's death. If the cost of the defined benefit plan exceeds the combined member/employer contribution rate, funds from the SRA may be used to make up the shortfall. Effective January 1, 2008, the Separate Retirement Account contribution rate for members of the Fire Component was set at 0 percent. The rate will remain at 0 percent for calendar years 2019 and 2020.

There were no changes to the benefit provisions since the prior valuation.



Table 15 – Definition of Terms

1. Actuarial Cost Method

A method for determining the actuarial present value of future benefits and allocating such value to time periods in the form of a normal cost and an actuarial accrued liability.

2. Present Value of Future Benefits

This is computed by projecting the total future benefit cash flow from the Plan, using actuarial assumptions, and then discounting the cash flow to the valuation date.

3. Normal Cost

Computed differently under different actuarial cost methods, the normal cost generally represents the value of the portion of the participant's anticipated retirement, termination, and/or death and disability benefits accrued during a year.

4. Actuarial Accrued Liability

Computed differently under different actuarial cost methods. Generally actuarial accrued liability represents the value of the portion of the participant's anticipated retirement, termination, and/or death and disability benefits accrued as of the valuation date.

5. Entry Age Actuarial Cost Method

A method under which a participant's actuarial present value of future benefits is allocated on a level basis over the earnings of the participant between his/her entry into the Plan and his/her assumed exit.

6. Unfunded Actuarial Accrued Liability

The difference between total actuarial present value of future benefits over the sum of the tangible assets of the Plan and the actuarial present value of the members' future normal costs. The Plan is underfunded if the difference is positive and overfunded if the difference is negative.

7. Actuarial Value of Assets

The value of cash, investments, and other property belonging to the Plan, as valued by the actuary for purposes of the actuarial valuation.

8. Actuarial Gain or Loss

From one valuation to the next, if the experience of the Plan differs from that anticipated by the actuarial assumptions, an actuarial gain or loss occurs. For example, an actuarial gain would occur if the assets in the trust had a yield of 12% based on actuarial value, while the assumed yield on

Table 16 – Supplemental Studies

A. Costs associated with Closing the Plan to New Entrants

1. Amendment

The City of Colorado Springs has agreed to fund the additional funding requirements of closing the New Hire Fire Pension Plan. An actuarial valuation was performed in order to determine the difference between the New Hire Fire Pension Plan as an open and a closed plan. This difference will be funded annually by the City of Colorado Springs. All other costs of the New Hire Fire Pension Plan will continue to be equally shared by the members of the Plan and the City of Colorado Springs, capped at 10%.

The difference between the open and closed plan is the difference in payments on the Unfunded Accrued Liability for a payment assuming a growing payroll vs. a payment with non-increasing payroll.

2. Analysis

Item (1)	Closed Plan (2)	Open Plan (3)	Difference (4)
a. Unfunded Actuarial			
Accrued Liability	\$ 41,328,878	\$ 41,328,878	\$ 0
b. Calculated			
Contribution	70.607%	33.409%	37.198%

3. Comments

The Plan has an underfunded position and this creates a cost associated with closing the Plan. If the Plan reaches a surplus position again in the future due to better than expected experience, then at that time there would be no additional cost to the City.

For 2020, the employee contribution rate is 50% of the determined contribution rate based on an open plan but not more than 10.00%. The employer contribution rate is the remainder of the cost, or 60.607%. Therefore, the total employee/employer contribution rate will be 70.607% (10% + 60.607%).

B. 5-year Deterministic Projection

Because the Plan is closed to new members, the amortization policy was changed to be level dollar effective January 1, 2008. As the payroll for the closed group diminishes, it is expected that the normal cost for the group will decrease over time. The amortization payment decreases over the five-year projection period as the outstanding asset gains of \$3.6 million are recognized.

The following exhibit provides an illustration of how the current valuation would expect the contribution amount to change over the next few valuations if all actuarial assumptions are met.

Year	Amortization Cost for UAAL		Normal Cost	Administrative Expenses		Total Contribution
2021	\$	4,132,069	\$ 1,841,322	\$	74,091	\$ 6,047,482
2022		4,132,686	1,728,066		69,687	5,930,439
2023		4,139,388	1,590,734		64,335	5,794,457
2024		4,145,992	1,419,682		57,666	5,623,340
2025		4,152,221	1,233,386		50,315	5,435,922

Table 17 – 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 result 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;
4. Longevity risk – members may live longer or shorter than expected and receive pensions for a period of time other than assumed;

The effects of certain trends in experience can generally be anticipated. For example, if the investment return 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 rate shown on page 5 may be considered as a minimum contribution rate that complies with the Plan's funding policy. 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.

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:

	<u>January 1, 2020</u>	<u>January 1, 2019</u>
Ratio of actives to retirees and beneficiaries	0.5	0.6
Ratio of net cash flows to market value of assets	-2.8%	-2.5%
Duration of the present value of future benefits	13.2	13.4

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.

Ratio of net Cash Flow to 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 Actuarial Accrued Liability

The duration of the actuarial accrued liability 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 liability would increase approximately 10% if the assumed rate of return were lowered 1%.

Additional Risk Assessment

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability.



Fire and Police Pension Association Colorado Springs New Hire Pension Plan – Police Component

Actuarial Valuation Report
For the Year Beginning January 1, 2020





To: Board of Directors for the Fire and Police Pension Association

CC: Administrative Heads and Finance Officers of the City of Colorado Springs

Date: June 2020

Subject: **Actuarial Valuation Results as of January 1, 2020**

This report contains the actuarial valuation results as of January 1, 2020 for the Colorado Springs New Hire Pension Plan – Police Component as determined by Gabriel, Roeder, Smith & Company (GRS), actuary for the Fire and Police Pension Association (FPPA). Questions about this report should be directed to FPPA, rather than to Gabriel, Roeder, Smith & Company.

Financing Objectives

This valuation was prepared to determine the Actuarially Determined Contribution (ADC) for fiscal year 2021. The ADC for FY2021 is \$12,545,129 and is shown in Table 1, Item 10.

The calculated employer contribution consists of the sum of two pieces: the normal cost and the amortization of the unfunded actuarial accrued liability (UAAL). The calculated contribution is shown in Table 1, Item 10. The normal cost (shown in Table 1, Item 2) can be viewed as the regular, ongoing cost of the Plan.

The UAAL is the amount by which the actuarial value of assets falls short of, or exceeds, the actuarial accrued liability for this Plan. Under the current funding policy, the UAAL must be amortized under a level dollar method over a period of 18 years. The determined payment to amortize the UAAL is shown in Table 1, Item 9.

The Actuarially Determined Contribution may be considered as a minimum contribution rate that complies with state statute. Users of this report should be aware that contributions made at that rate do not guarantee benefit security. Given the importance of benefit security to any retirement system, we suggest that contributions to the Plan in excess of those presented in this report be considered.

The contribution rate in this report is determined using the actuarial assumptions and methods disclosed in Table 13 of this report. Page 3 of this letter includes short term projections assuming alternate investment returns. With the exception of these short term funding projections, this report does not include an 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.

For 2020, from April through June, the employer contribution rate is expected to match the employee contribution rate of 8%. It is expected that the Plan will return to contributing the actuarially determined contribution in July of 2020.

Benefit Provisions

This actuarial valuation reflects the provisions that were applicable to the Colorado Springs New Hire Pension Plan – Police Component as of the valuation date. The details of the actuarial calculations, based on the current benefit provisions, are described in this report.

Stabilization Reserve Account (SRA) Contributions

As of January 1, 2020, the combined member/employer contribution rate is over 16.00% and therefore we recommend the SRA contribution rate be set to 0.00% as of January 1, 2021.

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

The assumptions and methods are detailed in Table 13 of the 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.

Because the Plan is closed to new members, the amortization period was closed at 30 years effective January 1, 2008.

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. Even seemingly minor changes in the assumptions can materially change the liabilities, calculated contribution and funding periods. The actuarial calculations are intended to provide information for rational decision making.

Assets

Table 4 shows the market value of assets for this department and Table 5 shows the development of the actuarial value. 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. This smoothed average approach is intended to ensure the smoothed value of assets will converge towards the market value in a reasonable amount of time.

Member Data

Member data as of January 1, 2020 was supplied by FPPA. GRS reviewed the data and tested it for reasonableness and consistency. The member count is shown in Table 3.

Experience

The Plan experienced an increase in its calculated contribution between the 2019 actuarial valuation and this valuation. This increase was primarily due to the higher than expected increase in salaries for the active members and reduced anticipated contributions during 2020.

Deferred Losses and Projected Actuarial Results

To allow the City to anticipate future contribution requirements for the Plan, we have projected the actuarial status of the Plan as of January 1, 2020. The table below provides the ADC for Fiscal Years 2021 - 2025 based on the January 1, 2020 actuarial valuation.

	Actuarially Determined Contribution (ADC)		
Fiscal Year	Assuming 3.0%	Assuming 7.0%	Assuming 11.0%
(FY)	return in FY	return in FY	return in FY
2021	\$12,545,129	\$12,545,129	\$12,545,129
2022	13,666,455	12,187,966	10,709,477
2023	14,860,541	11,844,198	8,711,884
2024	16,138,589	11,499,011	6,488,801
2025	17,322,208	10,963,027	3,824,823

The projected liabilities are calculated by rolling forward the liabilities as of January 1, 2020, taking into account interest and benefit payments for the year, including mortality incidence and anticipated cost of living increases. The 7.0% scenario above coincides with the actuarial investment return assumption of 7.0%. The 3.0% and 11.0% scenarios were selected because there is statistically a high probability of the return for a two year period being inside the expected return +/- 4%.

The scenarios above are for illustration purposes only and are in no way to be used as expected investment performance. There are no other deviations from the expected taken into consideration besides the asset performance. Careful consideration of this projected contribution should be taken into account before any benefit enhancement is adopted.

Trends

As of January 1, 2020, there remains \$8.8 million of deferred asset gains that will decrease future contribution levels, in the absence of offsetting losses. Additionally, it is anticipated that the dollar normal cost will continue to decrease over time.

Tables

This report includes the following sections:

- The executive summary includes a condensed summary of the demographic, financial, and actuarial data.
- Table 1 provides the details of the development of the actuarially determined contribution.
- Table 2 shows the sources of change in the calculated contribution since the prior valuation.
- Table 3 shows historical actuarial and demographic data for the department.
- Tables 4, 5, and 6 show the development of the financial information.
- Table 7 provides historical funding information.
- Table 8 provides the solvency test.
- Table 9 shows historical cash flow information.
- Tables 10, 11, and 12 show demographic data for the department.
- Table 13 shows the actuarial assumptions and methods used to calculate the liabilities.
- Table 14 is a summary of the benefit provisions for the department.
- Table 15 provides definitions of several terms used throughout the report.
- Table 16 provides a 5 year deterministic projection
- Table 17 provides Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

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. Colorado Springs receives a separate accounting report in order to meet their financial reporting requirements under GASB 68.

Certification

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 Colorado Springs New Hire Police Pension Fund as of January 1, 2020.

All calculations have been made in conformity with generally accepted actuarial principles and practices, and with the Actuarial Standards of Practice issued by the Actuarial Standards Board. In our opinion, the results presented comply with the requirements of the State of Colorado statutes and, where applicable, the Internal Revenue Code, ERISA, and the Statements of the Governmental Accounting Standards Board.

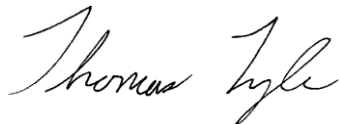
The undersigned are independent actuaries and consultants. Joseph Newton and Dana Woolfrey are Enrolled Actuaries and all are Members of the American Academy of Actuaries, and meet the Qualification Standards of the American Academy of Actuaries. Finally, all of the undersigned are experienced in performing valuations for large public retirement systems.

Respectfully submitted,

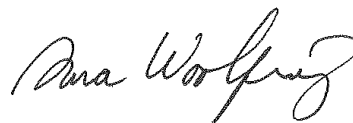
Gabriel Roeder Smith & Company



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



Thomas Lyle, ASA, EA, MAAA
Consultant



Dana Woolfrey, FSA, EA, MAAA
Senior Consultant



Executive Summary

Item	January 1, 2020	January 1, 2019
Membership		
• Number of:		
- Active members	257	268
- Terminated vested members	17	15
- Inactive members	5	6
- Members in DROP	45	55
- Retired members	267	251
- Beneficiaries	14	13
- Total	605	608
• Annualized payroll supplied by FPPA	\$ 24,315,756	\$ 23,137,303
• Annualized monthly benefits paid	\$ 14,763,009	\$ 14,213,941
Assets		
• Market value	\$ 349,383,584	\$ 311,369,449
• Actuarial value	\$ 340,540,030	\$ 322,447,392
• Return on market value	14.4 %	0.0 %
• Return on actuarial value	7.7 %	6.1 %
• Contribution	\$ 8,053,268	\$ 9,813,515
• Ratio of actuarial value to market value	97.5 %	103.6 %
Actuarial Information		
• Actuarial accrued liability	\$ 409,776,854	\$ 383,230,807
• Actuarial Value Basis		
- Unfunded actuarial accrued	\$ 69,236,824	\$ 60,783,415
- Funded ratio	83.1 %	84.1 %
• Market Value Basis		
- Unfunded actuarial accrued	\$ 60,393,270	\$ 71,861,358
- Funded ratio	85.3 %	81.2 %
• Amortization period (years)	18	19
Actuarially Determined Contribution (ADC)		
• For year ending December 31,	2021	2020
• Estimated contribution amount	\$ 12,545,129	\$ 11,420,163

Table of Contents

Table 1: Development of Actuarially Determined Contribution	3
Table 2: Change in UAAL/Calculated Contribution	4
Table 3: Actuarial Experience	5
Table 4: Reconciliation of Net Plan Assets	6
Table 5: Development of Actuarial Value of Assets	7
Table 6: Gain/Loss on Assets	8
Table 7: Statement of Funding Progress	9
Table 8: Solvency Test	10
Table 9: Cash Flow Analysis	11
Table 10: Membership Data	12
Table 11: Summary of Retirees by Age and Type	13
Table 12: Annuitants Added and Removed from Rolls	14
Table 13: Summary for Actuarial Assumptions, Methods, and Changes	15
Table 14: Summary of Benefit Provisions	20
Table 15: Definition of Terms	24
Table 16: Supplemental Studies	26
Table 17: Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution	28



Table 1 – Development of Actuarially Determined Contribution

	January 1, 2020	January 1, 2019
1. Valuation payroll	\$ 24,315,756	23,137,303
2. Normal cost	\$ 5,344,152	5,264,460
3. Administrative Expenses	\$ 143,204	145,894
4. Actuarial accrued liability for active members		
a. Present value of future benefits for active members	\$ 207,230,580	190,713,200
b. Less: present value of future normal costs	(29,564,509)	(31,716,323)
c. Actuarial accrued liability (a. + b.)	\$ 177,666,071	158,996,877
5. Total actuarial accrued liability for:		
a. Retirees and beneficiaries	\$ 182,616,421	166,189,863
b. Terminated vested members	5,579,997	4,184,182
c. Inactive members	698,273	810,342
d. Members in DROP	43,216,092	53,049,543
e. Active members (4c.)	177,666,071	158,996,877
f. Total	\$ 409,776,854	383,230,807
6. Actuarial value of assets	\$ 340,540,030	322,447,392
7. Unfunded actuarial accrued liability (UAAL)/(surplus) (5f. - 6.)	\$ 69,236,824	60,783,415
8. Funded ratio	83.10 %	84.14 %
9. Determined payment to amortize the UAAL/(surplus) over 18 years from January 1, 2020	\$ 7,057,774	6,009,809
10. Total calculated annual contribution for Fiscal Year:		
Actuarially Determined Contribution (2. + 3. + 9.)	\$ 12,545,129	11,420,163
11. Total present value of benefits (5f. - 4b.)	\$ 439,341,363	414,947,130

Table 2 – Actuarial Gain/(Loss) on UAAL

1. Unfunded actuarial accrued liability (UAAL)	\$ 60,783,415
2. Total normal cost for FY2019	5,523,169
3. Non Service Purchase Contributions during 2019	(8,037,168)
4. Administrative Expenses FY2019	143,204
5. a) Interest on Item 1 for one year	4,254,839
b) Interest on Item 2, 3, and Item 4 for one-half year *	(82,978)
6. Change in UAAL due to:	
a. Benefit Improvements	0
b. Assumption Changes	0
7. Expected UAAL as of this valuation (1.+2.+3.+4.+5.)	62,584,480
8. Actual UAAL at end of period	69,236,824
9. Actuarial gain/(loss) for the period (8. – 7.)	(6,652,344)

SOURCE OF GAINS/(LOSSES)

10. Asset gain/(loss) (See Table 6)	\$ 2,210,888
11. Salary/rank liability gain/(loss) for the period	(8,419,795)
12. Net liability gain/(loss) for the period (9. - 10. - 11.) #	(443,437)

Change in Calculated Contribution

1. Calculated contribution in 2019 valuation	\$ 11,420,163
2. Benefit changes	0
3. Assumption/method changes	0
4. Change in Normal Cost**	79,692
5. Investment experience	(234,048)
6. Salary/rank experience	891,331
7. Contribution Shortfall	343,667
8. Other liability experience ***	44,324
9. Total change	1,124,966
10. Calculated contribution in 2020 valuation	\$ 12,545,129

*Assume Normal Cost, contributions, and administrative expenses occurred in the mid-year.

** The normal cost is a measure of the rate at which active member benefits are accruing and directly relates to the active member payroll. The increase in normal cost is due to the increase in active member payroll due to pay increases outpacing pay reduction through terminations.

*** Includes losses from less disabilities than expected.



Table 3 – Actuarial Experience

	<u>2020</u>	<u>2019</u>	<u>2018</u>	<u>2017</u>	<u>2016</u>	<u>2015</u>	<u>2014</u>	<u>2013</u>	<u>2012</u>	<u>2011</u>
1. Number of members										
a. Active	257	268	283	318	350	384	409	426	443	470
b. Retired	267	251	231	221	207	183	167	151	138	124
c. DROP	45	55	63	43	37	36	30	38	45	41
d. Beneficiaries	14	13	12	10	6	6	5	6	5	1
e. Terminated vested	17	15	17	19	14	13	17	16	14	18
f. Inactive	5	6	7	8	7	5	7	6	5	11
g. Total	605	608	613	619	621	627	635	643	650	665
2. Covered payroll	\$ 24,315,756	\$ 23,137,303	\$ 23,039,390	\$ 25,429,284	\$ 27,575,061	\$ 29,432,993	\$ 30,441,800	\$ 30,420,085	\$ 31,381,480	\$ 33,357,427
3. Average compensation	\$ 94,614	\$ 86,333	\$ 81,411	\$ 79,966	\$ 78,786	\$ 76,648	\$ 74,430	\$ 71,409	\$ 70,839	\$ 70,973
4. Valuation results										
a. Normal cost	\$ 5,344,152	\$ 5,264,460	\$ 4,733,647	\$ 5,001,850	\$ 5,463,111	\$ 5,767,089	\$ 5,959,768	\$ 5,976,371	\$ 6,319,141	\$ 6,218,536
b. Accrued liability	409,776,854	383,230,807	342,817,503	331,007,540	319,975,168	297,810,707	281,166,840	258,960,907	246,518,300	226,088,133
c. Actuarial value of assets	340,540,030	322,447,392	308,034,365	286,951,659	271,515,321	253,937,185	233,009,247	212,428,394	197,710,046	187,249,190
d. Unfunded liability	69,236,824	60,783,415	34,783,138	44,055,881	48,459,847	43,873,522	48,157,593	46,532,513	48,808,254	38,838,943
e. Remaining amortization	18	19	20	21	22	23	24	25	26	27
f. Funded ratio	83.1%	84.1%	89.9%	86.7%	84.9%	85.3%	82.9%	82.0%	80.2%	82.8%
5. Actuarially Determined contribution										
Estimated dollar contribution	\$ 12,545,129	\$ 11,420,163	\$ 8,037,168	\$ 9,479,498	\$ 10,368,391	\$ 9,645,675	\$ 10,203,704	\$ 9,986,634	\$ 10,605,836	\$ 9,619,134

Item 5 above is the calculated contribution as it is described throughout the report: normal cost plus the amortization of the UAAL under the policy as described in the current statutes.

There is a one-year lag. As an example, the contribution shown in valuation year 2020 is payable in fiscal year 2021.



Table 4 – Reconciliation of Net Plan Assets

	Year Ending	
	December 31, 2019	December 31, 2018
1. Market value of assets at beginning of year	\$ 311,369,449	\$ 315,606,098
2. Revenue for the year		
a. Contributions		
i. Member contributions	\$ 2,000,225	\$ 2,222,616
ii. Employer contributions	6,053,042	7,590,899
iii. State contributions	0	0
iv. Contributions from the SWDD Plan	0	0
v. Total	\$ 8,053,267	\$ 9,813,515
b. Net investment income		
i. Interest	\$ 1,584,039	\$ 1,319,300
ii. Dividends	2,073,291	2,428,474
iii. Net change in accrued income	71,899	154,771
iv. Unrealized gain/(loss)	14,088,034	(18,181,495)
v. Realized gain/(loss)	28,186,726	15,329,432
vi. Defined contribution earnings (net)	(37,189)	(38,959)
vii. Investment expense	(2,780,310)	(2,792,945)
viii. Direct allocated plan	(16,452)	(14,045)
ix. Allocated fees and expenses	(126,752)	(131,849)
x. Other Income	1,290,995	1,776,554
c. Total revenue	\$ 52,387,548	\$ 9,662,753
3. Expenditures for the year		
a. Benefit payments	\$ (14,373,413)	\$ (13,899,402)
b. Refunds	0	0
c. Plan directed expenses	0	0
d. Total expenditures	(14,373,413)	(13,899,402)
4. Increase in net assets (2c. + 3d.)	\$ 38,014,135	\$ (4,236,649)
5. Market value of assets at end of year (1. + 4.)	\$ 349,383,584	\$ 311,369,449

Table 5 – Development of Actuarial Value of Assets

1.	Actuarial value of assets at beginning of year	\$	322,447,392
2.	Net new investments		
	a. Contributions		8,053,268
	b. Benefits paid		(14,373,413)
	c. Refunds		0
	d. Administrative Expenses		(143,204)
	e. Subtotal		(6,463,349)
3.	Assumed investment return rate for fiscal year		7.0%
4.	Assumed investment return for fiscal year	\$	22,345,099
5.	Expected Actuarial Value at end of year	\$	338,329,142
6.	Market value of assets at end of year	\$	349,383,584
7.	Excess return (6-5)	\$	11,054,442
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	(11,077,943)	11,077,943	0	4	0	0
2019	22,132,385	(11,077,943)	11,054,442	5	2,210,888	8,843,554
Total	\$ 11,054,442	\$ 0	\$ 11,054,442		\$ 2,210,888	\$ 8,843,554

9.	Actuarial value of assets as of December 31, 2019 (Item 6 - Item 8)	\$	340,540,030
10.	Ratio of actuarial value to market value		97.5%

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 is offset by the 2019 excess. The fiscal year 2015 through 2017 bases are \$0 because they were previously offset.

Table 6 – Gain/(Loss) on Actuarial Value of Assets

	Year Ending	
	December 31, 2019	December 31, 2018
1. Actuarial assets as of January 1	\$ 322,447,392	\$ 308,034,365
2. Total contributions since prior valuation	\$ 8,053,268	\$ 9,813,515
3. Benefits, refunds, and administrative expenses since prior valuation	\$ (14,516,617)	\$ (14,045,296)
4. Assumed net investment income		
a. Beginning assets	\$ 22,571,317	\$ 21,562,406
b. Contributions	281,864	343,473
c. Benefits, refunds, and administrative expenses	(508,082)	(491,585)
d. Total	\$ 22,345,099	\$ 21,414,294
5. Expected actuarial assets (1. + 2. + 3. + 4.)	\$ 338,329,142	\$ 325,216,878
6. Actual actuarial assets as of December 31	\$ 340,540,030	\$ 322,447,392
7. Net asset gain/(loss) since prior valuation (6. - 5.)	\$ 2,210,888	\$ (2,769,486)
	Gain	Loss

Table 7 – Statement of Funding Progress

Date	Actuarial Value of Assets (AVA)	Actuarial Accrued Liability (AAL)	Unfunded (Surplus) Actuarial	Funded Ratio (2)/(3)	Annual Covered Payroll	UAAL as a % of payroll (4)/(6)
			Accrued Liability (UAAL (3) - (2))			
(1)	(2)	(3)	(4)	(5)	(6)	(7)
January 1, 1998	\$ 63,082,332	\$ 45,567,059	\$ (17,515,273)	138.4 %	20,386,441	(85.9) %
January 1, 2000	86,139,093	72,268,663	(13,870,430)	119.2	22,905,603	(60.6)
January 1, 2002	97,169,645	91,016,905	(6,152,740)	106.8	29,154,383	(21.1)
January 1, 2004	105,649,541	117,092,862	11,443,321	90.2	33,432,961	34.2
January 1, 2005	117,965,939	122,896,108	4,930,169	96.0	34,437,864	14.3
January 1, 2006	137,688,853	139,568,165	1,879,312	98.7	39,294,072	4.8
January 1, 2007	159,508,243	161,530,980	2,022,737	98.7	40,438,034	5.0
January 1, 2008	178,548,095	188,263,199	9,715,104	94.8	39,048,754	24.9
January 1, 2009	156,099,012	198,695,916	42,596,904	78.6	36,735,114	116.0
January 1, 2010	170,960,335	213,764,095	42,803,760	80.0	35,550,304	120.4
January 1, 2011	187,249,190	226,088,133	38,838,943	82.8	33,357,427	116.4
January 1, 2012	197,710,046	246,518,300	48,808,254	80.2	31,381,480	155.5
January 1, 2013	212,428,394	258,960,907	46,532,513	82.0	30,420,085	153.0
January 1, 2014	233,009,247	281,166,840	48,157,593	82.9	30,441,800	158.2
January 1, 2015	253,937,185	297,810,707	43,873,522	85.3	29,432,993	149.1
January 1, 2016	271,515,321	319,975,168	48,459,847	84.9	27,575,061	175.7
January 1, 2017	286,951,659	331,007,540	44,055,881	86.7	25,429,284	173.2
January 1, 2018	308,034,365	342,817,503	34,783,138	89.9	23,039,390	151.0
January 1, 2019	322,447,392	383,230,807	60,783,415	84.1	23,137,303	262.7
January 1, 2020	340,540,030	409,776,854	69,236,824	83.1	24,315,756	284.7

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 8 – Solvency Test

Valuation Date	Aggregated Accrued Liabilities for				Actuarial Value of Assets	Portion of Accrued Liabilities Covered by Reported Assets		
	Active Members Contributions	Retirees		Members (Employer Financed Portion)		(5)/(2)	[(5)-(2)-(3)]/(4)	
		Beneficiaries and Vested Terminations					[(5)-(2)]/(3)	(4)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
January 1, 2007	\$ 25,345	\$ 45,637	\$ 90,549	\$ 159,508	100.0%	100.0%	97.8%	
January 1, 2008	26,162	57,986	104,116	178,548	100.0%	100.0%	90.7%	
January 1, 2009	26,693	70,017	101,986	156,099	100.0%	100.0%	58.2%	
January 1, 2010	28,025	82,218	103,521	170,963	100.0%	100.0%	58.7%	
January 1, 2011	28,721	96,564	100,804	187,249	100.0%	100.0%	61.5%	
January 1, 2012	29,048	112,336	105,134	197,710	100.0%	100.0%	53.6%	
January 1, 2013	30,326	118,304	110,331	212,428	100.0%	100.0%	57.8%	
January 1, 2014	31,545	124,081	125,541	233,009	100.0%	100.0%	61.6%	
January 1, 2015	31,514	139,420	126,876	253,937	100.0%	100.0%	65.4%	
January 1, 2016	30,658	161,841	127,476	271,515	100.0%	100.0%	62.0%	
January 1, 2017	29,768	179,910	121,329	286,952	100.0%	100.0%	63.7%	
January 1, 2018	27,549	203,465	111,803	308,034	100.0%	100.0%	68.9%	
January 1, 2019	27,998	224,234	130,999	322,447	100.0%	100.0%	53.6%	
January 1, 2020	28,751	232,111	148,915	340,540	100.0%	100.0%	53.5%	

\$ amount in 000s



Table 9 – Cash Flow Analysis

Year Ending December 31,	Contributions for the Year	Expenditures During the Year			Transfer to FPPA Statewide DB	External Cash Flow for the Year	Market Value of Assets	External Cash Flow as of Market
		Benefit Payments **	Expenses***	Total				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2004	\$ 6,156,684	\$ (2,820,944)	\$ (442,282)	\$ (3,263,226)	0	\$ 2,893,458	\$ 124,349,090	2.3 %
2005	6,841,155	(2,572,567)	(937,491)	(3,510,058)	0	3,331,097	140,611,634	2.4
2006	7,496,218	(2,952,333)	(1,056,148)	(4,008,481)	0	3,487,737	166,078,983	2.1
2007	8,173,010	(3,878,151)	(1,264,090)	(5,142,241)	(2,824,545)	206,224	182,745,963	0.1
2008	6,425,431	(4,757,098)	(1,322,660)	(6,079,758)	0	345,672	130,082,510	0.3
2009	8,216,628	(5,901,639)	(1,106,039)	(7,007,678)	0	1,208,950	158,403,521	0.8
2010	10,233,797	(6,219,750)	(1,272,055)	(7,491,805)	0	2,741,992	184,076,676	1.5
2011	9,666,399	(7,351,231)	(1,471,682)	(8,822,913)	(1,127,899)	(284,412)	186,028,008	(0.2)
2012	8,974,225	(7,901,852)	(1,799,573)	(9,701,425)	0	(727,200)	208,760,917	(0.3)
2013	10,647,439	(8,493,950)	(2,024,231)	(10,518,181)	0	129,258	242,667,157	0.1
2014	10,559,461	(9,260,894)	(2,147,681)	(11,408,575)	0	(849,114)	260,252,124	(0.3)
2015	10,409,669	(10,187,956)	(412,381)	(10,600,337)	0	(190,668)	264,726,596	(0.1)
2016	10,140,632	(11,658,008)	(451,871)	(12,109,879)	0	(1,969,247)	277,111,969	(0.7)
2017	10,752,643	(12,868,215)	(131,754)	(12,999,969)	0	(2,247,326)	315,606,098	(0.7)
2018	9,813,515	(13,899,402)	(145,894)	(14,045,296)	0	(4,231,781)	311,369,449	(1.4)
2019	8,053,268	(14,373,413)	(143,204)	(14,516,617)	0	(6,463,349)	349,383,584	(1.8)
2020*	8,538,751	(15,757,056)	(146,784)	(15,903,840)	0	(7,365,088)	366,217,568	(2.0)
2021*	12,545,129	(17,547,114)	(150,453)	(17,697,567)	0	(5,152,438)	386,520,025	(1.3)

* Cash flow estimated based on expected contributions and expected benefit payments. Assets are assumed to increase at the annual return of 7.0% with all cash flow occurring in the middle of the year.

** Expected Benefit Payments for 2020 and beyond include expected retirements, expected mortality and if applicable, future cost of living increases.

*** Beginning in fiscal year ending December 31, 2015, expenses reflect administrative expense only. Prior years include investment expenses.



Table 10 – Membership Data

	<u>January 1, 2020</u>	<u>January 1, 2019</u>	<u>January 1, 2018</u>
1. Active members			
a. Number	257	268	283
b. Total payroll	\$ 24,315,756	\$ 23,137,303	\$ 23,039,390
c. Average annual salary	\$ 94,614	\$ 86,333	\$ 81,411
d. Average age	48.3	47.4	46.6
e. Average service	20.3	19.3	18.4
2. Terminated vested members			
a. Number	17	15	17
b. Total annual benefits	\$ 533,071	\$ 426,008	\$ 464,868
c. Average annual benefit	\$ 31,357	\$ 28,401	\$ 27,345
d. Average age	45	45	44
3. Members In DROP			
a. Number	45	55	63
b. Total annual benefits	\$ 2,678,940	\$ 3,280,758	\$ 3,647,654
c. Average annual benefit	\$ 59,532	\$ 59,650	\$ 57,899
d. Average age	56	56	55
4. Service retirees			
a. Number	267	251	231
b. Total annual benefits	\$ 11,768,934	\$ 10,652,915	\$ 9,529,528
c. Average annual benefit	\$ 44,078	\$ 42,442	\$ 41,253
d. Average age	63	62	62
5. Beneficiaries			
a. Number	14	13	12
b. Total annual benefits	\$ 315,135	\$ 280,267	\$ 253,673
c. Average annual benefit	\$ 22,510	\$ 21,559	\$ 21,139
d. Average age	63	63	61
6. Inactive members			
a. Number	5	6	7

Table 11 – Summary of Retirees by Age and Type

Age	Retirees		Disabled Members		Beneficiaries		Members in DROP		All	
	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension	Number	Average Monthly Pension
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Less than 50	2	\$ 3,225	0	\$ 0	1	\$ 505	0	\$ 0	3	\$ 2,319
50-54	23	2,677	0	0	1	1,881	14	4,652	38	3,384
55-59	60	3,613	0	0	2	2,551	24	5,135	86	4,013
60-64	72	4,112	0	0	0	0	7	4,982	79	4,189
65-69	65	3,813	0	0	1	3,068	0	0	66	3,802
70-74	44	3,357	0	0	5	1,663	0	0	49	0
75-79	1	4,341	0	0	4	1,848	0	0	5	0
Greater than 80	0	0	0	0	0	0	0	0	0	0
All	267	3,673	0	0	14	1,876	45	4,961	326	3,774

Table 12 – Schedule of Retirants & Annuitants Added to and Removed from Rolls

Valuation Year	Added to Rolls		Removed from Rolls		Rolls-End of Year		% Increase in Annual Benefits	Average Annual Benefits	Average Age
	Number	Annual Benefits*	Number	Annual Benefits	Number	Annual Benefits			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2006	12	\$ 443,028	0	\$ 0	78	\$ 2,376,300	22.9 %	\$ 30,465	55.0
2007	14	619,230	0	0	92	2,995,530	26.1	32,560	55.4
2008	21	897,046	0	0	113	3,892,576	29.9	34,448	54.5
2009	17	847,350	0	0	130	4,739,926	21.8	36,461	55.5
2010	16	791,367	1	14,525	145	5,516,768	16.4	38,047	56.0
2011	21	1,007,007	0	0	166	6,523,775	18.3	39,300	57.8
2012	25	1,044,739	3	97,040	188	7,471,474	14.5	39,742	58.2
2013	9	428,295	2	73,884	195	7,825,885	4.7	40,133	59.1
2014	9	460,165	2	75,382	202	8,210,668	4.9	40,647	59.8
2015	24	1,230,728	1	22,383	225	9,419,013	14.7	41,862	59.8
2016	26	1,266,408	1	32,035	250	10,653,386	13.1	42,614	59.8
2017	27	1,251,164	3	86,395	274	11,818,155	10.9	43,132	60.3
2018	34	1,715,802	2	103,102	306	13,430,855	13.6	43,892	60.3
2019	14	813,587	1	30,501	319	14,213,941	5.8	44,558	61.5
2020	8	590,991	1	41,923	326	14,763,009	3.9	45,285	61.5

* Includes cost-of-living adjustments granted since the prior valuation.



Table 13 – Summary for Actuarial Assumptions, Methods, and Changes

The calculations set forth in this report are based on the following assumptions:

1. Investment Return Rate 7.00% per annum (net of investment expenses), compounded annually

2. Rates of Decrement due to:

a) Retirement As eligible for retirement after age 50 with 25 years of service:

Age 50: 60%

Ages 51-54: 45%

Ages 55+: 100%

b) Disability

Graduated rates, sample rates shown below:

<u>Annual Rate Per 1,000</u>		
Age	Occupational Disability	Total Disability
		Rate
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

c) Pre-Retirement Mortality

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 experience.

Annual Rate per 1,000 Members

Attained

Age in 2020	Males	Females
20	0.34	0.23
25	0.39	0.24
30	0.40	0.26
35	0.45	0.31
40	0.49	0.37
45	0.64	0.48
50	0.98	0.68
55	1.54	1.02

d) Withdrawal (any reason other than retirement, death, or disability) rates at selected ages are shown:

Annual Rate per 1,000 Members

<u>Years of Service</u>	<u>Termination Rates</u>	<u>Years of Service</u>	<u>Termination Rates</u>
0	108.4	12	14.6
1	93.1	13	12.9
2	79.5	14	11.8
3	67.5	15	10.9
4	57.1	16	10.3
5	48.0	17	10.0
6	40.2	18	9.7
7	33.6	19	9.4
8	28.1	20	8.9
9	23.4	21	8.3
10	19.7	22	7.2
11	16.8	23	5.7

3. Post-Retirement Mortality

Healthy Retirees, 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.

<u>Annual Rate per 1,000 Members</u>		
Attained		
Age in 2020	Males	Females
50	3.98	2.68
55	5.71	3.77
60	8.01	5.64
65	11.47	8.32
70	17.00	12.87
75	27.15	21.14
80	45.85	36.18
85	80.33	64.64

4. Salary Increase Rate

A service-related component shown below, plus a 2.5% inflation component and 1.75% productivity component, as follows:

<u>Years of Service</u>	<u>Service-Related Component</u>	<u>Total Annual Rate of Increase</u>
		<u>Including 2.5% Inflation and 1.75% Productivity Component</u>
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	0.75%	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 1st. 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.

- | | |
|--------------------------------------|---|
| 5. Marital Status | |
| a) Percent married | 85% male and female |
| b) Age difference | Males are assumed to be two years older than females. |
| 6. Benefit Escalation | 2.6% |
| 7. Payroll Growth | 0.00% - The Plan is closed to New Entrants. Therefore, no payroll growth was assumed in the amortization calculation. |
| 8. Third Week Pay Impact | To account for third week pay, an additional salary increase of 0.5% is included after 10 years of service and another 0.5% after 20 years of service. In addition, final average pay is increased by 2% at the time of retirement. This approximates 25% of actives beginning to cash out third week pay in their 11 th year of service, 25% beginning to cash out third week pay in their 21st year of service, and 50% of actives not cashing out until their last 78 months of employment (and then cashing out twice during that time). |
| 9. Administrative Expense | An explicit administrative expense equal to the prior year actual expenses |
| 10. Changes in Actuarial Assumptions | There were no changes in the actuarial assumptions since the prior valuation. |

11. Actuarial Cost Method

Under the entry age actuarial cost method, the normal cost is computed as the level percent of pay, which, if paid from the earliest time each member would have been eligible to join the Plan if it then existed (thus, entry age) until his retirement or termination, would accumulate with interest at the rate assumed in the valuation to a fund sufficient to pay all benefits under the Plan. The normal cost for the Plan is determined by summing the normal cost of all members.

The actuarial accrued liability under this method at any point in time is the theoretical amount of the fund that should have been accumulated had annual contributions been made in prior years equaling to the normal cost. The unfunded actuarial accrued liability/(surplus) is the excess of the actuarial accrued liability over the actuarial value of the Plan assets as of the valuation date.

The contribution requirements determined by this valuation will not be effective until one year later, and the determination of the requirement reflects this deferral. It is assumed that there will be no change in the normal cost due to the deferral, and it is assumed that payments are made monthly throughout the year. The reflection of the one year lag and the timing of the contributions are changes from the methodology of prior valuations.

Under this method, experience gains and losses (i.e. decreases or increases in accrued liabilities), attributable to deviations in experience from the actuarial assumptions, adjust the unfunded actuarial accrued liability.

12. Asset Valuation Method

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.

Table 14 – Summary of Benefit Provisions

Plan Description

Two plans from the City of Colorado Springs joined the Fire & Police Pension Association Defined Benefit System as of October 1, 2006. They are now one single-employer defined benefit pension plan, Colorado Springs New Hire Pension Plan (“Plan”), but with a fire component and a police component for fire and police employees hired by the City of Colorado Springs on or after April 8, 1978 but prior to October 1, 2006. The Plans are closed to new members as of October 1, 2006.

Employers may not withdraw from the Fire & Police Pension Association Defined Benefit System once elected. The Plan members had opportunities to transfer to the Fire & Police Pension Association Defined Benefit System - Statewide Defined Benefit Plan in conjunction with the administrative change. The Plan assets are included in the Fire & Police Members’ Benefit Investment Fund and the Fire & Police Members’ Self-Directed Investment Fund (for Deferred Retirement Option Plan “DROP” assets and Separate Retirement Account assets from eligible retired members).

Plan Year

A twelve-month period ending December 31.

Members Included

Members included are active employees hired on or after April 8, 1978 but prior to October 1, 2006. As of October 1, 2006, administration of the Plan has been transferred to the Fire & Police Pension Association and the Plan has been closed. All members hired on or after October 1, 2006 will become members of the Fire & Police Pension Association Defined Benefit System - Statewide Defined Benefit Plan.

Compensation Considered

Basic salary, including longevity pay, sick pay taken in the normal course of employment, vacation leave pay taken in the normal course of employment, third-week pay and mandatory overtime (including Annual Pay in lieu of leave) that is part of the members annual fixed periodic compensation. Also, all salary amounts deferred for 457 or Section 125 “cafeteria plan” are included.



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 within each component as determined by the actuarial study. Effective January 1, 2019, the Police Component's actuarially determined contribution was \$8,037,168. Of this amount the members of the Plan contributed 8 percent of basic salary and the employer remitted the remainder. Effective January 1, 2020, the actuarially determined contribution is \$11,420,163.

Final Average Salary

Final Average Salary is the average of monthly basic salary compensation awarded to the member during the 18 months immediately preceding termination or retirement.

Normal Retirement Date

A member's Normal Retirement Date shall be the date on which the member has completed at least 25 full years of credited service and has attained age 50.

Normal Retirement Benefit

Any member who elects to retire on or after his Normal Retirement Date shall be eligible for a monthly pension equal to 2 percent of Final Average Salary for each full year of service for the first 10 years, plus 2.75 percent of Final Average Salary for each full year of service in excess of 10 years. The maximum monthly pension is 75 percent of Final Average Salary. The maximum pension is earned upon completing 30 years of service.

Early Retirement Benefit

A member under the Police Component who has a minimum of 20 years of service is eligible to receive a reduced, early retirement pension benefit beginning at age 45. The early retirement pension benefit shall be equal to 2 percent of Final Average Salary for each full year of service for the first 10 years, plus 2.75 percent for each full year of service thereafter, not to exceed the maximum monthly pension benefit of 75 percent, reduced by 7.5 percent for each year and portion thereof that the benefit commences prior to age 50.

Any member hired prior to May 1, 2001, who has completed at least 20 years of service and who has attained the age of 45 years may elect to retire from active service but shall receive 50 percent of the member's Final Average Salary, with that amount reduced by 0.5 percent for each month or portion thereof that such member lacks to attain the age of 50 years as of the date of retirement.



Any member hired after April 30, 2001, and before October 1, 2003, who has completed at least 20 years of service prior to attaining the age of 45 years may elect to retire from active service shall receive 50 percent of the member's Final Average Salary, with that amount reduced by 0.5 percent for each month or portion thereof that such member lacks to attain the age of 50 years as of the date of retirement.

Deferred Retirement Benefit

Any member retiring and eligible for a Normal Retirement Benefit may elect to defer receipt of such pension until attaining the age of 65 years. In the case of such an election, the annual deferred retirement pension shall be actuarially equivalent to the normal retirement pension.

Terminated Vested Benefit

A member who terminates with at least 10 years of active service may leave the contributions in the Plan and when the member attains age 50 be eligible to receive a monthly vested benefit equal to 2 percent of Final Average Salary for each full year of credited service for the first 10 years, plus 2.75 percent of Final Average Salary for each full year of credited service in excess of 10 years. The maximum benefit is 75 percent of Final Average Salary.

Severance Benefit

In lieu of a future pension, a member may, upon termination elect to have the accumulated member contributions refunded in a lump sum. Interest is credited at 5 percent per annum.

Death & Disability Benefit of Active Members

Disabled members and survivors (spouse or dependent children) of active members who die prior to retirement eligibility are covered by the benefits provided by the Fire & Police Pension Association Statewide Death & Disability Plan.

Post-Retirement Death Benefit

If a retired member dies, the "qualified surviving spouse" shall receive, until death, a monthly pension equal to 70 percent of the monthly benefit the member was receiving prior to death, including cost-of-living increases. If there is no "qualified surviving spouse" or if the qualified surviving spouse dies, each qualified surviving child should receive equal shares of the qualified surviving spouses benefit, as long as the child remains a "qualified child." For purposes of this Plan, a spouse includes a partner in a civil union.



Cost-of-Living Adjustment (COLA)

Benefits are increased to reflect increases in the consumer price index but in no case may benefits be increased by more than 3 percent for any one year. Cost-of-living adjustments begin on October 1 immediately prior to the earlier of attainment of age 60 or 10 years after benefit payments commenced.

Deferred Retirement Option Plan (DROP)

A member may elect to participate in the DROP after reaching eligibility for Normal Retirement. 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 a lump sum, if desired. The member continues contributing the member contribution rate which is credited to the DROP. Effective March 1, 2003, the member shall self-direct the investments of their DROP funds.

Purchase of Service Credit

Active members of this Plan may purchase service credit for other employment completed within the United States not covered by this Plan. The cost of such service credit purchase shall be determined by the Fire & Police Pension Association Board of Directors and shall be on an actuarially equivalent basis. A member shall not be allowed to purchase service credit to the extent that the additional accrued benefits derived from the purchased service credit would result in the annual amount of the member's benefit exceeding the annual benefit limitation for defined benefit plans as determined under section 415 of the Internal Revenue Code (Ord. 02-114).

Stabilization Reserve Account (SRA)

Annually, at the discretion of the Fire & Police Pension Association Board of Directors, a contribution may be allocated to the SRA based on the actuarial study for the previous year. Amounts set aside in the SRA are allocated to individual accounts for each member. A member may receive the amount in this individual account upon election of normal, early, vested, disability, deferred retirement, or in the event of the active member's death. If the cost of the defined benefit plan exceeds the combined member/employer contribution rate, funds from the SRA may be used to make up the shortfall. Effective January 1, 2008, the Separate Retirement Account contribution rate for members of the Police Component was set at 0 percent. The rate will remain at 0 percent for calendar years 2019 and 2020.



Table 15 – Definition of Terms

1. Actuarial Cost Method

A method for determining the actuarial present value of future benefits and allocating such value to time periods in the form of a normal cost and an actuarial accrued liability.

2. Present Value of Future Benefits

This is computed by projecting the total future benefit cash flow from the Plan, using actuarial assumptions, and then discounting the cash flow to the valuation date.

3. Normal Cost

Computed differently under different actuarial cost methods, the normal cost generally represents the value of the portion of the participant's anticipated retirement, termination, and/or death and disability benefits accrued during a year.

4. Actuarial Accrued Liability

Computed differently under different actuarial cost methods. Generally actuarial accrued liability represents the value of the portion of the participant's anticipated retirement, termination, and/or death and disability benefits accrued as of the valuation date.

5. Entry Age Actuarial Cost Method

A method under which a participant's actuarial present value of future benefits is allocated on a level basis over the earnings of the participant between his/her entry into the Plan and his/her assumed exit.

6. Unfunded Actuarial Accrued Liability

The difference between total actuarial present value of future benefits over the sum of the tangible assets of the Plan and the actuarial present value of the members' future normal costs. The Plan is underfunded if the difference is positive and overfunded if the difference is negative.

7. Actuarial Value of Assets

The value of cash, investments, and other property belonging to the Plan, as valued by the actuary for purposes of the actuarial valuation.

8. Actuarial Gain or Loss

From one valuation to the next, if the experience of the Plan differs from that anticipated by the actuarial assumptions, an actuarial gain or loss occurs. For example, an actuarial gain would occur if the assets in the trust had a yield of 12% based on actuarial value, while the assumed yield on the actuarial value of assets was 7.5%.

Table 16 - Supplemental Studies

5-year Deterministic Projection

Because the Plan is closed to new members, the amortization policy was changed to be level dollar effective January 1, 2008. As the payroll for the closed group diminishes, it is expected that the normal cost for the group will decrease over time. The amortization payment decreases over the five-year projection period as the outstanding asset gains of \$8.8 million are recognized.

The following exhibit provides an illustration of how the current valuation would expect the contribution amount to change over the next few valuations if all actuarial assumptions are met.

Year	Amortization Cost for UAAL	Normal Cost	Administrative Expenses	Total Contribution
2021	\$ 7,057,773	\$ 5,344,152	\$ 143,204	\$ 12,545,129
2022	7,058,817	4,995,166	133,983	12,187,966
2023	7,075,469	4,644,007	124,722	11,844,198
2024	7,091,297	4,292,374	115,340	11,499,011
2025	7,105,424	3,756,485	101,118	10,963,027

Table 17 – 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 result 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;
4. Longevity risk – members may live longer or shorter than expected and receive pensions for a period of time other than assumed;

The effects of certain trends in experience can generally be anticipated. For example, if the investment return 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 rate shown on page 5 may be considered as a minimum contribution rate that complies with the Plan's funding policy. 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.

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:

	<u>January 1, 2020</u>	<u>January 1, 2019</u>
Ratio of actives to retirees and beneficiaries	0.8	0.8
Ratio of net cash flows to market value of assets	-1.8%	-1.4%
Duration of the present value of future benefits	14.3	14.6

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.

Ratio of net Cash Flow to 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 Actuarial Accrued Liability

The duration of the actuarial accrued liability 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 liability would increase approximately 10% if the assumed rate of return were lowered 1%.

Additional Risk Assessment

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability.



Fire and Police Pension Association Statewide Defined Benefit Plan

Actuarial Valuation Report
for the Year Beginning January 1, 2020





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 Defined Benefit Plan (the Plan) as of January 1, 2020

Dear Members of the Board:

We are pleased to present our Report on the actuarial valuation of the Statewide Defined Benefit Plan for the Fire and Police Pension Association (FPPA) as of January 1, 2020.

We certify that the information included herein and contained in our 2020 Actuarial Valuation Report is accurate and fairly presents the actuarial position of the FPPA Statewide Defined Benefit Plan as of January 1, 2020.

Our Report presents the results of the January 1, 2020 actuarial valuation of the FPPA Statewide Defined Benefit Plan (SWDB). The Report describes the current actuarial condition of the SWDB, 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.

House Bill 20-1044

During 2020, House Bill 20-1044 was passed. The measures enacted in the bill are reflected in this valuation, including:

- Increased employer contributions starting in 2021. Currently employers contribute 8.0% of pay. Starting in 2021, employer contributions are increased by 0.50% until reaching 13.0% in 2030. For members covered by the Supplemental Social Security provisions, rates continue to be half the rates for those associated with the standard plan.
- Introduced the Rule of 80 as part of Normal Retirement eligibility. Members who attain a minimum age of 50 plus service greater than or equal to 80 can retire immediately with unreduced benefits.

- Allowed the Board to reduce the additional contributions being charged on behalf of reentry members.
- Converted Stabilization Reserve Accounts to self-directed accounts effective January 1, 2021. (This will be reflected in the actuarial valuation as of January 1, 2021).

Financing Objectives

Contribution rates are established by law as a percentage of payroll. The valuation process verifies that the employer contributions, when combined with the contributions made by members, are intended to provide for the Normal Cost and to amortize any Unfunded Actuarial Accrued Liability (UAAL) as a level percentage of payroll over a single amortization period not to exceed 30 years, and such that the amortization payment is sufficient to pay the interest on the unfunded liability. This contribution amount is defined as the Actuarially Determined Contribution (ADC) in this report.

Progress toward Realization of Financing Objectives

In 2014, the members elected to increase the member contribution rate to the Plan beginning in 2015. For fiscal year 2020, the member contribution rate for the standard SWDB plan is 11.00% of base salary. Member contribution rates will increase 0.50% annually through 2022 to a total of 12.00% of base salary. Appendix B outlines the member contribution rates for the 3 components of the SWDB plan.

Currently employers contribute 8.0% of pay. In 2020, House Bill 20-1044 was passed which increased employer contributions starting in 2021. The contributions increase by 0.50% per year until an ultimate rate of 13.0% is reached in 2030.

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 our actuarial valuation as of January 1, 2020, the Plan now has assets of \$71.4 million less than current liabilities assuming no allowance for future discretionary benefit adjustments. The prior year the plan had assets of \$37.6 million less than liabilities.

As listed in the Executive Summary under Section I of our Report, the normal cost rate of the Plan is 16.52% of payroll as of January 1, 2020 and administrative expenses are estimated to be 0.48% of payroll. Since the employer contribution rate plus the member contribution rate totals 19.00% of payroll for 2020, an additional amount of 2.00% of payroll is available to amortize any UAAL that exists or to provide some level of future discretionary benefit adjustments. The contributions are sufficient to fund the unfunded liabilities.



The contribution rate required to fund the benefits (assuming no future discretionary benefit adjustments) is 17.65%. This rate is the normal cost rate, which is 16.52% of payroll, plus 0.48% of payroll to cover administrative expenses, plus the amount needed to fund at least the interest on the unfunded liability, which is 0.65% of payroll.

The recommended annual Stabilization Reserve Account contribution is 0.00% effective July 1, 2020. This recommendation is made in light of the FPPA Board's "Statewide Defined Benefit Plan Benefits Policy", adopted June 12, 2015, to prioritize funding for benefit adjustments rather than provide allocations to the Stabilization Reserve Account.

Benefit provisions

House Bill 20-1044 increased employer contributions and implemented the Rule of 80 for Normal Retirement eligibility. All other benefit provisions are the same as those used in the prior valuation. The benefit provisions are summarized in Appendix B of our Report.

Assumptions and methods

The current actuarial methods and assumptions were selected by the Board of Directors of FPPA based upon the actuary's analysis and recommendations from the 2018 Experience Study, for first use in the actuarial valuation as of January 1, 2019. For information regarding the rationale for the assumptions chosen, please see the experience study report dated September 21, 2018. In conjunction with the Rule of 80 Normal Retirement eligibility, additional retirement rates were included for those meeting the Rule of 80 eligibility prior to age 55, effective with this valuation.

The 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.

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 have concluded that the data is reasonable and consistent with the prior year's data. FPPA also supplied asset data as of January 1, 2020.



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 table on the following page 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 2020 are based on the same assumptions, methods and provisions used for the January 1, 2020 valuation. The projections assume the Board will grant benefit adjustments according to their current breakeven policy. For additional information see the "Discretionary Benefit Adjustments" portion of the Discussion Section.

5-Year Deterministic Projection						
January 1,	Market Value Investment Return					
	3.00%		7.00%		11.00%	
	FR	ADC	FR	ADC	FR	ADC
2020	97.6%	17.65%	97.6%	17.65%	97.6%	17.65%
2021	98.0%	17.57%	98.7%	17.36%	99.3%	17.19%
2022	97.9%	17.61%	100.1%	17.00%	102.0%	16.56%
2023	97.3%	17.81%	101.6%	16.65%	105.7%	15.73%
2024	96.1%	18.19%	103.1%	16.30%	110.1%	14.69%
2025	94.4%	18.75%	104.2%	16.02%	114.7%	13.52%

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.



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 and ERISA.

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



Table of Contents

	<u>PAGE</u>
Section I	Executive Summary 2
Section II	Discussion 5
Section III	Tables
	1 – Development of Contribution Rate..... 18
	2 – Actuarial Present Value of Future Benefits 19
	3 – Analysis of Normal Cost by Component 20
	4a – Actuarial Gain/(Loss) on UAAL 21
	4b – Analysis of Change in Calculated Contribution Rate 22
	5 – Summary of Historical Valuation Results..... 23
	6 – Allocation of Plan Assets at Fair Value..... 24
	7 – Reconciliation of Plan Net Assets..... 25
	8 – Development of Actuarial Value of Assets 26
	9 – Investment Yields..... 27
	10 – Gain/(Loss) on Actuarial Value of Assets 28
	11 – History of Investment Return Rates..... 29
	12 – Schedule of Funding Progress 30
	13 – Solvency Test 31
	14 – Cash Flow Analysis 32
	15 – Membership Data 33
	16 – Historical Summary of Active Member Data 34
	17 – Distribution of Active Members by Age and by Years of Service As of December 31, 2019 35
	18 – Schedule of Retirants & Annuitants Added to & Removed from Rolls 36
	19 – Summary of Members and Adjusted Payroll by Employer 37
Section IV	Appendix A – Summary of Actuarial Methods and Assumptions..... 45
	Appendix B – Summary of Benefit Provisions 54
	Appendix C – Risks Associated with Measuring the Accrued Liability and Actuarial Determined Contribution 64

SECTION I

EXECUTIVE SUMMARY

Executive Summary

Item	January 1, 2020	January 1, 2019
Membership		
• Number of:		
- Active members	8,953	8,398
- Retirees	1,362	1,222
- DROP Retirees	273	296
- Beneficiaries	97	74
- Inactive members	<u>1,281</u>	<u>1,173</u>
- Total	11,966	11,163
• Annualized payroll supplied by FPPA	\$ 729,346	\$659,583
Assets		
• Market value	\$ 2,975,935	\$2,526,693
• Actuarial value	\$ 2,900,631	\$2,615,483
• Rate of return on market value	14.4%	-0.1%
• Rate of return on actuarial value	7.7%	6.1%
• Contribution for prior year	\$ 170,971	\$199,491
• Ratio of actuarial value to market value	97.5%	103.5%
Actuarial Information		
• Total normal cost %	16.52%	16.11%
• Unfunded actuarial accrued liability/(surplus)	\$ 71,387	\$37,637
• Amortization rate	0.65%	0.38%
• Total required contribution %	17.65%	16.97%
• Funded ratio	97.6%	98.6%

Note: Dollar amounts in \$000

Executive Summary

1. The Actuarially Determined Contribution (ADC) rate (with no future benefit adjustments) increased from 16.97% to 17.65% as of January 1, 2020. The majority of this increase was due to the implementation of the Rule of 80 for Normal Retirement eligibility that was part of HB 20-1044.
2. Assets earned 14.4% on a market basis and 7.7% on an actuarial, smoothed, basis in 2019, producing an actuarial gain of \$18.83 million.
3. The funded ratio decreased from 98.60% to 97.60% as of January 1, 2020. This was due to the implementation of the Rule of 80 for Normal Retirement eligibility that was part of HB 20-1044.
4. Based on the FPPA Board's "Statewide Defined Benefit Plan Benefits Policy", adopted June 12, 2015, to prioritize funding for benefit adjustments, we recommend a Stabilization Reserve Account (SRA) contribution of 0.00% for the year beginning July 1, 2020.
5. Given the plan's contribution policy, if all actuarial assumptions are met (including the assumption of the plan earning 7.00% on the actuarial valuation of assets), it is expected that:
 - a. The employer normal cost as a percentage of pay will remain level over time,
 - b. The unfunded liability will be paid off over time and eventually the plan will start to slowly fund surplus assets which can be used to provide a margin for adverse experience and provide for future benefit adjustments, and
 - c. The funded status of the plan will increase gradually.

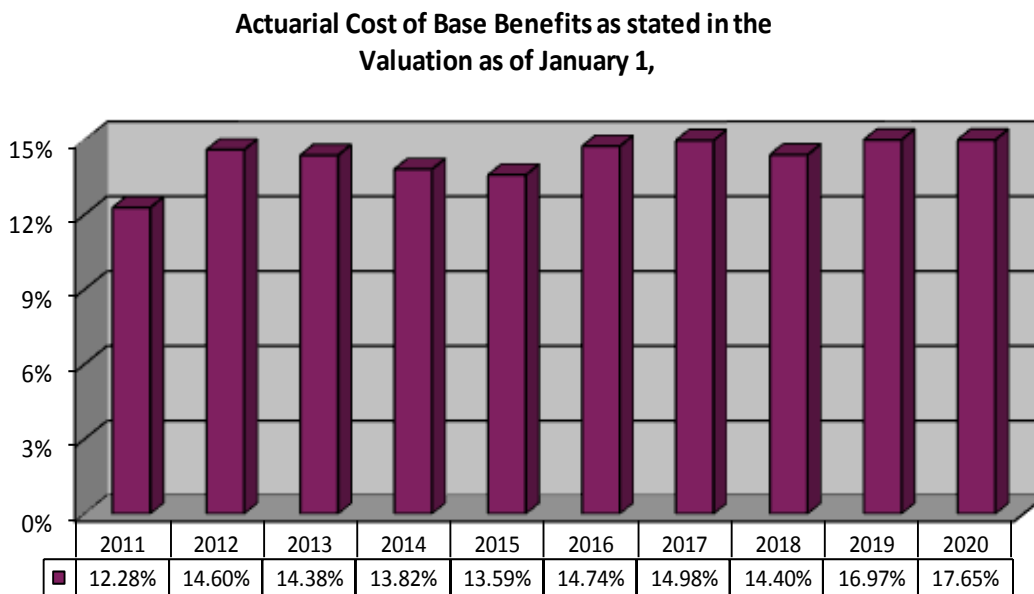
SECTION II

DISCUSSION

Contribution Requirements

The valuation of the Fire and Police Pension Association Statewide Defined Benefit Plan (SWDB) as of January 1, 2020, reflects a combined employer and member contribution rate for 2020 of 19.00% for the standard plan. Member contribution rates will increase 0.50% annually through 2022 to a total of 12.00% of base salary. With the passage of HB 20-1044, employer contribution rates will increase from the current level of 8.0% by 0.50% per year until the ultimate rate of 13.0% is reached in 2030, making the total ultimate contribution rate 25.00%. The Actuarially Determined Contribution (ADC) rate (with no future benefit adjustments) increased from 16.97% to 17.65% as of January 1, 2020. The majority of this increase was due to the implementation of the Rule of 80 for Normal Retirement eligibility that was part of HB 20-1044.

The following graph shows the historical costs of providing benefits as a percentage of payroll.



The computed contribution rate shown above may be considered as a minimum contribution rate that complies with the Board's funding policy.

Effective January 1, 2007, members currently covered under social security were transferred into the new FPPA supplemental social security program. The new plan is designed to give half the benefit when compared to the SWDB for half the cost. Employee and employer contributions are half those of the standard plan, with an ultimate employer contribution rate of 6.50% and combined contribution rate of 12.50% in 2030.

The plan membership also includes a group of employers whose contribution rates differ from the main section of the populations due to reentry in the SWDB plan. This valuation calculates what the contribution rate for those members needs to be for the next fiscal year. Historically and during 2020, there has been an additional 4.0% contribution for these members.

These employers reentered FPPA as a whole after the membership had matured. No prior service was granted for benefit purposes but prior service was granted for eligibility purposes. The membership does have the opportunity to purchase their prior service at an actuarially equivalent price. This group has a higher average entry age than the rest of the population and therefore a higher normal cost even though this difference has been decreasing over time. The appropriate contribution rate for this current reentry group is the 19.00% plus the difference in the normal cost when compared to the general population. Therefore, the cost of benefits for this group is 19.20%. Because the combined employer/member contribution rate of this group is 23.00%, the recommended reentry SRA contribution for this group is 3.80%. This amount is necessary in order to properly reflect that the equivalent contribution rate for this group is not 23.00%, but 19.20%.

The following table presents the various costs for the two groups of SWDB participants:

	Ordinary Members	Members whose departments reentered	Difference
Normal Cost assuming no future benefit adjustments	17.00%	17.17%	0.17%
Total Contribution	19.00%	19.20%	0.20%

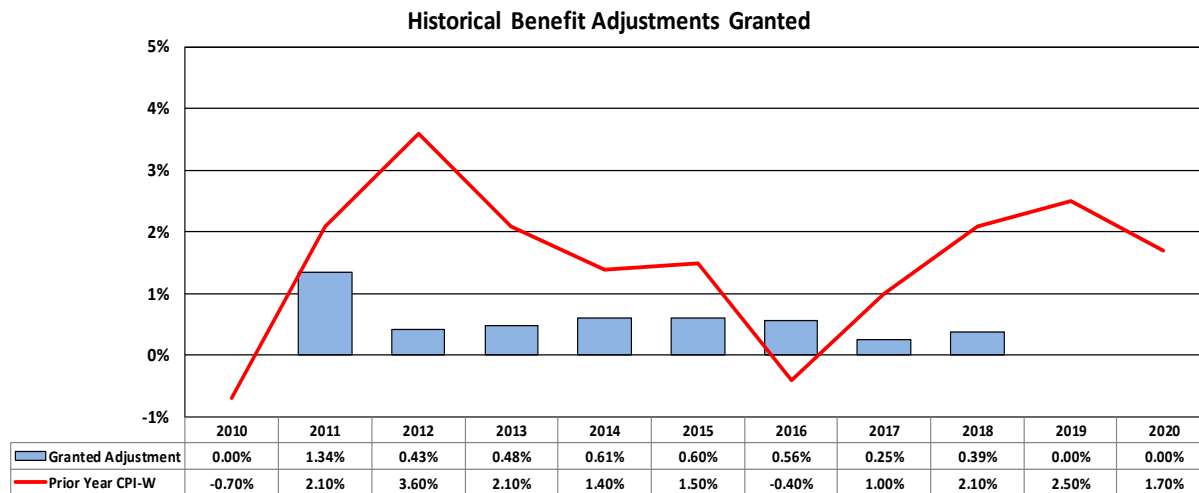
Starting in 2021, the Board will reduce the required additional contribution to 0.2%, for any employers that reentered the plan by January 1, 2021. This additional contribution will be assumed to cover the ongoing additional cost for this group. Employers reentering the plan thereafter will have additional contributions determined that reflect the demographics of the specific covered group.

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 the higher of 3% or the change in CPI. Because the increases are purely discretionary, the valuation results in the report are shown assuming no further benefit adjustments are granted. Historically (until 2009), the Board granted benefit adjustments that reflected an increase similar to the change in CPI-W. In 2009, the Board began granting benefit adjustments based on an actuarial calculation which determined the permanent benefit adjustment supported by the total contribution rate. In 2015, the Board adopted a new formal policy summarized below which largely determines the permanent benefit adjustment which can be supported on an actuarial basis using only current surplus assets.

The average benefit adjustment granted by the Board since 1981 has been 2.1%. The chart on the following page shows the benefit adjustments granted by the Board during the last 10 years and the change in CPI-W during that period.

The current valuation results indicate that the plan cannot currently support a permanent annual benefit adjustment. The result of the FPPA Board's "Statewide Defined Benefit Plan Benefits Policy", adopted June 12, 2015, regarding benefit adjustments is 0% based on this valuation. If all assumptions are met, it is expected that the current funding policy will fund the unfunded liability over time and the plan will be in a position to grant an adjustment under the Benefits Policy sometime in the next decade.



Stabilization Reserve Account (SRA)

Amounts set aside in the SRA are allocated to individual accounts for each active plan member. A member may receive the amounts in the individual account only upon death or the election of normal, early, disability or vested retirement. If the cost of the defined benefit plan exceeds the combined member/employer contribution rate, funds from the SRA can be used to make up the shortfall. Based on the FPPA Board's "Statewide Defined Benefit Plan Benefits Policy", adopted June 12, 2015, to advance fund future benefit adjustments before providing a Stabilization Reserve Account contribution, the recommended annual Stabilization Reserve Account contribution is 0.00% effective July 1, 2020. The recommended annual Stabilization Reserve Account contribution has been 0.00% since July 1, 2008. Effective January 1, 2021, these will become member directed accounts.

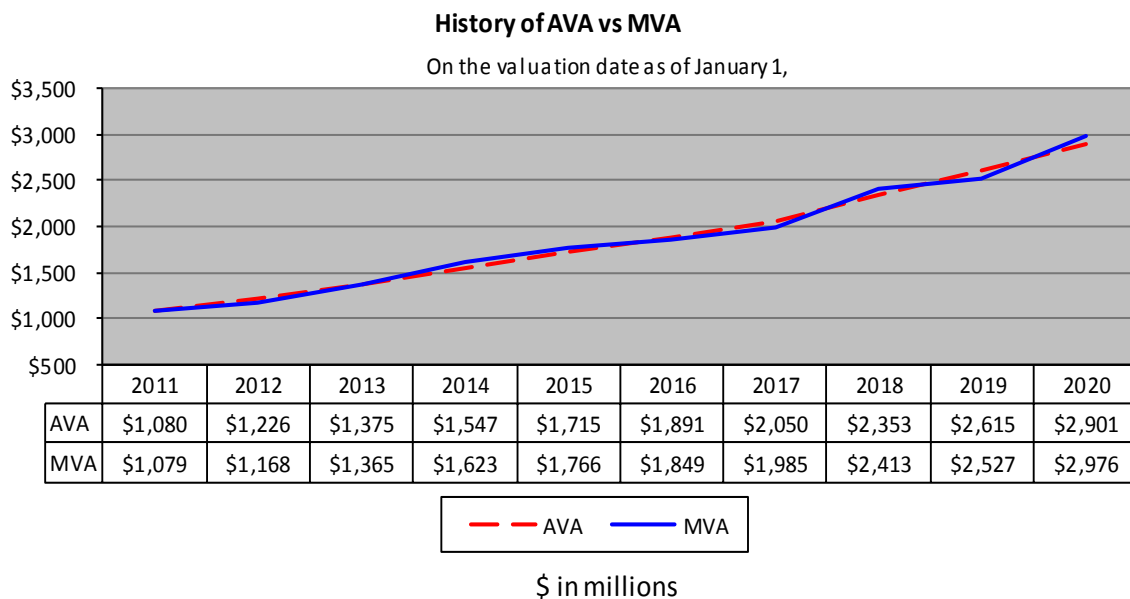
Financial Data and Experience

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 SWDB. FPPA provided GRS with a summary of Plan assets as of January 1, 2020. The market value of assets (MVA) reported was \$2,975.90 million as of January 1, 2020, as compared to \$2,526.70 million as of January 1, 2019. 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). Historically, returns have been 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 \$2,615.50 million to \$2,900.60 million since the prior valuation. This increase was less than expected and produced a loss of approximately \$18.83 million.

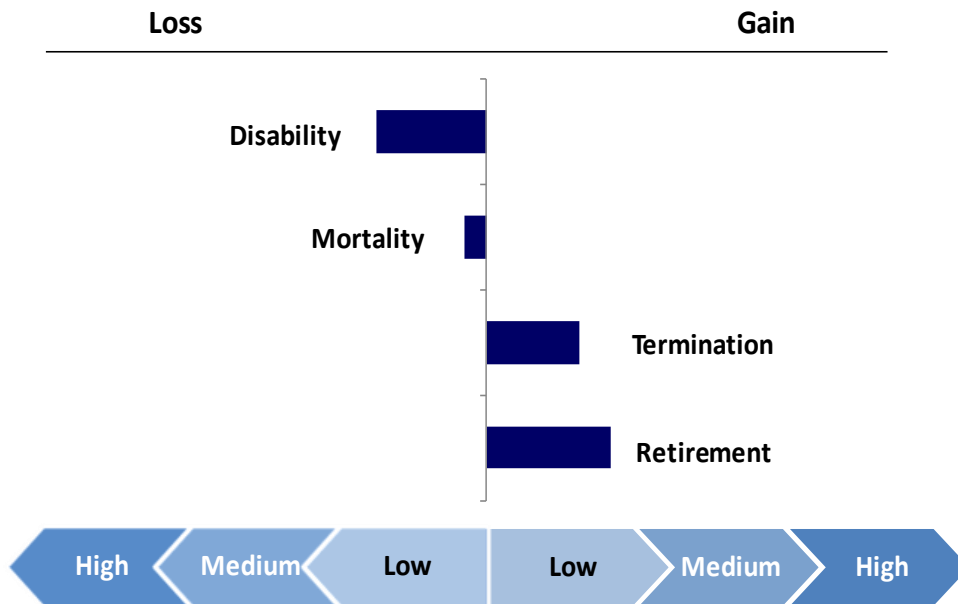
Effective January 1, 2012, the valuation assumed investment return was reduced from 8.0% to 7.5% per year. Effective January 1, 2019, the valuation assumed investment return was reduced from 7.5% to 7.0% per year. As indicated by item 8b of Table 9, the estimated return on mean market value was 14.4% in 2019, higher than the 7.0% assumption. The return on the actuarial value of assets was 7.7%, higher than the 7.0% assumption. This difference in the estimated return on market value and actuarial value illustrates the smoothing effect of the asset valuation method.



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

Demographic Experience

During the year, the plan had overall liability gains due to demographic experience. There were less disabilities than expected, more terminations than expected, and less retirements than expected.

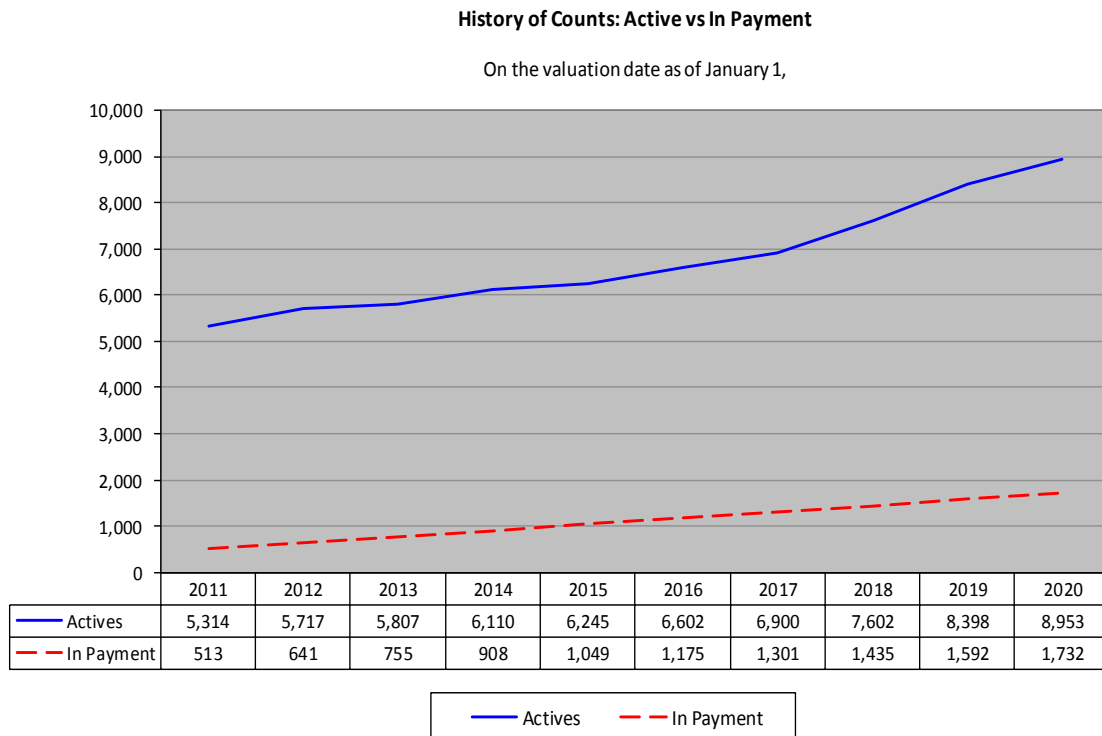


Member Data

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 contribution, and the accumulated stabilization reserve account. 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.



The active population has historically increased at a rapid rate due to reentry groups. There are a limited number of reentry groups and we do not anticipate that the historical trend in the active population will continue.

Benefit Provisions

Appendix B in Section IV includes a summary of the benefit provisions for the SWDB Plan. Highlights include:

- Normal Retirement
 - o Eligibility: Age 55 and 25 years of service or attainment of Age 50 and Age Plus Service Greater Than or Equal to 80 (Rule of 80)
 - o Annual Benefit: 2% of the average of the member's highest three years base salary for first 10 years of service credit and 2.5% for each year after 10. Members of the Supplemental Social Security component accrued benefits at half this rate.
 - o Payment Form: Benefits are paid as a monthly life annuity. Optional forms of payment are available.
- Contributions: Employers currently contribute 8.0% of payroll. This rate is scheduled to increase by 0.5% per year until reaching 13.0% in 2030. Members of this fund and are currently contributing at the rate of 11.00% of base salary in 2020. This rate is scheduled to increase by 0.5% per year until reaching 12.0% in 2022. Members who were active at the time of a department reentry have an additional 4.0% of base salary contributed, split between members and employers as determined by that department. This rate will be reduced to 0.2% in 2021. Members of the Supplemental Social Security component and their employers contribute half the non-reentry rate.
- Benefit adjustments are granted periodically at the discretion of the FPPA Board.

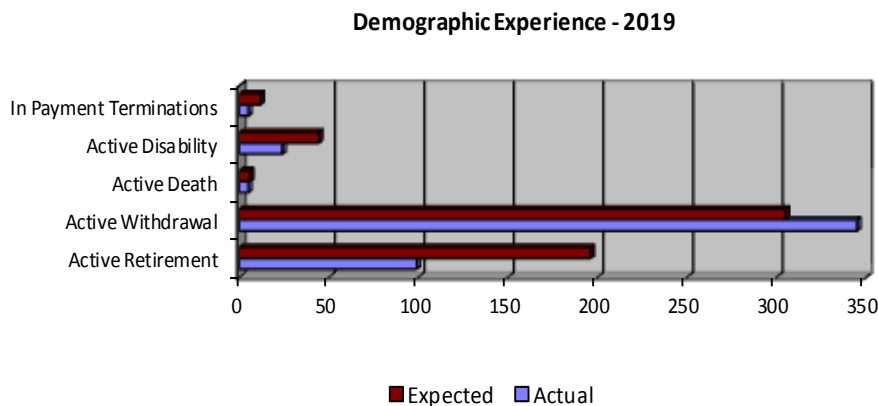
Actuarial Methods and Assumptions

The valuation was prepared using the Entry Age Normal Method. This is the same funding method that has been used in prior years. The asset valuation method uses a five-year phase in of the excess/(shortfall) between expected investment return and actual income. 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.

Since the prior valuation, the retirement rates were adjusted to reflect the Rule of 80 Normal Retirement eligibility. No other changes were made to assumptions or methods.

For FY 2019, the actual salary increases were 100.9% of expected. The following charts provide a comparison of the actual experience versus the expected experience for selected demographic assumptions.



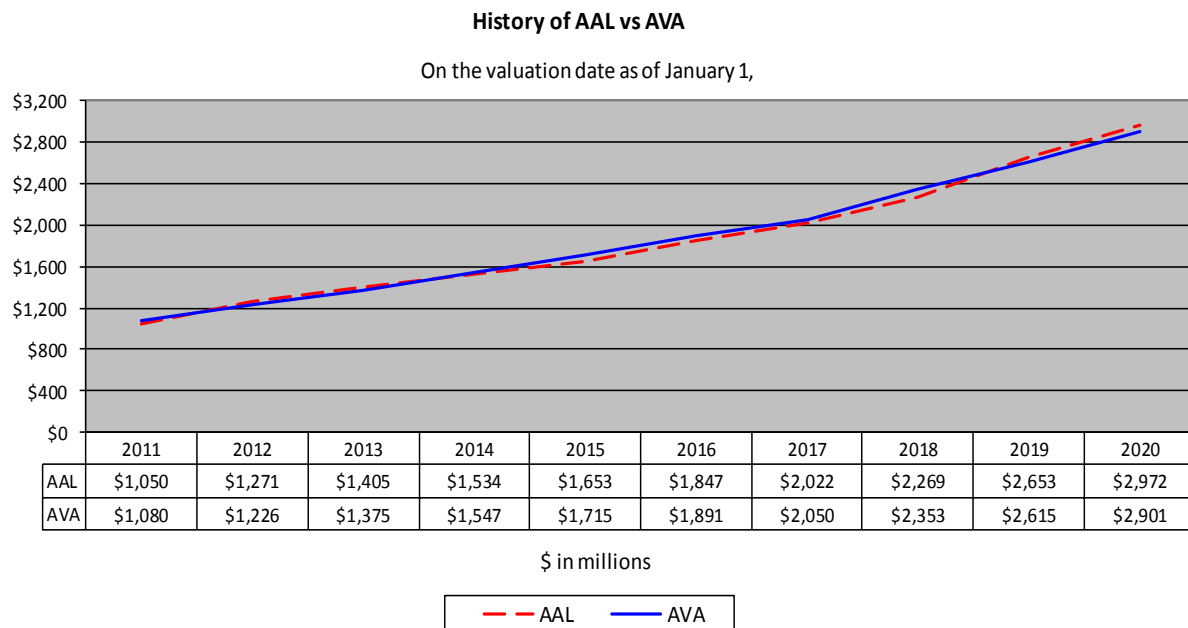
The In Payment Terminations above include deaths and benefits that were canceled for other reasons.

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.

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 graph on the following page shows the trend of assets and liabilities over the last decade.



The AAL referenced above is the actuarial accrued liability and the AVA is the actuarial value of assets.

Significant Factors Affecting Trends in Actuarial Information

Although House Bill 20-1044 increased the plan liabilities and normal costs due to the addition of Rule of 80 Normal Retirement eligibility, the overall impact, including the additional employer contributions, is to greatly improve the long-term funding trajectory of the plan. With the additional future contributions, it is expected that the funded status of the plan will gradually improve over time. This will provide protection against adverse deviation and potential to pay future benefit adjustments.

Risk Metrics

The Statewide Defined Benefit Plan is a defined benefit plan for Colorado Fire and Police employees hired on or after April 8, 1978. In comparison to its public sector peers, the Statewide Defined Benefit could be considered a “young” plan as the Plan’s liabilities are still largely attributable to active members and are comparably small in relation to the active member payroll. Historically, in addition to new hires and wage inflation, the Statewide Defined Benefit payroll has grown through additional affiliations into the Plan (reentry groups). 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.

Over time, as with all defined benefit plans, the Statewide Defined Benefit Plan active member population will stabilize and the retiree population will continue to grow, thus becoming more leveraged in relation to the active payroll. The funded status and contribution requirements will become more volatile as a result and the Board will have to give added consideration to the impact from possible adverse experience.

Valuation Year	AVA as % of Covered Payroll	AAL as % of Covered Payroll	ADC as % of Covered Payroll	Increase in ADC if Assets Decrease 10%	Funded Ratio	Change in Funded Ratio if Assets Decrease 10%
2007	295%	241%	8.29%	1.61%	122.5%	-12.3%
2008	304%	254%	9.98%	1.63%	119.4%	-11.9%
2009	253%	251%	12.51%	1.36%	101.0%	-10.1%
2010	265%	265%	12.66%	1.53%	100.0%	-10.0%
2011	306%	297%	12.28%	1.60%	102.9%	-10.3%
2012	318%	330%	14.60%	1.68%	96.4%	-9.6%
2013	338%	346%	14.38%	1.80%	97.9%	-9.8%
2014	363%	359%	13.82%	1.99%	100.9%	-10.1%
2015	389%	375%	13.59%	2.10%	103.8%	-10.4%
2016	399%	390%	14.74%	2.17%	102.4%	-10.2%
2017	399%	393%	14.98%	2.15%	101.4%	-10.1%
2018	407%	393%	14.40%	2.25%	103.7%	-10.4%
2019	397%	402%	16.97%	2.64%	98.6%	-9.9%
2020	398%	407%	17.65%	2.64%	97.6%	-9.8%

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 Results

Investment gains and losses are smoothed over five years, and currently, the smoothed or actuarial value of assets is 97.5% of the market value. If the Funded Ratio and Actuarially Determined Contribution had been measured using the Market Value of Assets, they would be 100.13% and 16.97% of payroll, respectively.

SECTION III

TABLES

Table 1 - Development of Contribution Rate

	January 1, 2020	January 1, 2019
1. Covered payroll for upcoming year	\$ 765,887,787	\$ 690,178,503
2. Present value of future pay	\$ 7,701,030,441	\$ 7,170,731,061
3. Total normal cost rate	16.52%	16.11%
4. Actuarial accrued liability for active members		
a. Present value of future benefits for active members	\$ 3,102,077,024	\$2,774,635,231
b. Less: present value of future normal costs	(1,270,601,914)	(1,149,819,719)
c. Actuarial accrued liability (a - b)	\$ 1,831,475,110	\$ 1,624,815,512
5. Total actuarial accrued liability for:		
a. Retirees and beneficiaries	\$ 893,976,665	\$ 814,311,945
b. Inactive members (terminated vested and nonvested)	126,605,929	105,165,501
c. Active members (Item 4c)	1,831,475,110	1,624,815,512
d. Stabilization reserve account	119,960,376	108,827,303
e. Total	\$ 2,972,018,080	\$ 2,653,120,261
6. Actuarial value of assets	\$ 2,900,630,940	\$ 2,615,483,150
7. Unfunded actuarial accrued liability (UAAL)/(surplus) (Item 5e - Item 6)	\$ 71,387,140	\$ 37,637,111
8. Contribution requirement		
a. UAAL amortization payment as % of pay	0.65%	0.38%
b. Normal cost	16.52%	16.11%
c. Administrative expense	0.48%	0.48%
d. Contribution requirement (a + b + c)	17.65%	16.97%

Table 2 - Actuarial Present Value of Future Benefits

	January 1, 2020	January 1, 2019
1. Active members		
a. Retirement benefits	\$ 2,963,596,377	\$ 2,651,955,419
b. Deferred termination benefits	88,681,534	81,111,894
c. Refunds	43,051,378	36,322,908
d. Death benefits	6,747,735	5,245,010
e. Total	<u>\$ 3,102,077,024</u>	<u>\$ 2,774,635,231</u>
2. Members in pay status		
a. Service retirements	\$ 871,806,774	\$ 796,400,052
b. Beneficiaries	22,169,891	17,911,893
c. Total	<u>\$ 893,976,665</u>	<u>\$ 814,311,945</u>
3. Inactive members		
a. Vested terminations	\$ 82,360,817	\$ 64,960,535
b. Nonvested terminations	44,245,112	40,204,966
c. Total	<u>\$ 126,605,929</u>	<u>\$ 105,165,501</u>
4. Stabilization Reserve Account	\$ 119,960,376	\$ 108,827,303
5. Total actuarial present value of future benefits	\$ 4,242,619,994	\$ 3,802,939,980

Table 3 - Analysis of Normal Cost by Component

	<u>January 1, 2020</u>	<u>January 1, 2019</u>
1. Retirement benefits	14.60%	14.22%
2. Deferred termination benefits	0.78%	0.78%
3. Refunds	1.11%	1.09%
4. Death benefits	<u>0.03%</u>	<u>0.02%</u>
5. Total normal cost	16.52%	16.11%

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	\$ 37,637,111	\$ (83,831,177)
1.b. Unfunded actuarial accrued liability (UAAL) as of January 1 of prior year after incorporation of the experience study recommendations	\$ 37,637,111	\$ 31,986,763
2. Total normal cost for year (Normal Cost % x actual payroll paid during year)	123,054,397	108,330,841
3. Non service purchase contributions during year ending December 31	(135,135,050)	(115,910,420)
4. Interest on UAAL for one year	2,634,598	2,239,073
5. Interest on Item 2 and Item 3 for one-half year	(415,672)	(260,798)
6. Expected UAAL as of January 1 (1 + 2 + 3 + 4 + 5)	\$ 27,775,384	\$ 26,385,459
7. Actual UAAL at end of year	\$ 71,387,140	\$ 37,637,111
8. Actuarial gain/(loss) for the period (6 - 7)	\$ (43,611,755)	\$ (11,251,652)
<u>SOURCE OF GAINS/(LOSSES)</u>		
9. Asset gain/(loss) (See Table 10)	\$ 18,826,035	\$ (22,197,585)
10. SRA liability gain/(loss) for the period (unsmoothed)	\$ (10,754,894)	\$ 9,560,020
11. Salary liability gain/(loss) for the period	\$ (8,579,325)	\$ (11,839,691)
12. Benefit Adjustment Granted as of October 1 (0.00% in 2019, 0.39% in 2018)	\$ 0	\$ (2,691,408)
13. Changes to benefit provisions (Rule of 80) from House Bill 20-1044	\$ (52,639,342)	N/A
14. Net liability gain/(loss) for the period (8 - 9 - 10 - 11 - 12 - 13)	\$ 9,535,771	\$ 15,917,012

Table 4b - Analysis of Change in Calculated Contribution Rate

	<u>January 1, 2020</u>	<u>January 1, 2019</u>
A. Results Assuming No Future Benefit Adjustments		
1. Recommended contribution rate as of last valuation	16.97%	14.40%
2. Change in contribution rate during year		
a. Change in normal cost*	0.41%	(0.06%)
b. Change in assumptions	0.00%	2.63%
c. Change in benefit provisions*	0.39%	0.00%
d. Impact of contributing less/(more) than calculated rate	(0.09%)	(0.05%)
e. Recognition of asset losses/(gains)	(0.15%)	0.21%
f. Effect of payroll growth	0.00%	(0.05%)
g. Benefit adjustment granted October 1, (year preceding valuation)	0.00%	0.02%
h. Resetting Funding Period to 30 Years	(0.01%)	(0.01%)
i. Actuarial (gain)/loss from other liability sources	0.13%	(0.12%)
j. Total change	0.68%	2.57%
3. Recommended contribution rate as of this valuation	17.65%	16.97%

*Change in benefit provisions in item 2c reflects only the amortization of the additional liability created by the Rule of 80 Normal Retirement eligibility. The change in normal cost in item 2a is primarily attributable to the Rule of 80. Thus, the total impact of the provision change is approximately 0.8%.

Table 5 - Summary of Historical Valuation Results

As of the Valuation Date January 1,										
	<u>2020</u>	<u>2019</u>	<u>2018</u>	<u>2017</u>	<u>2016</u>	<u>2015</u>	<u>2014</u>	<u>2013</u>	<u>2012</u>	<u>2011</u>
1. Number of Members										
a. Active	8,953	8,398	7,602	6,900	6,602	6,245	6,110	5,807	5,717	5,314
b. Retired/DROP/Beneficiaries	1,732	1,592	1,435	1,301	1,175	1,049	908	755	641	513
c. Inactive members	<u>1,281</u>	<u>1,173</u>	<u>1,066</u>	<u>939</u>	<u>846</u>	<u>725</u>	<u>637</u>	<u>573</u>	<u>501</u>	<u>499</u>
d. Total	11,966	11,163	10,103	9,140	8,623	8,019	7,655	7,135	6,859	6,326
2. Covered payroll (prior year)	\$ 729,346	\$ 659,583	\$ 577,624	\$ 513,837	\$ 473,360	\$ 441,314	\$ 426,690	\$ 406,259	\$ 384,804	\$ 353,485
3. Average Compensation	\$ 81.5	\$ 78.5	\$ 76.0	\$ 74.5	\$ 71.7	\$ 70.7	\$ 69.8	\$ 70.0	\$ 67.3	\$ 66.5
4. Covered payroll for upcoming year	\$ 765,888	\$ 690,179	\$ 595,034	\$ 536,430	\$ 496,733	\$ 465,325	\$ 449,010	\$ 440,873	\$ 411,051	\$ 378,877
5. Actuarial Value of Assets	\$ 2,900,631	\$ 2,615,483	\$ 2,353,242	\$ 2,050,114	\$ 1,890,604	\$ 1,714,971	\$ 1,546,834	\$ 1,374,577	\$ 1,225,538	\$ 1,080,284
6. Market Value of Assets	\$ 2,975,935	\$ 2,526,693	\$ 2,413,276	\$ 1,985,393	\$ 1,848,725	\$ 1,765,759	\$ 1,623,050	\$ 1,365,232	\$ 1,168,400	\$ 1,079,348
7. Present Value of Benefits										
a. Retired/Beneficiaries	\$ 893,977	\$ 814,312	\$ 690,105	\$ 619,451	\$ 550,165	\$ 469,967	\$ 401,555	\$ 318,254	\$ 261,825	\$ 184,827
b. Terminations	126,606	105,166	88,614	72,477	58,821	51,525	42,303	37,451	34,400	25,972
c. Actives	3,102,077	2,774,635	2,238,858	1,986,185	1,832,618	1,680,050	1,613,689	1,541,950	1,448,314	1,203,990
d. Reserve Account	<u>119,960</u>	<u>108,827</u>	<u>119,755</u>	<u>111,176</u>	<u>111,750</u>	<u>117,009</u>	<u>106,084</u>	<u>102,709</u>	<u>97,802</u>	<u>104,988</u>
Total	\$ 4,242,620	\$ 3,802,940	\$ 3,137,331	\$ 2,789,289	\$ 2,553,355	\$ 2,318,551	\$ 2,163,630	\$ 2,000,365	\$ 1,842,341	\$ 1,519,776
8. Total Recommended Contribution										
a. Amount	\$ 135,192	\$ 117,134	\$ 85,686	\$ 80,348	\$ 73,222	\$ 63,243	\$ 62,031	\$ 63,382	\$ 60,003	\$ 46,515
b. Percent of Pay	17.65%	16.97%	14.40%	14.98%	14.74%	13.59%	13.82%	14.38%	14.60%	12.28%
c. SRA Allocation	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

\$ amounts in '000s



Table 6 - Allocation of Plan Assets at Fair Value

	<u>Actual Allocation at January 1, 2020</u>	<u>Target Allocation</u>
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	<u>0.8%</u>	<u>2.0%</u>
	100.0%	100.0%

Asset Allocation as of January 1, 2020

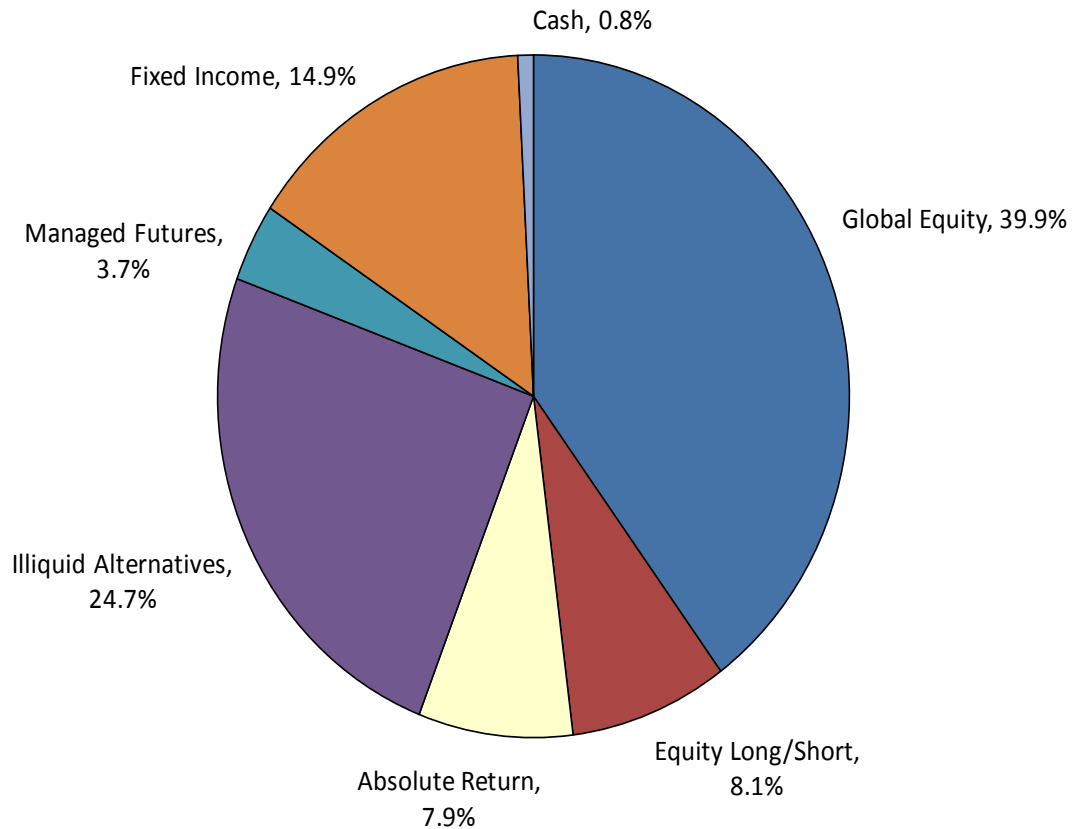


Table 7 - Reconciliation of Plan Net Assets

	Year Ending	
	December 31, 2019	December 31, 2018
1. Market value of assets at beginning of year	\$ 2,526,692,808	\$ 2,413,276,447
2. Revenue for the year		
a. Contributions and Affiliations		
i. Member contributions	\$ 112,362,120	\$ 147,886,813
ii. Employer contributions	58,608,381	51,566,487
iii. SWDD roll to normal contributions	0	38,108
b. Net investment income		
i. Interest	\$ 13,138,414	\$ 10,329,310
ii. Dividends	17,247,532	19,068,391
iii. Net change in accrued income	584,446	1,179,778
iv. Unrealized gain/(loss)	117,328,810	(144,825,573)
v. Realized gain/(loss)	232,874,904	120,100,299
vi. Defined contribution earnings (net)	(10,786)	(11,618)
vii. Investment expense	(23,140,742)	(21,963,037)
viii. Other income	10,796,568	13,875,096
c. Total revenue	\$ 539,789,647	\$ 197,244,054
3. Expenditures for the year		
a. Refunds	\$ (3,200,062)	\$ (3,406,375)
b. Benefit payments	(83,822,331)	(77,194,067)
c. Administrative expense	(3,524,983)	(3,227,251)
d. Total expenditures	\$ (90,547,376)	\$ (83,827,693)
4. Increase in net assets (Item 2c + Item 3d)	\$ 449,242,271	\$ 113,416,361
5. Market value of assets at end of year (Item 1 + Item 4)	\$ 2,975,935,079	\$ 2,526,692,808

Table 8 - Development of Actuarial Value of Assets

1.	Actuarial value of assets at beginning of year	\$ 2,615,483,150
2.	Net new investments	
a.	Contributions and Affiliations	\$ 170,970,501
b.	Benefits paid	(83,822,331)
c.	Refunds	(3,200,062)
d.	Administrative expenses	(3,524,983)
e.	Subtotal	<u>\$ 80,423,125</u>
3.	Assumed investment return rate for fiscal year	7.0%
4.	Assumed investment return for fiscal year	\$ 185,898,630
5.	Expected Actuarial Value at end of year	\$ 2,881,804,905
6.	Market value of assets at end of year	\$ 2,975,935,079
7.	Excess return (6-5)	\$ 94,130,174
8.	Development of amounts to be recognized as of December 31, 2019:	

Fiscal Year End	Remaining Deferrals		Net Deferrals Remaining	Years Remaining	Recognized for this valuation	Remaining after this valuation
	of Excess/(Shortfall) of Investment Income	Offsetting of Gains/(Losses)				
	(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	(88,790,342)	88,790,342	0	4	0	0
2019	<u>182,920,516</u>	<u>(88,790,342)</u>	<u>94,130,174</u>	5	<u>18,826,035</u>	<u>75,304,139</u>
Total	\$ 94,130,174	\$ 0	\$ 94,130,174		\$ 18,826,035	\$ 75,304,139

9.	Actuarial value of assets as of December 31, 2019 (Item 6 - Item 8)	\$ 2,900,630,940
10.	Ratio of actuarial value to market value	97.5%

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 through 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)	\$ 2,526,692,808	\$ 2,615,483,150
2. Contributions during FY19	170,970,501	170,970,501
3. Benefit payments made during FY19	(83,822,331)	(83,822,331)
4. Refunds of contributions during FY19	(3,200,062)	(3,200,062)
5. Administrative expenses during FY19	(3,524,983)	(3,524,983)
6. Investment return during FY19	<u>368,819,146</u>	<u>204,724,665</u>
7. Assets as of January 1, 2020 (B): (1 + 2 + 3 + 4 + 5 + 6)	\$ 2,975,935,079	\$ 2,900,630,940
8. Approximate rate of return on average invested assets		
a. Net investment income (I)	\$ 368,819,146	\$ 204,724,665
b. Estimated return based on $(2I / (A + B - I))$	14.37%	7.71%

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	\$ 2,615,483,150	\$ 2,353,241,861
2. Total contributions since prior valuation	\$ 170,970,501	\$ 199,491,406
3. Benefits, refunds, and administrative expense since prior valuation	\$ (90,547,376)	\$ (83,827,692)
4. Assumed net investment income at actuarial rate%*		
a. Beginning assets	\$ 183,083,820	\$ 164,726,930
b. Contributions	5,983,968	6,982,199
c. Benefits, refunds paid, and administrative expense	(3,169,158)	(2,933,969)
e. Total	\$ 185,898,630	\$ 168,775,160
5. Expected actuarial assets (1 + 2 + 3 + 4)	\$ 2,881,804,905	\$ 2,637,680,735
6. Actual actuarial assets, this valuation	\$ 2,900,630,940	\$ 2,615,483,150
7. Asset gain/(loss) (6 - 5)	\$ 18,826,035	\$ (22,197,585)
	Gain	Loss

*7.0% assumed as of January 1, 2019

Table 11 - History of Investment Return Rates

For Fiscal Year Ending (1)	Market Value (2)	Actuarial Value (3)
December 31, 2010	13.54%	7.95%
December 31, 2011	0.48%	5.49%
December 31, 2012	11.59%	7.25%
December 31, 2013	15.08%	8.86%
December 31, 2014	6.63%	8.58%
December 31, 2015	1.54%	6.90%
December 31, 2016	5.44%	6.51%
December 31, 2017	14.55%	8.21%
December 31, 2018	(0.09%)	6.08%
December 31, 2019	14.37%	7.71%
Average Returns:		
Last 5 Years	6.98%	7.08%
Last 10 Years	8.15%	7.35%

History of Asset Returns

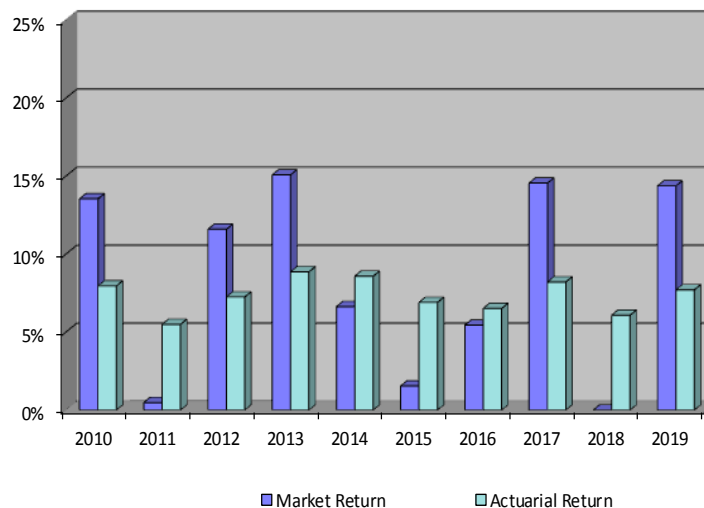


Table 12 - Schedule of Funding Progress

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, 2003	\$ 424,088,589	\$ 371,056,405	\$ (53,032,184)	114.3%	\$ 172,625,858	(30.7%)
January 1, 2004	473,006,658	426,673,675	(46,332,983)	110.9%	189,359,234	(24.5%)
January 1, 2005	557,949,693	495,915,617	(62,034,076)	112.5%	217,752,582	(28.5%)
January 1, 2006	681,193,087	569,819,934	(111,373,153)	119.5%	246,693,626	(45.1%)
January 1, 2007	801,426,848	654,097,657	(147,329,192)	122.5%	271,906,902	(54.2%)
January 1, 2008	950,114,346	795,499,983	(154,614,363)	119.4%	312,857,166	(49.4%)
January 1, 2009	856,090,014	847,821,122	(8,268,892)	101.0%	337,918,774	(2.4%)
January 1, 2010	963,500,681	963,300,852	(199,829)	100.0%	363,265,902	(0.1%)
January 1, 2011	1,080,284,447	1,049,622,033	(30,662,414)	102.9%	353,484,986	(8.7%)
January 1, 2012	1,225,537,747	1,271,490,169	45,952,422	96.4%	384,803,645	11.9%
January 1, 2013	1,374,576,631	1,404,607,765	30,031,134	97.9%	406,258,662	7.4%
January 1, 2014	1,546,834,469	1,533,631,141	(13,203,328)	100.9%	426,690,241	(3.1%)
January 1, 2015	1,714,971,185	1,652,901,084	(62,070,101)	103.8%	441,313,862	(14.1%)
January 1, 2016	1,890,604,068	1,846,961,999	(43,642,069)	102.4%	473,359,565	(9.2%)
January 1, 2017	2,050,113,711	2,021,526,883	(28,586,828)	101.4%	513,837,288	(5.6%)
January 1, 2018	2,353,241,861	2,269,410,684	(83,831,177)	103.7%	577,624,013	(14.5%)
January 1, 2019	2,615,483,150	2,653,120,261	37,637,111	98.6%	659,583,375	5.7%
January 1, 2020	2,900,630,940	2,972,018,080	71,387,140	97.6%	729,345,875	9.8%

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				Portion of Accrued Liabilities Covered		
	Active Members Contributions	Retirees Beneficiaries and Vested Terminations	Members (Employer Financed Portion)	Actuarial Value of Assets	by Reported Assets		
					(5)/(2)	[(5)-(2)]/(3)	[(5)-(2)-(3)]/ (4)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
January 1, 2002	\$ 85,368	\$ 15,946	\$ 236,078	\$ 428,389	100.0%	100.0%	100.0%
January 1, 2003	95,830	19,925	255,301	424,089	100.0%	100.0%	100.0%
January 1, 2004	106,332	28,578	291,764	473,007	100.0%	100.0%	100.0%
January 1, 2005	130,910	40,029	324,977	557,950	100.0%	100.0%	100.0%
January 1, 2006	161,665	57,780	350,375	681,193	100.0%	100.0%	100.0%
January 1, 2007	177,180	82,227	394,691	801,427	100.0%	100.0%	100.0%
January 1, 2008	211,285	110,301	473,914	950,114	100.0%	100.0%	100.0%
January 1, 2009	232,742	135,004	480,075	856,090	100.0%	100.0%	100.0%
January 1, 2010	259,369	165,390	538,542	963,501	100.0%	100.0%	100.0%
January 1, 2011	276,908	210,799	561,915	1,080,284	100.0%	100.0%	100.0%
January 1, 2012	331,763	296,225	643,502	1,225,538	100.0%	100.0%	92.9%
January 1, 2013	353,206	355,705	695,697	1,374,577	100.0%	100.0%	95.7%
January 1, 2014	369,248	443,857	720,526	1,546,834	100.0%	100.0%	100.0%
January 1, 2015	384,837	521,492	746,572	1,714,971	100.0%	100.0%	100.0%
January 1, 2016	422,699	608,987	815,276	1,890,604	100.0%	100.0%	100.0%
January 1, 2017	441,466	691,929	888,132	2,050,114	100.0%	100.0%	100.0%
January 1, 2018	559,153	778,718	931,540	2,353,242	100.0%	100.0%	100.0%
January 1, 2019	651,145	919,477	1,082,498	2,615,483	100.0%	100.0%	96.5%
January 1, 2020	709,830	1,020,583	1,241,606	2,900,631	100.0%	100.0%	94.3%

\$ amounts in '000s



Table 14 - Cash Flow Analysis

Year Ending December 31, (1)	Contributions for the Year (2)	Expenditures During the Year					External Cash Flow for the Year (8)	Market Value of Assets (9)	External Cash Flow as Percent of Market Value (10)
		Benefit Payments (3)	Refund of Contributions (4)	Identified Receipts (5)	Expenses (6)	Total (7)			
2003	\$ 29,729	\$ (1,304)	\$ (1,862)	\$ (117)	\$ (1,896)	\$ (5,180)	\$ 24,548	\$ 483,967	5.1%
2004	42,708	(2,005)	(1,694)	(83)	(2,113)	(5,895)	36,813	583,615	6.3%
2005	56,453	(3,129)	(2,889)	0	(4,152)	(10,171)	46,282	692,649	6.7%
2006	44,137	(5,114)	(4,061)	0	(5,089)	(14,264)	29,873	831,477	3.6%
2007	72,338	(7,261)	(4,698)	(51)	(6,428)	(18,438)	53,900	967,883	5.6%
2008	52,585	(10,525)	(3,621)	0	(7,118)	(21,265)	31,321	713,408	4.4%
2009	68,550	(13,272)	(1,927)	(1)	(7,119)	(22,318)	46,232	914,227	5.1%
2010	64,648	(24,277)	(1,751)	0	(7,399)	(33,428)	31,221	1,079,348	2.9%
2011	113,795	(28,285)	(1,882)	0	(8,745)	(38,912)	74,883	1,168,400	6.4%
2012	91,636	(31,959)	(1,616)	0	(11,596)	(45,171)	46,465	1,365,232	3.4%
2013	93,538	(42,443)	(2,796)	0	(14,401)	(59,639)	33,899	1,623,050	2.1%
2014	83,472	(47,701)	(1,849)	0	(15,647)	(65,196)	18,276	1,765,759	1.0%
2015	110,242	(53,076)	(1,763)	0	(1,854)	(56,694)	53,548	1,848,725	2.9%
2016	100,379	(59,989)	(1,813)	0	(3,384)	(65,186)	35,192	1,985,393	1.8%
2017	200,793	(65,965)	(2,188)	0	(3,136)	(71,288)	129,505	2,413,276	5.4%
2018	199,491	(77,194)	(3,406)	0	(3,227)	(83,828)	115,664	2,526,693	4.6%
2019	170,971	(83,822)	(3,200)	0	(3,525)	(90,547)	80,423	2,975,935	2.7%
2020*	145,519	(84,715)	(7,092)	0	(3,648)	(95,456)	50,063	3,236,066	1.5%
2021*	158,539	(99,405)	(7,341)	0	(3,776)	(110,522)	48,017	3,512,288	1.4%
2022*	172,292	(111,682)	(7,597)	0	(3,908)	(123,187)	49,105	3,808,971	1.3%

* 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 19.0%/20.0%/21.0% and 3.5% annual payroll growth, for 2020/2021/2022, respectively.

Expected benefit payments are based on current plan benefits 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.

\$ amounts in '000s



Table 15 - Membership Data

	<u>January 1, 2020</u>	<u>January 1, 2019</u>	<u>January 1, 2018</u>
1. Active members			
a. Number	8,953	8,398	7,602
b. Total payroll	\$ 729,345,875	\$ 659,583,375	\$ 577,624,013
c. Average annual salary	\$ 81,464	\$ 78,541	\$ 75,983
d. Average age	40.0	40.2	40.5
e. Average service	10.0	10.1	10.3
2. Inactive members			
a. Vested	267	251	235
b. NonVested *	1,014	922	831
3. Service retirees			
a. Number	1,635	1,518	1,373
b. Total annual benefits	\$ 74,857,390	\$ 68,006,494	\$ 59,950,357
c. Average annual benefit	\$ 45,784	\$ 44,800	\$ 43,664
d. Average age	64.0	63.5	63.1
4. Beneficiaries and spouses			
a. Number	97	74	62
b. Total annual benefits	\$ 2,030,577	\$ 1,577,666	\$ 1,281,737
c. Average annual benefit	\$ 20,934	\$ 21,320	\$ 20,673
d. Average age	59.4	59.0	58.4

* Includes members who have terminated and could elect a deferred benefit, but have not yet been processed

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
2002	3,179	38.0	8.8	\$ 151,369,850	\$ 47,616	5.04%
2003	3,340	38.4	9.1	166,734,883	49,921	4.84%
2004	3,459	38.9	9.4	182,825,786	52,855	5.88%
2005	3,907	39.0	9.1	209,765,329	53,690	1.58%
2006	4,302	39.1	9.1	239,642,543	55,705	3.75%
2007	4,512	39.3	9.2	264,560,282	58,635	5.26%
2008	4,988	39.3	9.2	298,313,990	59,806	2.00%
2009	5,197	39.6	9.5	322,971,268	62,146	3.91%
2010	5,331	40.1	9.9	348,253,545	65,326	5.12%
2011	5,314	40.7	10.5	353,484,986	66,520	1.83%
2012	5,717	40.8	10.5	384,803,645	67,309	1.19%
2013	5,807	41.0	10.8	406,258,662	69,960	3.94%
2014	6,110	40.7	10.6	426,690,241	69,835	-0.18%
2015	6,245	40.8	10.7	441,313,862	70,667	1.19%
2016	6,602	40.7	10.5	473,359,565	71,699	1.46%
2017	6,900	40.7	10.5	513,837,288	74,469	3.86%
2018	7,602	40.5	10.3	577,624,013	75,983	2.03%
2019	8,398	40.2	10.1	659,583,375	78,541	3.37%
2020	8,953	40.0	10.0	729,345,875	81,464	3.72%

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

Attained Age	Years of Credited Service												Total
	Less than 1	1-2	2-3	3-4	4-5	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over	
	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.
Under 25	155 \$56,553	65 \$55,342	24 \$55,103	11 \$52,895									255 \$55,941
25-29	320 \$56,698	258 \$58,234	232 \$63,185	152 \$70,884	95 \$73,315	113 \$80,406							1,170 \$63,805
30-34	257 \$56,445	209 \$59,945	218 \$65,898	196 \$72,692	164 \$77,808	468 \$81,237	77 \$83,242	4 \$80,196					1,593 \$71,035
35-39	127 \$56,588	103 \$59,893	111 \$65,775	117 \$73,233	114 \$78,237	412 \$81,980	447 \$90,019	108 \$97,616	3 \$79,613				1,542 \$79,727
40-44	61 \$56,386	49 \$61,988	50 \$67,412	48 \$69,399	49 \$75,745	245 \$81,883	377 \$90,289	334 \$96,614	80 \$106,287	1 \$69,552			1,294 \$86,424
45-49	50 \$57,918	36 \$60,581	27 \$80,772	35 \$70,404	37 \$81,384	133 \$80,666	268 \$89,161	404 \$94,931	322 \$102,734	60 \$115,964	1 \$95,742		1,373 \$91,655
50-54	19 \$61,443	20 \$73,428	11 \$76,226	13 \$71,759	20 \$75,658	87 \$79,206	167 \$90,323	223 \$94,737	298 \$102,855	188 \$107,946	29 \$112,619		1,075 \$96,030
55-59	9 \$56,681	7 \$77,307	6 \$53,405	7 \$76,951	9 \$110,053	35 \$83,752	54 \$88,115	73 \$94,859	116 \$101,880	100 \$107,130	43 \$119,495	4 \$133,683	463 \$98,745
60-64	6 \$61,901	5 \$69,875	1 \$46,830	7 \$59,209	6 \$92,323	11 \$84,219	22 \$96,959	23 \$95,496	29 \$96,878	18 \$104,241	13 \$110,235	8 \$115,637	149 \$94,200
65 & Over		2 \$73,992	1 \$53,674		2 \$102,056	5 \$71,844	5 \$81,651	7 \$86,767	11 \$100,097	1 \$95,579	1 \$143,547	4 \$136,554	39 \$94,026
Total	1,004 \$56,759	754 \$59,740	681 \$65,285	586 \$71,422	496 \$77,880	1,509 \$81,364	1,417 \$89,602	1,176 \$95,527	859 \$102,679	368 \$108,712	87 \$115,823	16 \$125,378	8,953 \$81,464
Average:													
		Age:	40.0	Number of participants:						Males:	7,988		
		Service:	10.0							Females:	965		

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

Year Ended	Added to Rolls**		Removed from Rolls		Rolls-End of Year		% Increase in Annual Benefits	Average Annual Benefits
	Number	Annual Benefits	Number	Annual Benefits	Number	Annual Benefits		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
December 31, 1996	8	\$ 54,955	1	\$ 568	19	\$ 137,627	53.59%	\$ 7,244
December 31, 1997	2	22,218	1	568	20	156,512	13.72%	7,826
December 31, 1998	5	61,039	0	0	25	253,185	61.77%	10,127
December 31, 1999	4	56,252	1	6,592	28	311,906	23.19%	11,140
December 31, 2000	5	50,774	1	15,482	32	353,534	13.35%	11,048
December 31, 2001	16	374,072	1	3,697	47	735,257	107.97%	15,644
December 31, 2002	14	301,795	0	0	61	1,054,842	43.47%	17,292
December 31, 2003	24	606,147	2	21,898	83	1,648,771	56.31%	19,865
December 31, 2004	27	825,955	0	0	110	2,506,161	52.00%	22,783
December 31, 2005	51	1,458,446	2	22,713	159	3,941,893	57.29%	24,792
December 31, 2006	69	2,284,964	2	97,352	226	6,129,506	55.50%	27,122
December 31, 2007	66	2,201,387	1	29,009	291	8,301,884	35.44%	28,529
December 31, 2008	65	2,375,478	3	75,874	353	10,601,488	27.70%	30,033
December 31, 2009	75	2,981,664	4	43,765	424	13,539,387	27.71%	31,933
December 31, 2010	94	3,862,662	5	131,169	513	17,270,880	27.56%	33,666
December 31, 2011	130	5,949,060	2	68,483	641	23,151,457	34.05%	36,118
December 31, 2012	115	5,199,290	1	43,620	755	28,307,127	22.27%	37,493
December 31, 2013	155	7,528,613	2	81,763	908	35,753,977	26.31%	39,377
December 31, 2014	146	6,358,310	5	121,694	1,049	41,990,593	17.44%	40,029
December 31, 2015	131	6,463,995	5	120,311	1,175	48,334,277	15.11%	41,136
December 31, 2016	131	6,612,256	5	138,121	1,301	54,808,412	13.39%	42,128
December 31, 2017	140	6,701,667	6	277,985	1,435	61,232,094	11.72%	42,670
December 31, 2018	168	8,745,761	11	393,695	1,592	69,584,160	13.64%	43,709
December 31, 2019	152	7,651,641	12	347,834	1,732	76,887,967	10.50%	44,393

*Includes beneficiaries of deceased members with a deferred benefit.

**Includes benefit adjustments



Table 19 - Summary of Members and Adjusted Payroll by Employer

City Code	City Name	Police		Fire		Total	
		No.	Earnings	No.	Earnings	No.	Earnings
550	ADAMS COUNTY	0	\$ 0	91	\$ 8,082,989	91	\$ 8,082,989
4	ALMA	2	114,200	0	0	2	114,200
5	ANTONITO	2	122,015	0	0	2	122,015
501	ARVADA FPD	0	0	159	14,460,024	159	14,460,024
711	ASPEN FPD	0	0	3	329,178	3	329,178
9	AULT	5	259,499	0	0	5	259,499
712	AULT FPD	0	0	7	298,111	7	298,111
10	AURORA	0	0	375	28,397,113	375	28,397,113
12	BASALT	9	696,534	0	0	9	696,534
13	BAYFIELD	5	291,533	0	0	5	291,533
718	BENNETT FPD #7	0	0	24	1,388,555	24	1,388,555
503	BERTHOUD FPD	0	0	26	2,023,825	26	2,023,825
538	BEULAH FIRE PROTECTION & AMBULANCE	0	0	2	117,343	2	117,343
7331	BIG SANDY FPD	0	0	1	39,815	1	39,815
580	BLACK FOREST RESCUE	0	0	18	1,169,940	18	1,169,940
723	BLACK HAWK	0	0	22	1,853,169	22	1,853,169
18	BLANCA	1	38,216	0	0	1	38,216
726	BOULDER MOUNTAIN AUTH	0	0	5	311,676	5	311,676
730	BOULDER RURAL FPD	0	0	16	1,357,663	16	1,357,663
7700	BRIGGSDALE FPD	0	0	1	52,000	1	52,000
326	BRIGHTON	76	5,707,837	0	0	76	5,707,837
26	BRIGHTON (GREATER) FPD	0	0	69	5,695,043	69	5,695,043
504	BROADMOOR FPD	0	0	4	317,388	4	317,388
27	BROOMFIELD	146	13,261,606	0	0	146	13,261,606
28	BRUSH	12	597,701	0	0	12	597,701
29	BUENA VISTA	8	454,604	4	215,346	12	669,950
735	BYERS FPD #9	0	0	1	44,084	1	44,084
740	CARBONDALE AND RURAL FPD	0	0	23	1,786,923	23	1,786,923
33	CANON CITY	33	1,789,791	0	0	33	1,789,791
35	CASTLE ROCK	0	0	92	8,073,559	92	8,073,559

Table 19 (continued) - Summary of Members and Adjusted Payroll by Employer

City Code	City Name	Police		Fire		Total	
		No.	Earnings	No.	Earnings	No.	Earnings
37	CENTER	6	\$ 302,816	0	\$ 0	6	\$ 302,816
38	CENTRAL CITY	0	0	1	57,100	1	57,100
749	CHAFFEE COUNTY FPD	0	0	5	290,517	5	290,517
754	CIMARRON HILLS FPD	0	0	16	1,003,957	16	1,003,957
7125	CLEAR CREEK AUTHORITY	0	0	1	63,336	1	63,336
509	CLIFTON FPD	0	0	18	1,179,092	18	1,179,092
757	COAL CREEK CANYON FPD	0	0	1	69,525	1	69,525
44	COLLBRAN	1	39,259	0	0	1	39,259
531	COLORADO RIVER FRA	0	0	46	3,039,751	46	3,039,751
45	COLORADO SPRINGS	454	34,191,790	322	27,551,470	776	61,743,260
46	COLUMBINE VALLEY	5	337,733	0	0	5	337,733
765	CORTEZ FPD	0	0	14	674,835	14	674,835
772	CRESTED BUTTE FPD	0	0	19	1,235,005	19	1,235,005
774	CRIPPLE CREEK	0	0	13	809,571	13	809,571
57	DACONO	12	859,355	0	0	12	859,355
58	DEBEQUE	4	242,520	0	0	4	242,520
779	DEBEQUE FPD	0	0	7	476,177	7	476,177
783	DELTA COUNTY FPD #1	0	0	2	114,200	2	114,200
62	DENVER	1,515	141,347,476	961	91,368,497	2,476	232,715,973
63	DILLON	5	410,213	0	0	5	410,213
64	DINOSAUR	2	114,200	0	0	2	114,200
566	DONALD WESCOTT FPD	0	0	21	1,298,168	21	1,298,168
567	DURANGO & RESCUE AUTH	0	0	73	5,040,063	73	5,040,063
507	EAST GRAND FPD #4	0	0	6	375,203	6	375,203
795	EATON FPD	0	0	18	1,054,589	18	1,054,589
73	EDGEWATER	15	1,079,212	0	0	15	1,079,212
74	ELIZABETH	7	421,757	0	0	7	421,757
7102	ELK CREEK FPD	0	0	10	605,805	10	605,805
75	EMPIRE	2	109,100	0	0	2	109,100
76	ENGLEWOOD	64	5,492,285	0	0	64	5,492,285
77	ERIE	37	2,940,708	0	0	37	2,940,708
523	ESTES VALLEY FPD	0	0	3	243,965	3	243,965



Table 19 (continued) - Summary of Members and Adjusted Payroll by Employer

City Code	City Name	Police		Fire		Total	
		No.	Earnings	No.	Earnings	No.	Earnings
79	EVANS	3	\$ 316,111	0	\$ 0	3	\$ 316,111
579	EVANS FPD	0	0	21	1,333,925	21	1,333,925
7109	EVERGREEN FPD	0	0	5	373,524	5	373,524
510	FAIRMOUNT FPD	0	0	25	1,745,903	25	1,745,903
80	FAIRPLAY MARSHALLS	4	231,215	0	0	4	231,215
7112	FALCON FPD	0	0	48	2,817,603	48	2,817,603
81	FEDERAL HEIGHTS	22	1,617,881	15	959,176	37	2,577,058
82	FIRESTONE	30	2,401,383	0	0	30	2,401,383
85	FLORENCE	11	477,652	0	0	11	477,652
7222	FOOTHILLS & RESCUE	0	0	3	206,754	3	206,754
7122	FORT LEWIS-MESA FPD	0	0	2	128,000	2	128,000
7123	FORT LUPTON FPD	0	0	29	1,847,742	29	1,847,742
89	FOUNTAIN	51	3,510,941	25	1,627,276	76	5,138,217
90	FOWLER	3	171,300	0	0	3	171,300
511	FRANKTOWN FPD	0	0	20	1,287,516	20	1,287,516
92	FREDERICK	20	1,462,022	0	0	20	1,462,022
592	FREDERICK FIRESTONE FPD	0	0	52	3,821,777	52	3,821,777
93	FRISCO	11	762,298	0	0	11	762,298
7131	FRONT RANGE FIRE RESCUE FPD	0	0	31	2,261,615	31	2,261,615
7132	GALETON FPD	0	0	2	152,997	2	152,997
95	GARDEN CITY	4	221,517	0	0	4	221,517
7135	GATEWAY-UNAWEEP FPD	0	0	1	50,000	1	50,000
7136	GENESEE FPD	0	0	2	169,600	2	169,600
97	GEORGETOWN	3	204,694	0	0	3	204,694
7147	GRAND FPD #1	0	0	3	171,780	3	171,780
104	GRAND JUNCTION	0	0	102	7,175,989	102	7,175,989
7149	GRAND LAKE FPD	0	0	15	835,973	15	835,973
7150	GRAND VALLEY FPD	0	0	14	1,204,760	14	1,204,760
7153	GREATER EAGLE FPD	0	0	16	954,471	16	954,471
107	GREELEY	0	0	116	9,406,058	116	9,406,058
7156	GYP SUM FPD	0	0	8	511,253	8	511,253
7158	HARTSEL FPD	0	0	1	72,236	1	72,236

Table 19 (continued) - Summary of Members and Adjusted Payroll by Employer

City Code	City Name	Police		Fire		Total	
		No.	Earnings	No.	Earnings	No.	Earnings
115	HAXTUN	3	\$ 146,264	0	\$ 0	3	\$ 146,264
119	HOLYOKE	3	151,427	0	0	3	151,427
7176	HUDSON FPD	0	0	27	1,742,732	27	1,742,732
123	HUDSON MARSHAL	5	266,650	0	0	5	266,650
124	HUGO	2	114,200	0	0	2	114,200
125	IDAHO SPRINGS	10	595,935	0	0	10	595,935
126	IGNACIO	7	422,510	0	0	7	422,510
7185	INDIAN HILLS FPD	0	0	1	43,260	1	43,260
7187	INTER-CANYON FPD	0	0	3	219,487	3	219,487
7191	JEFFERSON-COMO FPD	0	0	5	234,880	5	234,880
129	JOHNSTOWN	22	1,519,243	0	0	22	1,519,243
132	KERSEY	3	194,366	0	0	3	194,366
7198	KIOWA FPD	0	0	3	165,425	3	165,425
136	KREMMLING	2	137,477	0	0	2	137,477
5136	KREMMLING FPD	0	0	1	48,570	1	48,570
138	LA JARA	3	122,000	0	0	3	122,000
144	LA SALLE	6	354,870	0	0	6	354,870
7211	LA SALLE FPD	0	0	12	814,675	12	814,675
146	LA VETA	2	78,338	0	0	2	78,338
137	LAFAYETTE	35	3,071,023	31	2,381,339	66	5,452,362
7206	LAKE GEORGE FPD	0	0	2	77,700	2	77,700
263	LAKESIDE	4	220,480	0	0	4	220,480
141	LARKSPUR FPD	0	0	16	971,211	16	971,211
147	LEADVILLE	9	454,969	11	640,597	20	1,095,566
574	LEFTHAND FPD	0	0	3	252,100	3	252,100
149	LITTLETON	45	4,155,479	0	0	45	4,155,479
150	LOCHBUIE	11	704,701	0	0	11	704,701
214	LOG LANE VILLAGE	2	100,256	0	0	2	100,256
268	LONE TREE	51	4,298,265	0	0	51	4,298,265
578	LOS PINOS FPD	0	0	23	1,353,856	23	1,353,856
7226	LOWER VALLEY FPD	0	0	16	898,837	16	898,837
7227	LYONS FPD	0	0	4	204,445	4	204,445

Table 19 (continued) - Summary of Members and Adjusted Payroll by Employer

City Code	City Name	Police		Fire		Total	
		No.	Earnings	No.	Earnings	No.	Earnings
157	MANITOU SPRINGS	16	\$ 1,003,600	6	\$ 438,666	22	\$ 1,442,266
160	MEAD	8	536,728	0	0	8	536,728
163	MILLIKEN	10	634,501	0	0	10	634,501
167	MONTROSE	38	2,333,156	0	0	38	2,333,156
537	MONTROSE FPD	0	0	32	2,400,447	32	2,400,447
166	MONTE VISTA	6	342,600	0	0	6	342,600
168	MONUMENT	17	1,099,156	0	0	17	1,099,156
170	MOUNTAIN VIEW	10	646,279	0	0	10	646,279
516	MOUNTAIN VIEW FPD	0	0	95	8,975,953	95	8,975,953
7246	NEDERLAND FPD	0	0	4	233,684	4	233,684
7251	NORTH FORK FPD	0	0	1	69,000	1	69,000
532	NORTH METRO FIRE RESCUE	0	0	133	11,657,221	133	11,657,221
7253	NORTH ROUTT COUNTY	0	0	2	136,927	2	136,927
7255	NORTHEAST TELLER COUNTY FPD	0	0	14	898,388	14	898,388
7259	NORTH-WEST FPD	0	0	14	786,860	14	786,860
178	NUNN	2	107,304	0	0	2	107,304
179	OAK CREEK	2	111,766	0	0	2	111,766
7263	OAK CREEK FPD	0	0	4	227,794	4	227,794
180	OLATHE	5	262,376	0	0	5	262,376
7264	OLATHE FPD	0	0	1	27,746	1	27,746
588	PAGOSA FPD	0	0	17	787,500	17	787,500
188	PAGOSA SPRINGS	8	440,354	0	0	8	440,354
189	PALISADE	10	549,548	2	133,446	12	682,993
190	PALMER LAKE	2	124,589	3	170,006	5	294,595
192	PAONIA	5	210,568	0	0	5	210,568
106	PARACHUTE	5	296,647	0	0	5	296,647
191	PARKER	72	6,203,473	0	0	72	6,203,473
7281	PEYTON FPD	0	0	1	29,994	1	29,994
7481	PLATEAU VALLEY FPD	0	0	6	408,077	6	408,077
7285	PLATTE CANYON FPD	0	0	18	1,100,248	18	1,100,248
7287	PLATTE VALLEY FPD	0	0	24	1,830,049	24	1,830,049
196	PLATTEVILLE	9	506,523	0	0	9	506,523

Table 19 (continued) - Summary of Members and Adjusted Payroll by Employer

City Code	City Name	Police		Fire		Total	
		No.	Earnings	No.	Earnings	No.	Earnings
513	PLATTEVILLE/GILCREST FPD	0	\$ 0	36	\$ 2,531,695	36	\$ 2,531,695
7289	PLEASANT VIEW METRO FIRE DISTRICT	0	0	7	387,396	7	387,396
518	POUDRE FIRE AUTHORITY	0	0	80	4,614,297	80	4,614,297
199	PUEBLO	212	15,052,742	138	10,052,871	350	25,105,613
519	PUEBLO RURAL FPD	0	0	26	1,368,211	26	1,368,211
7294	PUEBLO W. METRO	0	0	24	1,480,855	24	1,480,855
7298	RATTLESNAKE FPD	0	0	4	261,626	4	261,626
521	RED WHITE & BLUE FPD	0	0	52	4,366,885	52	4,366,885
551	ROARING FORK FRA	0	0	27	2,252,268	27	2,252,268
752	ROCKY MOUNTAIN FPD	0	0	48	4,142,909	48	4,142,909
7314	RYE FPD	0	0	6	280,559	6	280,559
542	SABLE-ALTURA FPD	0	0	4	214,230	4	214,230
213	SALIDA	18	1,134,134	12	862,483	30	1,996,617
215	SANFORD	1	32,000	0	0	1	32,000
543	SECURITY FPD	0	0	36	1,765,132	36	1,765,132
219	SEVERANCE	5	281,300	0	0	5	281,300
220	SHERIDAN	31	2,385,985	0	0	31	2,385,985
222	SILT	7	376,639	0	0	7	376,639
525	SOUTH ADAMS COUNTY FPD	0	0	86	6,620,895	86	6,620,895
7339	SOUTH FORK	3	163,200	0	0	3	163,200
5339	SOUTH FORK FPD	0	0	5	269,661	5	269,661
540	SOUTH METRO FIRE RESCUE FPD	0	0	181	18,743,451	181	18,743,451
7340	SOUTHEAST WELD FPD	0	0	26	1,480,746	26	1,480,746
548	SOUTHERN PARK COUNTY FPD	0	0	1	43,600	1	43,600
229	SPRINGFIELD	3	136,642	0	0	3	136,642
231	STEAMBOAT SPRINGS	0	0	30	2,298,776	30	2,298,776
232	STERLING	21	1,121,866	22	1,064,606	43	2,186,472
7348	STRASBURG FPD #8	0	0	3	166,457	3	166,457
7349	STRATMOOR HILLS FPD	0	0	7	357,601	7	357,601
549	SUMMIT FIRE AND EMS AUTHORITY	0	0	58	4,445,955	58	4,445,955
545	TELLURIDE FPD	0	0	8	674,730	8	674,730
238	THORNTON	202	16,596,495	99	8,882,576	301	25,479,071

Table 19 (continued) - Summary of Members and Adjusted Payroll by Employer

City Code	City Name	Police		Fire		Total	
		No.	Earnings	No.	Earnings	No.	Earnings
7354	TIMBERLINE FPD	0	\$ 0	7	\$ 401,334	7	\$ 401,334
2557	TRI-LAKES MONUMENT FPD	0	0	50	4,180,135	50	4,180,135
240	TRINIDAD	0	0	14	775,910	14	775,910
595	UPPER PINE RIVER FPD	0	0	30	1,679,428	30	1,679,428
7369	WELLINGTON FPD	0	0	27	1,747,808	27	1,747,808
7373	WEST DOUGLAS COUNTY FPD	0	0	1	95,817	1	95,817
534	WEST METRO FPD	0	0	271	24,005,784	271	24,005,784
7375	WEST ROUTT FPD	0	0	4	263,986	4	263,986
252	WESTMINSTER	170	14,414,035	117	10,308,558	287	24,722,593
7384	WINDSOR SEVERANCE FPD	0	0	46	3,721,844	46	3,721,844
254	WIGGINS	2	110,016	0	0	2	110,016
257	WINDSOR	41	2,884,984	0	0	41	2,884,984
260	WRAY	5	269,636	0	0	5	269,636
262	YUMA	8	416,908	0	0	8	416,908
Totals		3,769	310,493,178	5,184	418,852,697	8,953	729,345,875

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 participant during the entire period of his anticipated covered service (from hire), 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 as a level percentage of payroll. 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. In future years, the returns will be net of investment expenses only.

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: 7.0% per annum, compounded annually, composed of an assumed 2.5% inflation rate and a 4.5% 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 surplus assets and funding projections, 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:

Gender	Year of Retirement			
	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, for members with more than 25 years of service

Age	Annual Rate per 100 Members
55	60
56-59	45
60	100

The rates above apply to members first meeting normal retirement eligibility at age 55 or later. For those that meet the Rule of 80 prior to age 55, rates from eligibility age to age 55 were as follows:

- First eligibility: $(\text{Age}-50) \times 10\% + 10\%$
- After first eligibility but before age 55: $45\% - 5\% \times (55 - \text{Age})$
- Age 55: 45%

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. Covered payroll projected for the calendar year following the valuation date (used in determining the contribution rate necessary to amortize the unfunded liability) is equal to actual pay that was paid during the calendar year preceeding the valuation date for members active at any time during that period increased by the payroll growth rate assumption and adjusted for differences in active membership count.
3. Percent married: 85% of employees are assumed to be married or in a civil union.
4. 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.
5. Post-retirement benefit adjustments: 0%.
6. Percent electing annuity on death (when eligible): All of the spouses of vested, married participants are assumed to elect an annuity.
7. 10% of members who become occupationally disabled after the age of 50 will transfer back to the SWDB Plan at age 55. No other assumption is made for recoveries once disabled.

8. 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.
9. No surviving spouse will remarry and there will be no children's benefit.
10. 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.
11. 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.
12. Decrement timing: Decrements of all types are assumed to occur mid-year.
13. 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.
14. Decrement relativity: Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
15. 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.
16. 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.
17. 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 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. Allocation to SRA

The SRA contribution rate is determined annually based on the normal cost plus amortization of unfunded liability (surplus). The excess of the total contribution rate (19.00% in 2020, ratcheted up by 1.00% through 2022, and then by 0.50% until reaching 25.0% in 2030) over the actuarial requirement is available as the SRA contribution rate. The Board has the authority and responsibility to choose the SRA rate. Other considerations may be evaluated such as:

1. Investment performance subsequent to the actuarial valuation
2. Potential future plan changes under consideration
3. Stability of SRA
4. Projections of future SRA contributions
5. Ability to grant future benefit adjustments to retired members

F. Changes to the assumptions:

Retirement rates were incorporated for those reaching Rule of 80 Normal Retirement eligibility prior to age 55. There were no other assumption or method changes.

SUMMARY OF BENEFIT PROVISIONS

Plan Description

The Fire & Police Pension Association Defined Benefit System – Statewide Defined Benefit Plan (“Plan”) is a cost-sharing multiple-employer defined benefit pension plan. The Plan covers substantially all full-time employees of participating fire or police departments in Colorado hired on or after April 8, 1978, provided that they are not already covered by a statutorily exempt plan. The Plan was established in 1980 pursuant to Colorado Revised Statutes.

Employers once had the option to elect to withdraw from the Plan, but a change in state statutes permitted no further withdrawals after January 1, 1988, unless the employer elects into and is determined to be eligible to participate in the Statewide Money Purchase Plan. 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 August 5, 2003, the Plan may include clerical and other personnel from fire districts whose services are auxiliary to fire protection. 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 assets are included in the Fire & Police Members’ Benefit Investment Fund Long-Term Pool and the Fire & Police Members’ Self-Directed Investment Fund (for Deferred Retirement Option Plan “DROP” assets and Separate Retirement Account “SRA” assets from eligible retired members.)

Plan Year

A twelve-month period ending December 31.

Members Included

Members included are active, 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. As of August 5, 2003, the Plan may include clerical and other personnel employed by a fire protection district, fire authority, or a county improvement district.

Also included are employees of any employer that covers members under the federal Social Security Act or any county that chooses to affiliate with the Fire & Police Pension Association and includes all personnel employed by a sheriff expected to work 1,600 hours or more in a calendar year who are directly involved with the provision of law enforcement or fire protection 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 Statewide Defined Benefit Plan or Statewide Money Purchase Plan which are “picked up” by the employer:

- 1) And 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 will also be included if a Member completes his/her 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 the preceding sentence), step-up pay or other pay for temporarily acting in a higher rank, uniform allowances, accumulated sick leave pay, accumulated vacation leave pay (except as noted in Section 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

Contribution rates for this Plan are set by state statute. Employer contribution rates can only be amended by state statute. Member contribution rates can be amended by state statute or by election of the membership.

Members of this Plan and their employers contributed at the rate of 8 percent of base salary for a total contribution rate of 16 percent through 2014. In 2014, the members elected to increase the member contribution rate to the Plan beginning in 2015. Member contribution rates will increase 0.5 percent annually through 2022 to a total of 12 percent of base salary. Legislation passed in 2020 requires a similar increase in Employer contributions effective January 1, 2021. Employer contribution rates will increase 0.5 percent annually through 2030 to a total of 13 percent of base salary. The total combined contribution rate will be 25% of base salary in 2030.

Contributions from members and employers of plans reentering the system are established by resolution and approved by the Fire & Police Pension Association's Board of Directors. An additional 4 percent continuing rate of contribution is made by the reentry group. It is a local decision on who pays the additional 4 percent contribution. The reentry group had a combined contribution rate of 20 percent of base salary through 2014. Per the 2014 member election, the reentry group also had their required member contribution rate increase 0.5 percent annually beginning in 2015 through 2022 for a total combined member and employer contribution rate of 24 percent. Per the January 2020 legislation, the FPPA Board may lower the continuing rate of contribution in the event it finds that the original continuing rate of contribution is in excess of what is required to pay the costs of benefits based on the advice of the actuary. At its April 2020 meeting, the Board determined effective January 1, 2021, the continuing rate of contribution for departments that completed the reentry process prior to 2021 will be 0.2 percent of base salary. Those departments, by resolution, may reduce the 4 percent continuing rate of contribution to 0.2 percent effective January 1, 2021. For departments that complete the reentry process on or after January 1, 2021, the continuing rate of contribution will be set at 1.9 percent of base salary and will be reevaluated after two years of experience, at which point, the rate may stay the same or may be decreased.

The contribution rate for members and employers of affiliated social security employers was 4 percent of base salary for a total contribution rate of 8 percent effective January 1, 2007 through 2014. Per the 2014 member election, the affiliated social security group also had their required member contribution rate increase 0.25 percent annually beginning in 2015 through 2022 to a total of 6 percent of base salary. Legislation passed in 2020 requires a similar increase in Employer



contributions effective January 1, 2021. Employer contribution rates will increase 0.25 percent annually through 2030 to a total of 6.5 percent of base salary. The total combined contribution rate will be 12.5% of base salary in 2030.

Statewide Defined Benefit Plan - Contribution Rate Implementation Schedule

Effective Date	Member Contribution Rate	Employer Contribution Rate	Total Combined Contribution Rate
1/1/2014	8.0%	8.0%	16.0%
1/1/2015	8.5%	8.0%	16.5%
1/1/2016	9.0%	8.0%	17.0%
1/1/2017	9.5%	8.0%	17.5%
1/1/2018	10.0%	8.0%	18.0%
1/1/2019	10.5%	8.0%	18.5%
1/1/2020	11.0%	8.0%	19.0%
1/1/2021	11.5%	8.5%	20.0%
1/1/2022	12.0%	9.0%	21.0%
1/1/2023	12.0%	9.5%	21.5%
1/1/2024	12.0%	10.0%	22.0%
1/1/2025	12.0%	10.5%	22.5%
1/1/2026	12.0%	11.0%	23.0%
1/1/2027	12.0%	11.5%	23.5%
1/1/2028	12.0%	12.0%	24.0%
1/1/2029	12.0%	12.5%	24.5%
1/1/2030	12.0%	13.0%	25.0%
Beyond	12.0%	13.0%	25.0%

Note: The Statewide Defined Benefit Plan - Reentry group had a combined contribution rate of 20 percent through 2014. It is a local decision on who pays the additional 4 percent contribution. Effective 1/1/2015, the member contribution rate increased by 0.5 percent per year over 8 years for a total combined member and employer contribution rate of 24 percent. Effective January 1, 2021, the reentry rates of contribution will be determined by department to reflect the actual cost of reentry. The responsibility for the payment of the additional rate of contribution is still determined by local decision.

Statewide Defined Benefit Plan - Supplemental Social Security - Contribution Rate Implementation Schedule

Effective Date	Member Contribution Rate	Employer Contribution Rate	Total Combined Contribution Rate
1/1/2014	4.00%	4.00%	8.00%
1/1/2015	4.25%	4.00%	8.25%
1/1/2016	4.50%	4.00%	8.50%
1/1/2017	4.75%	4.00%	8.75%
1/1/2018	5.00%	4.00%	9.00%
1/1/2019	5.25%	4.00%	9.25%
1/1/2020	5.50%	4.00%	9.50%
1/1/2021	5.75%	4.25%	10.00%
1/1/2022	6.00%	4.50%	10.50%
1/1/2023	6.00%	4.75%	10.75%
1/1/2024	6.00%	5.00%	11.00%
1/1/2025	6.00%	5.25%	11.25%
1/1/2026	6.00%	5.50%	11.50%
1/1/2027	6.00%	5.75%	11.75%
1/1/2028	6.00%	6.00%	12.00%
1/1/2029	6.00%	6.25%	12.25%
1/1/2030	6.00%	6.50%	12.50%
Beyond	6.00%	6.50%	12.50%

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 shall be the date on which the member has completed at least 25 years of credited service and has attained the age of 55. Effective January 1, 2021, a member's Normal Retirement includes the Rule of 80 (age plus service must total at least 80, with a minimum age of 50).

Normal Retirement Benefit

The annual Normal Retirement Benefit shall be 2 percent of the average of the member's highest three years base salary for each year of credited service up to ten years plus 2.5 percent for each year thereafter.



The benefit for members of affiliated social security employers will be reduced by the amount of social security income the member receives annually, calculated as if the social security benefit started as of age 62 for benefits prior to 2007. Beginning January 1, 2007, members of affiliated social security employers who participate in the Fire & Police Pension Association supplemental social security program which will provide benefits equal to 1 percent of the average of the member's highest three years base salary for each year of credited service up to ten years plus 1.25 percent for each year thereafter.

Benefits 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 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 Normal Retirement Benefit reduced on an actuarially equivalent basis.

Benefits 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 service is vested. A vested member who does not withdraw their contributions from the Plan is eligible for a vested benefit, payable at age 55. The annual vested benefit is equal to 2 percent of the average of the member's highest three years base salary for each year of credited service up to ten years plus 2.5 percent for each year thereafter. Both the highest average salary and service are determined at the time the member leaves active employment or enters the Deferred Retirement Option Plan (DROP). Benefits may commence at age 55.

The benefit for members of affiliated social security employers earned prior to January 1, 2007 will be reduced by the amount of social security income the member receives annually.

Benefits 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 may defer the receipt of their defined benefit pension to as late as age 65 and receive the actuarial equivalent of the benefit.



Benefits are paid as a monthly life annuity. Other forms of payment are available.

Severance Benefit

All members 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 in lieu of the future vested 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.

Death Benefit of Active Members

Death must have occurred while an active or an inactive, non-retired member.

Upon the death of a non-vested 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 vested, single and had no dependent children and was not eligible for a Normal or Early retirement, a joint and survivor annuity may be paid to the beneficiary if greater than the refund. The benefit for members of affiliated social security employers earned prior to January 1, 2007 will be reduced by the amount of social security income the member receives annually.

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 benefits, a spouse includes a partner in a civil union.

Survivors of an active or inactive member who is eligible for a Normal or Early retirement and who dies after leaving active service but before electing a payment option or receiving the first pension payment is eligible to receive a benefit according to payment Option 1 (Joint and 100% Survivor benefits).

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 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.

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 the higher of 3 percent or the Consumer Price Index. Benefit adjustment may begin once the retired member has been receiving retirement benefits for at least 12 calendar months prior to October 1.

Stabilization Reserve Account (SRA)

Annually, at the discretion of the Board of Directors, the difference between the combined member/employer contribution and the actuarially determined contribution rate may be allocated to the stabilization reserve account (SRA). Amounts set aside in the SRA are allocated to individual accounts for each member. A member may receive the amounts in this individual account only upon election of Normal, Early, Disability or Vested retirement. If the cost of the Plan exceeds the combined member/employer contribution rate, funds from the SRA may be used to make up the shortfall. If a member leaves with less than five years of service credit, the SRA account is forfeited. Likewise, if a vested member elects to take a refund of member contributions instead of a retirement, the SRA is forfeited. The SRA may be payable in the event of the active member's death if the member was vested at the time of death, or if the member's survivors receive benefits from the Statewide Death & Disability Plan, the applicable SRA offset applies.

Members of plans reentering the system have a higher contribution rate. Prior to January 1, 2021, their SRA had two components: the standard SRA and the reentry SRA. The component of the member's SRA attributable to the higher contribution rate is considered the reentry SRA. The reentry SRA cannot be used to subsidize the costs of the non-reentry members. The reentry SRA could be used to correct any deficiencies in the cost of participation for the reentry members only. Effective January 1, 2021, SRA accounts will be converted to self-directed accounts. Also, there will no longer be a reentry SRA as FPPA will receive contributions that reflect the actual cost of reentry for each department.



A member may elect to convert the SRA or reentry SRA to a lifetime monthly benefit with survivor benefits.

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 can continue 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 determined at the time of entry into the DROP. The monthly payments that begin at entry into the DROP are accumulated in a DROP account 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. While participating in DROP, the member continues to make pension contributions, which are credited to the DROP. Effective January 1, 2003, the member shall self-direct the investments of their DROP funds.

Investment Pool

The Statewide Defined Benefit Plan is invested in 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	4.1	3.8	4.2
Ratio of actuarial accrued liability to payroll	3.9	3.8	3.8
Ratio of actives to retirees and beneficiaries	5.2	5.3	5.3
Net cash flow as a percentage of market value of assets	2.7%	4.6%	5.4%
Duration of the actuarial accrued liability	13.5	13.7	13.2

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.

Fire and Police Pension Association Statewide Death & Disability Plan

Actuarial Valuation Report
for the Year Beginning January 1, 2020





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 Death & Disability Plan (the Plan) as of January 1, 2020

Dear Members of the Board:

We are pleased to present our Report on the actuarial valuation of the Statewide Death & Disability Plan for the Fire and Police Pension Association (FPPA) as of January 1, 2020.

We certify that the information included herein and contained in our 2020 Actuarial Valuation Report is accurate and fairly presents the actuarial position of the FPPA Statewide Death & Disability Plan as of January 1, 2020.

Our report presents the results of the January 1, 2020 actuarial valuation of the FPPA Statewide Death & Disability Plan (D&D). The report describes the current actuarial condition of the D&D, determines the appropriateness of the contribution rate for certain members, and analyzes changes since the last valuation. The results presented herein may not be applicable for other purposes.

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

Financing Objectives

Contribution rates are established by law as a percentage of payroll. The contributions are intended to finance the future benefits payable from the Plan using a modified version of the aggregate actuarial cost method.

House Bill 20-1044

House Bill 20-1044 increased the Board's ability to change contribution levels. Prior to its passage, the Board could move the contribution rate by 0.1% every two years. With the passage of House Bill 20-1044, the Board can now move the contribution rate by 0.2% every year. In addition, the bill automatically increased the 2021 rate to 3.0%.

Progress toward Realization of Financing Objectives

The unfunded actuarial accrued liability and the funded ratio (ratio of the actuarial value of assets to the net present value of benefits) illustrate the progress toward the realization of certain financing objectives. Based on our actuarial valuation as of January 1, 2020, the Plan has current liabilities greater than current assets by \$166.6 million assuming no allowance for future discretionary benefit

adjustments for non-totally disabled benefit recipients. After taking into account House Bill 20-1044 and increasing contribution levels to 3.0% starting in 2021, this amount is reduced to \$146.8 million. This does not take into account any increases beyond the 3.0% level which the Board may adopt starting in 2022.

The Board increased the annual contribution rate for members hired on or after January 1, 1997 to 2.80% effective January 1, 2019, and House Bill 20-1044 will increase rates to 3.00% starting in 2021. Based on smoothed assets, the cost of providing benefits is 4.34%, therefore, the current contribution rates are inadequate to provide any level of future discretionary benefit adjustments, or even to fund base benefits. We recommend that the Board maximize use of the contribution flexibility granted by the House Bill and increase rates by the 0.2% allowed when they are allowed to do so.

Benefit provisions

All of the benefit provisions reflected in this valuation are those which were in effect on January 1, 2020. There were no changes in 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 selected by the Board of Directors of FPPA based upon the actuary's analysis and recommendations from the 2018 Experience Study, for first use in the actuarial valuation as of January 1, 2019. For information regarding the rationale for the assumptions chosen, please see the experience study report dated September 21, 2018.

The 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.

Data

FPPA supplied data for active and disabled 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 have concluded that the data is reasonable and consistent with the prior year's data. FPPA also supplied asset data as of January 1, 2020.



GASB Accounting

The Governmental Accounting Standards Board (GASB) Statement No. 74, Financial Reporting for Postemployment Benefit Plans Other Than Pension Plans (Issued 6/2015), has replaced the requirements under GASB Statement No. 43, effective for financial statements for fiscal years beginning after June 15, 2016. GASB Statement No. 75, Accounting and Financial Reporting for Postemployment Benefits Other Than Pensions (Issued 6/2015), has replaced GASB Statement No. 45, effective for fiscal years beginning after June 15, 2017. Plan reporting information for GASB Statement No. 74 can be found in the FPPA Comprehensive Annual Financial Report at FPPA's website - FPPAco.org. There will be no employer reporting for GASB Statement No. 75 as all contributions to the FPPA Statewide Death & Disability Plan are made by members or on behalf of members.

Projected Actuarial Results

The following table shows the Funded Ratio (FR) and Annual Required Contribution (ARC) 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. These projections assume 2.8% contributions during 2020 and 3.0% thereafter.

5-Year Deterministic Projection						
January 1,	Market Value Investment Return					
	3.00%		7.00%		11.00%	
	FR	ARC	FR	ARC	FR	ARC
2020	72.2%	4.34%	72.2%	4.34%	72.2%	4.34%
2021	73.1%	4.40%	73.7%	4.36%	74.3%	4.33%
2022	71.3%	4.52%	73.2%	4.43%	74.9%	4.34%
2023	69.0%	4.69%	72.5%	4.50%	76.0%	4.31%
2024	66.3%	4.88%	71.9%	4.57%	77.6%	4.25%
2025	63.0%	5.11%	70.8%	4.67%	79.5%	4.17%

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.

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 all 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



Linna Ye, ASA, MAAA
Actuary

Table of Contents

	<u>PAGE</u>
Section I	Executive Summary 2
Section II	Discussion 5
Section III	Tables
	1 – Development of Unfunded Actuarial Accrued Liability..... 15
	2 – Actuarial Present Value of Future Benefits 16
	3 – Actuarial Gain/(Loss) on UAAL 17
	4 – Summary of Historical Valuation Results..... 18
	5 – Allocation of Plan Assets at Fair Value..... 19
	6 – Reconciliation of Plan Net Assets..... 20
	7 – Development of Actuarial Value of Assets 21
	8 – Investment Yields..... 22
	9 – Gain/(Loss) on Actuarial Value of Assets 23
	10 – History of Investment Return Rates..... 24
	11 – Schedule of Funding Progress 25
	12 – Solvency Test 27
	13 – Cash Flow Analysis..... 28
	14 – Membership Data..... 29
	15 – Historical Summary of Active Member Data 30
	16 – Distribution of Active Members by Age and by Years of Service as of December 31, 2019..... 31
	17 – Schedule of Retirants & Annuitants Added to & Removed from Rolls 32
	18 – Summary of Members and Adjusted Payroll by Employer 33
	19 – Summary of Inactive Members..... 42
	Appendix A – Summary of Actuarial Methods and Assumptions..... 44
	Appendix B – Summary of Benefit Provisions 53
	Appendix C – Risks Associated with Measuring the Accrued Liability and Actuarial Determined Contribution 58

SECTION I

EXECUTIVE SUMMARY

Executive Summary

Item	January 1, 2020	January 1, 2019
Membership • Number of: - Active members 13,283 12,747 - Total disabled members & beneficiaries 162 157 - Occupational disabled members & beneficiaries 987 949 - Survivors of deceased active members <u>135</u> <u>132</u> - Total 14,567 13,985 • Annualized payroll supplied by FPPA \$ 1,112,893 \$ 1,012,667		
Recommended contribution rates for members hired on or after January 1, 1997 and members covered by Social Security	2.80%	2.80%
Assets • Market value \$ 442,442 \$ 394,247 • Actuarial value \$ 432,227 \$ 409,327 • Rate of return on market value 14.4% 0.0% • Rate of return on actuarial value 7.6% 6.0% • Contribution for prior year \$ 26,150 \$ 22,685 • Ratio of actuarial value to market value 97.7% 103.8%		
Actuarial Information • Unfunded actuarial accrued liability/(surplus) \$ 166,602 \$ 153,496 • GASB funded ratio (2.8% Contributions) 72.2% 72.7% • GASB funded ratio (2.8% Contributions FY 2020, 3.0% Thereafter) 74.6% N/A		

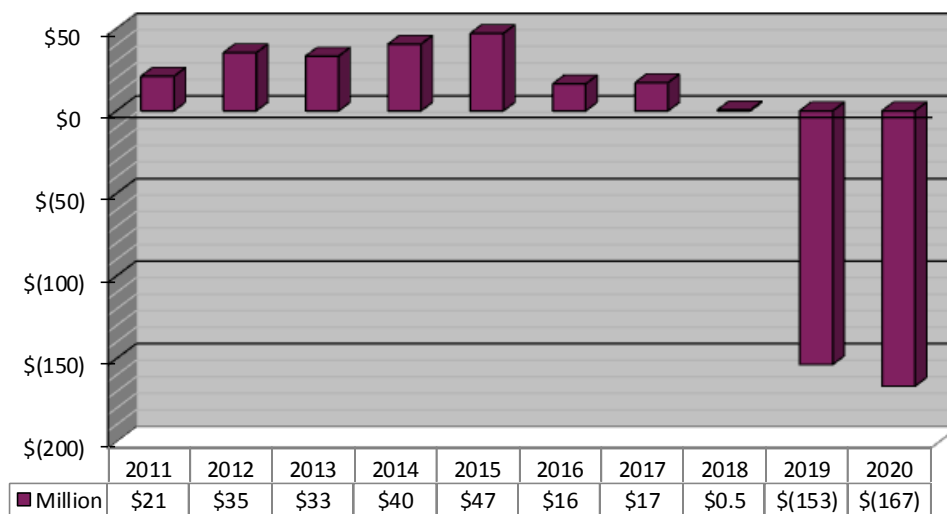
Note: Dollar amounts in \$000

Executive Summary

1. The annual contribution rate for members hired on or after January 1, 1997 and for members covered by Social Security is 2.8% as of January 1, 2020.
2. This rate was last increased from 2.7% to 2.8% as of January 1, 2019.
3. House Bill 20-1044 will automatically increase the rate to 3.0% effective January 1, 2021.
4. The number of total members increased from 13,985 in 2019 to 14,567 in 2020, an increase of 4.2%.
5. Current plan benefits provide an automatic annual 3.0% benefit adjustment to totally disabled members and their beneficiaries but assume no future benefit adjustments for other members. Based on actuarial estimations, the current 2.8% contribution rate is inadequate to provide any permanent annual benefit adjustment.
6. The present value of future benefits and expenses at the valuation date is in excess of the plan assets and the present value of future contributions by \$166.6 million. This unfunded position compares to the \$153 million unfunded position last year. The Plan is “unfunded” assuming no future discretionary benefit adjustments for non-totally disabled benefit recipients.
7. Assets earned 14.4% on a market basis and 7.6% on an actuarial basis in 2019, producing an actuarial gain of \$2.6 million.
8. The funded ratio decreased from 72.7% to 72.2% as of January 1, 2020.

The following chart shows the history of the (Unfunded Actuarial Accrued Liability)/Surplus as of past historical valuation dates. The dollar values are in millions.

Historical (UAAL)/Surplus



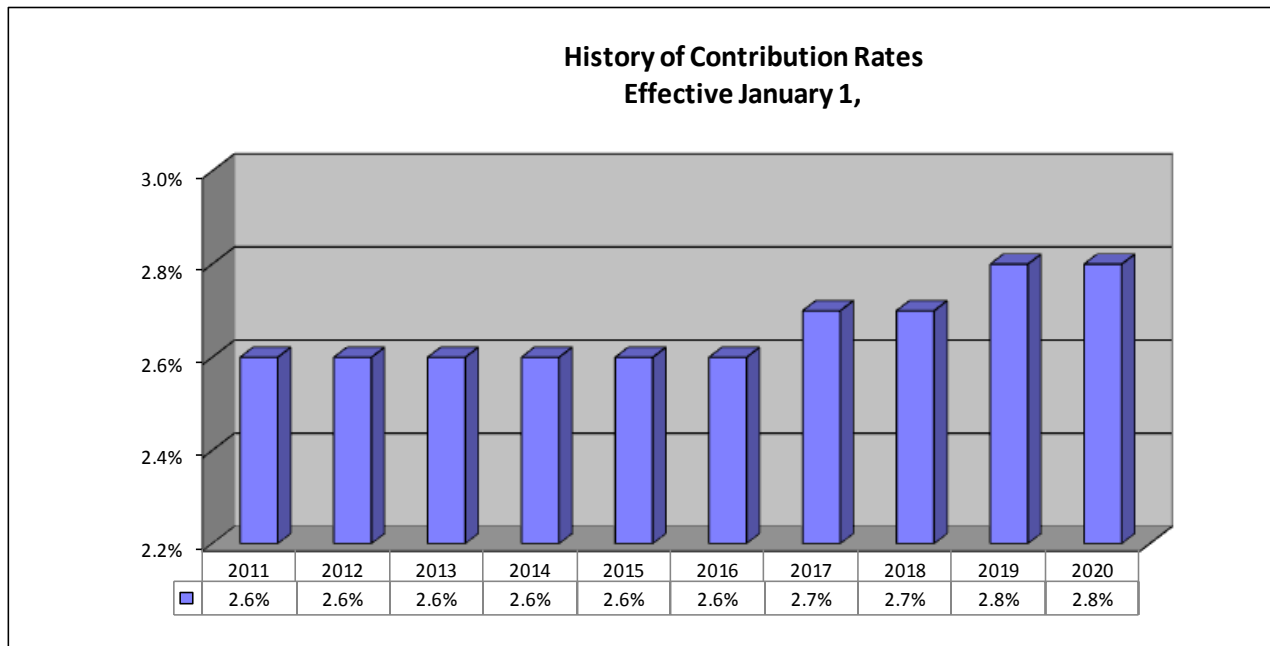
SECTION II

DISCUSSION

Contribution Requirements

The valuation of the Fire and Police Pension Association Statewide Death & Disability Plan (D&D) as of January 1, 2020, reflects a current employee contribution rate of 2.8% for members hired on or after January 1, 1997. By statute, this rate can change only every two years.

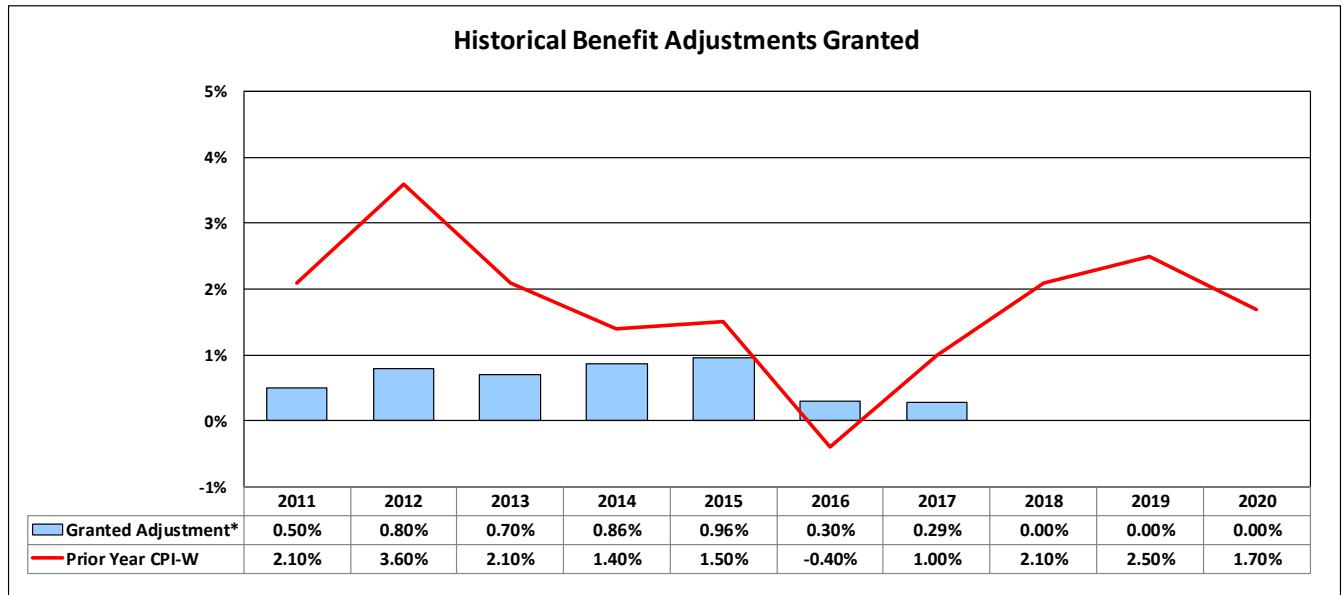
The following graph shows the historical contribution rates for employees hired on or after January 1, 1997 and for members covered by Social Security.



The cost of providing benefits is 4.34% (with no future benefit adjustments for non-totally disabled benefit recipients), therefore, the current 2.80% contribution rate is inadequate to provide any level of future benefit adjustments, or even to fund base benefits. House Bill 20-1044 will increase the contribution rate to 3.0% effective January 1, 2021, and allow the Board to increase rates by 0.2% per year starting January 1, 2022. We recommend the Board make maximum use of that discretion until the plan's funding outlook is significantly improved.

Discretionary Benefit Adjustments

On October 1st of each year, annuitants may receive a benefit increase at the discretion of the Board of Directors. Totally disabled members and their beneficiaries receive an automatic increase each year of 3%. For other annuitants, the increase may reflect CPI, but in no case may be higher than 3%. Because the increases are purely discretionary, the valuation results in the report are shown assuming no discretionary benefit adjustments are granted to annuitants other than total disability retirees. The current 2.80% contribution is inadequate to provide any permanent annual benefit adjustment, or even to fund base benefits. We recommend the Board not make any discretionary benefit adjustments until base benefits are adequately funded and additional funding is available for the discretionary adjustments.



**Total disability annuitants and their survivors receive an automatic annual Benefit Adjustment of 3.0%.*

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 D&D. FPPA provided GRS with a summary of plan assets as of January 1, 2020. The market value of assets reported was \$442.4 million as of January 1, 2020, as compared to \$394.2 million as of January 1, 2019. Table 6 shows data from some of the tables included in the annual financial statements of the Plan. Table 8 shows the estimated yield on a market value basis and on the actuarial asset valuation method.

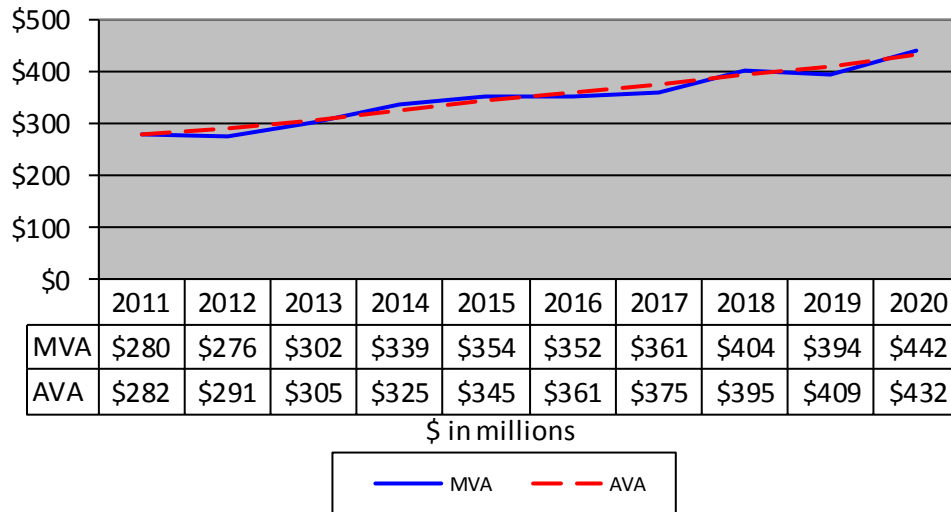
The asset valuation method uses a five-year phase in of the excess/(shortfall) between expected investment return and actual income. Expected earnings used to project the actuarial value are determined using the assumed investment return rate and the beginning of year actuarial value of assets (adjusted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

Table 7 shows the development of the actuarial value of assets. The actuarial value of assets increased from \$409.3 million to \$432.2 million since the prior valuation. This increase was more than expected and produced a gain of approximately \$2.6 million.

Effective January 1, 2019, the valuation assumed investment return was reduced from 7.5% to 7.0% per year. As indicated by item 6b of Table 8, the estimated return on mean market value was 14.41% in 2019; higher than the assumed 7.0% return. The actuarial asset value returned 7.63%. This difference in the estimated return on market value and actuarial value illustrates the smoothing effect of the asset valuation method.

History of MVA vs AVA

As of the valuation date January 1,



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

Demographic Experience

During the year, the plan had less disablements than expected (57 actual vs. 67.3 expected) and less active member deaths than expected (5 actual vs. 8.2 expected). The plan had more annuitant deaths than expected (23 actual vs. 15.7 expected). The primary component of the liability loss shown in Table 3 is from new hires to the plan. The 2.8% contribution rate is not sufficient to support the expected costs of the plan, and because of this, a new active member comes onto the plan with an unfunded liability at date of hire.

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 contribution, and the accumulated stabilization reserve account. 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 (total disability retirees, occupational disability retirees, beneficiary), and if applicable, the joint pensioner's date of birth and sex.

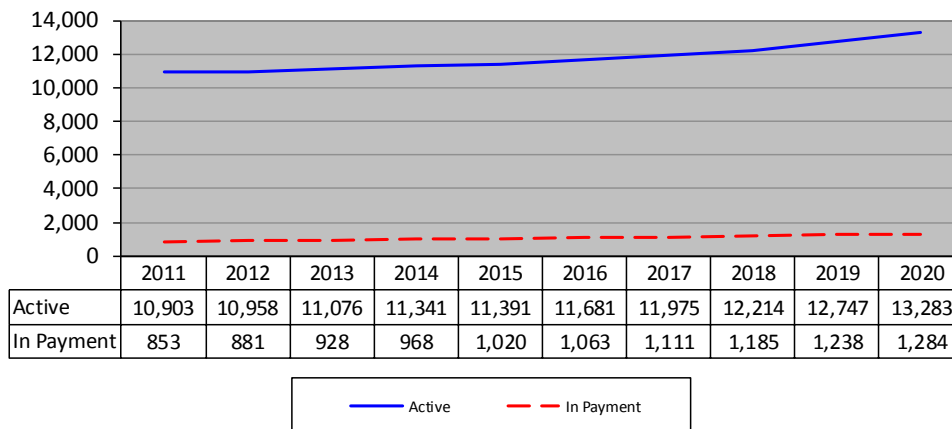
For local Money Purchase members, an array based on service was used to estimate each member's Money Purchase balance. For missing salary in the data, an array of salaries based on service was used to estimate the salary.

Table 17 shows the number of members by category (active, inactive, retired, etc.). Table 18 shows a historical summary of active member statistics, and Table 19 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

As of the valuation date January 1,



Benefit Provisions

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

- Pre-Retirement Death Benefits:
 - Off-duty: 40% of the base salary paid to the member prior to death, with an additional 10% of base salary if a surviving spouse has two or more dependent children.
 - On-duty: 70% of the base salary paid to the member prior to death.
- Disability Benefits:
 - Total Disability: 70% of the base salary preceding disability.
 - Permanent Occupational Disability: 50% of the base salary preceding disability.
 - Temporary Occupational Disability: 40% of the base salary preceding disability for up to 5 years.

- Contributions: Members hired after January 1, 1997 and members covered by Social Security currently contribute 2.8% of pay.
- Benefit adjustments are granted periodically at the discretion of the FPPA Board. Total disability retirees receive an automatic increase of 3%. For other annuitants, the increase may reflect CPI, but in no case may be higher than 3%.

There are no ancillary benefits—e.g., cost of living benefits—that are currently provided by a source independent of FPPA but that might be deemed an FPPA liability if continued beyond the availability of funding by the current funding source.

Actuarial Methods and Assumptions

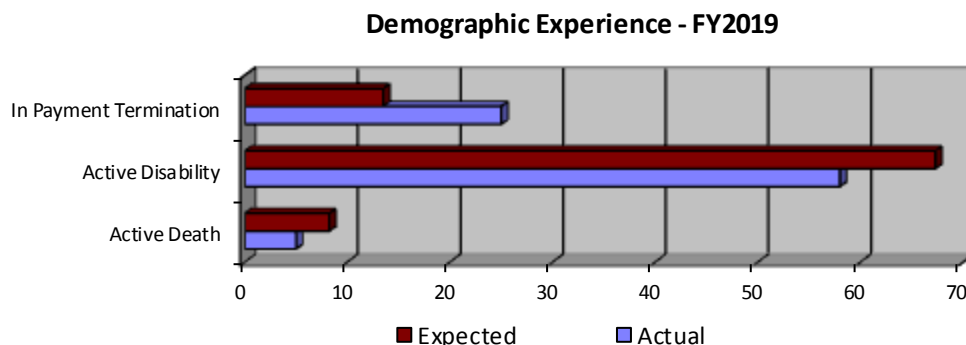
The valuation was prepared using the Aggregate Method. This is the same funding method that has been used in prior years. The asset valuation method uses a five-year phase in of the excess (shortfall) between expected investment return and actual income. See Appendix A for a complete description of this 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 as well. The economic assumptions include investment return and salary increases. Non-economic assumptions include rates of mortality, disability, and separation.

There were 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 102.4% of expected. The following charts provide a comparison of the actual experience versus the expected experience for selected assumptions.



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

GASB and Funding Progress

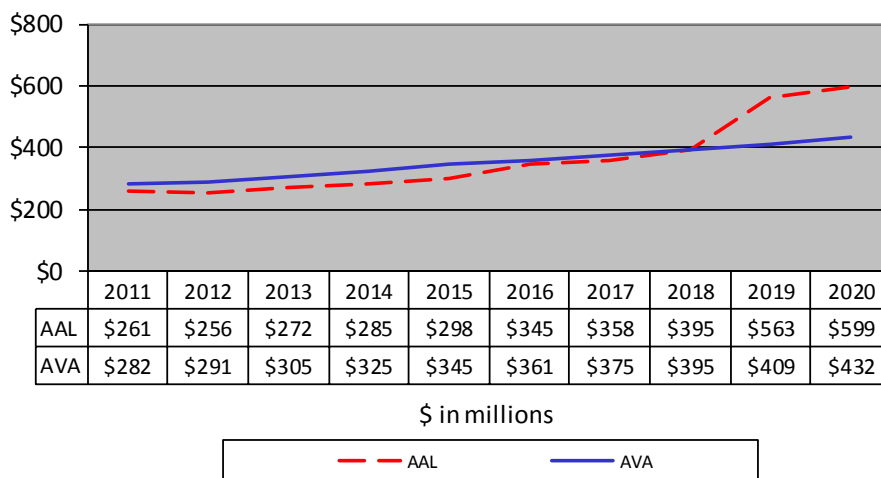
The governmental Accounting Standards Board (GASB) Statement No.74, *Financial Reporting for Postemployment Benefit Plans Other Than Pension Plans (GASB 74)*, has replaced the requirements under GASB Statement No. 43, *Financial Reporting for Postemployment Benefit Plans Other Than Pension Plans (GASB 43)*, effective for financial statements for fiscal years beginning after June 15, 2016. The governmental Accounting Standards Board (GASB) Statement No.75, *Financial Reporting for Postemployment Benefit Plans Other Than Pension Plans (GASB 75)*, has replaced the requirements under GASB Statement No. 45, *Financial Reporting for Postemployment Benefit Plans Other Than Pension Plans (GASB 45)*, effective for financial statements for fiscal years beginning after June 15, 2017.

Plan reporting information for GASB 74 can be found in the FPPA Comprehensive Annual Financial Report at FPPAco.org. There will be no employer reporting for GASB 75 as all contributions to the FPPA Statewide Death & Disability Plan are made by members or on behalf of members. Although it will no longer be required for financial reporting purpose, we have continued to include Table 11a (shows a historical summary of the funded ratios and other information for FPPA). In addition, we have included a Schedule of Funding Progress in Table 11b based on the Entry Age Normal cost method as required for plans using the Aggregate Cost Method.

For FPPA, the employer Annual Required Contribution for 2019 is 0%. For members hired on or after 1/1/97 and for members covered by Social Security the member contribution rate is 2.8% of pay. The 2.8% became effective January 1, 2019.

History of AAL vs AVA

As of the valuation date January 1,



The AAL referenced in the chart is the Actuarial Accrued Liability as referenced throughout the report.

Significant Factors Affecting Trends in Actuarial Information

With the recognition of significant increases in utilization of the disability benefits of this plan, the funding outlook of the plan notably deteriorated. In response to this poor funding outlook, House Bill 20-1044 provided relief by allowing the Board increased flexibility in increasing contributions to the plan. If the Board maximizes the use of the contribution increases allowed, it is anticipated that the plan will return to an expectation of sustainability.

Risk Metrics

The Statewide Death and Disability Plan provides death and disability benefits to members covered under the Statewide Death & Disability Plan, Statewide Hybrid Plan, Colorado Springs New Hire Plans, the Statewide Money Purchase Plan and Local Money Purchase and Defined Benefit Plans. The Plan is funded through payroll contributions on active member payroll for members hired on or after January 1, 1997. Benefits for members hired before 1997 were previously funded by the State. The contributions made for this group were considered to fulfill the State's funding obligation, and no further contributions are anticipated. Accordingly, the Calculated Contribution is calculated as a percentage of contributory (post-1996 hire) payroll. As pre-1997 hires terminate and are replaced by contributory members, the contributory portion of the active population grows. This results in the contributory payroll growing faster than the liabilities and assets. This deleveraging can be observed in the historical data. Although the Plan's contributory payroll is growing, because the Plan is funded through employee contributions, there is less tolerance for contribution rate volatility. Eventually the active population will become largely contributory and the contributory payroll will not grow at the same rate. At that point (expected to be about 10 years out), the trend will reverse and the Plan will start to become more leveraged.

Valuation Year	AVA as % of Contributory Payroll	AAL (EAN) as % of Contributory Payroll	Calculated Contribution % of Contributory Payroll	Increase in ADC if Assets Decrease 10%	Funded Ratio (EAN)	Change in Funded Ratio if Assets Decrease 10%
2009	61%	48%	2.31%	0.63%	126.3%	-12.6%
2010	58%	47%	2.32%	0.47%	123.3%	-12.3%
2011	60%	49%	2.23%	0.48%	122.4%	-12.2%
2012	59%	52%	1.98%	0.50%	114.6%	-11.5%
2013	58%	52%	2.05%	0.51%	111.5%	-11.1%
2014	58%	52%	1.97%	0.51%	112.3%	-11.2%
2015	58%	52%	1.89%	0.52%	110.8%	-11.1%
2016	55%	53%	2.37%	0.51%	104.0%	-10.4%
2017	54%	53%	2.48%	0.49%	100.7%	-10.1%
2018	50%	52%	2.69%	0.49%	95.8%	-9.6%
2019	47%	56%	4.40%	0.43%	84.2%	-8.4%
2020	43%	51%	4.34%	0.40%	83.9%	-8.4%

Market Value Results

Investment gains or losses are smoothed over five years, and currently, the smoothed or actuarial value of assets is 97.69% of the market value. If the Funded Ratio and Calculated Contribution had been measured using the Market Value of Assets, they would be 73.9% and 4.24% of payroll, respectively.

SECTION III

TABLES

Table 1 - Development of Unfunded Actuarial Accrued Liability

	January 1, 2020	January 1, 2019
1. Covered payroll for upcoming year	\$ 1,143,563,487	\$ 1,043,406,755
2. Present value of future pay		
a. Total	\$ 11,181,231,817	\$ 10,071,765,811
b. Contributory (Hired on or after January 1, 1997)	10,849,819,604	9,616,060,914
3. Present value of benefits for active members		
a. Future occupational disabilities	\$ 360,754,487	\$ 325,012,589
b. Future total disabilities	63,915,842	57,323,006
c. Future active deaths	46,800,321	42,447,914
d. Total for actives	\$ 471,470,650	\$ 424,783,509
4. Total present value of benefits		
a. Current disabled members	\$ 371,814,355	\$ 350,578,423
b. Current beneficiaries of deceased members	36,554,718	34,594,145
c. Active members (Item 3d)	471,470,650	424,783,509
d. Total	\$ 879,839,723	\$ 809,956,077
5. Unfunded actuarial accrued liability (UAAL)/(surplus)		
a. Present value of benefits	\$ 879,839,723	\$ 809,956,077
b. Present value of administrative costs	22,784,621	22,116,940
c. Less present value of future contributions (2.8%/2.8%)	(303,794,949)	(269,249,706)
d. Less actuarial value of assets	(432,227,330)	(409,326,924)
e. UAAL/(surplus)	\$ 166,602,065	\$ 153,496,388
6. a. Current Contribution	2.80%	2.80%
b. Calculated Contribution (Aggregate Funding) $[(5.a + 5.b + 5.d)/2.b]$	4.34%	4.40%
c. Difference (a. - b.)	-1.54%	-1.60%

Table 2 - Actuarial Present Value of Future Benefits

	<u>January 1, 2020</u>	<u>January 1, 2019</u>
1. Active members		
a. Total disability	\$ 63,915,842	\$ 57,323,006
b. Occupational disability	360,754,487	325,012,589
c. Off-duty death	32,436,131	29,577,255
d. On-duty death	14,364,190	12,870,659
e. Total	<u>\$ 471,470,650</u>	<u>\$ 424,783,509</u>
2. Members in pay status		
a. Total disabled	\$ 100,306,717	\$ 93,362,408
b. Occupationally disabled	271,507,638	257,216,015
c. Survivors	36,554,718	34,594,145
d. Total	<u>\$ 408,369,073</u>	<u>\$ 385,172,568</u>
3. Total actuarial present value of future benefits	\$ 879,839,723	\$ 809,956,077

Table 3 - Actuarial Gain/(Loss) on UAAL

For the year ending December 31,	2019	2018
1. Unfunded actuarial accrued liability (UAAL) as of January 1	\$ 153,496,388	\$ (527,737)
2. Interest on UAAL for one year	10,744,747	(36,942)
3. Expected UAAL as of December 31 (1 + 2)	164,241,135	(564,679)
4. Change in Unfunded Liability due to:		
a. Benefit Changes *	0	(8,653,295)
b. Provision or Assumption Changes**	0	144,844,824
5. Expected UAAL as of December 31 after changes in assumption, methods and plan provisions	164,241,135	135,626,850
6. Actual UAAL as of December 31	166,602,066	153,496,388
7. Actuarial gain/(loss) for the period (5 - 6)	(2,360,931)	(17,869,538)
<u>SOURCE OF GAINS/(LOSSES)</u>		
8. Asset gain/(loss) (See Table 9)	2,553,581	(3,770,103)
9. Salary liability gain/(loss) for the period	(4,385,814)	1,796,643
10. Benefit adjustment granted as of October 1 (0.00% in 2019, 0.00% in 2018)	0	0
11. Net liability gain/(loss) for the period (7- 8 - 9 - 10)	(528,698)	(15,896,078)

* Change in the Unfunded Liability due to Benefit Changes for the year ending December 31, 2018 reflects the change in member contribution rate from 2.7% to 2.8%.

** 2017 Change in Unfunded Liability due to Provisions or Assumption Changes reflects a change in allocation of administrative expenses. 2018 reflects assumption changes adopted following an experience study.

Table 4 - Summary of Historical Valuation Results

As of the Valuation Date January 1,

	<u>2020</u>	<u>2019</u>	<u>2018</u>	<u>2017</u>	<u>2016</u>	<u>2015</u>	<u>2014</u>	<u>2013</u>	<u>2012</u>	<u>2011</u>
1. Number of members										
a. Active	13,283	12,747	12,214	11,975	11,681	11,391	11,341	11,076	10,958	10,903
b. Disabled	1,149	1,106	1,058	991	944	904	851	814	774	747
c. Survivor	135	132	127	120	119	116	117	114	107	106
d. Total	<u>14,567</u>	<u>13,985</u>	<u>13,399</u>	<u>13,086</u>	<u>12,744</u>	<u>12,411</u>	<u>12,309</u>	<u>12,004</u>	<u>11,839</u>	<u>11,756</u>
2. Covered payroll (prior year)	\$ 1,112,893	\$ 1,012,667	\$ 947,520	\$ 917,100	\$ 863,106	\$ 827,633	\$ 810,578	\$ 787,010	\$ 755,952	\$ 750,497
3. Average compensation	\$ 83,783	\$ 79,444	\$ 77,577	\$ 76,585	\$ 73,890	\$ 72,657	\$ 71,473	\$ 71,055	\$ 68,986	\$ 68,834
4. Covered payroll for upcoming year	\$ 1,143,563	\$ 1,043,407	\$ 976,603	\$ 942,822	\$ 886,802	\$ 844,536	\$ 834,268	\$ 833,177	\$ 801,017	\$ 802,802
5. Actuarial value of assets	\$ 432,227	\$ 409,327	\$ 395,302	\$ 374,944	\$ 361,070	\$ 345,009	\$ 325,181	\$ 305,455	\$ 290,988	\$ 281,577
6. Market value of assets	\$ 442,442	\$ 394,247	\$ 403,693	\$ 360,747	\$ 351,520	\$ 353,776	\$ 339,347	\$ 301,653	\$ 275,873	\$ 279,882
7. Present value of benefits										
a. Actives	\$ 471,471	\$ 424,784	\$ 246,318	\$ 238,978	\$ 225,012	\$ 201,711	\$ 203,254	\$ 198,232	\$ 192,101	\$ 214,708
b. Disabled	371,814	350,578	315,103	287,456	265,786	243,179	221,357	204,847	189,203	169,063
c. Survivors	<u>36,555</u>	<u>34,594</u>	<u>31,490</u>	<u>30,923</u>	<u>30,430</u>	<u>25,703</u>	<u>26,290</u>	<u>25,700</u>	<u>23,036</u>	<u>22,180</u>
d. Total	\$ 879,840	\$ 809,956	\$ 592,911	\$ 557,357	\$ 521,228	\$ 470,593	\$ 450,900	\$ 428,778	\$ 404,340	\$ 405,952
8. Calculated Contribution	4.34%	4.40%	2.69%	2.48%	2.37%	1.89%	1.97%	2.05%	1.98%	2.23%

\$ amounts in '000s



Table 5 - 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	<u>0.8%</u>	<u>2.0%</u>
	100.0%	100.0%

Asset Allocation as of January 1, 2020

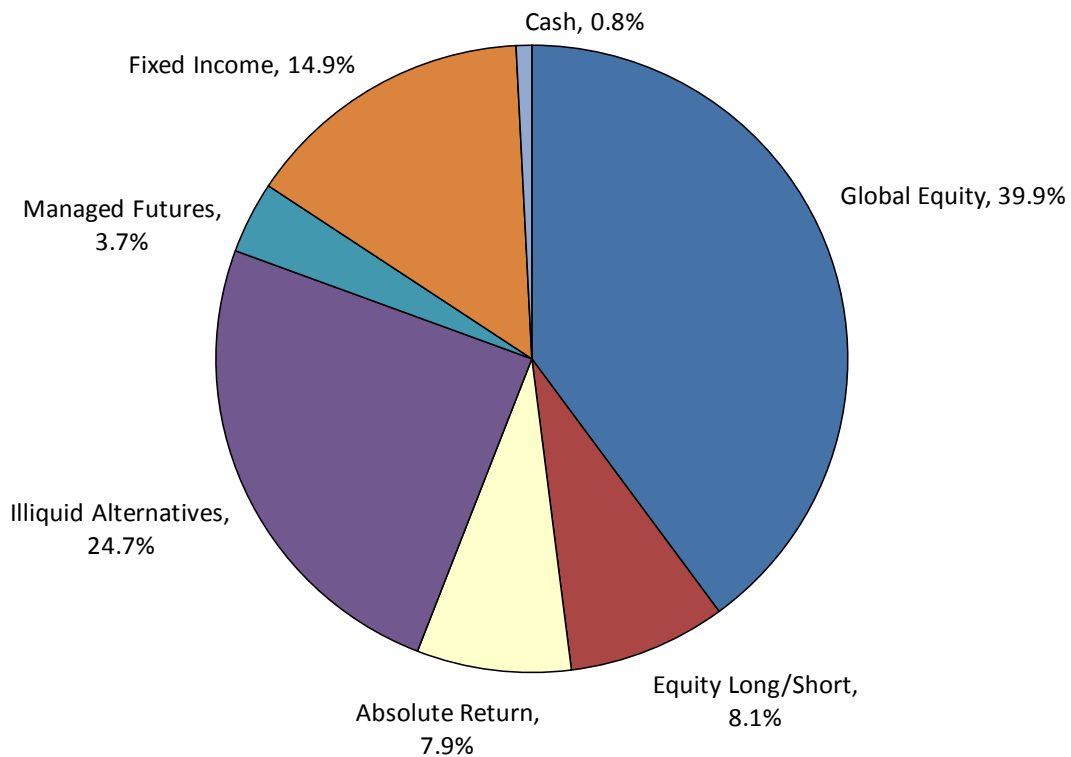


Table 6 - Reconciliation of Plan Net Assets

		Year Ending	
		December 31, 2019	December 31, 2018
1.	Market value of assets at January 1	\$ 394,246,510	\$ 403,693,032
2.	Revenue for the year		
a.	Contributions		
i.	Member contributions	\$ 4,249,903	\$ 3,780,098
ii.	Employer contributions *	21,899,808	18,904,415
iii.	Contributions from the SWDD Plan	0	0
b.	Net investment income		
i.	Interest	\$ 1,999,949	\$ 1,674,393
ii.	Dividends	2,617,900	3,080,972
iii.	Net change in accrued income	90,788	197,091
iv.	Unrealized gain/(loss)	17,811,720	(23,015,123)
v.	Realized gain/(loss)	35,580,870	19,447,005
vi.	Investment expense	(3,511,067)	(3,542,433)
vii.	Other Income	1,630,160	2,254,201
c.	Total revenue	\$ 82,370,031	\$ 22,780,619
3.	Expenditures for the year		
a.	Benefit payments and refunds	\$ (32,232,860)	\$ (30,273,489)
b.	Administrative expense	(1,942,028)	(1,953,652)
c.	Total expenditures	\$ (34,174,888)	\$ (32,227,141)
4.	Increase in net assets (Item 2c + Item 3c)	\$ 48,195,143	\$ (9,446,522)
5.	Market value of assets at December 31 (Item 1 + Item 4)	\$ 442,441,653	\$ 394,246,510

*All contributions are made by members or on behalf of members

Table 7 - Development of Actuarial Value of Assets

1. Actuarial value of assets at beginning of year	\$ 409,326,924
2. Net new investments	
a. Contributions	\$ 26,149,710
b. Benefit payments	(32,232,860)
c. Administrative expenses	(1,942,028)
d. Net cash flow	\$ (8,025,178)
3. Assumed investment return rate for fiscal year	7.0%
4. Assumed investment return for fiscal year	\$ 28,372,003
5. Expected Actuarial Value at end of year	\$ 429,673,749
6. Market value of assets at end of year	\$ 442,441,653
7. Excess return (6-5)	\$ 12,767,904
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	(15,080,414)	15,080,414	0	4	0	0
2019	27,848,318	(15,080,414)	12,767,904	5	2,553,581	10,214,323
Total	\$ 12,767,904	\$ 0	\$ 12,767,904		\$ 2,553,581	\$ 10,214,323

9. Actuarial value of assets as of December 31, 2019 (Item 6 - Item 8)	\$ 432,227,330
10. Ratio of actuarial value to market value	97.7%

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 through 2017 bases are \$0 because they were previously offset.



Table 8 - Investment Yields

Item	Market Value	Actuarial Value
1. Assets as of January 1, 2019 (A)	\$ 394,246,510	\$ 409,326,924
2. Contributions during FY19	26,149,710	26,149,710
3. Benefit payments and administrative expenses during FY19	(34,174,888)	(34,174,888)
4. Investment return during FY19	<u>56,220,321</u>	<u>30,925,584</u>
5. Assets as of January 1, 2020 (B): (1 + 2 + 3 + 4)	\$ 442,441,653	\$ 432,227,330
6. Approximate rate of return on average invested assets		
a. Net investment income (I)	\$ 56,220,321	\$ 30,925,584
b. Estimated return based on $(2I / (A + B - I))$	14.41%	7.63%

Table 9 - 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	\$ 409,326,924	\$ 395,302,474
2. Total contributions since prior valuation	\$ 26,149,710	\$ 22,684,513
3. Benefit payments and administrative expenses since prior valuation	\$ (34,174,888)	\$ (32,227,141)
4. Assumed net investment income at actuarial rate%*		
a. Beginning assets	\$ 28,652,884	\$ 27,671,173
b. Contributions	915,240	793,958
c. Benefit payments and administrative expenses	(1,196,121)	(1,127,950)
d. Total	\$ 28,372,003	\$ 27,337,181
5. Expected actuarial assets (1 + 2 + 3 + 4d)	\$ 429,673,749	\$ 413,097,027
6. Actual actuarial assets, this valuation	\$ 432,227,330	\$ 409,326,924
7. Asset gain/(loss) since prior valuation (6 - 5)	\$ 2,553,581 Gain	\$ (3,770,103) Loss

*7.5% beginning at January 1, 2012.

7.0% beginning at January 1, 2019

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Table 10 - History of Investment Return Rates

For Fiscal Year Ending	Market Value	Actuarial Value
December 31, 2010	13.29%	7.68%
December 31, 2011	0.52%	5.33%
December 31, 2012	11.60%	7.06%
December 31, 2013	14.80%	8.67%
December 31, 2014	6.45%	8.41%
December 31, 2015	1.40%	6.80%
December 31, 2016	5.17%	6.34%
December 31, 2017	14.73%	8.07%
December 31, 2018	0.02%	6.03%
December 31, 2019	14.41%	7.63%
Average Returns		
Last 5 Years	6.96%	6.97%
Last 10 Years	8.08%	7.20%

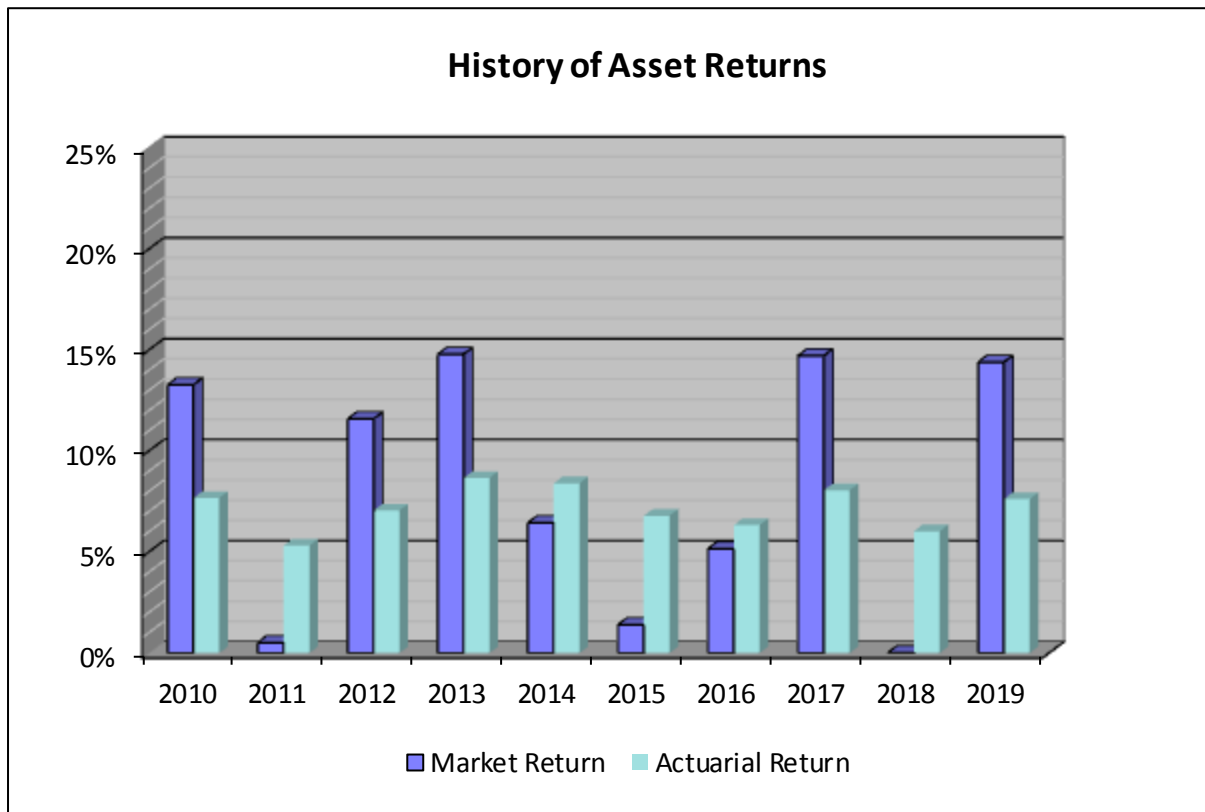


Table 11a - Schedule of Funding Progress
Based on the Aggregate Funding Method

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, 2009	\$ 257,279,496	\$ 241,813,411	\$ (15,466,086)	106.4%	\$ 740,172,854	(2.1%)
January 1, 2010	266,477,875	250,709,436	(15,768,440)	106.3%	758,113,476	(2.1%)
January 1, 2011	281,577,454	260,688,472	(20,888,983)	108.0%	750,497,200	(2.8%)
January 1, 2012	290,988,339	255,841,269	(35,147,071)	113.7%	755,952,497	(4.6%)
January 1, 2013	305,454,945	272,350,253	(33,104,693)	112.2%	787,009,650	(4.2%)
January 1, 2014	325,180,768	284,820,249	(40,360,519)	114.2%	810,578,220	(5.0%)
January 1, 2015	345,009,408	298,128,930	(46,880,478)	115.7%	827,633,440	(5.7%)
January 1, 2016	361,070,410	344,781,994	(16,288,416)	104.7%	863,105,687	(1.9%)
January 1, 2017	374,943,903	357,915,920	(17,027,983)	104.8%	917,099,955	(1.9%)
January 1, 2018	395,302,474	394,774,736	(527,738)	100.1%	947,520,430	(0.1%)
January 1, 2019	409,326,924	562,823,312	153,496,388	72.7%	1,012,666,543	15.2%
January 1, 2020	432,227,330	598,829,395	166,602,065	72.2%	1,112,892,992	15.0%

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 11b - Schedule of Funding Progress
Based on the Entry Age Normal Funding Method

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, 2011	\$ 281,577,454	\$ 229,959,016	\$ (51,618,438)	122.4%	\$ 750,497,200	(6.9%)
January 1, 2012	290,988,339	253,869,640	(37,118,699)	114.6%	755,952,497	(4.9%)
January 1, 2013	305,454,945	274,068,253	(31,386,692)	111.5%	787,009,650	(4.0%)
January 1, 2014	325,180,768	289,577,412	(35,603,356)	112.3%	810,578,220	(4.4%)
January 1, 2015	345,009,408	311,334,019	(33,675,389)	110.8%	827,633,440	(4.1%)
January 1, 2016	361,070,410	347,242,942	(13,827,468)	104.0%	863,105,687	(1.6%)
January 1, 2017	374,943,903	372,201,460	(2,742,443)	100.7%	917,099,955	(0.3%)
January 1, 2018	395,302,474	412,597,445	17,294,972	95.8%	947,520,430	1.8%
January 1, 2019	409,326,924	486,023,181	76,696,257	84.2%	1,012,666,543	7.6%
January 1, 2020	432,227,330	514,918,489	82,691,159	83.9%	1,112,892,992	7.4%

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 12 - Solvency Test

Valuation Date	Aggregated Accrued Liabilities for				Portion of Accrued Liabilities Covered by Reported Assets		
	Active Members Contribution	Retirees Beneficiaries and Vested Terminations	Members (Employer Financed Portion)	Actuarial Value of Assets	(5)/(2)	[(5)-(2)-(3)]/	
						[(5)-(2)]/(3)	(4)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
January 1, 2008	\$ 0	\$ 154,614	\$ 69,386	\$ 300,643	100%	100%	100%
January 1, 2009	0	165,740	76,074	257,279	100%	100%	100%
January 1, 2010	0	178,039	72,671	266,478	100%	100%	100%
January 1, 2011	0	191,243	69,445	281,577	100%	100%	100%
January 1, 2012	0	212,239	43,602	290,988	100%	100%	100%
January 1, 2013	0	230,546	41,804	305,455	100%	100%	100%
January 1, 2014	0	247,646	37,174	325,181	100%	100%	100%
January 1, 2015	0	268,883	29,246	345,009	100%	100%	100%
January 1, 2016	0	296,216	48,566	361,070	100%	100%	100%
January 1, 2017	0	318,379	39,537	374,944	100%	100%	100%
January 1, 2018	0	346,593	48,182	395,302	100%	100%	100%
January 1, 2019	0	385,173	177,651	409,327	100%	100%	14%
January 1, 2020	0	408,369	190,460	432,227	100%	100%	13%

\$ amounts in '000s



Table 13 - 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	Expenses	Total			
2008	\$ 10,963	\$ (14,887)	\$ 0	\$ (2,192)	\$ (17,079)	\$ (6,116)	\$ 214,400	(2.9%)
2009	11,957	(16,010)	0	(1,756)	(17,766)	(5,809)	251,923	(2.3%)
2010	12,259	(17,435)	0	(1,963)	(19,398)	(7,139)	279,882	(2.6%)
2011	12,813	(18,265)	0	(2,175)	(20,439)	(7,627)	275,873	(2.8%)
2012	13,612	(19,482)	0	(2,616)	(22,098)	(8,486)	301,653	(2.8%)
2013	14,570	(21,052)	0	(3,669)	(24,721)	(10,151)	339,347	(3.0%)
2014	15,509	(22,720)	0	(3,791)	(26,511)	(11,003)	353,776	(3.1%)
2015	16,938	(24,097)	0	(4,247)	(28,344)	(11,406)	351,520	(3.2%)
2016	18,216	(26,188)	0	(4,456)	(30,643)	(12,427)	360,747	(3.4%)
2017	20,535	(28,157)	0	(5,604)	(33,761)	(13,226)	403,693	(3.3%)
2018	22,685	(30,273)	0	(5,496)	(35,770)	(13,085)	394,247	(3.3%)
2019	26,150	(32,233)	0	(5,453)	(37,686)	(11,536)	442,442	(2.6%)
2020*	28,747	(34,499)	0	(5,644)	(40,143)	(11,396)	463,801	(2.5%)
2021*	32,108	(37,587)	0	(5,841)	(43,428)	(11,320)	486,842	(2.3%)
2022*	33,358	(40,759)	0	(6,046)	(46,805)	(13,447)	509,404	(2.6%)

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 applicable employee rate of 2.8% in 2020, 3.0% thereafter and 3.5% annual payroll growth

Expected benefit payments are based on the current plan benefits 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

\$ amounts in '000s



Table 14 - Membership Data

	<u>January 1, 2020</u>	<u>January 1, 2019</u>	<u>January 1, 2018</u>
1. Active members			
a. Number	13,283	12,747	12,214
b. Total payroll	\$ 1,112,892,992	\$ 1,012,666,543	\$ 947,520,430
c. Average annual salary	\$ 83,783	\$ 79,444	\$ 77,577
d. Average age	40.9	41.1	41.4
e. Average service	10.4	10.6	11.0
2. Disabled members and beneficiaries			
a. Number	1,149	1,106	1,058
b. Total annual benefits	\$ 29,576,339	\$ 27,860,403	\$ 26,013,174
c. Average annual benefit	\$ 25,741	\$ 25,190	\$ 24,587
d. Average age	58.8	58.5	58.0
3. Survivors of deceased active members			
a. Number	135	132	127
b. Total annual benefits	\$ 3,409,409	\$ 3,226,681	\$ 3,046,277
c. Average annual benefit	\$ 25,255	\$ 24,445	\$ 23,986
d. Average age	54.2	53.7	54.1

Table 15 - Historical Summary of Active Member Data

<u>Valuation Date</u>	<u>Active Count</u>	<u>Average Age</u>	<u>Average Service</u>	<u>Covered Payroll</u>	<u>Average Annual Salary</u>	<u>Percent Change in Average Salary</u>
January 1, 2008	10,971	40.0	10.1	\$ 668,502,284	\$60,934	3.56%
January 1, 2009	11,157	40.3	10.4	729,723,656	65,405	7.34%
January 1, 2010	11,077	40.8	10.9	751,781,464	67,869	3.77%
January 1, 2011	10,903	41.4	11.3	750,497,200	68,834	1.42%
January 1, 2012	10,958	41.6	11.5	755,952,497	68,986	0.22%
January 1, 2013	11,076	41.8	11.7	787,009,650	71,055	3.00%
January 1, 2014	11,341	41.7	11.5	810,578,220	71,473	0.59%
January 1, 2015	11,391	41.8	11.5	827,633,440	72,657	1.66%
January 1, 2016	11,681	41.7	11.3	863,105,687	73,890	1.70%
January 1, 2017	11,975	41.5	11.1	917,099,955	76,585	3.65%
January 1, 2018	12,214	41.4	11.0	947,520,430	77,577	1.30%
January 1, 2019	12,747	41.1	10.6	1,012,666,543	79,444	2.41%
January 1, 2020	13,283	40.9	10.4	1,112,892,992	83,783	5.46%

Table 16 - Distribution of Active Members by Age and by Years of Service
As of December 31, 2019

Attained Age	Years of Credited Service												Total
	Less than 1	1-2	2-3	3-4	4-5	5-9	10-14	15-19	20-24	25-29	30-34	35 & Over	
	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.	Count & Avg. Comp.
Under 25	240	92	36	9									377
	\$51,843	\$58,805	\$58,284	\$57,215									\$54,372
25-29	500	368	310	216	110	122							1,626
	\$55,394	\$60,566	\$65,686	\$72,451	\$74,801	\$81,358							\$64,054
30-34	428	307	295	305	212	548	68						2,163
	\$59,438	\$61,480	\$68,007	\$75,216	\$78,159	\$83,627	\$88,053						\$71,984
35-39	203	173	163	189	168	595	549	108					2,148
	\$61,336	\$63,670	\$68,872	\$77,147	\$80,755	\$84,454	\$92,117	\$97,852					\$81,113
40-44	106	79	81	74	76	357	554	509	84				1,920
	\$63,593	\$63,998	\$69,137	\$74,262	\$80,951	\$85,149	\$92,728	\$98,378	\$107,202				\$88,486
45-49	92	51	36	53	41	198	372	693	489	45			2,070
	\$64,277	\$67,295	\$87,069	\$73,701	\$82,330	\$83,506	\$91,921	\$96,069	\$104,017	\$114,453			\$93,276
50-54	46	33	20	31	36	121	212	409	492	249	37		1,686
	\$77,822	\$80,661	\$82,079	\$85,455	\$84,278	\$86,962	\$91,774	\$95,840	\$103,652	\$107,844	\$114,610		\$97,766
55-59	24	13	12	7	11	61	70	136	203	181	115	17	850
	\$87,656	\$93,846	\$85,791	\$81,806	\$94,851	\$90,913	\$92,163	\$96,192	\$100,711	\$105,131	\$120,321	\$115,471	\$101,554
60-64	8	11	5	6	8	20	25	56	57	45	52	52	345
	\$74,146	\$78,614	\$96,609	\$65,234	\$92,926	\$91,120	\$90,529	\$96,107	\$103,912	\$102,324	\$111,159	\$111,035	\$100,362
65 & Over	1	3	1	1	3	13	10	8	12	8	7	31	98
	\$70,195	\$91,529	\$53,674	\$99,664	\$96,777	\$83,734	\$81,134	\$88,430	\$95,334	\$108,146	\$127,951	\$106,119	\$97,860
Total	1,648	1,130	959	891	665	2,035	1,860	1,919	1,337	528	211	100	13,283
	\$58,878	\$62,917	\$68,500	\$74,972	\$79,704	\$84,479	\$91,993	\$96,711	\$103,498	\$107,011	\$117,315	\$110,265	\$83,783
Average: Age: 40.9 Number of participants: Males: 11,862													
												Service: 10.4	Females: 1,421



Table 17 - Schedule of Retirants & Annuitants Added to & Removed from Rolls*

Year Ended	Added to Rolls*		Removed from Rolls		Rolls-End of Year		% Increase in Annual Benefit	Average Annual Benefit
	Number	Annual Benefit	Number	Annual Benefit	Number	Annual Benefit		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
December 31, 2007	39	\$ 1,264,925	16	\$ 258,356	747	\$ 14,281,152	7.58%	\$ 19,118
December 31, 2008	45	1,259,221	20	339,442	772	15,200,931	6.44%	19,690
December 31, 2009	54	1,537,193	14	312,334	812	16,425,790	8.06%	20,229
December 31, 2010	50	1,366,173	9	185,774	853	17,606,189	7.19%	20,640
December 31, 2011	46	1,239,908	18	414,489	881	18,431,608	4.69%	20,921
December 31, 2012	56	1,721,508	9	166,231	928	19,986,885	8.44%	21,538
December 31, 2013	56	1,853,252	16	341,854	968	21,498,284	7.56%	22,209
December 31, 2014	67	2,082,872	15	299,192	1,020	23,281,964	8.30%	22,825
December 31, 2015	52	1,797,136	9	184,015	1,063	24,895,085	6.93%	23,420
December 31, 2016	68	2,098,542	20	413,487	1,111	26,580,140	6.77%	23,925
December 31, 2017	92	2,807,643	18	328,332	1,185	29,059,451	9.33%	24,523
December 31, 2018	76	2,443,624	23	415,991	1,238	31,087,084	6.98%	25,111
December 31, 2019	71	2,483,559	25	584,895	1,284	32,985,748	6.11%	25,690

*Includes benefit adjustments



Table 18 - Summary of Members and Adjusted Payroll by Employer

City Code	City Name	Police		Fire		Total	
		No.	Earnings	No.	Earnings	No.	Earnings
550	ADAMS COUNTY FPD	0	\$ 0	100	\$ 9,251,504	100	\$ 9,251,504
3	ALAMOSA	24	1,299,168	0	0	24	1,299,168
4	ALMA	2	97,000	0	0	2	97,000
5	ANTONITO	1	38,895	0	0	1	38,895
7	ARVADA	185	16,624,021	0	0	185	16,624,021
501	ARVADA FPD	0	0	161	14,740,375	161	14,740,375
8	ASPEN	25	1,968,026	0	0	25	1,968,026
711	ASPEN FPD	0	0	3	337,077	3	337,077
9	AULT	5	259,496	0	0	5	259,496
712	AULT FPD	0	0	7	254,129	7	254,129
10	AURORA	741	66,818,199	415	32,097,337	1,156	98,915,536
11	AVON	19	1,547,635	0	0	19	1,547,635
12	BASALT	9	795,056	0	0	9	795,056
13	BAYFIELD	6	373,770	0	0	6	373,770
718	BENNETT FPD #7	0	0	24	1,229,916	24	1,229,916
503	BERTHOUD FPD	0	0	24	1,769,369	24	1,769,369
5030	BERTHOUD FPD	0	0	2	266,976	2	266,976
538	BEULAH FIRE PROTECTION & AMBULANCE DISTRICT	0	0	2	91,443	2	91,443
7331	BIG SANDY FPD	0	0	1	39,815	1	39,815
580	BLACK FOREST FIRE RESCUE	0	0	17	990,750	17	990,750
723	BLACK HAWK	0	0	22	1,882,186	22	1,882,186
18	BLANCA	1	41,285	0	0	1	41,285
22	BOULDER	188	17,122,889	113	11,292,693	301	28,415,582
726	BOULDER MOUNTAIN FPD	0	0	5	272,355	5	272,355
730	BOULDER RURAL FPD	0	0	15	1,368,774	15	1,368,774
7700	BRIGGSDALE FPD	0	0	1	52,000	1	52,000
3260	BRIGHTON	1	126,605	0	0	1	126,605
326	BRIGHTON	77	5,867,136	0	0	77	5,867,136
26	BRIGHTON (GREATER) FPD	0	0	69	5,807,293	69	5,807,293
504	BROADMOOR FPD	0	0	4	316,387	4	316,387



Table 18 (continued) - Summary of Members and Adjusted Payroll by Employer

City Code	City Name	Police		Fire		Total	
		No.	Earnings	No.	Earnings	No.	Earnings
27	BROOMFIELD	166	\$ 15,400,917	0	\$ 0	166	\$ 15,400,917
28	BRUSH	12	594,504	0	0	12	594,504
29	BUENA VISTA	10	611,271	4	162,888	14	774,159
735	BYERS FPD #9	0	0	1	44,084	1	44,084
33	CANON CITY	34	1,777,614	0	0	34	1,777,614
533	CANON CITY AREA FPD	0	0	33	2,307,292	33	2,307,292
740	CARBONDALE & RURAL FPD	0	0	20	1,584,636	20	1,584,636
35	CASTLE ROCK	0	0	92	8,137,801	92	8,137,801
37	CENTER	7	291,734	0	0	7	291,734
38	CENTRAL CITY	0	0	2	137,177	2	137,177
749	CHAFFEE COUNTY FPD	0	0	5	271,417	5	271,417
40	CHERRY HILLS VILLAGE	23	2,181,859	0	0	23	2,181,859
754	CIMARRON HILLS FPD	0	0	16	1,074,247	16	1,074,247
7125	CLEAR CREEK FIRE AUTHORITY	0	0	2	165,085	2	165,085
509	CLIFTON FPD	0	0	18	1,187,286	18	1,187,286
757	COAL CREEK CANYON FPD	0	0	1	69,525	1	69,525
44	COLLBRAN MARSHALS	2	98,435	0	0	2	98,435
531	COLORADO RIVER FPD	0	0	51	3,164,767	51	3,164,767
45	COLORADO SPRINGS	712	58,556,504	414	37,106,015	1,126	95,662,519
46	COLUMBINE VALLEY	5	341,978	0	0	5	341,978
47	COMMERCE CITY	109	9,333,115	0	0	109	9,333,115
48	CORTEZ	31	1,590,650	0	0	31	1,590,650
765	CORTEZ FPD	0	0	14	625,505	14	625,505
772	CRESTED BUTTE FPD	0	0	19	1,255,245	19	1,255,245
774	CRIPPLE CREEK	0	0	13	783,718	13	783,718
57	DACONO	12	865,288	0	0	12	865,288
58	DEBEQUE	4	242,519	0	0	4	242,519
779	DEBEQUE FPD	0	0	7	516,976	7	516,976
60	DEL NORTE	2	88,268	0	0	2	88,268
61	DELTA	20	1,278,517	0	0	20	1,278,517



Table 18 (continued) - Summary of Members and Adjusted Payroll by Employer

City Code	City Name	Police		Fire		Total	
		No.	Earnings	No.	Earnings	No.	Earnings
783	DELTA COUNTY FPD #1	0	\$ 0	2	\$ 74,880	2	\$ 74,880
62	DENVER	1,521	142,892,765	963	91,627,379	2,484	234,520,144
63	DILLON	10	729,891	0	0	10	729,891
64	DINOSAUR	2	87,999	0	0	2	87,999
566	DONALD WESCOTT FPD	0	0	20	1,261,318	20	1,261,318
67	DURANGO	51	3,735,960	0	0	51	3,735,960
567	DURANGO FPD	0	0	79	5,562,277	79	5,562,277
522	EAGLE RIVER FPD	0	0	69	5,433,625	69	5,433,625
507	EAST GRAND FPD #4	0	0	5	324,571	5	324,571
795	EATON FPD	0	0	17	953,034	17	953,034
73	EDGEWATER	16	1,161,674	0	0	16	1,161,674
74	ELIZABETH	8	484,971	0	0	8	484,971
515	ELIZABETH FPD	0	0	19	1,268,733	19	1,268,733
7102	ELK CREEK FPD	0	0	10	611,225	10	611,225
75	EMPIRE	2	108,000	0	0	2	108,000
76	ENGLEWOOD	76	6,806,216	0	0	76	6,806,216
77	ERIE	37	2,848,332	0	0	37	2,848,332
523	ESTES VALLEY FPD	0	0	3	243,964	3	243,964
79	EVANS	35	2,736,348	0	0	35	2,736,348
579	EVANS FPD	0	0	20	1,259,914	20	1,259,914
7109	EVERGREEN FPD	0	0	5	375,380	5	375,380
510	FAIRMOUNT FPD	0	0	26	1,796,866	26	1,796,866
80	FAIRPLAY MARSHALLS	4	231,213	0	0	4	231,213
7112	FALCON FPD	0	0	47	2,580,080	47	2,580,080
81	FEDERAL HEIGHTS	22	1,647,818	15	966,941	37	2,614,759
810	FEDERAL HEIGHTS FIRE	0	0	1	109,990	1	109,990
82	FIRESTONE	30	2,418,350	0	0	30	2,418,350
85	FLORENCE	12	556,869	0	0	12	556,869
7222	FOOTHILLS FIRE & RESCUE	0	0	3	224,653	3	224,653
86	FORT COLLINS	260	23,270,066	1	96,013	261	23,366,079



Table 18 (continued) - Summary of Members and Adjusted Payroll by Employer

City Code	City Name	Police		Fire		Total	
		No.	Earnings	No.	Earnings	No.	Earnings
7122	FORT LEWIS MESA FPD	0	\$ 0	2	\$ 128,000	2	\$ 128,000
87	FORT LUPTON	22	1,496,347	0	0	22	1,496,347
7123	FORT LUPTON FPD	0	0	29	1,826,066	29	1,826,066
88	FORT MORGAN	27	1,630,318	0	0	27	1,630,318
89	FOUNTAIN	55	3,843,208	28	1,920,644	83	5,763,852
90	FOWLER POLICE	3	105,594	0	0	3	105,594
511	FRANKTOWN FPD	0	0	20	1,272,945	20	1,272,945
592	FREDERICK FIRESTONE FPD	0	0	41	3,760,570	41	3,760,570
5920	FREDERICK FIRESTONE FPD	0	0	6	567,945	6	567,945
93	FRISCO	11	675,565	0	0	11	675,565
7131	FRONT RANGE FIRE RESCUE FPD	0	0	31	2,302,071	31	2,302,071
94	FRUITA	15	893,085	0	0	15	893,085
7132	GALETON FPD	0	0	2	152,996	2	152,996
95	GARDEN CITY	4	209,416	0	0	4	209,416
7135	GATEWAY-UNAWEEP FPD	0	0	6	150,119	6	150,119
7136	GENESEE FPD	0	0	2	169,599	2	169,599
97	GEORGETOWN	3	195,434	0	0	3	195,434
99	GLENDALE	30	2,400,513	0	0	30	2,400,513
100	GLENWOOD SPRINGS	23	1,642,962	26	1,861,585	49	3,504,547
101	GOLDEN	48	4,266,168	13	975,683	61	5,241,851
102	GRANADA	1	32,868	0	0	1	32,868
7147	GRAND FPD #1	0	0	3	169,102	3	169,102
104	GRAND JUNCTION	123	9,270,161	127	9,102,270	250	18,372,431
7149	GRAND LAKE FPD	0	0	14	757,896	14	757,896
7150	GRAND VALLEY FPD	0	0	25	1,616,310	25	1,616,310
7153	GREATER EAGLE FPD	0	0	16	1,009,428	16	1,009,428
107	GREELEY	154	13,497,299	116	9,472,366	270	22,969,665
512	GREEN MOUNTAIN FALLS-CHIPITA PARK FPD	0	0	1	54,750	1	54,750
109	GREENWOOD VILLAGE	62	5,340,309	0	0	62	5,340,309
7156	GYPSUM FPD	0	0	8	503,651	8	503,651



Table 18 (continued) - Summary of Members and Adjusted Payroll by Employer

City Code	City Name	Police		Fire		Total	
		No.	Earnings	No.	Earnings	No.	Earnings
7158	HARTSEL FPD	0	\$ 0	1	\$ 72,235	1	\$ 72,235
115	HAXTUN	3	146,263	0	0	3	146,263
119	HOLYOKE	3	151,426	0	0	3	151,426
7176	HUDSON FPD	0	0	27	1,688,724	27	1,688,724
124	HUGO	2	103,379	0	0	2	103,379
125	IDAHO SPRINGS	10	572,602	0	0	10	572,602
126	IGNACIO	8	525,576	0	0	8	525,576
7185	INDIAN HILLS FPD	0	0	1	43,260	1	43,260
7187	INTER-CANYON FPD	0	0	4	285,638	4	285,638
7191	JEFFERSON-COMO FPD	0	0	6	315,540	6	315,540
129	JOHNSTOWN	22	1,509,015	0	0	22	1,509,015
132	KERSEY	3	196,769	0	0	3	196,769
7198	KIOWA FPD	0	0	3	165,423	3	165,423
5136	KREMMLING FPD	0	0	2	117,756	2	117,756
138	LA JARA	4	205,117	0	0	4	205,117
139	LA JUNTA	11	529,691	13	621,490	24	1,151,181
144	LA SALLE	7	448,592	0	0	7	448,592
7211	LA SALLE FPD	0	0	11	797,259	11	797,259
146	LA VETA	2	78,337	0	0	2	78,337
137	LAFAYETTE	39	3,468,709	31	2,367,406	70	5,836,115
7206	LAKE GEORGE FPD	0	0	1	47,700	1	47,700
263	LAKESIDE	4	220,480	0	0	4	220,480
143	LAMAR	15	741,647	9	403,774	24	1,145,421
141	LARKSPUR FPD	0	0	17	1,064,032	17	1,064,032
147	LEADVILLE	9	414,475	11	630,701	20	1,045,176
574	LEFTHAND FPD	0	0	3	249,999	3	249,999
149	LITTLETON	81	7,462,639	0	0	81	7,462,639
150	LOCHBUIE	11	722,770	0	0	11	722,770
214	LOG LANE VILLAGE	2	64,401	0	0	2	64,401
268	LONE TREE	51	4,242,501	0	0	51	4,242,501



Table 18 (continued) - Summary of Members and Adjusted Payroll by Employer

City Code	City Name	Police		Fire		Total	
		No.	Earnings	No.	Earnings	No.	Earnings
151	LONGMONT	159	\$ 13,854,500	84	\$ 8,068,338	243	\$ 21,922,838
578	LOS PINOS FPD	0	0	20	1,107,728	20	1,107,728
153	LOVELAND	113	9,913,440	0	0	113	9,913,440
2153	LOVELAND FRA	0	0	94	7,445,934	94	7,445,934
7226	LOWER VALLEY FPD	0	0	17	1,018,618	17	1,018,618
7227	LYONS FPD	0	0	4	204,442	4	204,442
157	MANITOU SPRINGS	16	968,967	6	438,664	22	1,407,631
160	MEAD	8	546,490	0	0	8	546,490
163	MILLIKEN	11	695,298	0	0	11	695,298
166	MONTE VISTA	13	584,547	0	0	13	584,547
167	MONTROSE	38	2,308,993	0	0	38	2,308,993
537	MONTROSE FPD	0	0	33	2,444,833	33	2,444,833
168	MONUMENT	17	1,100,845	0	0	17	1,100,845
170	MOUNTAIN VIEW	10	621,505	0	0	10	621,505
516	MOUNTAIN VIEW FPD	0	0	96	9,088,080	96	9,088,080
266	MOUNTAIN VILLAGE	7	455,675	0	0	7	455,675
7246	NEDERLAND FPD	0	0	5	339,729	5	339,729
7251	NORTH FORK FPD	0	0	1	69,000	1	69,000
532	NORTH METRO FIRE RESCUE	0	0	123	11,043,094	123	11,043,094
7253	NORTH ROUTT FPD	0	0	2	128,144	2	128,144
7255	NORTHEAST TELLER COUNTY FPD	0	0	13	814,763	13	814,763
175	NORTHGLENN	68	5,275,952	0	0	68	5,275,952
7259	NORTH-WEST FPD	0	0	14	758,889	14	758,889
178	NUNN	2	94,364	0	0	2	94,364
179	OAK CREEK	2	111,766	0	0	2	111,766
7263	OAK CREEK FPD	0	0	4	206,693	4	206,693
1790	OAK CREEK POLICE	1	77,345	0	0	1	77,345
180	OLATHE	5	243,674	0	0	5	243,674
588	PAGOSA FPD	0	0	16	735,070	16	735,070
188	PAGOSA SPRINGS	8	432,128	0	0	8	432,128



Table 18 (continued) - Summary of Members and Adjusted Payroll by Employer

City Code	City Name	Police		Fire		Total	
		No.	Earnings	No.	Earnings	No.	Earnings
189	PALISADE	10	\$ 545,260	2	\$ 116,344	12	\$ 661,604
190	PALMER LAKE	2	124,588	3	138,277	5	262,865
192	PAONIA	5	185,615	0	0	5	185,615
106	PARACHUTE	5	268,773	0	0	5	268,773
191	PARKER	72	6,276,985	0	0	72	6,276,985
7281	PEYTON FPD	0	0	1	29,993	1	29,993
7481	PLATEAU VALLEY FPD	0	0	6	400,870	6	400,870
7285	PLATTE CANYON FPD	0	0	17	1,054,998	17	1,054,998
7286	PLATTE VALLEY FPD	0	0	18	1,381,204	18	1,381,204
7287	PLATTE VALLEY FPD	0	0	3	325,350	3	325,350
196	PLATTEVILLE	9	482,795	0	0	9	482,795
513	PLATTEVILLE/GILCREST FPD	0	0	34	2,453,554	34	2,453,554
7289	PLEASANT VIEW METRO FIRE DISTRICT	0	0	7	385,395	7	385,395
518	POUDRE FIRE AUTHORITY	0	0	188	16,072,758	188	16,072,758
199	PUEBLO	214	15,039,971	139	9,999,363	353	25,039,334
519	PUEBLO RURAL FPD	0	0	26	1,335,957	26	1,335,957
7294	PUEBLO WEST METRO FPD	0	0	24	1,377,854	24	1,377,854
201	RANGELY	5	312,227	0	0	5	312,227
7298	RATTLESNAKE FPD	0	0	4	247,372	4	247,372
521	RED WHITE & BLUE FPD	0	0	52	4,379,950	52	4,379,950
206	RIFLE	20	1,279,896	0	0	20	1,279,896
551	ROARING FORK FRA	0	0	30	2,733,747	30	2,733,747
208	ROCKY FORD	8	298,976	5	183,185	13	482,161
752	ROCKY MOUNTAIN FPD	0	0	46	3,994,385	46	3,994,385
7314	RYE FPD	0	0	6	280,556	6	280,556
542	SABLE-ALTURA FPD	0	0	7	331,902	7	331,902
213	SALIDA	18	1,134,126	12	862,619	30	1,996,745
215	SANFORD	1	32,000	0	0	1	32,000
543	SECURITY FPD	0	0	36	1,730,618	36	1,730,618
219	SEVERANCE POLICE	6	366,020	0	0	6	366,020



Table 18 (continued) - Summary of Members and Adjusted Payroll by Employer

City Code	City Name	Police		Fire		Total	
		No.	Earnings	No.	Earnings	No.	Earnings
220	SHERIDAN	33	\$ 2,617,608	0	\$ 0	33	\$ 2,617,608
222	SILT	7	352,207	0	0	7	352,207
228	SNOWMASS VILLAGE	9	731,802	0	0	9	731,802
525	SOUTH ADAMS COUNTY FPD	0	0	75	5,980,728	75	5,980,728
7339	SOUTH FORK	3	128,559	0	0	3	128,559
5339	SOUTH FORK FPD	0	0	5	237,905	5	237,905
540	SOUTH METRO FIRE RESCUE FPD	0	0	574	57,835,775	574	57,835,775
7340	SOUTHEAST WELD FPD	0	0	24	1,063,772	24	1,063,772
7341	SOUTHEAST WELD FPD	0	0	1	125,000	1	125,000
548	SOUTHERN PARK COUNTY FPD	0	0	1	43,599	1	43,599
229	SPRINGFIELD	3	95,441	0	0	3	95,441
231	STEAMBOAT SPRINGS	29	2,148,816	30	2,117,811	59	4,266,627
232	STERLING	21	1,082,971	22	1,036,582	43	2,119,553
7348	STRASBURG FPD #8	0	0	3	166,455	3	166,455
7349	STRATMOOR HILLS FPD	0	0	7	370,252	7	370,252
549	SUMMIT FIRE & EMS AUTHORITY	0	0	64	5,061,527	64	5,061,527
237	TELLURIDE	10	810,175	0	0	10	810,175
545	TELLURIDE FPD	0	0	8	633,989	8	633,989
238	THORNTON	0	0	134	12,455,615	134	12,455,615
338	THORNTON	235	19,931,379	0	0	235	19,931,379
7354	TIMBERLINE FPD	0	0	5	248,198	5	248,198
2557	TRI-LAKES MONUMENT FPD	0	0	49	4,114,216	49	4,114,216
2400	TRINIDAD	0	0	1	54,493	1	54,493
240	TRINIDAD	26	1,279,441	16	903,097	42	2,182,538
595	UPPER PINE RIVER FPD	0	0	30	1,659,950	30	1,659,950
242	VAIL	31	2,611,886	37	2,825,540	68	5,437,426
7369	WELLINGTON FPD	0	0	20	1,185,610	20	1,185,610
7370	WELLINGTON FPD	0	0	5	432,919	5	432,919
7373	WEST DOUGLAS COUNTY FPD	0	0	1	95,817	1	95,817
534	WEST METRO FPD	0	0	347	33,053,306	347	33,053,306



Table 18 (continued) - Summary of Members and Adjusted Payroll by Employer

City Code	City Name	Police		Fire		Total	
		No.	Earnings	No.	Earnings	No.	Earnings
5340	WEST METRO FPD	0	0	24	2,919,843	24	2,919,843
7375	WEST ROUTT FPD	0	0	9	282,634	9	282,634
2520	WESTMINSTER	0	0	2	202,895	2	202,895
252	WESTMINSTER	0	0	124	11,083,374	124	11,083,374
253	WHEAT RIDGE	83	6,771,821	0	0	83	6,771,821
254	WIGGINS	2	94,788	0	0	2	94,788
7384	WINDSOR SEVERANCE FPD	0	0	44	3,550,453	44	3,550,453
259	WOODLAND PARK	20	1,190,383	0	0	20	1,190,383
260	WRAY	5	271,815	0	0	5	271,815
262	YUMA	8	349,273	0	0	8	349,273
Totals		6,765	\$ 567,353,548	6,518	\$ 545,539,444	13,283	\$ 1,112,892,992

Table 19 - Summary of Inactive Members

	<u>Count</u>	<u>Average Age</u>	<u>Average Monthly Benefit</u>
Totally Disabled Members*	162	59.1	\$3,479
Occupationally Disabled Members*	987	58.7	\$1,926
Beneficiaries of Deceased Active Members	135	54.2	\$2,105

* Including beneficiaries of deceased retirees

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 Aggregate Funding Method. Under this method, the contribution rate is calculated to fully fund the present value of all benefits over the remaining working career of the active employees. The contribution rate is determined as a percentage of increasing payroll.

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 actuarial value of assets is subtracted from the present value of all expected benefits to determine the present value of future normal costs. The future normal costs are spread across the future value of salaries to be paid to the current active population to determine a contribution rate.

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 this valuation 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 investment expenses.
2. Salary increase rate: Inflation rate of 2.50%, plus productivity component of 1.75%, plus step-rate/ promotional component as shown:

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. Mortality rates (members in payment status) –

a. 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 for an individual age 55 at retirement in a given year based on the assumption with full generational projection:

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

b. Occupationally disabled retirees: Healthy retiree tables set forward three 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	5.00	3.24	70	22.34	17.25
55	6.97	4.80	75	36.98	29.01
60	9.92	7.12	80	63.99	51.09
65	14.40	10.71	85	113.06	91.90

c. Totally disabled retirees: RP-2014 Disabled Mortality Tables, projected with Scale BB, with minimum probability of 3% for males and 2% for females.

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	30.00	20.00	70	40.91	28.21
55	30.00	20.00	75	54.94	41.44
60	30.00	20.00	80	78.55	63.37
65	32.99	21.57	85	117.45	96.61

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.

Annual Rate per 1,000 Members				
Age	Occupational Disability Rates (MP)	Occupational Disability Rates (SWDB)	Total Disability Rates (MP)	Total Disability Rates (SWDB)
(1)	(2)	(3)	(4)	(5)
25	0.25	0.48	0.01	0.02
30	1.18	2.26	0.11	0.17
35	1.60	3.05	0.23	0.34
40	2.35	4.48	0.35	0.52
45	4.09	5.53	0.48	0.72
50	8.86	8.22	0.63	0.94
55	15.53	11.56	0.78	1.17

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: Members are assumed to retire at the time of attaining:
- A. Statewide Defined Benefit Plan Members and other New Hire Plan Members: Age 55 with 22 years of service or current age, if greater.
 - B. Money Purchase Plan Members: The earliest of Age 65 or Age 55 with 25 years of service; or current age, if greater. For members age 55 with less than 25 years of service, service-based rates consistent with the SWDB service-based rates shown below.
 - C. All Other Plan members: Age 52 or current age, if greater.

C. Other Assumptions

1. Family status: 85% of employees are assumed to be married or in a civil union. Those assumed to be married or in a civil union are assumed to have two or more dependent children until age 51.
2. 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.
3. Post-retirement benefit adjustments: Totally disabled 3.0%; All others 0.0%.
4. Percent electing annuity on death (when eligible): All of the spouses of vested, married participants are assumed to elect an annuity.
5. There will be no recoveries once disabled.
6. No surviving spouse will remarry.
7. Earned income: It is assumed that there are no offsets for Worker's Compensation or other current income.
8. Dependent children: Dependency status assumed to terminate at age 21.
9. Combined spouse/dependent records: In cases, where an annuitant record includes benefits for both a spouse and a dependent child, the total benefit was assumed to be payable for the life of the spouse.
10. Administrative expenses: Based on actual administrative expenses paid in the prior year, adjusted by wage inflation.
11. Money Purchase Offset: For members where no data is available, the current money purchase balance is estimated using current pay, estimated pay histories, actual plan investment returns, and the current money purchase contribution rate specific by employer. The balance is projected forward using 7.00% investment returns, and the current money purchase contribution rate specific by employer. The money purchase account used for offset is limited based on the specific money purchase contribution rate by employer and the contribution rate requirements for the Statewide Death & Disability Plan. At decrement, the limited account is converted to an annuity using current actuarial equivalence factors.
12. SRA Offset: The SRA balances are projected forward using 7.00% investment returns. For reentry members, the assumed annual contribution to the account is 4% less the surcharge determined as of the prior valuation. At decrement, the account is converted to an annuity using current actuarial equivalence factors.

13. Decrement timing: Decrements of all types are assumed to occur mid-year.
14. 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.
15. Decrement relativity: Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects.
16. 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.

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 following:

- If the YTD service credit is at least 12, then use the earnings for the year preceding the valuation date
- If the YTD service credit is less than 12, then use the greater of the earnings for the year preceding the valuation date or the annual salary.
- If the YTD service credit is less than 12, greater than 0 and the Member DD Flag is N, then use the annualized earnings for the year preceding the valuation date.
- If both Salary YTD and Annual Salary are zero, an array of salaries based on service will be used to estimate the salary.
- Finally, the prior salaries are used to prevent the valuation salary from decreasing.

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:

There were no changes to assumptions since the prior valuation.

SUMMARY OF BENEFIT PROVISIONS

Plan Description

The Fire & Police Pension Association Statewide Death & Disability Plan ("Plan") is a cost-sharing multiple-employer defined benefit death and disability plan covering full-time employees of substantially all fire and police departments in Colorado. As of August 5, 2003, the Plan may include part-time police and fire employees. Contributions to the Plan are used for the payment of death and disability benefits. Employers who are covered by Social Security may elect supplementary coverage by the Plan. 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 was established in 1980 pursuant to Colorado Revised Statutes. The Plan assets are included in the Fire & Police Members' Benefit Investment Fund Long-Term Pool.

Plan benefits provide 24-hour coverage, both on and off duty and are available for members not eligible for normal retirement under a defined benefit plan, or members who have not met 25 years of accumulated service and age 55 under a money purchase plan.

In the case of an on-duty death, benefits may be payable to the surviving spouse or dependent children of active members who were eligible to retire, but were still working. Death and disability benefits are free from state and federal taxes in the event that a member's disability is determined to be the result of an on-duty injury or an occupational disease.

Plan Year

A twelve-month period ending December 31.

Members Included

Members included are active full-time salaried employees of a participating municipality or fire protection 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. As of August 5, 2003, the Plan may include part-time police and fire employees. A department chief who elects to be exempted from the Fire & Police Pension Association Defined Benefit System and covered under Social Security or Colorado Public Employees Retirement Association shall not be covered by the Plan.

Also included are employees of any employer that covers members under the federal Social Security Act or any county that chooses to affiliate with the Fire & Police Pension Association and includes all personnel employed by a sheriff expected to work 1,600 hours or more in a calendar year who are directly involved with the provision of law enforcement or fire protection, as certified by the county, except that personnel whose position does not require passage of a fitness for duty test shall not be eligible for participation in the Statewide Death & Disability Plan.



Compensation Considered (Base Salary)

Base salary, also known as Pensionable Earnings, means the total base rate of pay including Member Contributions to the Statewide Defined Benefit Plan or Statewide Money Purchase Plan (or contributions to any alternate retirement plan) which are “picked up” by the employer:

- 1) And 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 will 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 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).
- 6) The base salary under the Plan for each Member of the Colorado Springs New Hire Pension Plan shall be the same as the basic salary as defined in the Colorado Springs New Hire Pension Plan.

Contribution Rates

Prior to 1997, the Plan was primarily funded by the State of Colorado, whose contributions were established by Colorado statute. In 1997 the State made a one-time contribution of \$39,000,000 to fund past and future service costs for all firefighters and police officers hired prior to January 1, 1997. As of January 1, 1997, the Board could adjust the annual rate of contribution by 0.1 percent of base salary every other year. Effective January 1, 2021, the Board can adjust the annual rate of contribution by 0.2 percent of base salary every year.

Members hired on or after January 1, 1997 and members covered by Social Security, began contributing 2.4 percent of base salary to this Plan as of January 1, 1997. The contribution increased to 2.6 percent of base salary as of January 1, 2007. The contribution rate increased to 2.7 percent of base salary as of January 1, 2017. The contribution rate increased to 2.8 percent of base salary as of January 1, 2019. The contribution rate will increase to 3.0 percent of base salary



as of January 1, 2021. This percentage can vary depending on actuarial experience. All contributions are made by members or on behalf of members. The contribution may be paid entirely by the employer or member, or it may be split between the employer and the member.

Pre-Retirement Death Benefits

If a member dies prior to normal retirement eligibility while off-duty, the surviving spouse shall receive a benefit equal to 40 percent of the monthly base salary paid to the member prior to death. An additional 10 percent of base salary is payable if a surviving spouse has two or more dependent children. If there is no surviving spouse, but the member had one or two dependent children, the benefit payable is 40 percent of the member's monthly base salary. If there is no spouse but three or more dependent children, the benefit equals 50 percent of the member's monthly base salary.

As of October 15, 2002, if a member dies prior to retirement while on-duty; the surviving spouse shall receive a benefit equal to 70 percent of the member's monthly base salary regardless of the number of dependent children. If there is no spouse but one or more dependent children living in the member's household the benefit equals 70 percent of the member's monthly base salary. If there are dependent children without a surviving spouse, and they do not live in the household, the benefit is 40 percent for the first child and 15 percent for each additional child, but not greater than 70 percent in total of the member's monthly base salary. Benefits will be paid to the spouse until death and to dependent children until age 23, death, marriage or other termination of dependency. Benefits may be extended for an incapacitated child.

For purposes of this Plan, a spouse includes a partner in a civil union. These benefits are offset by Money Purchase account balances, Stabilization Reserve Accounts ("SRA") and Deferred Retirement Option Plan ("DROP") accounts, converted to annuities.

Disability Benefits

The Plan provides the members with two types of disability: occupational and total.

Occupational Disability means a member is unable to perform their assigned duties due to a medical condition that is expected to last at least 1 year. Assigned duties are those specific tasks or job duties that a member is required to regularly perform. Within the Occupational Disability category, there are two sub-categories: Temporary Occupational Disability and Permanent Occupational Disability.

Temporary Occupational Disability is an occupational disability for which there is prognosis for improvement or recovery through surgical treatment, counseling, medication, therapy or other means.

Permanent Occupational Disability is an occupational disability caused by a condition that is permanent or degenerative and for which there is no prognosis for improvement or recovery through surgical treatment, counseling, medication, therapy or other means.



Total Disability means the member is unable to engage in any substantial gainful activity due to a medically determined physical or mental impairment that may be expected to result in death or that has lasted or is expected to last at least 1 year.

A member who becomes disabled prior to normal retirement eligibility shall be eligible for disability benefits.

If the member is totally disabled, the member shall receive 70 percent of their base salary preceding disability.

If the member is occupationally disabled and their disability is determined to be a permanent occupational disability, the member shall receive 50 percent of their base salary preceding disability regardless of their family status. If the member is occupationally disabled and the disability is determined to be a temporary occupational disability, the member shall receive 40 percent of their base salary preceding disability regardless of their family status for up to five years.

Total disability and permanent occupational disability benefits are offset by the Money Purchase, SRA or DROP balances, converted to annuities. For member's who also participate in Social Security, disability benefits are reduced by Social Security disability benefits derived from employment as a member, if applicable.

Temporary Occupational Disability benefits are payable for a maximum of five years. Permanent Occupational and Total Disability benefits are payable as long as the member remains disabled.

Offsets for Money Purchase Balances, SRA, and DROP

Plan benefits are reduced by the actuarially equivalent annuities of the Money Purchase, SRA, and DROP account balances. A blended rate based on the annual required contributions, as defined in the Statewide Defined Benefit Plan, is used to calculate the offset for Money Purchase Plans. Benefits provided by the Plan are also offset by any defined benefit that the member may have received due to work as a Colorado firefighter or police officer.

Spousal income, IRAs, insurance benefits, legal awards, and other investment incomes are not subject to any offset. Deferred compensation accounts are generally not subject to an offset. However, if a department chief has contributions directed to a deferred compensation plan in lieu of a pension plan, the benefit award is offset based on the amount in the deferred compensation account. The amount of the offset is calculated in the same manner as the money purchase offset.

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



Optional Forms of Payment

The Plan provides four choices for receipt of the Permanent Occupational and Total Disability benefits.

Normal Option – The disabled retiree receives an unreduced benefit, payable for as long as the disability exists and as long as the member remains eligible. Upon the death of the retiree, the benefit is discontinued.

Option 1 (Joint and 100% Survivor) - The disabled retiree's benefit amount is reduced on an actuarially equivalent basis, payable for as long as the disability exists and as long as the member remains eligible. Upon the death of the retiree, the designated beneficiary receives 100 percent of the retiree's actuarially equivalent reduced benefit for life.

Option 2 (Joint and 50% Survivor) - The disabled retiree's benefit amount is reduced on an actuarially equivalent basis, payable for as long as the disability exists and as long as the member remains eligible. Upon the death of the retiree, the designated beneficiary receives 50 percent of the retiree's actuarially equivalent reduced benefit for life.

Option 3 (Family Benefit) - The disabled retiree's benefit amount is reduced on an actuarially equivalent basis, payable for as long as the disability exists and as long as the member remains eligible. Upon the death of the retiree, the actuarially equivalent reduced benefit amount is paid to the surviving spouse* and dependent children, if any, until the death of the surviving spouse, the death of any incapacitated child, or until the youngest child reaches age 23, whichever is later.

*Per FPPA Rule 402.10(c) 'Spouse' for the purposes of Payment Option 3 means the Member's spouse at the time the first benefit payment is negotiated. If the spouse beneficiary is removed by the Member, or dies, the Member is not permitted to add a subsequent spouse.

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

Benefit Adjustments for Benefits in Pay Status

A benefit adjustment of up to 3 percent may be granted to members and survivors by the Fire & Police Pension Association Board of Directors annually. Totally disabled members and their beneficiaries receive an automatic benefit adjustment each year of 3 percent. The benefit adjustment is effective October 1. A benefit adjustment may begin after receiving benefits for at least 12 calendar months prior to October 1.

Investment Pool

The Statewide Death & Disability Plan 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	0.4	0.4	0.4
Ratio of actuarial accrued liability to payroll	0.5	0.5	0.4
Ratio of actives to retirees and beneficiaries	10.3	10.3	10.3
Net cash flow as a percentage of market value of assets	-2.6%	-3.3%	-3.3%
Duration of the actuarial accrued liability	21.4	20.7	17.9

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 0.4 times the payroll, a return on assets 5% different than assumed would equal 2% 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 0.5 times the payroll, a change in liability 2% other than assumed would equal 1% 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.

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

Actuarial Valuation Report

For the Year Beginning January 1, 2020





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



Table of Contents

	<u>PAGE</u>
Section I	Executive Summary..... 2
Section II	Discussion..... 5
Section III	Tables
	1 – Development of Contribution Rate 18
	2 – Actuarial Present Value of Future Benefits 19
	3 – Analysis of Normal Cost by Component..... 20
	4a – Actuarial Gain/(Loss) on UAAL..... 21
	4b – Analysis of Change in Calculated Contribution Rate 22
	5 – Summary of Historical Valuation Results 23
	6 – Allocation of Plan Assets at Fair Value 24
	7 – Reconciliation of Plan Net Assets 25
	8 – Development of Actuarial Value of Assets..... 26
	9 – Investment Yields 27
	10 – Gain/(Loss) on Actuarial Value of Assets..... 28
	11 – History of Investment Return Rates 29
	12 – Schedule of Funding Progress 30
	13 – Solvency Test..... 31
	14 – Cash Flow Analysis 32
	15 – Membership Data 33
	16 – Historical Summary of Active Member Data 34
	17 – Distribution of Active Members by Age and by Years of Service As of December 31, 2018 35
	18 – Schedule of Retirants & Annuitants Added to & Removed from Rolls.... 36
	19 – Summary of Members and Adjusted Payroll by Employer 37
Section IV	Appendix A – Summary of Actuarial Methods and Assumptions 39
	Appendix B – Summary of Benefit Provisions..... 47
	Appendix C – Risks Associated with Measuring the Accrued Liability and Actuarial Determined Contribution..... 54



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	<u>39</u>	<u>37</u>
- 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

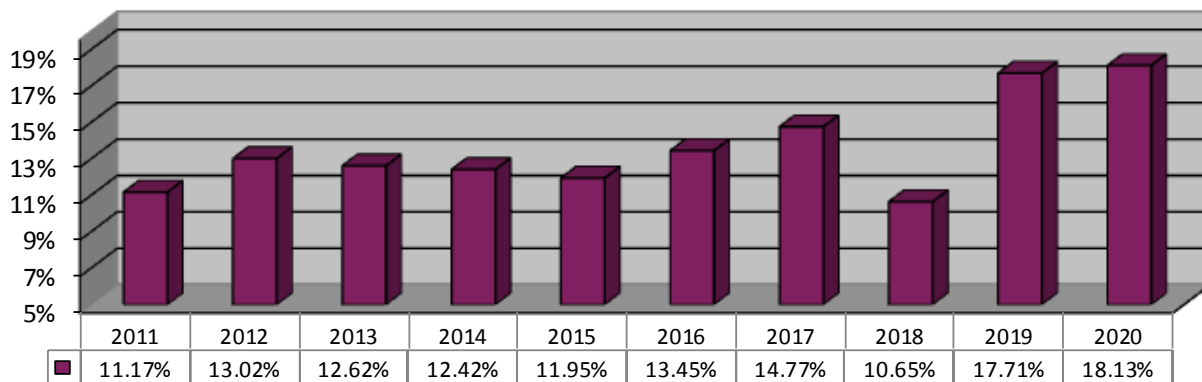
Annually, at the discretion of the Board of Directors, the amount of the combined employee and employer contribution rate to be allocated to the Defined Benefit portion of the Hybrid plan is determined.

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.

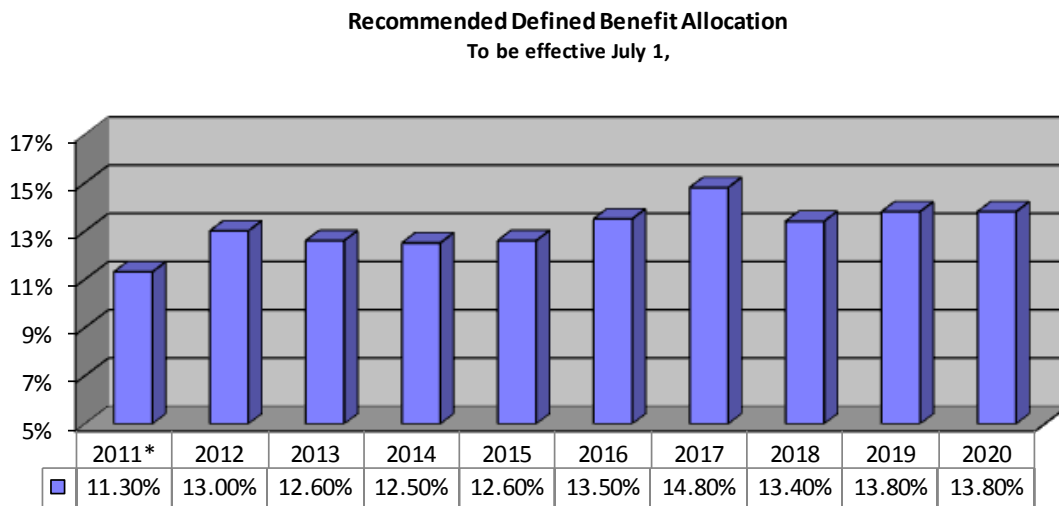
Historically, the plan has been at or very near funding levels which would support future discretionary benefit adjustments of 3% per year which would result in full allocation of the 16.00% allowed to the DB portion. Rather than allocate current contribution dollars toward improving the funded status 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,



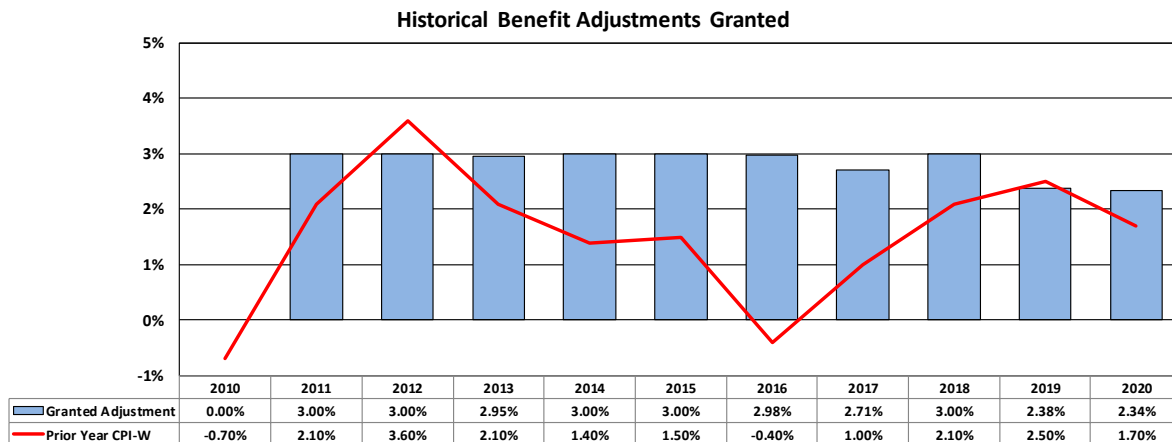
The following graph illustrates the historical Defined Benefit allocation contribution percentages and the recommended percentage for 2020.



**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.



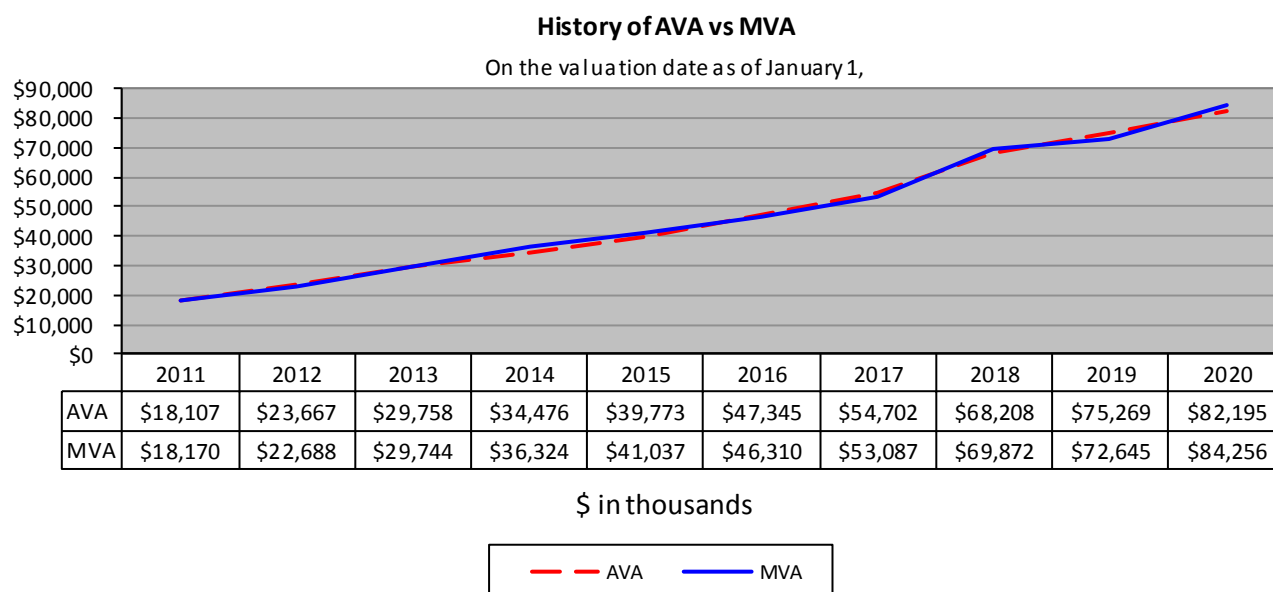
Financial Data and Experience

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.



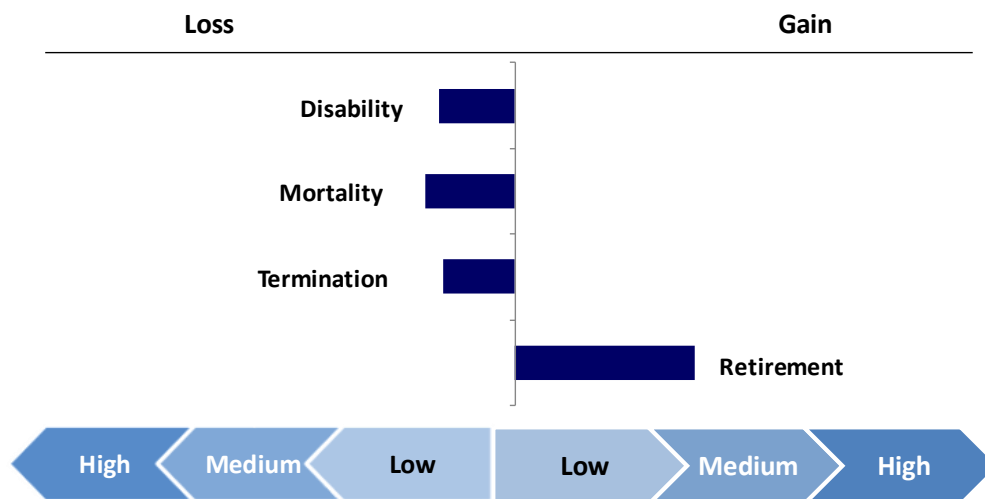
AVA: Actuarial (Smoothed) Value of Assets

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

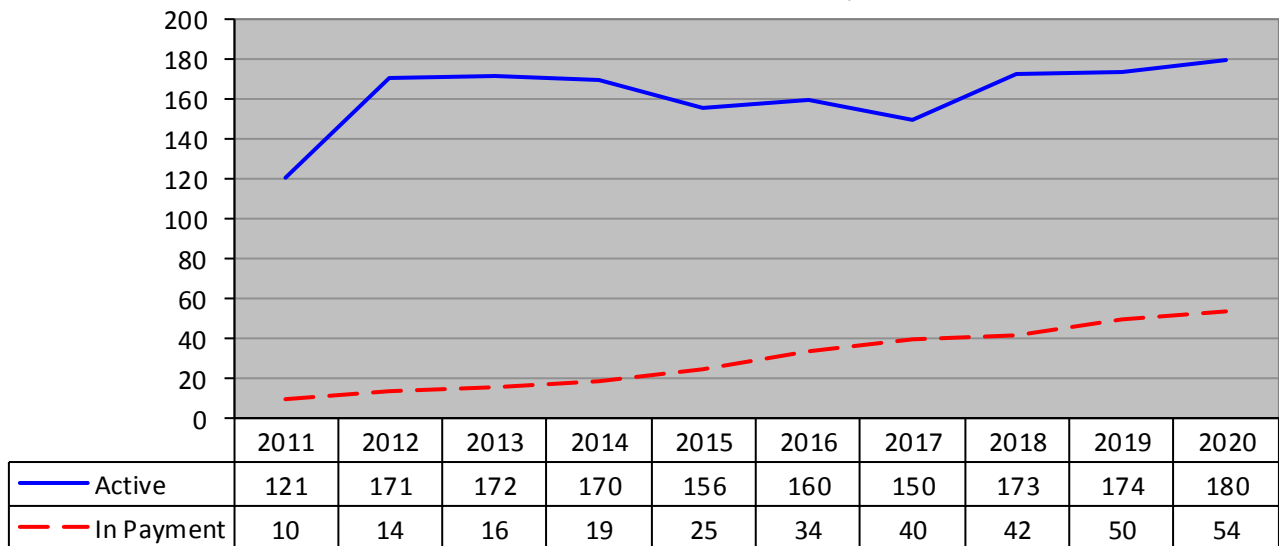
FPPA supplied member data as of January 1, 2020. While we did not audit this data, we did perform various tests to ensure that it was internally consistent, consistent with the prior year's data, and was reasonable overall. Information provided for active members includes: name, member ID, sex, a code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



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 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

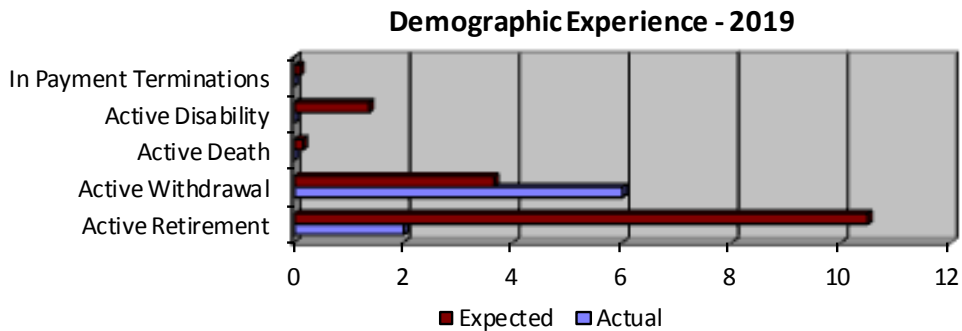
The valuation was prepared using the Entry Age Normal Method. This is the same funding method that has been used for the Statewide Defined Benefit Plan. Effective January 1, 2013, the asset valuation method is an actuarial value based on a five-year phase-in of excess investment gains and losses. See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

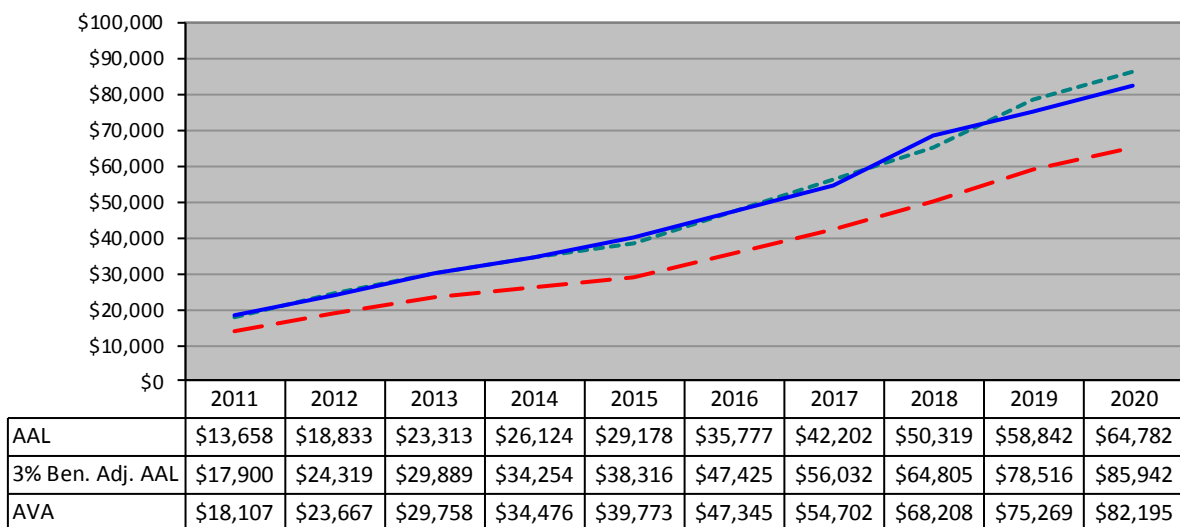
The Governmental Accounting Standards Board (GASB) Statement No. 67, Financial Reporting for Pension Plans (Issued 6/2012), has replaced the requirements under GASB Statement No. 25, Financial Reporting for Defined Benefit Pension Plans and Note Disclosures for Defined Contribution Plans (Issued 11/1994),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

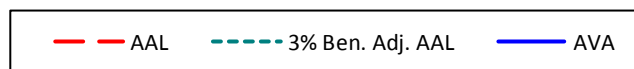
Although it will no longer be required for financial reporting purposes, we have continued to include Table 12 (Schedule of Funding Progress) which shows a historical summary of the funded ratios and other information for FPPA. While not required, it shows insight into funding trends over time. Similarly,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



\$ 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

	<u>January 1, 2020</u>	<u>January 1, 2019</u>
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	<u>\$ 48,198,147</u>	<u>\$ 44,817,975</u>
2. Members in pay status		
a. Service retirements	\$ 23,987,955	\$ 21,357,938
b. Beneficiaries	188,123	227,807
c. Total	<u>\$ 24,176,078</u>	<u>\$ 21,585,745</u>
3. Inactive members		
a. Vested terminations	\$ 2,636,634	\$ 3,694,578
b. Nonvested terminations	3,360,727	1,960,828
c. Total	<u>\$ 5,997,361</u>	<u>\$ 5,655,406</u>
4. Total actuarial present value of future benefits	<u>\$ 78,371,586</u>	<u>\$ 72,059,126</u>

Table 3 - Analysis of Normal Cost by Component

	<u>January 1, 2020</u>	<u>January 1, 2019</u>
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	<u>10.30%</u>	<u>10.26%</u>

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)
<u>SOURCE OF GAINS/(LOSSES)</u>		
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,**

	<u>2020</u>	<u>2019</u>	<u>2018</u>	<u>2017</u>	<u>2016</u>	<u>2015</u>	<u>2014</u>	<u>2013</u>	<u>2012</u>	<u>2011</u>
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	<u>0.8%</u>	<u>2.0%</u>
	100.0%	100.0%

Asset Allocation as of January 1, 2020

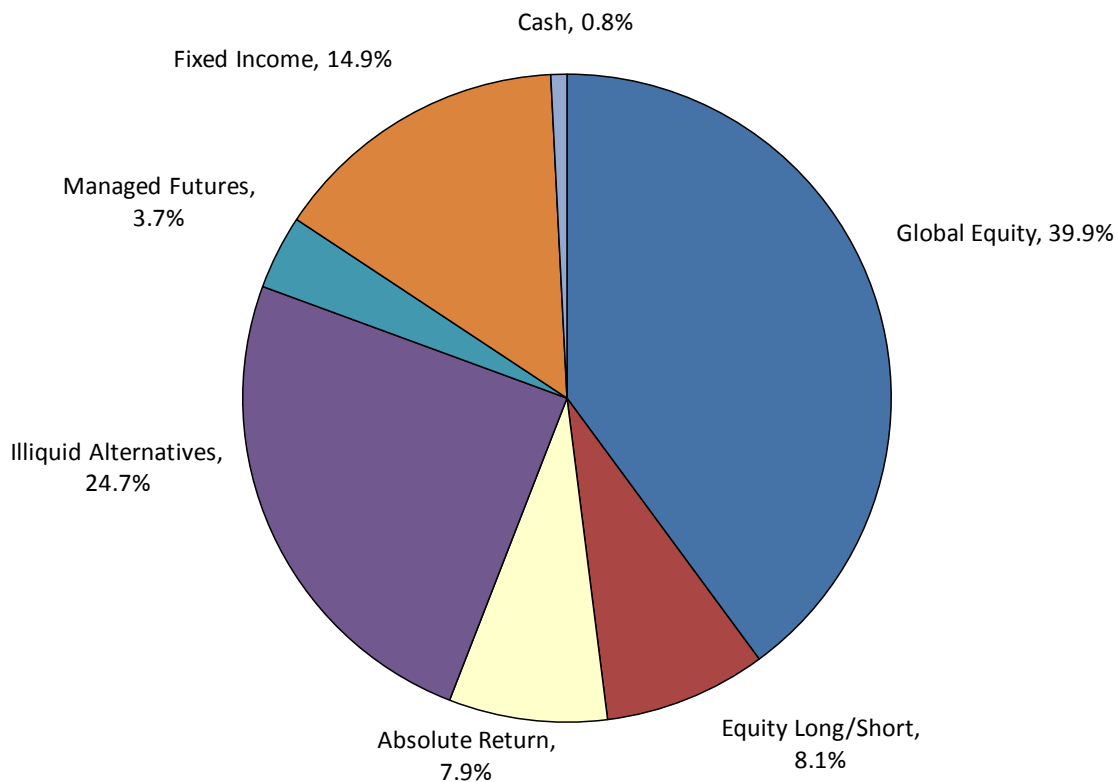


Table 7 - Reconciliation of Plan Net Assets

	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	<u>\$ 1,103,001</u>
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:	

		Remaining Deferrals of					
Fiscal	Excess (Shortfall) of	Offsetting of	Net Deferrals	Years	Recognized for	Remaining after	
Year End	Investment Income	Gains/(Losses)	Remaining	Remaining	this valuation	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	<u>5,200,556</u>	<u>(2,623,853)</u>	<u>2,576,703</u>	5	<u>515,341</u>	<u>2,061,362</u>	
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
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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	<u>10,508,011</u>	<u>5,822,796</u>
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%

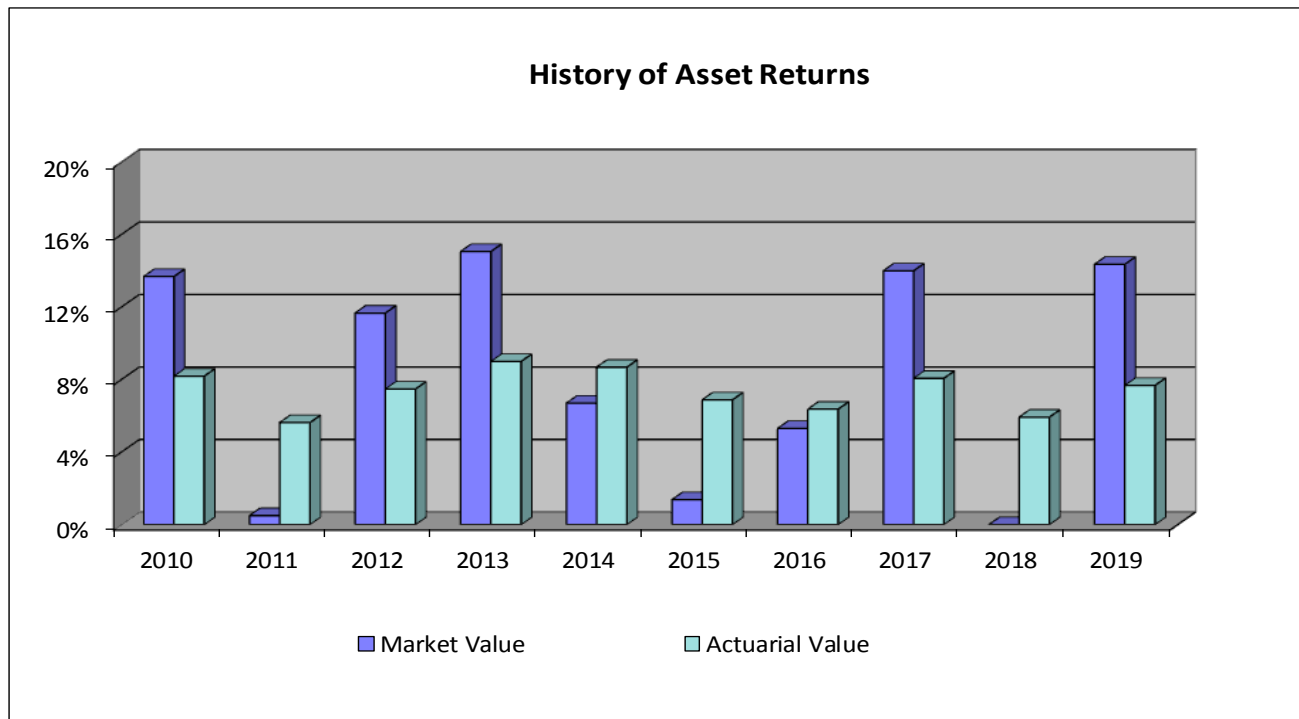


Table 12 - Schedule of Funding Progress

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				Portion of Accrued Liabilities Covered by Reported Assets		
	Active Members Contributions	Retirees	Members (Employer Financed Portion)	Actuarial Value of Assets	by Reported Assets		
		Beneficiaries and Vested Terminations			[(5)-(2)-(3)]/		
					(5)/(2)	[(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, (1)	Contributions for the Year (2)	Expenditures During the Year					External Cash Flow for the Year (8)	Market Value of Assets (9)	External Cash Flow as Percent of Market Value (10)
		Benefit Payments (3)	Refund of Contributions (4)	Identified Receipts (5)	Expenses (6)	Total (7)			
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

	<u>January 1, 2020</u>	<u>January 1, 2019</u>	<u>January 1, 2018</u>
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

<u>Valuation Date</u>	<u>Active Count</u>	<u>Average Age</u>	<u>Average Service</u>	<u>Covered Payroll</u>	<u>Average Annual Salary</u>	<u>Percent Change in Average Salary</u>
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												Total Count & Avg. Comp.
	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.	
Under 25	1 \$51,929												1 \$51,929
25-29	4 \$38,054		1 \$62,146	2 \$64,258	2 \$67,820	2 \$62,460							11 \$54,858
30-34	2 \$56,934	2 \$62,881	3 \$70,389		1 \$69,777	1 \$73,871							9 \$66,049
35-39	2 \$37,310		1 \$76,997			3 \$85,163	6 \$94,348	2 \$75,224					14 \$80,260
40-44	2 \$57,376	1 \$62,353	3 \$91,539	2 \$60,565	3 \$100,442	6 \$79,422	6 \$94,738	4 \$101,910	3 \$96,374				30 \$87,197
45-49	1 \$65,650	1 \$92,398	1 \$87,102			7 \$94,553	16 \$95,172	15 \$98,720	6 \$101,790	3 \$95,305			50 \$96,144
50-54		2 \$71,575				2 \$89,760	4 \$86,043	6 \$98,099	9 \$101,491	4 \$124,442	4 \$107,121		31 \$99,842
55-59					1 \$128,043	3 \$104,018	6 \$89,319	2 \$99,198	5 \$101,493		1 \$104,310	2 \$125,206	20 \$101,830
60-64							4 \$95,426	1 \$135,817	2 \$85,920	2 \$126,342	1 \$103,217	1 \$99,869	11 \$104,103
65 & Over						2 \$101,041						1 \$63,137	3 \$88,406
Total	12 \$47,753	6 \$70,610	9 \$79,114	4 \$62,411	7 \$90,684	26 \$87,936	42 \$93,311	30 \$98,723	25 \$99,703	9 \$115,152	6 \$106,002	4 \$103,355	180 \$90,770
	Average:	Age: Service:	47.0 14.0		Number of participants:			Fully vested: Not Vested:	142 38		Males: Females:	169 11	



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

Year Ended	Added to Rolls*		Removed from Rolls		Rolls-End of Year		% Increase in Annual Benefits	Average Annual Benefits
	Number	Annual Benefits	Number	Annual Benefits	Number	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 Code	City Name	Police		Fire		Total	
		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.

Attained Age in 2020	Annual Rate per 1,000 Members				
	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:

Gender	Year of Retirement			
	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.